Motivation

Individual differences in students'
educational choices and study success

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Motivatie

Individuele verschillen bij studenten

in studiekeuzes en studiesucces

(met een samenvatting in het Nederlands)

Evelyne Elisabeth Maria Meens

Motivation: Individual differences in students' educational choices and study success

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"What is your life's blueprint?"

- Martin Luther King, Jr.

Chapter 1

General introduction

Picture yourself a (long) time ago when you were completing your secondary education. In the final grade you had to deal with your next step: deciding to pursue higher education or not? How did you handle the educational decision-making process of considering different programs in higher education? After you started a particular program, did it live up to all your expectations? Would you make the same educational choice all over again? Maybe you have changed your choice already.

1. Introduction

For several decades, student success in higher education has been an important theme (Van der Zanden, Denessen, Cillessen, & Meijer, 2018). Most students who drop out of university do so during or immediately after the first year (Credé & Niehorster, 2012). Getting a degree is not only associated with benefits for individuals, but also for society at large (DeKoning, Loyens, Rikers, Smeets, & van der Molen, 2013; Mayhew et al., 2016). Therefore, it is important to gain a better understanding of study success in higher education.

When considering study success in higher education (mostly known as academic achievement, such as grades and credit points), in general, many factors predicting students' academic achievement and dropout have already been examined. Schneider and Preckel (2017) conducted the first systematic and comprehensive meta-analyses review on 105 variables associated with achievement in higher education. They distinguished two main categories of factors influencing students' achievement: instruction variables and student-related variables. Although instruction variables are very important predictors of academic achievement (Hattie, 2009; Kulik & Kulik, 1989), this dissertation will only focus on student-related variables.

The main student-related variables that Schneider and Preckel (2017) identified were intelligence, learning strategies, motivation, and personality. Although intelligence is the most powerful predictor, motivation does also explain variances in academic achievement (e.g., Spinath, Spinath, Harlaar, & Plomin, 2006). One of the main reasons for high dropout rates in higher education is lack of motivation (Trevino & DeFreitas,

2014; Van den Broek et al., 2017; Van den Broek, Wartenbergh, Bendig-Jacobs, Braam, & Nooij, 2015). Specifically, students' intrinsic motivation seems to decline throughout the first year (Brahm & Gebhardt, 2011; Busse, 2013), which might lead to dropout (Van der Veen, Jong, Leeuwen, & Korteweg, 2005).

Another main reason for high dropout rates in higher education is an erroneously chosen bachelor's program (Trevino & DeFreitas, 2014; Van den Broek et al., 2017; Van den Broek, Wartenbergh, Bendig-Jacobs, Braam, & Nooij, 2015). Many students following secondary education have difficulties aligning their interests to possible suitable bachelor's programs. Choosing a bachelor's program that later turns out not to align with one's interests is considered by some researchers as one of the most important reasons for dropout in higher education (Quinn, 2013; Van Bragt, Bakx, Teune, & Bergen, 2011). Moreover, students' interest in their programme declines severely throughout the first year of higher education (Brahm & Gebhardt, 2011; Busse, 2013; Van der Veen, Jong, Leeuwen, & Korteweg, 2005).

Thus, motivation and erroneous educational choices are important variables predicting study success and retention in higher education. The main research question in this dissertation is, therefore: *What role do students' motivational differences play in educational choices and study success in higher education?* The overarching premise we aim to investigate is the influence of motivation and educational choice on study success. The uniqueness of this dissertation resides in that it considers a combination of three variables: study success, educational choice, and motivation. Furthermore, it examines the transition phase from secondary to higher education, using large samples. Until now, there has been a lack of knowledge concerning the development of motivation during educational transitions to higher education. Motivation seems to decline after the transition to secondary education, depending on the extent to which the new environment meets students' needs (i.e., Stage-environment theory; Eccles et al., 1993; Jacobs, Lanza, Osgood, Symonds, & Hargreaves, 2016). Despite the latest research in the field, we know little about how motivational trajectories can be different for each student (e.g., some may even increase in motivation) or how motivation declines during the transition to higher education.

By understanding the extent to which the three variables are associated with each other, before and after the transition from secondary to higher education, educational

institutions can develop interventions to ensure that students start and stay motivated in their new environment to reduce dropout and increase study success. Following, an in-depth explanation of these three main variables, research questions, and outline of this dissertation will be presented.

2. Study success

2.1 Academic achievement

Study success is the dependent variable of this dissertation. A clear and consistent definition of study success in higher education is lacking (Van der Zanden et al., 2018). In research it is common to equate study success with academic achievement, operationalised by, for example, obtained credit points (Nicholson, Putwain, Connors, & Hornby-Atkinson, 2011; Zajda & Rust, 2016). For educational programs, equating study success with credit points makes sense because their funding is often based on the rate of students that obtained all predefined credit points. In this dissertation, study success is operationalised as academic achievement by means of objective measures, such as *credit points*, and whether students continued their studies or not (i.e., *retention* versus *dropout*). In addition to this objectively quantifiable definition, we defined study success more subjectively in the form of socio-emotional adjustment to a new university environment (i.e., *social-emotional well-being*).

2.2 Social-emotional well-being

In contemporary research on study success in higher education, subjective factors have been increasingly considered in its definition. For instance, the shift from secondary to higher education can be seen as a transition that may take place more or less successfully. Students leave their familiar secondary education environment and are faced with the social and academic demands of the new university environment (Gale & Parker, 2014). Some students go through this phase without any problems while others seem to encounter difficulties (Ratelle, Guay, Larose, & Senécal, 2004; Roeser, Eccles, & Freedman-Doan, 1999). Furthermore, in this stage of life, students have to cope with emerging adulthood, which is characterized by identity exploration, increased responsibility, and independent decision-making (Arnett, 2000). Dealing properly

with these psychosocial changes is necessary to successfully adjust to the university environment and achieve a level of social-emotional well-being (Dyson & Renk, 2006; Evans, Forney, Guido, Patton, & Renn, 2010; Keyes, 2002).

Self-determination theory (SDT) asserts that individuals experience social-emotional well-being when their fundamental needs for autonomy, relatedness, and competence are met (i.e., need satisfaction; Deci & Ryan, 1985, 2000). In this dissertation, four proxy indicators of students' need satisfaction were examined regarding the following aspects: satisfaction with the educational choice, social adjustment, academic adjustment, and self-efficacy. Satisfaction with the educational choice (from now on satisfaction with choice) represents the satisfaction with the selected bachelor's program. Social adjustment refers to how well the student deals with interpersonal experiences at the university (Beyers & Goossens, 2002). Academic adjustment represents how well the student manages the educational demands of the university experience (Beyers & Goossens, 2002). Self-efficacy comprises the belief that one is capable of successfully studying in the new university environment. To summarise, along with parameters of study success measured objectively, such as obtained credit points and retention, this dissertation will include more subjective indicators of social-emotional well-being.

3. Educational choice

One of the critical aspects of improving success rates and preventing dropout in higher education is providing adequate guidance and information during the educational choice process (Fonteyne, Wille, Duyck, & De Fruyt, 2017). Educational choice is one of the two predictive variables of study success in this dissertation. Educational choice pertains to the decision of students in secondary education whether they want to prolong their study career by going into higher education and, if so, what bachelor's program to choose. In countries like the Netherlands and Belgium, the access to higher education is open, and the successful completion of an admissible secondary school diploma allows every student to enter almost any university without passing an admission test (with some exceptions). Students, thus, have a large variety of bachelor's programs to choose from when they decide to pursue their study career in higher education.

3.1 Identity: exploration and commitment

Making choices, like the educational choice for a bachelor's program, is one of the aspects that contribute to forming an individual's identity (Klimstra, Luyckx, Germeijs, Meeus, & Goossens, 2012). Identity formation is a complex process that comprises exploring one's own identity and interests. It is guided by two dimensions: exploration and commitment (Marcia, 1966). Exploration refers to the process by which several alternative options in light of one's identity and interests are examined and compared. When making an educational choice, this refers to exploring different programs, comparing them, reflecting on them, and finally choosing one. The last part of choosing the program involves commitment. Being committed to a bachelor's program implies investing time and effort in this program. Well-explored commitments are positively associated with favourable educational outcomes (e.g., Germeijs & Verschueren, 2007; Klimstra et al., 2012). Conversely, students who are either not fully involved in identity exploration or not committed to their choices might be prone to unfavourable educational outcomes (Germeijs, Luyckx, Notelaers, Goossens, & Verschueren, 2012).

Students differ concerning their motivations for identity commitments like choosing a bachelor's program. Whereas some students' educational choices are based on intrinsic motivation like interest and curiosity, others base their decisions on external factors such as the influence of others, status, or money. Past findings (e.g., Pintrich & De Groot, 1990; Taylor et al., 2014; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009) have suggested that students who are intrinsically motivated persist longer, overcome more challenges, and demonstrate better accomplishments than those who are extrinsically motivated. Therefore, enrolling in a bachelor's program just because of external reasons might make students more vulnerable for setbacks, which could result in poor achievement (e.g., Vansteenkiste et al., 2009) or dropout (e.g., Vallerand, Fortier, & Guay, 1997). These different reasons for making identity commitments (i.e., choices) brings us to the second predictive variable of study success in this dissertation: motivation.

4. Motivation

The concept of motivation refers to internal factors that compel action and to external factors that induce action (Locke & Latham, 2004). What moves a person to make

certain choices, to put an effort in certain actions, and to persist in these actions? These questions lie at the heart of motivation theory and research.

Overall, motivational theories and constructs can be organized into two broad categories: 1) those having to do with students' beliefs about one's capabilities to do a certain task, and 2) those having to do with one's reasons for doing a certain task (Pintrich, Marx, & Boyle, 1993). If students see little reason for performing certain activities in a particular bachelor's program (such as doing homework) they probably would not do so, even if they believed they were capable of performing the activity (e.g., Wigfield, Tonks, & Klauda, 2009).

The focus of this dissertation is mainly on the second motivation category mentioned above (Pintrich et al., 1993). This category can be further distinguished as the *interest* students have in choosing a particular bachelor's program and their intrinsic *motivation* to put effort into it. Although interest and intrinsic motivation have different intellectual roots and therefore have inherently different meanings, they are strongly related (Hidi, 1990; Schiefele, 1996; Wigfield & Cambria, 2010). These two motivational variables will be addressed in the following sections.

4.1 Interests

In educational research, two types of interest - situational and individual - have been the focus (Renninger, 2000). Simply phrased, situational interest is environmentally triggered while individual interest develops over time and is relatively stable (Hidi, 2000). As the focus of this dissertation is on aligning general stable interests to possible suitable bachelor's programs, we will pay attention to the second type of interest (i.e., individual interests).

It seems that students achieve better when their interests are congruent with the educational environment (Allen & Robbins, 2008; Nye, Su, Rounds, & Drasgow, 2012; Smart, Feldman, & Ethington, 2000). One of the most well-known models used to describe individuals' vocational interests is Holland's model of vocational interests (Holland, 1997). The core idea of this model is that people can be characterised by their resemblance to each of six interest types (i.e., the realistic, investigative, artistic, social, enterprising, and conventional interest type), commonly abbreviated with the acronym RIASEC (for a description of these types, see Table 1). Likewise, work environments can

be categorized by a combination of these RIASEC types. Some research suggests that when students' RIASEC profiles are congruent with their environment's RIASEC profiles, this will lead to higher retention (Tracey & Robbins, 2006). Vocational interests influence choices that students make concerning which tasks and activities to engage in (e.g., choosing a bachelor's program), how much effort to spend on those tasks, and how long to persist on them (staying in or leaving a program). Thus, interests motivate students to engage and persist in particular activities in the chosen university environment (Allen & Robbins, 2008).

Table 1. Description of the RIASEC interest types

Interest types	Description
Realistic	An interest in working with things, gadgets, or the outdoors.
Investigative	An interest in science, including mathematics, physical and social sciences, and the biological and medical sciences.
Artistic	An interest in creative expression, including writing, the visual and performing arts, and creativity.
Social	An interest in helping, taking care of, training, counselling, or teaching people.
Enterprising	An interest in working in leadership or persuasive roles directed toward achieving economic objectives.
Conventional	An interest in working in well-structured environments, especially business settings.

Note. Definitions were partly quoted from Nye, Su, Rounds, & Drasgow (2012)

4.2 Intrinsic motivation

One of the most well-known theories on motivation is Self-determination theory (SDT; Deci & Ryan, 2000). SDT is based on a multidimensional view of motivation that distinguishes autonomous types of motivation from controlled types of motivation. Autonomous motivation is characterised by a sense of choice and personal volition (e.g., Vansteenkiste, Lens, Dewitte, De Witte, & Deci, 2004), whereas controlled motivation is characterised by external or internal pressures.

According to SDT, autonomous types of motivation are related to the satisfaction of three basic psychological needs: the need for autonomy, the need for relatedness, and the need for competence. The need for autonomy involves the experience of choice

and congruence between one's activities and values (Marshik, 2010). The need for relatedness concerns the feeling that one is close and connected to others (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). The need for competence refers to an experience of effectiveness that comes from mastering a task (Broeck, Vansteenkiste, Witte, Soenens, & Lens, 2010). The satisfaction of these three needs is essential for well-being and autonomous motivation, which consists of two types.

The most autonomous type of motivation, intrinsic motivation, describes the motivation to perform a behaviour because it is experienced as inherently interesting or enjoyable (e.g., a student who reads a book because (s)he finds the subject interesting or is curious about it). Identified regulation represents a well-internalized (and therefore also autonomous) type of motivation. Activities are not performed purely for intrinsic reasons, but to achieve personally endorsed goals (Deci & Ryan, 1987). An illustration of identified regulation is, for example, when a student undergoes medical training that (s)he does not necessarily like, but because s(he) is focused on the goal to become a doctor. A type of controlled motivation, introjected regulation, describes a type of regulation that is controlling as individuals perform certain actions with feelings of pressure to avoid guilt or anxiety, or to attain ego-enhancements or pride (Ryan & Deci, 2000a, p. 62). An example of this type of regulation would be a student embarking on a bachelor's program because (s)he would feel ashamed if (s)he did not. Although the source of control is inside the individual, it is not autonomous but experienced as pressure or tension. Extrinsic regulation, another type of controlled motivation, represents behaviours initiated to attain a desired external consequence or to avoid punishment (Ryan & Deci, 2000b). For example, a student might choose a certain bachelor's program to avoid negative consequences (e.g., criticisms from parents) or to receive a reward (e.g., promised by parents). This type of regulation is considered extrinsic because the reason for this behaviour lies outside the activity itself. Finally, SDT identifies the possibility of lack of motivation, labelled amotivation. For example, a student might choose a bachelor's program without a clearly articulated reason.

Thus, social environments and individual differences that support students' needs for autonomy, relatedness, and competence, facilitate autonomously motivated behaviour, whereas those that forestall these three needs are associated with poorer motivation, performance, and well-being (Ryan & Deci, 2000b).

4.3 Motivational profiles

Several authors (e.g., Vansteenkiste et al., 2009) have recommended a person-centred approach to determine how the five different types of motivation mentioned above can be combined into distinct profiles. These profiles entail homogeneous groups of people who share similar motivational characteristics in contrast to other groups. Adopting this approach offers two advantages. First, it provides evidence of the internal validity of SDT that claims that the qualitative difference between autonomous and controlled motivation is important for describing students' motivation (González, Paoloni, Donolo, & Rinaudo, 2012). Second, viewed from a more practical perspective, students with certain profiles can be identified, which facilitates diagnosis resulting in appropriate interventions within universities. Because of these two reasons, a person-centred approach was used in two of our studies.

5. An integrated model

The three main variables of this dissertation, being study success, educational choice, and motivation, are associated with each other and therefore brought together in a model. Tinto's Student Integration Model (1993; see Figure 1) was used as an inspiration to display the associations between the main variables.
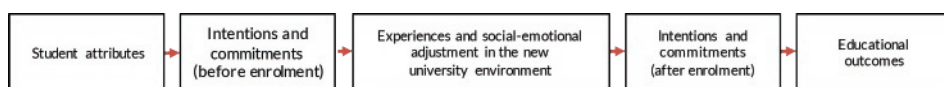
Figure 1. Simplified form of the Student Integration Model. Adapted from Tinto (1993).

The Student Integration Model (Tinto, 1993) describes that before commencing a program in higher education, during the phase of making an educational decision, certain student attributes (e.g., pre-education or skills), intentions, and commitments before enrolment influence the experiences and adjustment to the new university environment after enrolment (see Figure 1). According to Tinto's model, the student's experiences within the university and the subsequent (lack of) adjustment to this new environment will continuously weaken or strengthen her or his level of initial intentions and commitment. Thus, the model suggests that initial intentions and commitments can

change, leading to (modified) levels of intentions and commitments after enrolment, affecting study outcomes (Tinto, 1975; 1993).

More recent versions of the Student Integration Model have included motivational variables (Demetriou & Schmitz-Sciborski, 2011) to gain a better understanding of student persistence and retention. Our model is an elaboration on this Student Integration Model by introducing motivation. Figure 2 represents our model, including the three main variables investigated, that is, study success (subjective and objective), educational choice, and motivation. As portrayed in the model, we assume that educational choice and motivation influence both subjective and objective study success. The model also assumes a relationship between subjective study success (social-emotional well-being) and objective study success, however, this association was not part of this dissertation.
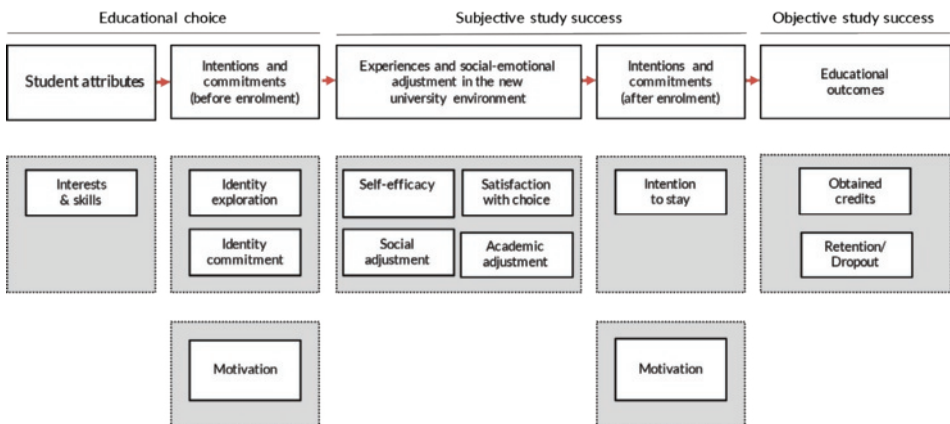
Figure 2. This dissertation's model and variables.

Regarding the phase of making the educational choice, we examined student attributes in the form of interests and skills (i.e., the interest types of Holland, 1997). By determining these interest types, we also examined whether a fit between the student's interest type and the environment (their bachelor's program) was positively associated with their satisfaction with the educational choice made (as part of their experiences in the new university environment) and their intention to stay (their intentions and commitment after enrolment) (see Figure 2).

Regarding the intentions and commitments during the phase of making the educational choice, we examined the identity commitments that prospective students had made. Before students start higher education, different bachelor's programs are often explored (as part of identity exploration in Figure 2), and an educational decision must be made related to what program may suit best (i.e., making an identity commitment). Thus, the process of identity exploration and commitment describes how this kind of decisions are generally made and, hence, are part of the educational choice in the model.

Motivation before enrolment was examined together with identity formation (i.e., exploration and commitment). Whereas the latter explains the *how* of the decision-making process, motivation explains the *why*.

After initiating the new bachelor's program, the student will enter a new university environment, gain experiences in it, and establish a degree of adjustment. Students' experiences and adjustment (being part of subjective study success) were operationalised by four proxy indicators of social-emotional well-being: satisfaction with choice, social adjustment, academic adjustment, and self-efficacy.

The experiences and degree of adjustment will strengthen or weaken the commitment a student had before her/his enrolment. This reflection on experiences and evaluation of earlier intentions and commitments, also known as commitment-evaluation cycle (Luyckx, Goossens, & Soenens, 2006), can lead to adapted intentions and commitment after enrolment. Therefore, an evaluation based on experiences might lead to an affirmative feeling that the right choice was made or to disappointments because earlier intentions and commitments were based on false expectations. These intentions and commitments after enrolment based on the experiences in the new university environment are represented by 'intention to stay' and 'motivation' in our model.

Finally, these (modified) intentions and commitments after enrolment influence students' outcomes that are here represented by indicators such as obtained credits, retention, or dropout.

6. Aims and outline of this dissertation

The aim of this dissertation was to examine what role students' motivational differences play in educational choices and study success in higher education. These insights could be used in higher education to increase the chance of prospective students making suitable educational choices, decreasing students' dropout rates and increasing study success within or after the first year. The different variables discussed in the previous sections were investigated in the four studies that were conducted. In these four studies, we utilized a mixed research design by means of quantitative and qualitative methods and various analyses (see Figure 3). We collected data from four different samples of (prospective) students at one of the largest universities of applied sciences in the Netherlands. To see how motivation changes and how these changes might influence study success, we focused on three points in time during students' careers (see Figure 3). The first time point was the moment of making an educational choice just before enrolment ($t = 1$). The second time point was 10 weeks after enrolment when students had their first experiences in the new university environment ($t = 2$). The third time point was at the end of the first year when it was clear whether the students had stayed or dropped out and how many credits had been obtained ($t = 3$). In the four studies data were collected at one or two of the time points mentioned before. The four studies and their subsequent research questions are discussed in the next sections.

7. The four studies

Figure 4 represents the theoretical model underlying this dissertation, showing the four studies as well as the associations investigated. Each study will be described in the following chapters. One of the reasons to examine the role of students' motivational differences in this dissertation was to improve the educational decision-making process of prospective students. Therefore, in Study 1 (**Chapter 2**) we aimed at developing and validating a short, publicly available, interest and skills scale for students in secondary education who are planning to prolong their study career in higher education and choose a particular bachelor's program. The research question of the first study was: *How can interests and skills be assessed by means of a valid questionnaire?* We developed items based on Holland's RIASEC model (1997) following rational scale construction.

	STUDY 1	STUDY 2	STUDY 3	STUDY 4
Content	Interests and skills scale construction and validation	Motivation, identity and academic achievement	Motivation, and students' need satisfaction	Motivation to enroll, continue, and leave
Method	(Rational) Scale Construction	Fixed-item questionnaires	Fixed-item questionnaires	Semi-structured interviews
Analyses	Analyses on structural validity, internal consistency, construct validity, and criterion validity	Latent profile analyses, multinomial logistic regression, chi-squared tests	Latent profile analyses and multinomial logistic regression	Qualitative interview study
Sample	(Prospective) 1st year students $N = 6,215$	(Prospective) 1st year students $N = 8,723$	(Prospective) 1st year students $N = 1,311$	2nd year students $N = 22$
Time	$t = 1$ $t = 2$	$t = 1$ $t = 3$	$t = 1$ $t = 2$	$t = 3$

Figure 3. Summary of the four studies of this dissertation

For the main study, participants were prospective students ($N = 6,215$) who applied for various bachelor's programs. After rational scale construction, several statistical analyses were conducted. In five subsequent studies, structural validity, internal consistency, construct validity, and criterion validity were examined. We predicted that congruence between the student and her/his bachelor's program regarding interests and skills before enrolment ($t = 1$), would be associated with satisfaction with choice and intention to stay 10 weeks after enrolment ($t = 2$).

Another reason to examine the role of students' motivational differences, along with improving the educational decision-making process, was to enhance their study success. In Study 2 (**Chapter 3**) we wanted to examine how the educational decision-making process could affect objective study success after the first year. The research question of this study was: *What role do identity formation and motivation play among prospective students at the moment of choosing a bachelor's program and in predicting academic achievement during the first year?*
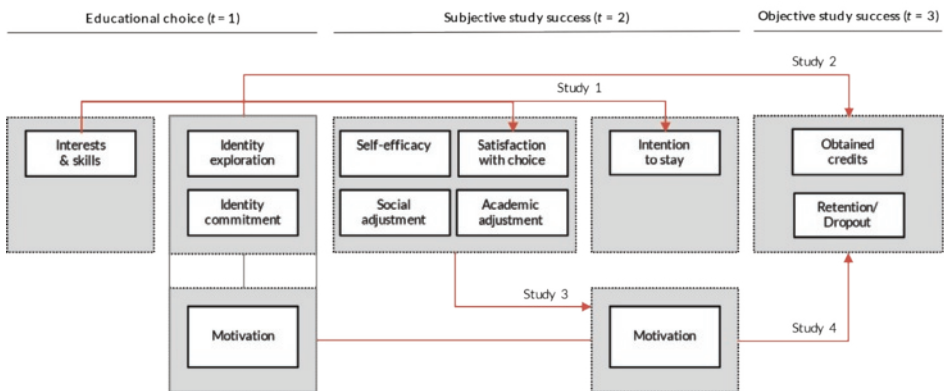
Figure 4. Associations investigated in this dissertation

We examined whether identity and motivation separately predicted academic achievement, whether identity and motivation dimensions could be combined into new distinct profiles, and if these new profiles predicted academic achievement. Identity and motivation were assessed by a questionnaire. Participants (N = 8,723) were divided into four student achievement groups (i.e., 'successful dropouts', 'successful stayers', 'unsuccessful stayers', and 'unsuccessful dropouts') to operationalise the dependent variable. In our model, identity and motivation were assessed at t = 1 and were associated with obtained credits, retention, and dropout at t = 3.

In Study 3 (**Chapter 4**) our purpose was to find out how motivation after enrolment may change and could be influenced by subjective study success (i.e., social-emotional well-being) in the form of four proxy indicators of need satisfaction. Therefore, the research question of the third study was: *To what extent does students' motivation change after the transition to higher education and how is students' need satisfaction associated with this motivation?* This study focused on motivation after students had spent about 10 weeks in the new university environment. The sample consisted of 1,311 (prospective) students. First, we studied how motivation developed over time after the transition to higher education (changes were observed between t = 1 and t = 2). Based on these changes, we identified motivational change profiles. Subsequently, students' need satisfaction was associated with these motivational profiles. Four proxy indicators operationalised students' need satisfaction (i.e., satisfaction with educational choice, social adjustment, academic adjustment, and self-efficacy) and were assessed by a questionnaire at t = 2.

In the multinomial logistic regressions with students' need satisfaction as independent variable and motivation as the dependent variable, we could control for the motivational change between $t = 1$ and $t = 2$.

In our final study (**Chapter 5),** we aimed to get a comprehensive view regarding motivation in the educational (decision-making) process. Therefore, we conducted an interview study in one particular program. This study sought to gain more qualitative insight into motives for enrolling, continuing in or withdrawing from a primary teacher training program, and to compare the motives between continuing students and students who switched to another program within or after the first year (i.e., 'switch students'). The research question was: *How do motives for enrolling, continuing in or withdrawing from a primary teacher training program differ between continuing students and switch students?* In this study two groups of students, 10 continuing students versus 12 switch students (as a result of continuing or dropping out at $t = 3$, respectively) were compared regarding their motives for enrolling ($t = 1$, in retrospect), and their motives for continuing in or leaving a teacher training program ($t = 2$, in retrospect).

In the general discussion section (**Chapter 6**), the research results of the four empirical chapters (Chapters 2 to 5) are summarised by presenting which of the proposed associations in Figure 4 were found. Furthermore, these findings are discussed and an integrative model for student success is proposed. Practical implications are provided as well as limitations and directions for future research.

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"Where your talents and the needs of the world cross, there lies your vocation"

- Aristotle

Chapter 2

The development and validation of an interest
and skill inventory on educational choices

Abstract

This study was aimed at developing and validating a new instrument that facilitates late adolescents and young adults during their orientation on their next educational choice concerning bachelor's programs in higher education. For the main study, the sample consisted of 6,215 late adolescents and young adults (M_{age} = 19.50, SD = 1.89, 42.3% female). After rational scale construction, several statistical analyses were conducted. In five studies, structural validity, internal consistency, construct validity, and criterion validity were examined. Adequate structural validity, internal consistency, and construct validity were established. A seven-factor structure was found, in which the investigative domain split into two subscales. Criterion validity was established for four out of six subscales. The overall results suggest that the instrument is reliable and valid as an orientation instrument in applied settings in secondary and higher education.

1. Introduction

Choosing a bachelor's program that does not align with one's interests is seen as one of the important reasons for drop-out in higher education (Quinn, 2013). However, many pupils following secondary education have difficulties with defining their interests and choosing a suitable bachelor's program. These difficulties eventually can lead to drop-out (Van Bragt, Bakx, Teune & Bergen, 2011). Therefore, helping pupils in secondary education explore and select appropriate bachelor's programs might lead to higher retention rates at universities (Tracey & Robbins, 2006). Existing measures for determining people's interests satisfy basic psychometric criteria, like structural validity and reliability. However, most measures were not originally created for educational choices, but for adults making career choices. Therefore, a lot of the established interest measures draw heavily on items or job titles that might make less sense to a 17-year old. Furthermore, most existing measures have been developed and validated in the U.S. Cross-cultural application of interest measures is not always without problems (Einarsdóttir, Rounds, Ægisdóttir, & Gerstein, 2002), not least because educational systems are organized differently across cultural and national boundaries. Finally, most established measures have copyright restrictions, limiting their availability to the target group.

The current paper describes the development and validation process of a new interest measure that circumvents these issues. We wanted to develop a 1) short and publicly available instrument 2) especially for the target group of pupils in secondary education contemplating their next educational choice 3), suitable for our contemporary context (i.e., the present context of Dutch secondary and tertiary education).

1.1 A new interest measure

A great deal of the interest measures are based on Holland's model of vocational interests (Holland, 1985), because this is one of the most well-known models used to describe individuals' vocational interests (Brown & Brooks, 1990). Personal interests as well as educational environments can be classified by six types, i.e., the Realistic, Investigative, Artistic, Social, Enterprising, and Conventional type (for a description of these types, see Nye et al., 2012). When a person's RIASEC-profile (the acronym of the beginning letter

of each interest) is congruent with one's environment, the theory predicts that this will lead to higher performance (e.g., higher retention rates, Tracey & Robbins, 2006).

The most familiar measures (mostly based on Holland's theory) to assess interests and skills are presented in Table 1. We reviewed these measures according to criteria that especially focused on 1) the development and validation and 2) length and open source availability. Some measures do not meet all criteria. Foremost, not all of them were developed for the target group of late adolescents and young adults entering higher education, except for the PGI-Short (Tracey, 2010) and the UNIACT (American College Testing, 2009). Furthermore, some of these measures, like the Hollands Zelfonderzoek (HZO; Platteel & Uterwijk, 2008) and Self Directed Search (SDS; Holland & Messer, 2013), are not open source. This practical feature makes an instrument less accessible for the target group of pupils in secondary education.

Table 1. Most familiar and contemporary measures (revised after 2000).

Measure	Development and validation			Length and availability	
	Target Group[g]	Diversified validation sample (> 5000)	Development context	Length (< 100 items)	Open source
HZO[a]	✗	✗	U.S. (translated)	✗	✗
O*NET IP[b]	✗	✗	U.S.	✓	✓
PGI-Short[c]	✓	✗	U.S.	✓	✓
SDS[d]	✗	✗	U.S.	✗	✗
SII[e]	✗	✗	U.S.	✗	✗
UNIACT[f]	✓	✓	U.S.	✗	✓

[a] Hollands Zelfonderzoek (Platteel & Uterwijk, 2008)
[b] O*NET Interest Profiler Short Form (Rounds, Su, Lewis & Rivkin, 2010)
[c] Personal Globe Inventory Short (Tracey, 2010)
[d] Self Directed Search (Holland & Messer, 2013)
[e] Strong Interest Inventory Revised (Donnay, Thompson, Morris, & Schaubhut, 2004).
[f] The Unisex Edition of the ACT Interest Inventory (American College Testing, 2009)
[g] The inventory was specifically made for 16-25 years olds entering higher education
✓ = criterion is present
✗ = criterion is not present

Despite the limitations displayed in Table 1, it seems that the PGI-Short and the UNIACT meet a plurality of our criteria. However, these instruments do not specifically meet our own contemporary context. The Dutch situation is different from the U.S. situation. For

example, in more feminine cultures, like the Dutch culture (Hofstede, 1991), people face fewer barriers to vocational choice because of less restrictive gender roles than in more masculine cultures (Rounds and Tracey, 1996). So, there is a possibility that this would result in a different latent structure of interests.

Moreover, the educational system in the Netherlands is different from the U.S. and many other countries. Dutch pupils have to decide on a vocational direction in the second half of their secondary education period. There are four study profiles developed to give pupils a better preparation for the sectors in which society is divided, i.e. science & technology (science profile), science & health (health profile), economics & society (economy profile), and culture & society (culture profile). The choice of one of these four profiles is mainly based on students' interests, skills, and ambitions. Students select their university majors instantly, and typically do not switch majors at a later stage like in the U.S. In other words, Dutch students have to specialize quite early in their educational trajectory. Given the differences between cultures as well as educational systems a different latent structure of interests may exists. For example, Wille and colleagues (2015) have already noted that the six RIASEC scales might include sub-factors. For instance, they suggest that the social interest type consists of two components: a 'social-care' component (helping and taking care of others) and a 'social-education' component (developing others).

1.2 Goals of the study

The main goal of the present study was to develop and validate a short and publicly available instrument for pupils in secondary education choosing a bachelor's program in our contemporary context. The four research questions addressed in this study are:

1. Does the instrument consist of the same factor structure (RIASEC types) of Holland and is this structure invariant across gender?
2. Are the subscales internal consistent and do the subscales yield the same results on repeated trials (test-retest reliability)?
3. Does the instrument have the ability to measure what it is supposed to measure (convergent and discriminant validity)?
4. Does the instrument have the ability to predict intended outcomes (predictive validity)?

Based on these four research questions (see Figure 1 for an overview of the studies), the following hypotheses were formulated. Regarding Research Question 1, we expected that, overall, there would be a factor structure resembling RIASEC, with possible sub-factors due to the differences in cultural and educational context, as Wille et al. (2015) have suggested (*Hypothesis 1*). Furthermore, we expected that the internal consistencies and the test-retest reliabilities of the RIASEC scales would be at least 0.7 (Kline, 2000; *Hypothesis 2*). Third, we compared our instrument with two instruments that were developed in the U.S. Because results of Savickas and colleagues (2002) indicated that similar and same-named scales of five different interest measures developed in the U.S. correlated only moderately, we also expect moderate convergent (and large discriminant) validity for our newly developed instrument (*Hypothesis 3*). Fourth, we expected that congruence between interest and a bachelor's program is linked to satisfaction with the choice for this program and intention to stay (Logue et al., 2007; Miller, Heck, & Prior, 1988), resulting in moderate/high correlations (*Hypothesis 4).*

Study	Item development	Study 1 Pilot version	Study 2 Instrument	Study 3 Instrument	Study 4 Instrument	Study 5 Instrument
Method	Rational Scale Construction	Factor analyses N = 1,107	Factor analyses Final item selection N = 6,215	Scale reliability Test-retest reliability N = 271	Convergent and Discriminant validity N = 102	Predictive validity N = 189
RQ	Research Question 1			Research Question 2	Research Question 3	Research Question 4

Figure 1. Flowchart of the five studies

2. Rational scale construction

We started with rational scale construction in order to develop items, for each of the six interest types, that tap into the interest in activities that (prospective) students can relate to. We aimed to measure two aspects of every activity. The first aspect would be whether someone is interested in the activity or not (1 = *completely uninteresting* and 5 = *extremely interesting*). The second aspect would be whether someone feels competent in the activity or not (1 = *I definitely cannot do this* and 5 = *I can do this extremely well*). This distinction is inspired by the expectancy value theory of Eccles (1983). Theorists supporting this theory argue that individuals' choice, among others, can be explained to

the extent to which they value the activity (their interest) and by their beliefs about how well they will do on the activity (self-perceived skill; Wigfield & Eccles, 1992).

Two experts who developed the items for our instrument were instructed to write down activities for each of the Holland types, resulting in an initial pool of 66 daily activities. These 66 items were submitted to a group of eighteen pupils belonging to the intended target group (50.0% female, M_{age} 19.6, SD = 2.85). We asked them on a Likert scale ranging from 1 (*completely disagree*) to 5 (*completely agree*) whether the items were clear to them and whether the proposed activities fell within their frame of reference. Subsequently, the items were submitted to eight vocational experts (vocational interest assessment professionals, career counseling experts, or academic scholars), who rated from 1 (*completely disagree*) to 5 (*completely agree*) whether items were adequately phrased and whether they were clearly representative of one interest type. If this was not the case, we asked for at least three alternative items per interest type. After a series of revisions based on this input, we ended up with 12 items that were unchanged, 48 items that were modified, and 12 new items that were proposed by the experts. This resulted in a list of twelve items per Holland type for the pilot version (i.e., 72 activities).

3. Study 1: A pilot version of the instrument

In order to answer Research Question 1 on structural validity, we conducted preliminary factor analyses on the pilot version of our instrument.

3.1 Method

3.1.1 Participants

The sample of Study 1 consisted of 1,127 applicants who signed up in January 2016 and February 2016 for a bachelor's program at one of the largest universities of applied sciences in the Netherlands (i.e., higher professional education). As we decided to focus on the specific age group of pupils in secondary education (i.e., late adolescents and young adults), we eliminated applicants older than 25 years (1.8%), resulting in a sample of 1,107 participants (68,1% female) aged between 16 and 25 years (M_{age} = 19.04, SD = 1.78). They filled out an online questionnaire as part of the intake procedure at this university.

3.1.2 Measure

The pilot version of our instrument measured interests and self-perceived skills. For each of the 72 activities, participants indicated whether they found it interesting and whether they felt skilled. The response format ranged from 1 (*completely uninteresting/ definitely cannot do this*) to 5 (*extremely interesting/ I can do this extremely well*). Hence, the instrument consisted of twelve subscales of twelve items each.

3.2 Results

Conducting an exploratory factor analysis with Direct Oblimin rotation resulted in thirteen components explaining 58.13% of the total variance and fourteen components explaining 55.87% of the total variance, for interest and skill scales, respectively. However, many components were not interpretable, as they contained just one or a few items. When constricting the number of factors to six, this resulted in 45.59% explained variance for interests and 41.25% explained variance for skills. Twenty items were eliminated because they did not load on the expected factor or loaded (higher) on another factor. Some scales still consisted of more than eight items. In those cases we eliminated those items that had the lowest loadings on their own factor.

After the first step of conducting exploratory factor analyses, every subscale consisted of eight items, except for the investigative scale that consisted of twelve items. Five of the twelve items of the investigative scale did not load on the expected factor and two items had a higher loading on another factor. Most of these items (six in total) also loaded on the realistic scale (e.g., 'Learning about gravity theory').

The second step, consisting of confirmatory factor analyses[1], resulted in CFI values below the threshold of .90 (.86 for both interests and skill scales) even though the RMSEA values were adequate (.05 for both interests and skill scales). Finally, reliability analyses resulted in satisfactory results of Cronbach alpha's between .77 and .87 for the interest subscales and .73 and .85 for the skills subscales.

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1   In this analyses we included the selected eight items for all subscales except for the investigative subscales that consisted of five items (after elimination of items according to our previous determined criteria).

3.3 Conclusion

In summary, a clear factor structure was established that corresponded with the interest typologies of Holland, except for the investigate scale. Regarding the investigative scale, half of its items loaded on their own factor, as expected, whereas the other half did not. In order to interpret this unexpected distribution of factor loadings, we compared all investigative items with the original definition of the investigative type; ; Holland's (1997) investigative type prefers activities that entail the observational, symbolic, systematic, and creative investigation of physical, biological, and cultural phenomena in order to understand such phenomena' (p. 237, Wille, De Fruyt, Dingemanse, & Vergauwe, 2015). The items that loaded on the investigative factor were mostly items on cultural phenomena, (e.g. 'Investigating the history of a specific subject'). The other half that loaded on the realistic scale had in common that these were science items that were 'activity-oriented' (e.g., 's*olving* a *mathematic* problem' and '*executing* a *chemistry* experiment'). Therefore, new items had to be developed to tap into the construct of the investigative Holland type, comprehensively, but in such a way that they were less activity-oriented and more contemplative or creatively investigative in nature (like stated in Holland's definition of the investigative type). Therefore, the purpose of the second study was to examine the factor structure of the instrument once more after including several newly written investigative items.

4. Study 2: Validation study

This study was done in order to check the structural validity of our improved version of the pilot instrument. In order to have enough items left after this study, two experts developed extra investigative items independently from each other to enhance this specific scale. They made sure that these new items had a science (physical or biological) component, and were formulated in such a way that these items tapped more into creative investigation ("e.g., examining the effect of alcohol on the brain"). Together with a third expert the before mentioned procedure of rating and selecting items was followed, resulting in seven new investigative items.

In order to proceed with answering Research Question 1 on structural validity, this study was conducted to do some additional validation analyses on the items chosen in

the first study and to see whether the (new) investigative items resulted in a reliable and valid investigative subscale. In order to reduce the total number of items and to select the best ones, we strived to maintain six items per subscale after this validation study.

4.1 Method

Participants

The sample of this second study consisted of 6,215 applicants (42.3% female) aged between 16 and 25 years (M_{age} = 19.50, *SD* =1.89). They signed up between April 2016 and September 2016 for a bachelor's program at one of the largest universities of applied sciences in the Netherlands (i.e., higher professional education). They filled out an online questionnaire as part of the intake procedure at this university. This diverse group of applicants signed up for 68 different bachelor's programs in total.

4.1.1 Measure

Like in Study 1, the interest instrument measures two domains: interests and skills. The domain of interests comprised 52 items measuring interests with respect to certain activities on a Likert scale ranging from 1 (*completely uninteresting*) to 5 (*extremely interesting*). Five of the RIASEC type scales (R, A, S, E, C) consisted of eight items each, except for the investigative scale that consisted of twelve items. For this scale we included four extra items to ensure that enough items would remain after the psychometric analyses in this second study, (due to the problematic factor structure of the investigative scale in the pilot version of our instrument). Like in Study 1, skills were measured with a different answering scale ranging from 1 (*I definitely cannot do this*) to 5 (*I can do this extremely well*).

4.1.2 Data analysis

In order to establish a valid factor structure, exploratory factor analyses with a Direct Oblimin rotation were conducted. To choose the best items we considered four criteria: a high primary factor loading, a high item-total correlation, means not higher than 4.0 (to avoid ceiling effects), and the convergence of items with two well-established measures (reported in Study 4). Secondly, confirmatory factor analyses in Mplus were done to see how well the data would fit a six-factor structure. Thirdly, to examine whether the final

items were invariant across gender, we ran four models, suggested by Van de Schoot, Lugtig and Hox (2012): Model 0 to test for configural invariance, Model 1 to test for metric invariance, Model 2 to test whether the meaning of the levels of the underlying items was equal across both genders, and Model 3 to test for scalar invariance. Finally, internal consistency was examined for all subscales with the chosen items.

4.2 Results

Conducting an exploratory factor analysis with Direct Oblimin rotation resulted in nine components for both the interest and skill scales explaining 56.98% and 52.96% of the total variance, respectively. Some of the later components were not interpretable. Based on our four criteria, fourteen items were eliminated.

Regarding the twelve items of the investigative subscale, all items (except for one) loaded on the expected investigative factor when conducting an exploratory factor analysis with Oblimin rotation constricted to six factors. However, five of these twelve items again double-loaded on other factors. However, when we conducted an exploratory factor analysis with Oblimin rotation constricted to seven factors, none of the items loaded on other factors and the investigative scale split into two sub-factors. One subscale consisted of 'humanities' items (which we will call the investigative-humanities subscale) and one subscale consisted of 'natural science' items (which we will call the investigative-science subscale). Based on these figures we decided to maintain eight items for the investigate subscale, but distinguished between a humanities subscale with four items and a natural science subscale with four items. The factor loadings of all chosen items of the exploratory factor analysis with Oblimin rotation constricted to six factors, are presented in Table 2. The factor loadings of all chosen items of the exploratory factor analysis with Oblimin rotation with seven factors, are presented in Table 3.

In the second step, to assess the structural validity of the final item set, a confirmatory factor analysis in Mplus was conducted. From the results we can infer that a seven-factor structure for the interests scales (CFI = .89, $RMSEA$ = .05) fit the data somewhat better than a six-factor structure (CFI = .88, $RMSEA$ = .06; $\Delta\chi^2$ = 826.76, p < .001). Likewise, for the skill subscales a seven-factor structure (CFI = .91, $RMSEA$ = .04) fit the data somewhat better than a six-factor structure (CFI = .90, $RMSEA$ = .05; $\Delta\chi^2$ = 1146.55, p < .001).

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Table 2. Factor loadings (> .35) of all items (exploratory factor analysis with Direct Oblimin rotation constricted to six factors).

Items	Interests						Skills					
	1	2	3	4	5	6	1	2	3	4	5	6
Realistic												
Assembling an Ikea construction kit	.68						.71					
Working with tools	.83						.81					
Making a desk that precisely fits into your own room	.73						.76					
Fixing a punctured bicycle tire	.71						.71					
Trying to replace the broken screen on your smartphone	.72						.67					
Building a little summerhouse	.84						.83					
Investigative												
Investigating the history of a specific subject		.61						-.61				
Establishing an opinion on a current news item		.55						-.58			.37	
Thinking about differences between cultures		.55						-.56				
Comparing different points of view on a particular subject		.62						-.64				
Considering how rain, hail or snow are formed	.36	.61						-.57				
Looking for a theory which can explain why a boat floats	.58	.47					.59	-.37				
Examining the effect of alcohol on the brain		.45		-.39				-.37		-.41		
Thinking about ways to predict the size of the world population in 2050		.69						-.55				
Artistic												
Making music, for example in a band			-.57						.42			
Creating designs for the title page of an assignment			-.66						.59			
Producing illustrations			-.78						.82			
Drawing, painting or sculpting			-.82						.86			
Photographing with an SLR camera			-.64						.48			
Designing decors for a movie			-.76						.76			

Table 2. (continued) Factor loadings (> .35) of all items (exploratory factor analysis with Direct Oblimin rotation constricted to six factors).

Items	Interests						Skills					
	1	2	3	4	5	6	1	2	3	4	5	6
Social												
Helping others with things in which they are less skilled				-.60						-.49		
Caring for a family member				-.67						-.64		
Coaching a group of children or young people				-.71						-.59	.39	
Tutoring extra lessons				-.56						-.48		
Helping someone to recover after an accident				-.84						-.79		
Helping people in trouble				-.77						-.67		
Enterprising												
Dividing tasks within a team					.71						.67	
Engaging acquaintances in a sponsorship activity					.46						.46	
Occupying a board member position in an association					.68						.59	
Taking the lead in a working group					.73						.74	
Taking responsibility for a team performance					.72						.67	
Giving a presentation					.65						.62	
Conventional												
Creating a checklist						-.67						.68
Tidying a bookcase by genre or author						-.62						.58
Creating a schedule						-.66						.66
Regularly update the contacts list from, for example, your phone or e-mail						-.64						.57
Arranging your (home) work in folders on the computer						-.78						.76
Looking up journey times for planes or trains						-.52						.47

Table 3. Factor loadings (> .4) items of all subscales (exploratory factor analysis with Direct Oblimin rotation without constriction: 7 factors).

Items	Interests							Skills						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Realistic														
Assembling an Ikea construction kit	.78							.80						
Working with tools	.87							.84						
Making a desk that precisely fits into your own room	.75							.75						
Fixing a punctured bicycle tire	.71							.73						
Trying to replace the broken screen on your smartphone	.58							.51						
Building a little summerhouse	.82							.81						
Investigative-humanities														
Investigating the history of a specific subject		.79							.67					
Establishing an opinion on a current news item		.70							.69					
Thinking about differences between cultures		.64							.67					
Comparing different points of view on a particular subject		.58							.62					
Investigative-science														
Considering how rain, hail or snow are formed			.74							-.73				
Looking for a theory which can explain why a boat floats			.65							-.66				
Examining the effect of alcohol on the brain			.62							-.68				
Thinking about ways to predict the size of the world population in 2050			.75							-.73				
Artistic														
Making music, for example in a band				-.56							.41			
Creating designs for the title page of an assignment				-.68							.59			
Producing illustrations				-.78							.82			
Drawing, painting or sculpting				-.81							.85			
Photographing with an SLR camera				-.70							.50			
Designing decors for a movie				-.81							.77			

Table 3. (continued) Factor loadings (> .4) items of all subscales (exploratory factor analysis with Direct Oblimin rotation without constriction: 7 factors).

Items	Interests							Skills						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Social														
Helping others with things in which they are less skilled					-.63							-.56		
Caring for a family member					-.69							-.72		
Coaching a group of children or young people					-.70							-.60		
Tutoring extra lessons					-.55							-.46		
Helping someone to recover after an accident					-.81							-.72		
Helping people in trouble					-.77							-.72		
Enterprising														
Dividing tasks within a team						.70							.68	
Engaging acquaintances in a sponsorship activity						.49							.46	
Occupying a board member position in an association						.70							.67	
Taking the lead in a working group						.73							.75	
Taking responsibility for a team performance						.73							.68	
Giving a presentation						.63							.59	
Conventional														
Creating a checklist							-.66							.68
Tidying a bookcase by genre or author							-.61							.56
Creating a schedule							-.66							.66
Regularly update the contacts list from, for example, your phone or e-mail							-.64							.55
Arranging your (home) work in folders on the computer							-.77							.75
Looking up journey times for planes or trains							-.51							.44

Therefore, there was evidence for two separate investigative sub-factors.

After the decision to continue with seven subscales we wanted to do an extra validity check based on the available data. Therefore, we ranked the top five bachelor's programs according to the students' average scores on the investigative-humanities and the investigative-science subscales to see whether these two lists differed in terms of a focus on humanity studies and a focus on natural science studies, respectively.

Table 4 shows that students who had high scores on the investigative-humanities subscales had indeed chosen bachelor's programs in which a humanity factor is important (e.g. the programs Teacher Education in Sociology and Teacher Education in History). Likewise, students who had high scores on the investigative-science subscales had chosen bachelor's programs in which a natural science factor is important (e.g. the programs Technical Physics and Teacher Education in Biology). This confirms the discriminant validity of the two sub-factors.

Table 4. Top five bachelor's programs (high to low) based on the average of the two investigative sub-factors.

Top ten investigative-humanities subscale	Top ten investigative-science subscale
1. Teacher Education in Religion	1. Teacher Education in Physics
2. Religious-pastoral studies	2. Technical Physics
3. Teacher Education in Sociology	3. Teacher Education in Geography
4. Teacher Education in History	4. Teacher Education in Biology
5. Teacher Education in Geography	5. Applied Science

In the third step, we conducted multi-group analyses to see whether the final items were invariant across gender. When running the model for configural invariance (Model 0), they had a sufficient fit for both interests and skills (*CFI* = .90, *RMSEA* = .05 for interests and *CFI* = .92, *RMSEA* = .04 for interests) for females as well as males (Table 5 and 6). This means that the pattern of factor loadings did not differ between both groups for interests or skills. When running the subsequent models, only the metric model for interests and the intercept-only models converged. The model of metric invariance for interests had the same fit as the configural model (*CFI* = .90, *RMSEA* = .05). This means that both females and males attributed the same meaning to the latent construct under study. The fit of the intercept-only models was somewhat lower (*CFI* = .84, *RMSEA* =

.06 and *CFI* = .81, *RMSEA* = .06, for interests and skills, respectively). This means that females interpreted some items differently from men. All in all, the instrument seemed partially gender-invariant.

Table 5. Model fit for seven interest subscales.

Model	(Sub)sample	χ^2	df	CFI	RMSEA (90% CI)
No invariance model	Total sample (N = 6,215)	10580.218*	579	.89	.05 (.052-.054)
0 Configural invariance	Female (N = 2,626)	4364.181*	579	.90	.05 (.049-.051)
0 Configural invariance	Male (N = 3,589)	5759.725*	579	.90	.05 (.049-.051)
1 Metric invariance	Multi-group (N = 6,215)	10490.093*	1222	.90	.05 (.049-.050)
2 Intercept only invariance	Multi-group (N = 6,215)	15642.017*	1222	.84	.06 (.061-.062)

Note: χ^2 = Chi-Square, * = *p* < .001; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation.

Table 6. Model fit for seven skill subscales.

Model	(Sub)sample	χ^2	df	CFI	RMSEA (90% CI)
No invariance model	Total sample (N = 6,215)	7580.592*	580	.91	.04 (.043-.045)
0 Configural invariance	Female (N = 2,626)	3223.474*	580	.92	.04 (.040-.043)
0 Configural invariance	Male (N = 3,589)	4179.133*	580	.92	.04 (.040-.043)
1 Metric invariance	Multi-group (N = 6,215)	No convergence			
2 Intercept only invariance	Multi-group (N = 6,215)	15439.549*	1326	.81	.06 (.058-.059)

Note: χ^2 = Chi-Square, * = *p* < .001; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation.

Finally, Cronbach's alpha's of the fourteen subscales were computed in order to examine the reliability of all subscales. Table 7 shows that the reliabilities for all subscales were between .71 and .87. In summary, the newly developed instrument with a total of 76 items had a seven-factor structure with partial gender invariance. Furthermore, the reliabilities of all subscales were acceptable.

Table 7. Correlations, means, and reliabilities of all subscales.

Subscale	1	2a	2b	3	4	5	6
1. Realistic	(.77**)	-.00	.46**	.30**	.04**	.03**	.17**
2a. Investigative-humanities	.01	(.79**)	.37**	.34**	.35**	.33**	.27**
2b. Investigative-science	.35**	.31**	(.74**)	.29**	.22**	.08**	.18**
3. Artistic	.28**	.23**	.24**	(.77**)	.28**	.11**	.24**
4. Social	.05**	.35**	.18**	.26**	(.77**)	.41**	.34**
5. Enterprising	.09**	.37**	.04**	.17**	.51**	(.76**)	.42**
6. Conventional	.08**	.26**	.12**	.22**	.28**	.33**	(.59**)
Mean interests	2.82 (.85)	3.58 (.74)	2.92 (.86)	3.06 (.87)	3.72 (.66)	3.63 (.59)	3.23 (.65)
Mean skills	2.94 (.80)	3.62 (.59)	2.74 (.78)	2.68 (.71)	3.58 (.58)	3.56 (.56)	3.81 (.53)
Mean composite	2.88 (.77)	2.40 (.42)	1.89 (.51)	2.87 (.74)	3.65 (.59)	3.60 (.54)	3.52 (.53)
Cronbach's alphas interests	.87	.75	.78	.83	.82	.79	.76
Cronbach's alphas skills	.86	.72	.77	.77	.78	.79	.71

Note. Subscale intercorrelations for the interest subscales (upper-triangle) and skill subscales (lower-triangle). On the diagonal between brackets the intercorrelations between the interest and skills subscales for the interest type in question. Behind means the SD between brackets. **Correlation is significant at the 0.01 level (2-tailed).

5. Study 3: Test-retest reliability

In order to address Research Question 2 we examined the test-retest reliability of the 76 items that were chosen in Study 2.

5.1 Method

5.1.1 Participants

Applicants who signed up in April 2016 for a bachelor's program, and who were between 16 and 25 years of age, were asked to fill out our instrument a second time (N = 922). Of these applicants, 271 (29.4%) responded to this request (53.5% female, M_{age} = 19.00, SD =1.84). The time lag between the first and second time these participants filled out the same questions was between three and seven weeks.

5.1.2 Measures

The final version used in this study, from now on called the Interest and Skills inventory on Educational Choices (ISEC), comprised of 76 items at Time 1 as well as Time 2. All of the RIASEC type scales (for interests as well as for skills) consisted of six items each, except for the investigative scale, which consisted of 8 items (4 items per sub-factor).

5.2 Results

As seen in Table 8, test-retest reliabilities were between .74 and .86, indicating high test-retest reliability. While seven of the fourteen subscales had means that differed significantly between T1 and T2, these differences were not very large (between .06 and .14). The means that differed significantly over time had in common that the average scores at T1 were higher than at T2. Thus, adequate test-retest reliability was established.

Table 8. Test-retest reliabilities and means for T1 and T2.

	Test-retest		Means T1		Means T2	
Scale	Interest	Skill	Interest	Skill	Interest	Skill
Realistic	.81[**]	.86[**]	2.80	2.86	2.80	2.89
Investigative-humanities	.83[**]	.74[**]	3.50[b]	3.59	3.43	3.54
Investigative-science	.76[**]	.76[**]	2.88	2.75	2.93	2.79
Artistic	.86[**]	.87[**]	3.05	2.74	3.09	2.76
Social	.80[**]	.82[**]	3.85[b]	3.75[b]	3.75	3.62
Enterprising	.82[**]	.79[**]	3.68[b]	3.52[b]	3.59	3.45
Conventional	.75[**]	.79[**]	3.27[b]	3.80[b]	3.13	3.74
Average[a]	.81	.81				

Note. [a] Using Fisher r-to-z transformation en back-transformation. [b] Significant difference between the first and second measurement (p <.01). [**]Correlation is significant at the 0.01 level (2-tailed).

6. Study 4: Construct validity

With the aim of addressing Research Question 3 on convergent and discriminant validity we compared the ISEC with two well-established measures.

6.1 Method

6.1.1 Measures

ISEC

For this study we used the ISEC with 76 items, similar to the test-retest study (Study 3).

HZO

In order to investigate the convergent and discriminant validity, we compared our instrument with an established Dutch instrument, the HZO (Platteel & Uterwijk, 2008). The HZO is the Dutch translation of the Self-Directed Search (SDS) and was chosen for this study as it is the most established Dutch copyright protected interest scale that is based on Holland's theory. It is a self-report instrument designed to measure the six RIASEC types. We used the activities module to measure interests and the skills module to measure skills. The vocational preferences scales and the self-concept scales of the HZO were only taken into account for this study when computing composite scores. The answering scale is binary (yes versus no) and its scale reliabilities ranged from .89 to .93 (established with the Kuder-Richardson Formula 20).

PGI-Short

With four items per scale, the Personal Globe Inventory Short (PGI-Short, Tracey, 2010) measures eight general interest scales: Social Facilitating, Managing, Business Detail, Data Processing, Mechanical, Nature/Outdoors, Artistic, and Helping. There are two additional prestige-scales that were not used for the current study. Using the formulas, provided by Tracey (2002), it is possible to transform the scores on these eight general interest scales into six RIASEC scale scores. A respondent is asked to respond twice to 32 unique items, with respect to both the degree of liking, ranging from 1 (*strongly dislike very much*) to 7 (*strongly like very much*), as well as the degree of competence ranging from 1 (*unable to do*) to 7 (*able to do very much*). The Cronbach alpha's of the eight scales for both interests and skills ranged between .71 and .90.

6.1.2 Participants

Participants were asked to fill out our ISEC, the HZO and the PGI-Short as part of a career counseling procedure. They received a small compensation of €15,-. The sample consisted of 102 young adults planning to (re-)enter higher education (42.2% female, M_{age} = 20.8, *SD* = 1.91), who sought services at the student career center of the university. This career center serves both students at the university and pupils from secondary education who explore their educational options. While perhaps not representative of the general population, this sample matches the subpopulations for which our instrument was developed.

6.1.3 Data analysis

Convergent validity was examined by correlating the outcomes of the ISEC with outcomes of an equivalent subscale of the HZO and PGI-Short. Discriminant validity was computed by averaging the correlations with all dissimilar subscales of the HZO and PGI-Short.

6.2 Results

The correlations between our instrument and the HZO and PGI-Short interest scales obtained are reported in Table 9. It shows that correlations between all convergent scales were substantial in size and correlations between discrepant scales were small. Overall, the convergent correlations for the composite investigative-total subscale (r = .59, p < .001 and r = .48, p < .001) as well as for the composite investigative-science subscale (r = .67, p < .001 and r = .57, p < .001) were solid for the HZO and PGI-Short, respectively. The convergent correlations between our investigative-humanities subscale and the HZO and PGI-Short investigative subscales were lower (r = .23, p < .05 and r = .15, *ns*, respectively). Furthermore, even though the correlation between our composite conventional subscale and the corresponding HZO scale was adequate (r = .55, p < .01) the correlation with the PGI-Short conventional scale was not significant (r = .15, *ns*). Thus, the convergent and discriminant values were very adequate, except for the correlation of the conventional scale between our instrument and the PGI-Short.

Table 9. Convergent validity for the interest, skill, and composite subscales.

	HZO						PGI					
	Convergent validity (r)			Discriminant validity (r)			Convergent validity (r)			Discriminant validity (r)		
	Interest	Skill	Composite[a]	Interest[b]	Skill[b]	Composite[a]	Interest	Skill	Composite[a]	Interest[b]	Skill[b]	Composite[a]
Realistic	.73*	.70**	.82**	.02	.05	.01	.65**	.64**	.69**	.05	.06	.03
Investigative-total	.51**	.45**	.59**	.19	.21	.06	.48**	.42**	.48**	.26	.28	.14
Investigative-humanities	.22*	.03	.23*	.17	.23	.19	.24*	.09	.15	.20	.22	.21
Investigative-science	.61**	.59**	.67**	.14	.10	.09	.55**	.50**	.57**	.24	.22	.23
Artistic	.67**	.65**	.73**	.08	.10	.04	.64**	.75**	.73**	.11	.07	.11
Social	.69**	.60**	.74**	.10	.18	.10	.73**	.46**	.66**	.15	.14	.17
Enterprising	.66**	.72**	.73**	.10	.10	.09	.63**	.57**	.63**	.18	.19	.09
Conventional	.43*	.44**	.55**	.17	.12	.03	.23*	.14	.15	.23	.20	.10
Average[b]	.59	.56	.67	.12	.13	.08	.55	.48	.54	.17	.16	.14

Note. [a] We correlated our interest and skill scales with all RIASEC scales of the HZO and PGI. [b] Using Fisher r-to-z transformation en back-transformation (Investigative-total scale excluded). * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed)

7. Study 5: Predictive validity

With the aim of addressing Research Question 4 on predictive validity we correlated the congruence between interest and programs with two outcomes measures: satisfaction with educational choice and intention to stay.

7.1 Method

7.1.1 Measures

ISEC

For this study we used the ISEC with 76 items, similar to the test-retest study (Study 3 and Study 4).

Satisfaction with educational choice

Satisfaction with educational choice was measured ten weeks after commencement with the Academic Major Satisfaction Scale (AMSS), constructed by Nauta (2007). In our context, an academic major was operationalized as the chosen bachelor's program. For this study, the scale was translated into Dutch and back-translated by two different researchers. The AMSS uses a 5-point Likert-type scale from 1 (*completely disagree) to* 5 (*completely agree*). The six items had a Cronbach's alpha of .89. Additionally, intention to stay was assessed by a one-item scale: 'To what extent are you planning to stay in this programme?' The scale ranged from1 (*certainly not staying) to* 10 (*certainly staying).*

7.1.2 Participants

The sample consisted of 189 students (60.9% female, M_{age} = 18.89, *SD* = 1.67) of ten fulltime bachelor's programs. These programs were representative for one of Holland's interest types largely based on the 'World of Work map' (Prediger, 2002): Electrical Engineering & Automotive (Realistic), Applied Mathematics, Technical Physics, and Applied science (Investigative), Industrial Product Design (Artistic), Teacher primary education (Social), Small Business & Retail Management and Real estate (Enterprising), and Accountancy (Conventional). These students voluntarily filled out a questionnaire about their first experiences in the first ten weeks after their enrollment.

7.2 Results

Predictive validity was examined by correlating the outcomes of a specific interest subscales of the ISEC (which was an evident interest type for that particular bachelor's program) with the two outcome measures. The results in Table 10 suggest that for four types of programs (i.e., realistic, social, enterprising, and conventional) a medium to large significant correlation existed between the interest scale and one of the two outcome measures. For the Industrial product design program (artistic interest type) and for the investigative programs, no significant correlations were found.

Table 10. Pearson correlation between RIASEC scales and Satisfaction with educational choice and Intention to stay.

Bachelor's program	N	Satisfaction with choice						Intention to stay					
		R	I	A	S	E	C	R	I	A	S	E	C
R Electrical Engineering & Automotive	13	.74**						.23					
I Applied Mathematics, Technical Physics, and Applied sciences	39		.08						.05				
A Industrial Product Design	11			.30						.19			
S Teacher primary education	89				.29**						.15		
E Small Business and Retail Management and Real estate	27					.23						.46*	
C Accountancy	10						.44						.64*

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed)

8. General discussion

The purpose of the present study was to develop and validate a short and public available interest measure for pupils in secondary education orienting on bachelor's programs in higher education in our contemporary Dutch context. Research Question 1 addressed whether the instrument would conform to Holland's factor structure (i.e., RIASEC types) and whether this structure is invariant across gender. Preliminary results from Study 1 showed that the expected factor structure was indeed found for all subscales (with partial gender invariance), except for the investigative subscale, which consisted of two sub-factors. These two sub-factors were labeled as investigative-humanities (tapping into a humanity aspect) and investigative-science (tapping into a natural science aspect).

An extra face validity check confirmed the discriminate validity of these two investigative sub-factors. Thus, Hypothesis 1 was mostly supported. Furthermore, results regarding internal consistency and test-retest reliabilities were satisfactory, supporting Hypothesis 2.

The finding of two investigative sub-factors is in line with the findings of Wille et al. (2015) who also differentiated between two investigative components. They stated that people scoring high on the 'Investigative-Theory' component are eager to uncover the how and the why of processes and events and have a preference for social, economic, political, and philosophical science. By comparison, people scoring high on the 'Investigative-Science' component prefer studying problems from a fundamental perspective and are interested in work related to natural science, technology, engineering, and mathematics. These descriptions show similarities with our investigative-humanities and investigative-science sub-factors, respectively.

Research Question 3 addressed whether the instrument has the ability to measure what it is supposed to measure. Overall, our subscales correlated highly with the equivalent scales of the HZO and PGI-Short, supporting the convergent validity of our instrument. Furthermore, for all scales the correlations with discrepant scales were low, supporting discriminant validity as well. So, Hypothesis 3 was partly supported, because the convergent correlations were higher than expected.

Although the correlations between our investigative-science and investigative-total subscales and the investigative scales of the PGI-Short and HZO were substantial, the correlations of our investigative-humanities subscale with the investigative scales of these other instruments were small. This is in accordance with the findings of Wille et al. (2015), who examined the convergent validity of their Career Insight Questionnaire for employed people (CIQ: Dingemanse, Van Amstel, De Fruyt, & Wille, 2007), comparing it with the PGI-Short. Accordingly, it seems that the investigative items of the HZO and the PGI-short consist mostly of natural science colored items. The addition of more humanities colored items to the ISEC therefore seems a useful addition that allows a broader coverage of student interests.

The convergence of our conventional scale with the PGI-Short was low. These findings were also in accordance with recent studies. For example, Etzel, Nagy, and Tracey, (2016) and Wille and colleagues (2015) found that of all equivalent RIASEC scales of the PGI, the conventional scale had the lowest convergence value. So it seems

that other scholars also had some problems with the PGI conventional scale. A possible reason is that this scale seems somewhat more ill-defined than the others, and that what counts as 'conventional' might differ between historical and cultural contexts, and thus also between inventories. More research is warranted on what the conventional scale actually measures and whether this justifies Holland's original intention.

Research Question 4 addressed whether the instrument has the ability to predict intended outcomes. Because for only four of the six interest types predictive validity was sufficient, Hypothesis 4 was partly supported. Holland (1997) suggested that congruence between one's interests (and skills) and the environment (i.e., bachelor's program) can be linked to satisfaction. This hypothesis has received mixed support in previous research. Some studies (e.g., Logue et al., 2007; Miller et al., 1988) have found that congruence between interests and educational programs has been linked to satisfaction, whereas others have not (e.g., Assouline & Meir, 1987). Limitations regarding the measurement of the criterion validity are stated below.

Overall, as stated, we wanted to use an approach in which we developed an instrument in our context to see whether the end result would be comparable with its North American counterparts in terms of factor structure and psychometric properties. The difference we found is that our investigative scale was characterized by an investigative-science scale (conform the investigative scales of most other interest measures) and an investigative-humanities scale. The investigative-science scale taps into the interests of pupils preferring studies like physics and applied science. The investigative-humanities scale taps into the interests of pupils preferring studies that ask for thorough research and thinking, but in a more general and societal way (e.g., teacher history and teacher sociology).

8.1 Limitations and future research

The present study has a number of limitations that need to be remedied. We validated our instrument in a certain population, namely Dutch prospective students at a certain age (16-25 years old). Further research is necessary to see whether our results can be generalized across other vocational groups (e.g. employed, self-employed, and unemployed people) or other age groups. On the positive side, the validation sample was large and diverse (6,215 applicants for 68 different bachelor's programs), which

increases the external validity of the results for this specific target group in higher education for which the instrument was developed.

Regarding criterion validity, no positive significant correlations were found for the investigative and artistic subscales. Regarding the latter, the industrial product design program (artistic type of program) was the only program among all others that came closest to the artistic interest type, because of the design part of the program. Obviously, programs on art education would be more obviously aligned with the artistic interest type. However, these programs were not part of our sample. Furthermore, students who have a pronounced investigative interest profile are more likely to visit regular instead of applied universities. More research on criterion validity with more diverse target groups is therefore needed.

Finally, no invariance analyses were done regarding different race/ethnic groups or language groups. Because of ethical reasons we did not ask for these data, so these analyses were not possible to conduct.

8.2 Practical implications

Dutch students have to specialize immediately upon entering higher education. First, the ISEC can help individual pupils in secondary education to give them a sense of direction in the labyrinth of bachelor's programs. By completing the ISEC, pupils get feedback on what their main interest types are. It is also possible that counselors in secondary education use this instrument for their pupils as a starting point in their counselling. These counsellors can match pupil's outcomes (interest types) to certain domains of education. Furthermore, this instrument can be used in higher education as a base to match prospective students to bachelor's programs. The ISEC can be accompanied by a feedback tool that links interest profiles to a list with congruent bachelor's programs (see for example Fonteyne, Wille, Duyck, & De Fruyt, 2017). By identifying successful profiles for every bachelor's program, prospective students can base their educational decision on the degree of congruence between themselves and a particular program. Alternatively, teachers of these programs can base their recruiting or selection strategies on this congruence as well.

8.3 Conclusion

The ISEC is a promising measure assessing interests and self-perceived skills of pupils in secondary education encouraging their exploration of bachelor's programs. In the present context, the instrument seems to be appropriate to tap into the interests and skills of Dutch pupils on the verge of an educational decision. Hopefully, using this measure can result in more prospective students choosing a bachelor's program that fits their interests/skills resulting in less drop-out as a consequence of erroneously educational choices.

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"He who has a strong enough why can bear almost any how"

- Friedrich Nietzsche

Chapter 3

The association of motivation and identity with students' achievement in higher education

Abstract

Two main reasons for dropping out of higher education are making an erroneous educational choice (an identity commitment) and lack of motivation. This study examined whether identity formation and motivation among prospective students at the moment of choosing a bachelor's program (N = 8723; 47.1% female, M_{age} = 19.64, SD = 1.95) predicted academic achievement during their first year. Participants were divided into four students' achievement groups (i.e., 'successful dropouts', 'successful stayers', 'unsuccessful stayers', and 'unsuccessful dropouts'). We examined whether identity and motivation separately predicted academic achievement, whether identity and motivation dimensions could be combined into distinct profiles, and if these new profiles predicted academic achievement. Results indicated that motivation was associated with academic achievement, whereas identity was not. Furthermore, five new combined motivation-identity profiles were identified (i.e., 'moderately positive', 'amotivated', 'moderately negative', 'autonomously achieved', and 'controlled & troubled diffused'), which predicted academic achievement. In general, the 'moderately positive' profile was positively associated with academic achievement, while both the 'amotivated' and 'controlled & troubled diffused' profiles were negatively associated with academic achievement.

1. Introduction

Student retention problems are manifest worldwide (Fonteyne, De Fruyt, & Duyck, 2014). Each year, roughly 30% of first-year students at US baccalaureate institutions do not return for their second year (Schneider, 2010). The Organisation for Economic Cooperation and Development reported that 32% of tertiary students did not graduate from a program at this level (OECD, 2013). These high rates lead to a drain in public finance and also to a drop in the well-being of these students because of their failure experience.

Two of the main reasons for high dropout rates in higher education are making an erroneous educational choice and lack of motivation (Wartenbergh & Van den Broek, 2008; Van den Broek, Wartenbergh, Bendig-Jacobs, Braam, & Nooij, 2015). Regarding the former, choosing a bachelor's program (making an educational choice) is linked to the process of identity formation (Klimstra, Luyckx, Germeijs, Meeus, & Goossens, 2012). This process is complex, as it comprises exploring different programs, comparing them, reflecting on them, and finally choosing one. Students can also have different motives for making these educational choices. Whereas some choices are based on autonomous reasons like interest and curiosity, others are based on controlled reasons like pressuring parental expectations or self-worth concerns.

Research has linked well-explored commitments (e.g., Germeijs & Verschueren, 2007; Klimstra et al., 2012) and being autonomously motivated (e.g., Ratelle, Guay, Vallerand, Larose, & Senécal, 2007; Taylor et al., 2014) to favorable educational outcomes that reflect a person's goals and values. Conversely, students who are either not fully involved in identity exploration or not committed to their choices on the one hand, or who base their choices on controlled motives might be more prone to unfavorable educational outcomes. In fact, a combination of both could bring students in an even more vulnerable position. Therefore, empirically combining the constructs of identity formation and motivation in one study could be relevant for better identifying and understanding students who are at risk for dropout or other unfavorable educational outcomes.

Previous conceptual work has already linked the domains of identity formation and motivation. For instance, Wigfield and Wagner (2005, p. 228) argued that 'a discussion of motivation would be incomplete without considering the effects that identity development processes may have'. Furthermore, Waterman (1990; 2004) argued that

in research on identity formation, the construct of motivation is typically overlooked and proposed that intrinsic motivation could serve as a third defining dimension of identity, along with the dimensions of exploration and commitment. From more than 3,000 identity status interviews he recognized that there were differences in motivation between people who had formed their identity in a healthy way (also called identity achievers). For some of these identity achievers, commitments were intrinsically motivated choices, but for others within this group this was not the case. In this same line of reasoning, Ryan and Deci (2000a) have proposed that life paths (as might be reflected in identity commitments) might be experienced as exciting and interesting if they are autonomously or freely chosen, whereas the same life path might be viewed as aversive if it is pursued out of obligation or coercion (see also Waterman, Schwartz, & Conti, 2008). It therefore seems promising to examine the extent to which the adoption of any given identity co-occurs with autonomous or controlled motivation, because the motives and the goals behind one's identity commitment are important for optimal functioning (Soenens and Vansteenkiste, 2011).

Although previous work has discussed conceptual links between identity formation and motivation, these links have not often been examined empirically. As one important exception, Luyckx, Schwartz, Soenens, Vansteenkiste, and Goossens (2010) found that motivational orientations were related to forming clear identity commitments and adhering to them. More specifically, an autonomous motivational orientation (which is the source of initiation and regulation toward behavior) among first year students, characterized by seeking out opportunities for self-determination (Deci & Ryan, 1985), was positively related to making commitments and to feeling certain about these commitments. Impersonal orientation, in which actions are perceived as being influenced by factors over which one has limited control, was negatively related to identity commitment. Soenens, Berzonsky, Dunkel, Papini, and Vansteenkiste (2011) found that an informational identity style (i.e., actively seeking out information and reflecting upon choices) was associated with autonomous types of motivation and that these motivations mediated the association between identity style and personal adjustment. Lastly, Cannard, Lannegrand-Willems, Safont-Mottay, and Zimmermann (2016) explored the relation between identity and motivation in college students. They found clear linkages, as for example, exploration was underrepresented in demotivated

students and commitment was underrepresented in amotivated students, compared to the total sample.

The central assumption in this study is that identity commitments and choices can be regulated either by autonomous or controlled motives, with autonomous regulation resulting in deeper internalization of identity commitments. In this study, we aim to contribute to scientific literature by combining constructs from theories of identity formation and motivation in an educational setting to gain a better understanding of students' academic achievement in higher education. Specifically, we aimed to make the following three contributions. First, we wanted to examine the separate and unique roles of motivation and identity in predicting students' achievement. For this purpose, a variable-centered approach was combined with a person-centered approach. A variable-centered approach might give insight into the dimensions predicting students' achievement, whereas a combination of dimensions in a person-centered approach might identify specific groups of students in relation to their achievement. Second, we wanted to examine whether identity and motivation can be integrated into combined profiles that predict students' achievement. This analytic framework has the potential to establish that specific identity profiles might co-occur with different motivational profiles. Third, we aimed to better understand an educational outcome variable (dropout and academic achievement) that has not yet been examined in combination with the constructs of identity and motivation. Unlike many previous studies, this is an objective measure that does not rely on self-reports: either obtaining the required 60 credits in the first year, or staying in or leaving the bachelor's program the student started with.

Before we present the research questions and hypotheses, we will present the theories that informed our conceptual framework as well as our measures. First, we will review Marcia's identity status paradigm (1966) as a theory of identity formation. Second, the Self-Determination Theory (SDT; Deci & Ryan, 2000), a well-known motivation theory, will be presented.

1.1 Identity formation

Contemporary research on identity formation employs models that expand Marcia's (1966) distinction between dimensions of commitment (i.e., the degree of feeling certain about current choices and engaging in relevant activities toward the implementation

of these choices) and exploration (i.e., the degree of examining and comparing several possible alternative choices). One of these models is the dual-cycle model by Luyckx and colleagues (Luyckx, Goossens, & Soenens, 2006; Luyckx, Goossens, Soenens, & Beyers, 2006). This model describes identity formation along four dimensions, placed in two consecutive cycles. The first cycle, identity formation, comprises Marcia's original dimensions of exploration in breadth (i.e., active exploration of alternatives) and commitment making (i.e., choosing and adhering to one of these alternatives). For instance, after a prospective student has explored various possibilities for a bachelor´s program by reading internet sites or by talking to others (exploration in breadth), he or she might choose one specific program (commitment making). The second cycle, known as commitment evaluation, describes how existing commitments are evaluated and re-evaluated. It comprises exploration in depth (i.e., the degree of evaluation and exploration of current commitments, to become more aware of the chosen commitments) and identification with commitment (i.e., the degree of identifying with and growing certain and confident about these commitments). With respect to an educational choice, a prospective student might reflect on and evaluate the chosen bachelor's program (exploration in depth). On the one hand, this might lead to a growing conviction that this program is the right one, and identification with commitment will strengthen. On the other hand, the commitment made might also be reconsidered, leading to new exploration.

In subsequent research (Luyckx et al., 2008a), a fifth dimension was added to this model to differentiate healthy or reflective exploration in breadth from ruminative exploration. Previous research has suggested that some individuals get stuck in the process of exploring different identity alternatives (Luyckx et al., 2008a). Ruminative exploration refers to individual differences in delaying or inhibiting progress in identity formation and might be displayed as ruminating about the educational choice without deciding.

Based on these five identity dimensions, identity profiles have been derived using cluster analytic methods (Luyckx et al., 2008a; Luyckx, Soenens, Goossens, Beckx, & Wouters, 2008; Schwartz et al., 2011). Four of these profiles map onto Marcia's (1966) original statuses. Specifically, the 'achievement' identity profile is characterized by high scores on all five identity dimensions except for ruminative exploration. The 'foreclosure'

profile is characterized by high levels of the commitment dimensions and low levels of each of the exploration dimensions. The 'ruminative moratorium' profile is characterized by high scores on all three exploration dimensions and moderate to high levels of commitment making and identification with commitment. The 'troubled diffusion' profile is low on commitment making and identification with commitment, high on ruminative exploration, and moderate to high on exploration in breadth, and exploration in depth. In addition, Luyckx et al. (2008a, 2008b) found two new clusters: the 'carefree diffusion' profile is characterized by low levels on all five dimensions, and the 'undifferentiated' profile represents individuals whose scores on all dimensions are close to their respective sample means (Luyckx, Goossens, Soenens, Beyers, & Vansteenkiste, 2005; Luyckx et al., 2008a; Luyckx et al., 2008b).

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1.2 Motivation

SDT is based on a multidimensional view of motivation that distinguishes autonomous types of motivation from controlled types of motivation. Autonomous motivation can be mapped onto a gradient ranging from well-internalized to intrinsic motivation. Intrinsic motivation is the most autonomous type of motivation and describes the motivation to perform a behavior because it is experienced as inherently interesting or enjoyable (e.g., a student who reads a book because he finds the subject interesting or is curious about it). Identified motivation, a type of well-internalized motivation, is not performed purely for intrinsic reasons, but to achieve personally endorsed goals (Deci & Ryan, 1987). An illustration of identified motivation is when a student undergoes medical training he or she does not necessarily like, but because he or she has the eventual goal to become a doctor. As both intrinsic motivation and identified motivation are characterized by a sense of volition, corresponding scores often have been combined to form a composite score of autonomous motivation (e.g., Vansteenkiste, Lens, Dewitte, De Witte, & Deci, 2004).

Likewise, two types of controlled motivation have been distinguished. 'Introjection describes a type of regulation that is controlling because people perform such actions with the feeling of pressure in order to avoid guilt or anxiety, or to attain ego-enhancements or pride' (Ryan & Deci, 2000a, p. 62). An example of introjected motivation would be a student embarking on a bachelor's program because he would

feel ashamed if he did not. Although the source of control is inside the individual, it is not autonomous but experienced as pressure or tension. With extrinsic regulation, the source of control is outside the student. It represents behaviors initiated to attain a desired consequence or to avoid punishment (Ryan & Deci, 2000b). For example, a student might choose a certain bachelor's program to avoid negative consequences (e.g., criticisms from parents) or to receive a reward (e.g., promised by parents). This type of regulation is considered extrinsic because the reason for this behavior lies outside the activity itself. Finally, SDT identifies the possibility of a lack of motivation. This possibility, coined amotivation, is neither autonomous nor controlled. For example, a student might have chosen a bachelor's program without a clearly articulated reason.

Previous studies used motivational dimensions that are derived from the different motivation types to identify distinct motivational profiles (Cannard et al., 2016; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). Studies that included amotivation found profiles with 1) high autonomous motivation, low controlled motivation and low amotivation, 2) high autonomous motivation, high controlled motivation, and average amotivation, 3) low autonomous motivation, low controlled motivation, and average amotivation, and 4) low autonomous motivation, high controlled motivation and high/average amotivation (e.g. González, Paoloni, Donolo, & Rinaudo, 2012; Ratelle, et al., 2007). Thus, high autonomous motivation can co-occur with low(er) as well as high(er) levels of controlled motivation. Previous research already demonstrated that these two profiles predict different outcomes (Ratelle, et al., 2007), justifying a person-centered approach.

1.3 Relation of identity and motivation with educational outcomes

There is already some evidence that identity dimensions can predict educational outcomes. Germeijs and Verschueren (2007) found that commitment was positively associated with academic adjustment and academic achievement in the first year in higher education. Klimstra and colleagues (2012) found that college students with identified commitment were less likely to face study delays. Luyckx et al. (2008b) found a negative association between ruminative exploration and academic adjustment. Likewise, there is evidence that identity profiles predict educational outcomes. Most clearly, the achievement identity profile has been consistently associated with favorable

educational outcomes (e.g., Germeijs, Luyckx, Notelaers, Goossens, & Verschueren, 2012; Perez, Cromley, & Kaplan, 2014). Germeijs et al. (2012) also found that the foreclosure profile had relatively high means on favorable educational outcomes (i.e., academic and social adjustment), whereas the moratorium and the diffused profile had lower means regarding these favorable educational outcomes. However, Perez et al. (2014) found that the foreclosed identity profile was related to low competence beliefs. So, there seem to be some contradictory findings regarding the foreclosure profile.

With respect to the motivation dimensions, previous research suggested that autonomous motivation was positively associated with grade point average (e.g., Taylor et al., 2014; Vansteenkiste, et al., 2009). Controlled motivation has been found to predict a variety of undesirable educational outcomes including more dropout (e.g., Vallerand, Fortier, & Guay, 1997) and lower academic achievement (e.g., Vansteenkiste et al., 2009). Amotivation has been related to lower academic achievement (e.g., Taylor et al., 2014). Generally, previous research thus suggests that autonomous motivation is associated with better educational outcomes than controlled motivation or amotivation. Likewise, motivational profiles with high autonomous motivation were associated with higher levels of academic achievement. However, the level of achievement (e.g., grade point average and dropout) has also been shown to depend on the level of controlled motivation. That is, a combination of high autonomous motivation in combination with lower levels of controlled motivation has been found to predict better achievement compared to profiles with high levels of both autonomous and controlled motivation (Ratelle et al., 2007). Finally, profiles characterized by low autonomous motivation have been associated with lower levels of academic achievement (González et al., 2012; Ratelle et al., 2007; Vansteenkiste et al., 2009; Wormington, Corpus, & Anderson, 2012).

In sum, research has already focused on the constructs of identity formation and motivation in educational settings, using both variable-centered and person-centered approaches. However, some contradictory results have been found and the educational outcome variables did not always concern direct objective measures of students' achievement like the ones in the present study (i.e., obtaining 60 credits and dropout). In addition, no previous study combined the constructs of identity formation and motivation simultaneously in combined profiles the way we did, in spite of the potential merits of such an approach (e.g., as stressed by Waterman, 2004). Finally, no previous

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study had such a large sample with prospective students (N = 8,723) applying for a large variety of bachelor's programs (N = 71).

1.4 Research questions and hypotheses

The main purpose of the present study was to investigate whether identity formation combined with motivation can predict students' achievement in the first year in higher education. In order to achieve this purpose, we addressed the following four research questions. (1) How is identity associated with students' achievement using both a variable-centered approach and a person-centered approach? (2) How is motivation associated with students' achievement using both a variable-centered approach and a person-centered approach? (3) Can meaningful combined motivation-identity profiles be identified by combining the dimensions of identity and motivation? (4) How are these combined motivation-identity profiles associated with student's achievement? Based on these four research questions we propose four main hypotheses in the next paragraph. These hypotheses are, just like these research questions, linked to two indicators of students' achievement (i.e., obtaining 60 credits or not and dropping out or not). The best possible type of student's achievement in this study is deemed to be a combination of obtaining the 60 credits and not dropping out (i.e., being a successful stayer). So, if a particular dimension or profile is expected to be positively (or negatively) associated to students' achievement in one of the hypotheses below, this means that this particular dimension or profile is expected to be more (or less) likely to show up in the group of successful stayers compared to the other achievement groups.

With respect to Research Question 1, four hypotheses were proposed. Based on previous research (e.g., Germeijs & Verschueren, 2007; Klimstra et al., 2012), we expected that both commitment dimensions would be positively associated with students' achievement (*Hypothesis 1a*) and that ruminative exploration would be negatively associated with students' achievement (*Hypothesis 1b)*. For identity profiles, we expected based on earlier research (e.g., Germeijs et al., 2012; Perez et al., 2014) that the achievement identity profile would be positively associated with students' academic achievement (*Hypothesis 1c*) and that the diffused profile would be negatively associated with students' academic achievement (*Hypothesis 1d)*.

Regarding Research Question 2, based on previous research (e.g., Taylor et al., 2014; Wormington et al., 2012) we expected that autonomous motivation would be positively associated with students' achievement (*Hypothesis 2a)* and controlled motivation and/ or amotivation would be negatively associated with students' achievement *(Hypothesis 2b)*. For our person-centered analyses, we expected that profiles with high autonomous motivation would be positively associated with students' achievement (*Hypothesis 2c)* and profiles with only high controlled motivation would be negatively associated with students' achievement (*Hypothesis 2d)*.

With respect to our Research Questions 3 and 4, we followed the same line of reasoning as for our hypotheses regarding Research Question 1 and 2. However, because research on combined profiles and their association with educational outcomes is lacking, our hypotheses for these research questions were more tentative. We expected that having an achieved identity would go along with autonomous motivation (*Hypothesis 3a)* and that a diffused identity would go along with controlled motivation (*Hypothesis 3b)*. Other combinations (i.e., identity achievement that co-occurs with controlled motivation) could also exist and would be interesting to discover. However, based on previous literature we expect other combinations (e.g., identity achievement that co-occurs with controlled motivation) to occur less often.

Regarding students' achievement, we expected that profiles with a combination of identity achievement and high autonomous motivation would be positively associated with academic achievement (*Hypothesis 4a)* and profiles with a combination of identity diffusion and high controlled/(a)motivation would be negatively associated with academic achievement (*Hypothesis 4b)*.

2. Method

2.1 Participants and procedure

The initial sample consisted of 10,080 applicants for bachelor's programs at one of the largest universities of applied sciences in the Netherlands. These applicants filled out an online questionnaire as part of an intake procedure before they commenced their studies. Taking part of the intake procedure was an obligatory part of the admission procedure, although applicants could object to their data being included in the research.

At the beginning of the questionnaire, participants had the chance of withdrawing. This institution did not have an Institutional Review Board. However, to make sure the data collection and usage was according to ethical standards, we complied with the provisions of the Dutch Personal Data Protection Act. Furthermore, the content and process of the intake procedure and the data collection were approved by the central representative advisory board in which the board of directors was represented, as well as a staff member responsible for upholding data protection guidelines.

There were 747 individuals with missing values regarding academic achievement (the outcome variable in this study), resulting in a sample of 9,333 students with correctly administrated educational outcomes after one year. As the overwhelming majority of our target population consisted of late adolescents and young adults making educational decisions, we excluded the 6.5% applicants who fell outside of this scope (i.e., were older than 25 years) to increase sample homogeneity. This resulted in a final sample of 8,723 participants (47.1% female) aged between 16 and 25 years (M_{age} = 19.64, SD = 1.95).

2.2 Measures

2.2.1 Students' academic achievement

After one year in higher education, students' academic achievement (specifically, whether or not they obtained all 60 credits and/or dropped out of the originally chosen program) was derived from the student registration system (for a description of this procedure, see also Van Bragt, Bakx, Teune, & Bergen, 2011). Participants were labelled as dropouts when they ended the bachelor´s program they had enrolled, within or right after the first year. Switching to another program was also labelled as dropout from the initial program, because tracing a possible erroneous educational choice was of importance in this study.

As there were two dichotomous outcomes (yes/no) on two educational outcome variables (obtaining all 60 credits and dropout) we identified four groups of students: (1) dropouts who obtained all 60 credits ('successful dropouts'; N = 213), (2) stayers who obtained all 60 credits ('successful stayers'; N = 3,380), (3) stayers who did not obtain all 60 credits ('unsuccessful stayers'; N = 2,114) and (4) dropouts who did not obtain all 60 credits ('unsuccessful dropouts'; N = 3,016). We were therefore able to distinguish, for example, between students who dropped out because of failing academic performance

from students who dropped out of their original program for other reasons (e.g., because they wanted to pursue another educational program or career choice).

2.2.2 Identity

Identity formation was measured using the Dimensions of Identity Development Scale (DIDS: Luyckx et al., 2008a). The DIDS is a 25-item questionnaire (5 items for each dimension) rated on a 5-point Likert scale ranging from 1 (*completely disagree*) to 5 (*completely agree*) that assesses five identity dimensions. The five dimensions, assessed with five items each, were commitment making (e.g., 'I have an idea of what I will do in the future'), identification with commitment (e.g., 'My plans for the future correspond to my core interests and values), exploration in breadth (e.g., 'I actively consider the different directions that I can take in my life'), exploration in depth (e.g., 'I discuss the plans for the future that I have made with other individuals'), and ruminative exploration (e.g., 'I continue to ask myself what I should do with my life'). Cronbach's alphas are reported in Table 1. Due to a system error, the answers of 583 participants were not recorded, resulting in a sample of N = 8,140 for this scale.

2.2.3 Motivation

Students' motives for choosing a specific bachelor's program were assessed with a Dutch version of the Academic Self-Regulation Scale (Ryan & Connell, 1989), which has been used in previous work of Vansteenkiste, Zhou, Lens, and Soenens (2005). Participants answered each item on a 5-point Likert scale ranging from 1 (*completely disagree*) to 5 (*completely agree*). The five dimensions were assessed with four items each, and started with the sentence 'I am motivated about commencing my studies in this course program, because...'. These dimensions are intrinsic motivation (e.g., 'I enjoy doing it'), identified motivation (e.g., 'it is an important life goal to me'), introjected motivation (e.g., 'I want others to think I'm a good student'), extrinsic regulation (e.g., 'that is what others expect me to do'), and amotivation (e.g., 'The reasons for which I commence this bachelor's program are not clear to me'). Cronbach's alphas are reported in Table 1.

In order to make the set of variables not too extensive for the Latent Profile Analyses (LPAs) described in the next paragraph, we created composite scales for autonomous motivation as well as for controlled motivation. These composite scales were used for the

LPAs regarding motivational profiles as well as the combined motivation-identity profiles for better comparison. Composing these scales was done by averaging the subscales of intrinsic and identified motivation (α = .78), and introjected and external regulation (α = .79), respectively. This procedure was already followed by Vansteenkiste and colleagues (2009).

2.3 Analyses

To examine Research Question 1 (whether identity predicts students' achievement) a variable-centered as well as a person-centered approach was used. For the variable-centered approach, we conducted multinomial logistic regression analysis with either the identity dimensions or the motivation dimensions as independent variables, and age, gender and the chosen bachelor's program as covariates. The chosen bachelor's program was a categorical variable with six categories (Economic, Social, Health, Education, Science & Technology, and ICT). Students' achievement was the dependent variable with successful stayers as the reference group. Before conducting the chi-square tests on the identity profiles, Latent Profile Analysis (LPA) was used to identify these profiles. LPA is a variant of latent class analysis based on observed continuous rather than categorical variables. The LPAs were conducted in Latent GOLD 5.1 (Vermunt & Magidson, 2013). LPA groups individuals based on their scores on multiple characteristics (i.e., identity and motivation dimensions) in a way that maximizes between-group heterogeneity and within-group homogeneity.

The LPAs for the identity profiles were conducted in two steps. This procedure was also used for the motivational profiles and combined profiles later on. In the first step, individuals were clustered based on their pattern of scores on the identity dimensions. As this type of analysis is sensitive to outliers, we began these analyses by removing multivariate outliers (i.e., individuals with high Mahalanobis distance values; Garson, 1998) and univariate outliers (i.e., values with more than 3 *SD* below or above the mean; Hadi, 1992; 1994). Four criteria were used to determine the number of profiles. First, the Bayesian information criterion (BIC; Schwarz, 1978) was a criterion for model selection among a finite set of models; the model with the lowest BIC was preferred. Secondly, the solution with $k + 1$ profiles should lead to an improvement in model fit as indicated by a significant bootstrap/likelihood ratio (BLRT; Nylund, Asparouhov, &

Muthén, 2007). Third, the most parsimonious solution was selected if an additional profile in a *k* profile model was equal to one of the profiles presented in the *k* – 1 solution. Finally, if a distinct additional profile appeared, this solution was only chosen if this additional profile contained more than 5% of the sample.

In the second step of the LPA, we computed the probability of belonging to each of the profiles using individuals' scores on the identity dimensions. The classification probabilities were used to assign each individual to the profiles for which the classification probability was the largest. To examine Research Question 2 (whether motivation predicts students' achievement) the same procedure was followed as for Research Question 1 with the composite scales for motivation (i.e., autonomous motivation, controlled motivation, and amotivation).

To answer Research Question 3 (whether meaningful combined motivation-identity profiles can be identified) we conducted LPAs as described above. These analyses were conducted with the five identity dimensions and the composite scales for motivation. To examine Research Question 4 (how combined motivation-identity profiles predict students' academic achievement), again, chi-squared tests were performed.

3. Results

3.1 Identity and students' achievement

3.1.1 Identity dimensions

Cronbach's alphas and correlations of the measured variables are shown in Table 1. The results of the multinomial regressions with the five identity dimensions are presented in Table 2. In Table 2 coefficients on age, gender and type of bachelor's program were omitted (indices on all these variables are presented in Appendix A). These results suggest that commitment making, identification with commitment and exploration in breadth did not predict student's academic achievement. However, exploration in depth and ruminative exploration were associated with students' achievement.

Table 1. Cronbach's alphas of and correlations between the measured variables.

	α	2	3	4	5	6	7	8	9	10	11	12	13
1. Age		.15**	.10**	.10**	.08**	-.04**	-.06**	.20**	.02	.01	-.02	-.12**	.06**
2. Commitment making	.86		.75**	.27**	.44**	-.49**	.36**	.48**	-.04**	-.13**	-.30**	-.01	-.00
3. Identification with commitment	.79			.24**	.40**	-.51**	.43**	.51**	-.06**	-.18**	-.33**	-.00	-.02
4. Exploration in breadth	.68				.53**	.24**	.18**	.30**	.11**	.02	-.08**	-.03*	.01
5. Exploration in depth	.61					.07**	.23**	.34**	.12**	.02	-.12**	.04**	-.02*
6. Ruminative exploration	.79						-.23**	-.21**	.24**	.24**	.31**	-.02	.03*
7. Intrinsic motivation	.66							.55**	-.03**	-.24**	-.38**	.08**	-.10**
8. Identified regulation	.70								.08**	-.11**	-.35**	.02	-.04**
9. Introjected regulation	.69									.54**	.21**	-.04**	-.00
10. Extrinsic regulation	.72										.38**	-.06**	.04**
11. Amotivation	.90											-.08**	.07**
12. Propaedeutic exam													-.54**
13. Drop out													

** *p* < .001. *Notes.* Propaedeutic exam passed = 60 obtained credits (1 = Yes, 0 = No), DROP-OUT (1 = Yes, 0 = No). The correlational analyses between the continuous variables and the dichotomous variables were done by point-biserial correlations.

Table 2. Odds ratios of identity dimensions with the students' achievement groups as dependent variables (successful stayers as reference group).

Predictors	Successful dropouts		95% CI for Odds Ratio			Unsuccessful stayers		95% CI for Odds Ratio			Unsuccessful dropouts		95% CI for Odds Ratio		
	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper
Commitment making	-.11	.92	.71	.90	1.12	0.06	1.84	0.97	1.07	1.17	-0.01	0.08	0.91	0.99	1.07
Identification with commitment	-0.21	2.42	0.62	0.81	1.06	0.06	1.21	0.95	1.06	1.18	-0.06	1.55	0.85	0.94	1.04
Exploration in breadth	0.02	0.01	0.77	1.02	1.34	0.11	3.57	1.00	1.11	1.25	0.05	1.03	0.95	1.05	1.17
Exploration in depth	-0.02	0.01	0.75	0.98	1.29	-0.09	2.51	0.82	0.92	1.02	-0.16**	10.29	0.77	0.85	0.94
Ruminative exploration	.21*	3.96	1.00	1.23	1.51	.01	.04	.93	1.01	1.10	0.07	3.71	1.00	1.08	1.16

Note. Only the odds ratios of the identity dimensions are presented here. The analyses were controlled for gender, age and type of bachelor's program. Indices on all variables are presented in Appendix A. Commitment Making: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model χ^2(24) = 661.95, p < .001. Identification with commitment: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model χ^2(24) = 665.29, p < .001. Exploration in breadth: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model χ^2(24) = 661.63, p < .001. Exploration in depth: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model χ^2(24) = 668.51, p <.001. Ruminative exploration: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model χ^2(24) = 665.32. p < .001. * p < .05, ** p < .01.

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Participants' score on exploration in depth predicted a reduced likelihood of belonging to the unsuccessful dropout group (b = -.16, p < .01), compared to being a successful stayer. Participants' score on ruminative exploration predicted an increased likelihood of belonging to the successful dropout group (b = .21, p < .05), compared to being a successful stayer. Although these effects were significant, effect sizes were small (R^2 = .04, Cox & Snell and R^2 = .05, Nagelkerke, for both).

3.1.2 Identity profiles

In order to determine identity profiles we conducted LPAs on the five identity dimensions. Prior to conducting LPAs, we removed 145 univariate outliers and 14 multivariate outliers from the initial sample (N = 8,140), resulting in a sample of 7,981 participants. Solutions up to six profiles resulted in lower BIC values and significant BLRT values, suggesting that each additional profile contributed to model fit improvement (see Appendix B for detailed statistics). The six-profile solution was reliable (i.e., seven identical log-likelihood values in ten trial runs). In the seven-profile solution an additional meaningful profile appeared, but it was very small (< 5%). Therefore, the six-profile solution was chosen as the final solution. This line of reasoning was also followed for identifying the motivational profiles (from now on called 'motivation-only profiles') and the combined motivation-identity profiles later on.

As depicted in Figure 1, we identified an 'undifferentiated' profile (28.0%), a 'ruminative moratorium' profile (22.0%), a 'carefree diffusion' profile (18.7%), a 'troubled diffusion' profile (12.6%), a 'foreclosure' profile (9.5%), and an 'achievement' identity profile (9.2%). These percentages are based on the proportional assignments presented in the ANOVA table in Appendix B.

Our results replicated those obtained in previous studies, which also reported six identity profiles (Luyckx et al., 2008a; Luyckx, et al., 2008b; Schwartz et al., 2011). However, our results did not indicate a significant association between identity profiles and students' academic achievement (χ^2 = 15.54, ns). Table 3 shows that across the six identity profiles, the observed and expected frequencies of the student's achievement groups were not significantly different from each other.

Table 3. Students' achievement outcomes for the six identity profiles.

Identity profiles		Undifferentiated N = 2,376	Moratorium N = 1,737	Carefree diffusion N = 1,457	Diffused diffusion N = 971	Foreclosure N = 716	Achievement N = 724	Total N = 7,981
Students' achievement								
Successful dropout	Observed count	51	51	34	28	11	20	
	Expected count	58.1	42.4	35.6	23.7	17.5	17.7	
	Standardized Residual	-.9	1.3	-.3	.9	-1.6	.5	
Successful stayer	Observed count	926	657	553	351	288	252	
	Expected count	901.2	658.8	552.6	368.3	271.6	274.6	
	Standardized Residual	.8	-.1	.0	-.9	1.0	-1.4	
Unsuccessful stayer	Observed count	583	422	365	233	174	171	
	Expected count	579.9	424.0	355.6	237.0	174.8	176.7	
	Standardized Residual	.1	-.1	.5	-.3	-.1	-.4	
Unsuccessful dropout	Observed count	816	607	505	359	243	281	
	Expected count	836.9	611.8	513.2	342.0	252.2	255.0	
	Standardized Residual	-.7	-.2	-.4	.9	-.6	1.6	

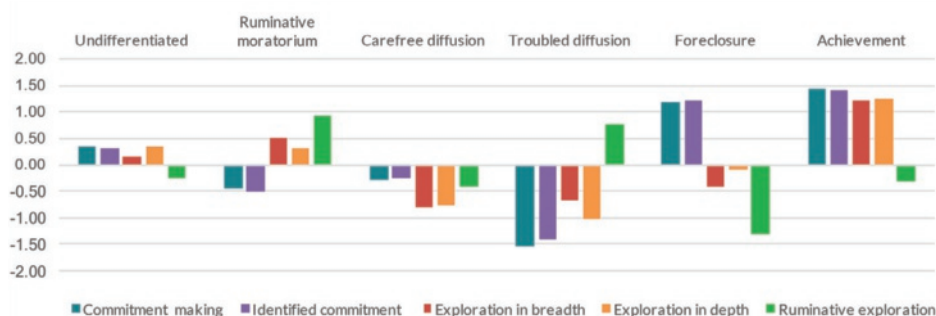*Note.* Effect size: Cramer's V = .04 (ns) (df = 15)

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Figure 1. Six identity profiles

3.2 Motivation and students' achievement

3.2.1 Motivation dimensions

The results of the multinomial regressions with the three motivation scales are presented in Table 4. In Table 4 coefficients on age, gender and type of bachelor's program were omitted (indices on all these variables are presented in Appendix C). Results suggest that all three scales had significant associations with students' achievement. Participants' score on autonomous motivation predicted a reduced likelihood of belonging to the successful dropout group (b = -.41, p < .05) or the unsuccessful dropout group (b = -.34, p < .001), compared to being a successful stayer. Participants' score on controlled motivation predicted a reduced likelihood of belonging to the successful dropout group (b = -.33, p < .05), compared to being a successful stayer. Participants' score on amotivation predicted an increased likelihood of belonging to the unsuccessful stayer group (b = .17, p < .05) or the unsuccessful dropout group (b = .39, p < .001), compared to being a successful stayer. Although these effects are significant, their effect sizes are rather small (R^2 = .08).

3.2.2 Motivation-only profiles

We conducted LPAs on the three motivation scales to identify motivation-only profiles. The subsequent steps that were followed are described in paragraph 3.1.2 (see Appendix D for more statistic details).

The profiles we identified (Figure 2) were a 'high quality' profile (69.5%, with above-average autonomous motivation and below-average controlled motivation and amotivation), a 'low quality' profile (17.0%, with below-average autonomous motivation and above-average controlled motivation and amotivation) and an 'amotivated' profile

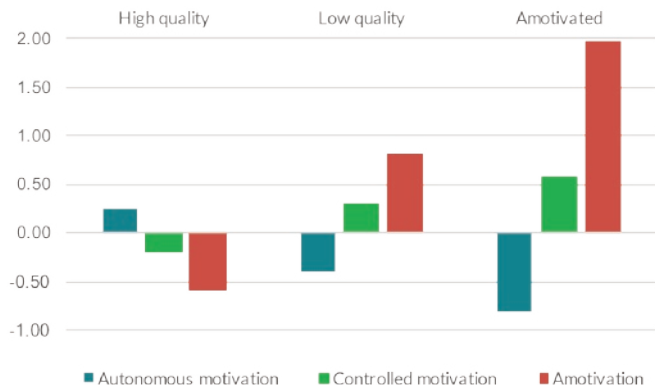(13.5%, with below-average autonomous motivation, above-average controlled motivation, and high amotivation).

Figure 2. Three motivational-only profiles

These percentages are based on the proportional assignments presented in the ANOVA table in Appendix D.

There was a significant association between motivation-only profiles and students' academic achievement (χ^2 = 37.54, p < .001). The effect size was small however (Cramer's V = .05). Table 5 suggests that in the group of successful stayers, the high quality profile was significantly overrepresented and the amotivated profile was significantly underrepresented. In the group of unsuccessful dropouts, the amotivated profile was significantly overrepresented and the high quality profile was significantly underrepresented. No significant differences between motivation-only profiles were found for successful dropouts and unsuccessful stayers.

Table 4. Odds ratios of motivation dimensions with the students' achievement groups as dependent variables (successful stayers as reference group).

	Successful dropouts		95% CI for Odds Ratio			Unsuccessful stayers		95% CI for Odds Ratio			Unsuccessful dropouts		95% CI for Odds Ratio		
	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper
Autonomous motivation	-0.41*	5.72	0.48	0.66	0.91	-0.01	0.02	0.87	0.99	1.12	-0.34***	29.40	0.63	0.71	0.80
Controlled motivation	-0.33*	4.74	0.53	0.72	0.97	0.06	1.33	0.96	1.07	1.19	0.07	1.80	0.97	1.07	1.18
Amotivation	0.16	0.83	0.83	1.17	1.65	0.17*	6.08	1.04	1.19	1.36	0.39***	38.92	1.31	1.47	1.67

Note. Only the odds ratios of the motivation dimensions are presented here. The analyses were controlled for gender, age and type of bachelor's program. Indices on all variables are presented in Appendix C. Autonomous motivation (intrinsic motivation and identified regulation): R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(24)$ = 734.94, $p < .001$. Controlled motivation (introjected regulation and extrinsic regulation): R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(24)$ = 704.37, $p < .001$. Amotivation: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(24)$ = 735.74, $p < .001$. * $p < .05$; ** $p < .01$.

Table 5. Students' achievement for the three motivation-only profiles

Motivation-only profiles		High quality	Low quality	Amotivated	Total
Students' achievement		N = 5,758	N = 1,394	N = 1,128	N = 8,280[a]
Successful dropout	Observed count	155	26	25	
	Expected count	143.3	34.7	28.1	
	Standardized Residual	1.0	-1.5	-.6	
Successful stayer	Observed count	2333	500	369	
	Expected count	2226.7	539.1	436.2	
	Standardized Residual	**2.3**	-1.7	**-3.2**	
Unsuccessful stayer	Observed count	1385	348	282	
	Expected count	1401.3	339.2	274.5	
	Standardized Residual	-.4	.5	.5	
Unsuccessful dropout	Observed count	1885	520	452	
	Expected count	1986.8	481.0	389.2	
	Standardized Residual	**-2.3**	1.8	**3.2**	

Note. Standardized Residuals in bold are those that exceed +/- 1.96 (MacDonald & Gardner, 2000). Effect size: Cramer's V = .05, p < .001 with df = 6.
[a] N = 8,280 (8,723 - 443 univariate/multivariate outliers).

3.3 Identifying combined motivation-identity profiles

In order to identify combined motivation-identity profiles, we conducted LPAs on the five identity dimensions and the three composite motivation dimensions. The subsequent steps that were followed are described in paragraph 3.1.2 (see Appendix E for more statistic details).

The five profiles we found (Figure 3) were a 'moderately positive' profile (60.7%), which was the most common one, an 'amotivated' profile (13.3%), a 'moderately negative' profile (9.9%), an 'autonomously achieved' profile (9.1%), and a 'controlled & troubled diffused' profile (7.0%). These percentages are based on the proportional assignments presented in the ANOVA table in Appendix E. In the moderately positive profile, the favorable dimension of autonomous motivation was just above average whereas the less favorable dimensions (ruminative exploration, controlled motivation, and amotivation) were just below average. In the moderately negative profile, this was the other way around. In the amotivated profile, the dimension of amotivation was very distinct from the other dimensions within its own profile but also in comparison with other profiles. In the autonomously achieved profile, the commitment and exploration dimensions were above average (except for ruminative exploration), autonomous motivation was above average and controlled and amotivation were below average (i.e., high quality of motivation). In the controlled & troubled diffusion profile, a combination of a troubled diffusion and a low quality of motivation could be identified. Basically, four of our profiles thus mirrored each other. That is, the moderately positive and moderately negative profiles were each other's opposites, and the same was true for the autonomously achieved and controlled & troubled diffusion profiles. The amotivated profile did not have a 'mirror profile'.

From the results of the ANOVAs (described in Appendix E), we can infer that the means of all the identity dimensions (except for exploration in breadth) were significantly different between the five combined motivation-identity profiles. Regarding the motivation dimensions, the means for autonomous motivation, controlled motivation and amotivation were not always significantly different between the profiles (e.g., autonomous motivation did not differ between the amotivated and controlled & troubled diffused profiles).

3.4 Combined motivation-identity profiles and students' achievement

The combined motivation-identity profiles significantly predicted students' academic achievement ($\chi^2 = 41.07$, $p < .001$), but the effect size was rather small (Cramer's $V = .04$). Table 6 shows that especially among the successful stayers, students with a moderately positive profile were significantly overrepresented and students with an amotivated profile were significantly underrepresented. In the group of unsuccessful dropouts, the students with a moderately positive profile were significantly underrepresented, whereas the amotivated and controlled & troubled diffused profile were significantly overrepresented. We found no significant deviations from the expected distribution of combined motivation-identity profiles in the groups of successful dropouts and unsuccessful stayers.
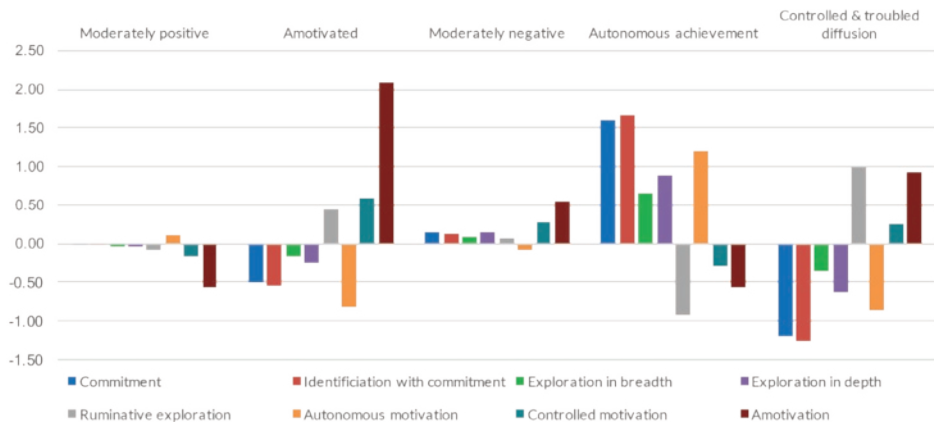
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Figure 3. Five combined motivation-identity profiles.

Table 6. Students' achievement for the five combined motivation-identity profiles.

Combined motivation-identity profiles		Moderately positive	Amotivated	Moderately negative	Autonomously achieved	Controlled & troubled diffused
Students' achievement		N = 4,774	N = 1,055	N = 782	N = 707	N = 511
Successful dropout	Observed count	121	23	14	16	15
	Expected count	115.2	25.5	18.9	17.1	12.3
	Standardized Residual	.5	-.5	-1.1	-.3	.8
Successful stayer	Observed count	1910	338	288	269	184
	Expected count	1,822.6	402.8	298.6	269.9	195.1
	Standardized Residual	**2.0**	**-3.2**	-.6	-.1	-.8
Unsuccessful stayer	Observed count	1170	269	200	169	105
	Expected count	1,166.5	257.8	191.1	172.8	124.9
	Standardized Residual	.1	.7	.6	-.3	-1.8
Unsuccessful dropout	Observed count	1573	425	280	253	207
	Expected count	1,669.6	369.0	273.5	247.3	178.7
	Standardized Residual	**-2.4**	**2.9**	.4	.4	**2.1**

Note. Standardized Residuals in bold are those that exceed +/- 1.96 (MacDonald & Gardner, 2000). Effect size: Cramer's $V = .04$, $p < .001$ with $df = 12$. $N = 7,829$ (8,723 - 583 missings - 311 univariate/multivariate outliers).

4. Discussion

The present study was designed to identify whether identity and motivation separately and combined predict students' achievement in the first year in higher education. First, we examined whether identity was associated with students' academic achievement (Research Question 1). Using a variable-centered approach, we found no significant associations between the commitment dimensions and students' achievement, in contrast to previous research (Germeijs and Verschueren, 2007; Klimstra et al., 2012). Thus, Hypothesis 1a was not supported. An explanation could be that high commitment at the start of a bachelor's program might have been based on misconceived ideas. In that case, the student might drop out after he recognizes that the reality is different. Exploration in depth and ruminative exploration were associated with students' achievement. Students were more likely to be a successful stayer than an unsuccessful dropout when they engaged in more exploration in depth. Furthermore, students were more likely to be a successful dropout than a successful stayer when they ruminated, which is in line with the findings of Luyckx and colleagues (2008b). So, Hypothesis 1b was supported.

Furthermore, regarding the identity profiles, no significant associations were found between our (replicated) six identity profiles and students' achievement. Hence, we found no support for Hypothesis 1c and Hypothesis 1d. Identity was assessed with a scale measuring a distal predictor, because it assessed the future domain of identity formation (one of the limitations, see also below), which could be a possible reason for the null findings. Another possible explanation for this is the Dutch educational context in which only a limited amount of exploration is feasible: Adolescents have to make these choices very early, often before they are mature enough to oversee the consequences. For example, in secondary education in third grade, 14-year olds already have to decide on a selection of subjects that exclude the selection of some bachelor's programs later on (cf. Klimstra, Luyckx, & Meeus, 2012).

Secondly, we were interested in whether motivation dimensions and motivation-only profiles could predict students' achievement (Research Question 2). Consistent with previous research (Taylor et al., 2014; Vallerand, et al., 1997; Vansteenkiste, et al., 2009) autonomous motivation was positively associated with students' achievement and controlled motivation and amotivation were negatively associated with students'

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achievement. Students were more likely to be a successful stayer than an (un)successful dropout when they were autonomously motivated. Students were more likely to be an (un)successful dropout than a successful stayer when they had controlled motivation or amotivation. Therefore, Hypothesis 2a and Hypothesis 2b were supported.

Using a person-centered approach, we found a high quality, a low quality, and an amotivated motivation profile. No profiles with either high autonomous motivation, high controlled motivation, and average amotivation or low autonomous motivation, low controlled motivation and average amotivation were found, in contrast to other studies (e.g., González et al., 2012). However, the three profiles found in our study were analogous to profiles in other studies employing college students samples (e.g., Boiché, & Stephan, 2014; Haerens, Kirk, Cardon, De Bourdeaudhuij, & Vansteenkiste, 2010).

The three motivation-only profiles predicted students' achievement significantly. In line with previous studies (Hayenga & Corpus, 2010; Vansteenkiste et al., 2009), the high quality profile was overrepresented among the successful stayers and underrepresented among the unsuccessful dropouts. The low quality profile was underrepresented among the successful stayers and overrepresented among unsuccessful dropouts. So, autonomous motivation was positively associated with students' achievement, supporting Hypothesis 2c. Controlled motivation was negatively associated with students' achievement, supporting Hypothesis 2d. These findings support SDT (Ryan & Deci, 2000b) by showing that the quality of the motivation matters the most compared to the quantity of motivation.

Next, we examined whether identity and motivation could be integrated into meaningful combined motivation-identity profiles (Research Question 3). We identified a moderately positive profile, an amotivated profile, a moderately negative profile, an autonomously achieved profile, and a controlled & troubled diffusion profile. The autonomously achieved profile represented students who scored above average on commitment, exploration, and autonomous motivation and below average on ruminative exploration, controlled motivation, and amotivation. Thus, in this profile it seems that having an achieved identity tends to go along with autonomous types of motivation, which supports Hypothesis 3a. Additionally, we found two less favorable profiles, namely the amotivated profile and the controlled & troubled diffusion profile. These two profiles, representing about 20% of the sample, showed a lack of exploration, commitment,

and autonomous motivation, combined with high ruminative exploration, controlled motivation, and amotivation. These profiles support Hypothesis 3b, as being diffused goes along with controlled types of motivation. Thus, in line with previous research (Cannard et al., 2016), weak commitments and a lack of reflective exploration, combined with relatively high levels of ruminative exploration, appears to characterize demotivated students.

Finally, we found that the combined motivation-identity profiles predicted students' achievement significantly (Research Question 4). However, these combined profiles are not better predictors of academic achievement than the motivation-only profiles. Especially among the successful stayers, students with a moderately positive profile were overrepresented and students with an amotivated profile were underrepresented. We hypothesized however, that identity achievement combined with autonomous motivation (i.e., the autonomously achieved profile) would be the most favorable combination concerning students' achievement. Therefore, Hypothesis 4a was not supported. In the group of unsuccessful dropouts, the students with a moderately positive profile were underrepresented whereas the amotivated and the controlled & troubled diffused profile were overrepresented. As expected, the profiles with a combination of diffusion and high controlled/(a)motivation (i.e., amotivated profile and the controlled & troubled diffused profile) were overrepresented in the groups of unsuccessful dropouts, supporting Hypothesis 4b. In other words, prospective students who do not have clear motives at the start of a bachelor's program were less successful in the first year of their study career.

Remarkably, the autonomously achieved profile did not have added predictive value over the high quality motivation profile. Classification probabilities, might be one of the explanations why this high-quality motivation is the best predictor of successful staying while this is no longer the case when high-quality motivation is combined with indicators of successful identity development (i.e., the autonomous achieved profile). The classification probabilities were very high regarding the motivation-only profiles (0.99 or 1.00) but not so much for the autonomous achieved profile (between 0.5 and 1.0). A frequency table on classification probabilities is given in Appendix F. Thus, in the autonomous achieved profile the classification accuracy for a large number of individuals was rather low, which might have made it more difficult to achieve statistically significant

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results. Another line of thought is that identity achievement is something that pays off only after some time. For instance, in a study of Luyckx, Duriez, Klimstra, and De Witte (2010), the foreclosed profile co-occurred with comparably favorable adjustment in the short run (compared to the achievement identity profile), but not in the longer run. Since the scope of this study was just one year, a recommendation for future research would be to conduct this study over a period of four years. That way, one could compare the performance of autonomously achieved students with the performance of other students for the duration of a complete bachelor's program. A final thought here is that in the educational domain identity profiles were mostly examined in relation to adjustment and well-being indicators (Luyckx, Goossens, Soenens, et al., 2006; Germeijs et al., 2012; Schwartz et al., 2011). Obviously, the way students' achievement was operationalized in this study was different from the way indicators of adjustment/well-being are operationalized. One important difference is, for example, that our students' academic achievement variable was an objective outcome, whereas effects of identity variables on adjustment/well-being indicators are confounded with shared-method variance.

Regardless, the finding of the combination of achieved identity and autonomous motivation in the autonomously achieved profile is in line with our expectations and previous research. Luyckx et al. (2010) found that autonomous motivation was associated with commitment making and identification with commitment, and Soenens et al. (2011) found that individuals who were more autonomously motivated also engaged more in identity exploration. Subsequently, troubled diffusion and unfavorable motivation went hand in hand in the amotivated and the controlled & troubled diffused profile, as expected. This is in line with research of Cannard et al. (2016) who found that ruminative exploration was overrepresented in amotivated students. These findings are also consistent with Waterman's (2004) suggestion that a lack of exploration and commitment might go along with a lack of intrinsic motivation. Thus, it seems that positive aspects of identity formation go together with positive motivation orientations and negative aspects of identity formation with negative motivation orientations.

4.1 Limitations and recommendations for future research

The first limitation concerns potential response bias. Although the operationalization of motivation in this study was specifically focused on the educational context, the identity

measure assessed more generally future plans. This is a limitation because the items focused on exploration and commitment with respect to general future goals. Perhaps the measurement of identity formation was not specific enough to predict academic achievement. A recommendation for future research would be to use an identity scale that taps more specifically into the educational domain. An example could be the Utrecht-Management of Identity Commitments Scale (U-MICS; Meeus, 2001; Crocetti, Rubini, & Meeus, 2008) that aims to assess commitment, in-depth exploration and reconsideration of commitment. Its items can be used to assess identity dimensions in different domains, such as the educational or relational domain. Furthermore, the questionnaire was filled out as part of an application procedure. The answers of the prospective students had no consequences for their application, as they were allowed to commence their desired bachelor's program regardless of their answers. However, the fact that these students were applying for a certain program might still have caused some socially desirable answering, perhaps reducing the variance in the scores.

A second limitation is that we did not use longitudinal data. For example, it is an open question as to whether a lack of motivation suppresses identity commitment, or whether the absence of identity commitment was the reason for less intrinsic or no motivation. A recent longitudinal study by Luyckx et al. (2017) suggests that the former explanation may be more likely, as they found that an intrinsic goal orientation positively predicted commitment making and identification with commitment over time whereas an extrinsic goal orientation positively predicted ruminative exploration over time. However, ruminative exploration also predicted relative decreases in intrinsic orientation over time, suggesting that identity dimensions may also predict motivation dimensions. Longitudinal research could also examine whether motivation is a mediator of effects of identity, since the dimensions of identity and quality of motivation were quite substantially related in this study. Regarding the choice of a bachelor´s program, the reasoning would be that students need to be in touch with their most important preferences, values, and interests (i.e., to have clear identity commitments) in order to make an autonomous choice for a bachelor's program (i.e., a choice that is well-aligned with these preferences, values, and interests). Soenens et al. (2011) already found that motivation was a mediator of identity styles.

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Third, the rather low reliabilities of two scales (exploration in depth and intrinsic motivation) are a limitation. Both scales have few items (exploration in depth had five items and intrinsic motivation had four items), which could partly explain their lower Cronbach's alphas. These scales have proven to be reliable in previous research (e.g., Vallerand & Bissonnette, 1992; Klimstra, Luyckx, Goossens, Teppers & De Fruyt, 2013), but measures that are more reliable (have less error variance) might yield different profiles in LPAs. Likely, those profiles would have been stronger predictors of achievement.

Finally, for some individuals the classification probabilities were very high regarding the motivation-only profiles (0.99 or 1.00), but not so much for some of the combined profiles (between 0.5 and 1.0; for an example, see Appendix F). Thus, in the combined profiles the classification accuracy for a number of individuals was rather low, which might have made it more difficult to achieve statistically significant results with the combined profiles.

4.2 Conclusion

Despite some limitations, the present study is the first to show that the co-occurrence of identity formation dimensions and motivation result in combined profiles of identity and motivation. These combined motivation-identity profiles predicted students' achievement in the first year of higher education. However, these combined profiles are not better predictors of academic achievement than the motivation-only profiles. Students who had an unfavorable identity profile combined with low quality motivation at the start of a bachelor's program in higher education, seemed to be more likely to not obtain 60 credits in the end of the year and/or to drop out. Because approximately 20% of our sample was classified in these unfavorable profiles, it would be beneficial to identify these students at an early stage and give them more support in their decision making process regarding their educational choice for higher education. With this information, parents, teachers, and career counsellors might be better equipped to facilitate these students in their future orientation and stimulate them in finding reasons to (not) start a bachelor's program, for example by advising them to make use of open education days and class visits offered by universities. A well-explored identity along with autonomous motivation seems important for study success, so these qualities should be facilitated.

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"Sometimes the wrong choices bring us to the right places."

- Unknown author

Chapter 4

The association between students' need satisfaction and their motivation: the longitudinal change and stability of motivational profiles during a transition

Abstract

The transition from secondary education to higher education can be a risk for motivation, especially when the new educational environment is not aligned with students' needs. The purpose of this study was to examine to what extent students' motivation changes after the transition to higher education and how students' need satisfaction is associated with this motivation. Students' need satisfaction was assessed among 1,311 university students (62.5% female, M_{age} = 19.18, SD = 2.04) and operationalised by four proxy indicators of need satisfaction: satisfaction with major choice, social adjustment, academic adjustment, and self-efficacy. Motivation was assessed before and after enrolment and three motivational profiles were replicated across these two time points. Motivation changed to a large extent (55% of the students), but not in the same way for every student. All four proxy indicators of students' need satisfaction were positively associated with motivation after enrolment. The strongest associations found were for satisfaction with choice and academic adjustment.

1. Introduction

An educational transition is a critical phase in students' lives and can place significant demand on them (Tinto, 1993). Educational transitions can be a risk for academic motivation (e.g., Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Symonds & Hargreaves, 2016). After all, students have to adjust to a new learning context with different tasks, goals (Scalera & Alivernini, 2010) and new peer groups. Some students go through this phase without any problems while others seem to encounter some difficulties (Ratelle, Guay, Larose, & Senécal, 2004; Roeser, Eccles, & Freedman-Doan, 1999).

A theory that specifically studies motivation during the transition to secondary education is the stage-environment theory (Eccles et al., 1993). This theory is a developmental variant of the person-environment fit theory (Hunt, 1975) and is consistent with ideas of Self-Determination Theory (SDT; Ryan & Deci, 2000a). Person-environment theorists claim that students have better academic achievement and higher satisfaction when there is congruence between them and their educational environment (Allen & Robbins, 2008; Nye, Su, Rounds, & Drasgow, 2012). SDT theorists posit that individuals seek experiences that fulfil the fundamental needs for autonomy, relatedness, and competence through interaction with their environment (Deci & Ryan, 1985, 2000). Thus, motivation originates when the environment provides opportunities for the student to develop a sense of autonomy, positive relationships with others, and personal competence (Deci & Ryan, 1985, 2000; Reeve, 2002). The extent to which the school environment is perceived (experienced) by students to be supportive of these needs, their motivation in school will be enhanced (how an individual perceives an environment may be just as important as the environment itself; Deci & Ryan, 1985). The focus of this study was to examine how congruence between students' need satisfaction and the new educational environment is associated with motivation in the context of a transition to higher education.

The aim of this study was twofold. One aim was to examine whether the satisfaction of students' needs in the new the university environment is predictive of their motivation. In this study, four proxy indicators represented students' needs satisfaction: satisfaction with major choice, social adjustment, academic adjustment, and self-efficacy. These variables are outlined below after reviewing the construct of motivation.

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The other aim was to examine whether the decline in motivation already found in the transition to secondary education, could also be found in the transition to higher education. Using a longitudinal person-centred approach, this study identified students' motivational profiles before as well as after commencement of a bachelor's program. Adopting this person-centred approach offers two advantages. First, it can address the claim of Self-determination theory that the qualitative difference between autonomous and controlled motivation is of importance for describing students' motivation (González, Paoloni, Donolo, & Rinaudo, 2012). Second, viewed from a more practical perspective, students with certain profiles can be identified, which aids diagnosis and interventions within universities.

1.1 Types of motivation

SDT (Ryan & Deci, 2000a) is a motivational theory that is based on a multidimensional view of the concept of motivation. Deci & Ryan (1985) distinguished different reasons or goals that give rise to an action. They approach motivation as a continuum ranging from behaviours originating within the self (autonomous motivation) to those spurred by external factors (controlled motivation). Intrinsic motivation, an autonomous type of motivation, occurs when individuals engage in behaviours that are perceived as inherently interesting or enjoyable. Identified regulation, another type of autonomous motivation but less volitional, is performed to achieve personally endorsed goals (Deci & Ryan, 1987). Introjected regulation represents behaviours spurred by external forces (and is therefore a controlled type of motivation) that have been internalized (Ryan & Deci, 2000a). Lastly, extrinsic regulation, also a type of controlled motivation, represents behaviours initiated by external constraints, such as monetary rewards or threats. When motivation is lacking, this is called amotivation, referred to as 'a state of motivational apathy in which students harbour little or no reason (motive) to invest energy and effort' (Cheon & Reeve, 2015, p. 99).

Generally speaking, research suggests that autonomous motivation leads to better educational outcomes than controlled types of motivation or amotivation (e.g., Taylor et al., 2014; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009).

1.2 Students' need satisfaction and motivation

SDT and stage-environment theory assume that the degree to which students perceive that the new university environment (after the transition) develops a sense of autonomy, positive relationships with others, and personal competence, determines their quality of motivation (Deci & Ryan, 1985, 2000; Reeve, 2002). In light of these three needs, we examined four proxy indicators of students' need satisfaction as predictors for motivation: Satisfaction with major choice, social adjustment, academic adjustment, and self-efficacy. These four variables can be regarded as proxy indicators related to the satisfaction of the three basic needs, as is described below.

Students feel a sense of autonomy when their study work relates to their interests (Roeser, Eccles, & Sameroff, 1998), that is, when the courses are meaningful, relevant, and related to students' personal interests and goals (Finn & Voelkl, 1993). When choosing a bachelor's program, prospective students often base this decision on the congruence between the (activities of the) program and their own values and interests. Students' satisfaction with this choice can therefore be seen as a proxy indicator of students' experience of this congruency. This satisfaction is subject to whether the students' experiences in the new environment, endorse the students' initial expectations of the choice they made (Suhre, Jansen, & Harskamp, 2007). Therefore, we assessed students' satisfaction major choice ten weeks after they had started their program.

Relatedness refers to the need to experience oneself as socially connected to other people (Connell & Wellborn, 1991). Wigfield, Eccles, and Rodriguez (1998) found that after the transition to middle school, many aspects of the social environment seem to have negative effects on students' intrinsic motivation. They claim that the teacher-student relationship and the relationships with peer students are essential after this transition. So, becoming integrated into the social life in the new university environment and forming a support network, among others, are essential elements to feel related. To create a proxy indicator of whether the students experienced to be socially integrated into the new university environment, we assessed their social adjustment after ten weeks.

Students' need for competence is fulfilled when they know how to effectively achieve desired outcomes (Skinner & Belmont, 1993). Self-efficacy beliefs tend to decline as students advance through school (Schunk & Pajares, 2002; Pintrich & Schunk, 1996),

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especially among students who are less academically prepared to cope with increasingly challenging academic tasks. This decline has been attributed to, among others, school transitions. Lack of self-efficacy and lack of academic adjustment can negatively affect motivation (Fredricks & Eccles, 2002; Roeser, Eccles, & Freedman-Doan, 1999; Schunk & Pajares, 2002). Hence, students' need to feel competent is represented by two proxy indicators in this study: academic adjustment and self-efficacy. Academic adjustment refers to the students' experience to meet the educational demands (Baker & Siryk, 1984). Self-efficacy focuses on students' belief that they can successfully perform in the university environment after ten weeks (Pintrich, 1991).

1.3 Change in motivation after educational transitions

Studies have already revealed that educational transitions are a risk factor for motivation (Eccles et al., 1993; Tuominen-Soini, Salmela-Aro, & Niemivirta, 2012). It has been suggested that motivation is most threatened right after the transition and a resulting decline can persist thereafter (Wigfield & Eccles, 2000). Nevertheless, not all students experience declining motivation. For example, the risk appears to be higher among students who perceive low competence beliefs and who are poorly adjusted (Fredricks & Eccles, 2002; Roeser, Eccles, & Freedman-Doan, 1999).

Relatively few empirical studies have explicitly investigated the longitudinal change and stability of motivational profiles using a person-centred approach. Corpus and Wormington (2014) found that motivational clusters were moderately stable with 62% of the students remaining in the same profile between fall and spring. Hayenga and Corpus (2010) found a general trend towards lower quality motivation profiles (low autonomous and high controlled motivation) among middle school students in which 56.5% of the sample remained in the same cluster. However, to our knowledge, no studies have examined the development of motivational profiles across the specific educational transition to higher education. The uniqueness of this study is that motivation was measured across an educational transition (i.e., from secondary education to higher education education). This is important because the stability in motivation assessed in the above-described studies might possibly have been overestimated since these studies only investigated stability outside educational transitions (e.g., during middle school).

1.4 The present study

Despite extensive research, there are some gaps in the literature, which the present study aims to address. First, it is known that motivation can be spurred by the satisfaction of basic needs, but not so much in higher education yet. By gaining insight into four proxy indicators related to the needs for autonomy, relatedness, and competence, interventions can be conducted to get students more autonomously motivated. Second, there is a lack of knowledge on the development of motivational profiles during educational transitions to higher education. In general, we know that motivation declines after transitions (Veen, Jong, Leeuwen, & Korteweg, 2005), which plausibly results from a lack of need satisfaction. However, it could be that the trajectory is different for individual students (some may even increase in motivation). Identifying specific profiles of students is important when setting up targeted interventions in order to increase their motivation.

Thus, the purpose of this study was to examine to what extent students' motivation changes after the transition to higher education and how students' need satisfaction is associated with this motivation. Specifically, we addressed the following research questions:

1. What kind of motivational profiles can be identified before and after the transition to higher education?
2. How do students change regarding their motivational profiles after the transition to higher education?
3. How are our proxy indicators of students' need satisfaction (i.e., satisfaction with major choice, social adjustment, academic adjustment, and self-efficacy) associated with motivational profiles after the transition?

Regarding the first research question, based on prior research (e.g., González, Paoloni, Donolo, & Rinaudo, 2012; Ratelle, Guay, Vallerand, Larose, & Senécal, 2007) we expected to find four motivational profiles, consisting of combinations of: 1) high autonomous motivation, low controlled motivation and low amotivation, 2) high autonomous motivation, high controlled motivation, and average amotivation, 3) low autonomous motivation, low controlled motivation, and average amotivation, and 4) low autonomous motivation, high controlled motivation and high/average amotivation (*Hypothesis 1*).

Regarding the second research question, as previous studies have exhibited moderate stability between motivational profiles of 62% (Corpus and Wormington, 2014) and 56.5% (Hayenga & Corpus, 2010) in the same educational context, we expected less stability in our study as we incorporate two different educational contexts during a transition (*Hypothesis 2*).

Regarding the third research question, we hypothesize that satisfaction with major choice (e.g., Wach, Karbach, Ruffing, Brünken, & Spinath, 2016), social and academic adjustment (e.g., Dennis, Phinney, & Chuateco, 2005), and self-efficacy (Veen, et al., 2005) are positively associated with the motivational profile with the highest quality of motivation (i.e., autonomous motivation) (*Hypothesis 3*).

2. Method

2.1 Participants and procedure

The initial sample consisted of 7,785 applicants for fulltime bachelor's programs at one of the largest universities of applied sciences in the Netherlands. These applicants filled out an online questionnaire as part of an intake procedure before they commenced their studies. Taking part in the intake procedure was an obligatory part of the admission procedure, although applicants could object to their data being included in the research. At the beginning of the questionnaire, participants had the chance of withdrawing. This institution did not have an Institutional Review Board. However, to make sure the data collection and usage was according to ethical standards, we complied with the provisions of the Dutch Personal Data Protection Act. Furthermore, the content and process of the intake procedure and the data collection were approved by an advisory board in which the board of directors was represented, as well as a staff member responsible for upholding data protection guidelines.

The participants at Time 1 were also approached ten weeks after their commencement (Time 2) to participate another time. Of these students, 1,311 (16.8%) agreed to participate again (62.5% female, M_{age} = 19.18, SD = 2.04). Probably, students found it easier to decline this request the second time, when they already entered their new educational environment and were no longer required to comply with admission procedures. This could be a reason for the lower response at Time 2.

Because of the lower response at Time 2, we performed an attrition analysis to see whether the drop-outs (N = 6,474) differed from the non-dropouts (N = 1,311) on the variables measured at T1. Specifically, one-way ANOVAs were conducted in order to examine how these two groups differed with respect to gender, age and the five types of motivation. ANOVA mean comparisons of group membership (no dropout/dropout) on the measured variables are presented in Table 1. From this table we can infer that almost all comparisons are statistically significant, but this is to be expected given the large sample size. Effect sizes were very small, however. Thus, it seems that the group of non-dropouts (our research sample) does not represent a biased sample.

2.2 Measures

2.2.1 Motivation

Students' motivation was assessed with a Dutch version of the Academic Self-Regulation Scale (Ryan & Connell, 1989) before as well as ten weeks after commencement. This version has already been used in previous work of Vansteenkiste, Zhou, Lens, and Soenens (2005). Five types of motivation were assessed and participants answered items on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree).

Table 1. ANOVA mean comparisons of group membership (no dropout/dropout) on measured variables

	No dropout N = 1,311		Dropout N = 6,474		Total N = 7,785		F-value	R^2
	M	SD	M	SD	M	SD		
Gender (female)	62.5%	0.48	43.4%	0.50	46.6%	0.50	163.88***	.02
Age	19.13	2.03	19.52	2.11	19.45	2.10	37.90***	.00
Intrinsic motivation	4.49	0.42	4.41	0.45	4.42	0.44	35.19***	.00
Identified motivation	4.33	0.49	4.29	0.50	4.30	0.49	6.19*	.00
Introjected motivation	2.18	0.81	2.23	0.82	2.22	0.82	3.88*	.00
Extrinsic motivation	1.36	0.47	1.44	0.53	1.42	0.52	22.74***	.00
Amotivation	1.17	0.35	1.21	0.40	1.21	0.40	14.80***	.00

Note. *** p < .001 and * p < .05.

Motivation assessed before enrolment was based on students' expectations, as students had not experienced the program yet and their expectations were (partially) based on

their own constructed image of the program. Motivation assessed after enrolment was based on students' first experiences; they had experienced the new university environment with their first courses, first exams, and first contacts with teachers and peer students. Therefore, motivation assessed before enrolment will be referred to as 'expected motivation', and motivation assessed after enrolment will be referred to as 'experienced motivation'.

2.2.2 Students' need satisfaction

The independent variable in this study, students' need satisfaction, was operationalized by four proxy indicators, that is, satisfaction with major choice (from now on called satisfaction with choice), social adjustment, academic adjustment, and self-efficacy. Satisfaction with choice was measured ten weeks after commencement with the Academic Major Satisfaction Scale (AMSS), constructed by Nauta (2007). In our context, an academic major was operationalized as the chosen bachelor's program. For this study, the scale was translated into Dutch and back-translated by two different researchers. The AMSS uses a 5-point Likert-type scale from 1 (*completely disagree)* to 5 (*completely agree*).

To measure social adjustment in higher education, the Dutch 20-item shortened version (Beyers, 2001; Beyers & Goossens, 2002) of the Student Adaptation to College Questionnaire (SACQ; Baker & Siryk, 1984) was used ten weeks after commencement. Social adjustment was measured with 10 items tapping into how well students deal with interpersonal experiences at the university. All items were rated on a 5-point Likert scale ranging from 1 (*completely disagree*) to 5 (*completely agree*).

Academic adjustment was also assessed by the Dutch 20-item shortened version of the SACQ (Beyers, 2001; Beyers & Goossens, 2002). It was measured ten weeks after commencement with 10 items tapping into the educational demands of the university experience. All items were rated on a 5-point Likert scale ranging from 1 (*completely disagree*) to 5 (*completely agree*).

Self-efficacy was measured ten weeks after commencement with the Self-Efficacy for Learning and Performance Scale of Pintrich (1991). For this study, the scale was translated into Dutch and back-translated by two different researchers. Based on a pilot measurement we selected three items with the highest item-total correlation from the

original scale with seven items (α = .79). These three items were rated on a 5-point Likert scale ranging from 1 (*completely disagree*) to 5 (*completely agree*).

Example items, number of items per scale, and Cronbach's alphas for all investigated variables are presented in Table 2.

Table 2. Example items and Cronbach's alphas per scale

Scale	Example item	Items	α	
Intrinsic motivation	I am motivated about (commencing) my studies in this bachelor's program, because I enjoy doing it.	4	.77	.79
Identified motivation	I am motivated about (commencing) my studies in this bachelor's program, because it is an important life goal to me.	4	.74	.75
Introjected motivation	I am motivated about (commencing) my studies in this bachelor's program, because I want others to think I'm a good student.	4	.79	.75
Extrinsic motivation	I am motivated about (commencing) my studies in this bachelor's program, because that is what others expect me to do.	4	.78	.80
Amotivation	The reasons for which I commence this bachelor's program are not clear to me.	4	.90	.92
Satisfaction with choice	I wish I was happier with my choice of a bachelor's program.	6	-	.89
Social adjustment	I am meeting as many people and making as many friends as I would like at the university.	10	-	.87
Academic adjustment	Recently I have had trouble concentrating when I try to study.	10	-	.72
Self-efficacy	I'm certain I can understand the most difficult material presented in the readings.	3	-	.86

2.3 Analytic strategy

First, descriptive statistics like means, standard deviations and basic associations were computed. To identify motivational profiles (Research Question 1), a person-centred approach was used and Latent Profile Analyses (LPA) were conducted. LPA is a variant of Latent Class Analysis based on observed continuous rather than categorical variables. In the first step, individuals were clustered based on their pattern of scores on the motivational dimensions before their commencement. Four criteria were used

to determine the number of profiles. First, the Bayesian information criterion (BIC; Schwarz, 1978) is a criterion for model selection among a finite set of models; the model with the lowest BIC is preferred. Secondly, the solution with k + 1 profiles should lead to an improvement in model fit as indicated by a significant bootstrap/likelihood ratio (BLRT; Nylund, Asparouhov, & Muthén, 2007). Third, the most parsimonious solution was selected if an additional profile in a k profile model was equal in fit to one of the profiles presented in the k – 1 solution. Finally, if a distinct additional profile appeared, this solution was chosen only if this additional profile contained more than 5% of the sample. In the second step of the LPA, we computed the probability of belonging to each of the profiles using the individual's scores on the motivational dimensions. The classification probabilities were used to assign each individual to the profile for which the classification probability was the largest. We repeated this procedure in order to identify the motivational profiles after commencement. After that, every student had two motivational profiles, one before commencement and one after commencement.

In order to identify students' shifts in group membership (Research Question 2), every possible shift from a motivational profile at Time 1 to a motivational profile at Time 2, was coded for every student, resulting in motivational change configurations. A unique code was assigned to every possible shift for every single student. In order to examine the stability of and changes in the group memberships, a configural frequency analysis (CONFA; von Eye, 1990) was conducted. CONFA compares the observed to expected frequencies in a cross-tabulation and asks whether cell frequencies are larger or smaller than could be expected. Configurations of which the observed frequency is significantly higher than the expected frequency are referred to as 'Types'. Configurations of which the observed frequency is significantly lower than the expected frequency are referred to as 'Antitypes'.

To answer Research Question 3 we conducted multinomial logistic regression analyses with one of the proxy indicators of students' need satisfaction (e.g., social adjustment) as the independent variable with age and gender as covariates, and experienced motivation ($t = 2$) as the dependent variable. Expected motivation ($t = 1$) was also incorporated as independent variable to control for a certain level of (expected) motivation that students can have as part of stable factors, such as their personality.

3. Results

3.1 Descriptive analyses

We conducted preliminary analyses on means, standard deviations and basic associations. Results in Table 3 demonstrate that in all cases, the four proxy indicators of students' need satisfaction were positively correlated with autonomous types of motivation (intrinsic and identified) and negatively correlated with controlled types of motivation (introjected and extrinsic) and amotivation. Furthermore, we can infer from Table 4 that the means of the autonomous types of motivation were significantly lower at Time 2 and the means of controlled types of motivation and amotivation were significantly higher at Time 2.

3.2 Motivational profiles

Research Question 1 addressed the identification of motivational profiles before and after the transition to higher education. Regarding expected motivation at Time 1, LPAs showed that solutions up to three profiles resulted in lower BIC values and significant BLRT values, suggesting that each additional profile contributed to model fit improvement (see Table 5). Additionally, the three-profile solution was very reliable (i.e., the same log-likelihood values in subsequent runs), but profile solutions with more than three profiles were not. Therefore, the three-profile solution was chosen as the final model. The entropy value was 0.97, which indicates that the three-profile model provided a clear classification.

For the Time 1 scores, the first profile we identified was a 'high quality' profile (42.5%) because prospective students in this profile displayed autonomous motivation above the sample mean and controlled motivation and amotivation below the sample mean (Figure 1). Furthermore, we identified a 'high quantity' profile (34.2%), in which prospective students displayed all types of motivation above the sample mean, except for amotivation. Finally, we identified a 'low quality' profile (23.3%) in which prospective students displayed autonomous types of motivation below the sample mean, and controlled motivation and amotivation above the sample mean.

Table 3. Correlations between all variables.

Measures	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
Time 1														
1.Intrinsic Motivation	-													
2.Identified motivation	.60**	-												
3.Introjected motivation	-.05	.14**	-											
4.Extrinsic motivation	-.29**	-.14**	.45**	-										
5.Amotivation	-.38**	-.31**	.17**	.42**	-									
Time 2														
6.Intrinsic Motivation	.38**	.29**	-.04	-.18**	-.19**	-								
7.Identified motivation	.27**	.42**	.04	-.10**	-.15**	.65**	-							
8.Introjected motivation	-.13**	-.03	.42**	.32**	.16**	-.18**	.03	-						
9.Extrinsic motivation	-.24**	-.18**	.20**	.39**	.28**	-.34**	-.19**	.60**	-					
10.Amotivation	-.26**	-.25**	.08**	.21**	.29**	-.59**	-.48**	.30**	.52**	-				
11.Satisfaction with choice	.27**	.21**	-.06*	-.16**	-.21**	.69**	.51**	-.28**	-.40**	-.71**	-			
12.Social adjustment	.20**	.17**	-.07*	-.13**	-.17**	.45**	.36**	-.23**	-.29**	-.45**	.50**	-		
13.Academic adjustment	.25**	.26**	-.04	-.16**	-.23**	.57**	.48**	-.22**	-.34**	-.58**	.59**	.51**	-	
14.Self-efficacy	.17**	.11**	-.08**	-.10*	-.13**	.31**	.21**	-.15**	-.21**	-.30**	.36**	.27**	.39**	-

Note. ** *p* < .01 and * = *p* <.05.

Table 4. Means and standard deviations for all variables.

Variable	Time 1		Time 2		
	M	*SD*	*M*	*SD*	*Sig.*
Intrinsic motivation	4.49	0.42	4.16	0.55	.00
Identified motivation	4.33	0.49	4.18	0.54	.00
Introjected motivation	2.18	0.81	2.27	0.81	.00
Extrinsic motivation	1.36	0.47	1.61	0.64	.00
Amotivation	1.17	0.35	1.42	0.61	.00
Satisfaction with choice	-	-	4.32	0.68	
Social adjustment	-	-	3.91	0.54	
Academic adjustment	-	-	3.64	0.50	
Self-efficacy	-	-	3.85	0.65	

Note. The last row of the table reports the significance of difference between the means at Time 1 and time 2.

Table 5. Information criteria values for different profile solutions with motivational dimensions at T1.

Number of profiles	Log Likelihood	BIC[a]	BLRT *p*-value[b]	Entropy	Group sizes
1	-4602.76	9277.31	-	-	1311
2	-637.71	1426.16	.00	.96	984, 327
3	885.14	-1540.56	.00	.97	557, 449, 305

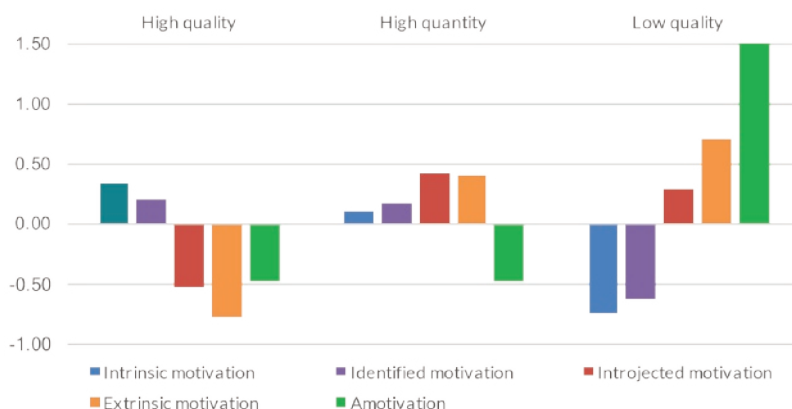*Notes.* [a] Bayesian information criteria. [b] Bootstrap likelihood ratio.

Figure 1. Students' z- scores of motivational dimensions as a function of group membership at Time 1

We replicated the LPAs with the motivational dimensions measured at Time 2 (experienced motivation). Again, LPAs showed that solutions up to three profiles resulted in lower BIC values and significant BLRT values, suggesting that each additional profile contributed to model fit improvement (see Table 6). Additionally, the three-profile solution was very reliable (i.e., the same log-likelihood values in eight of ten subsequent runs). Solutions with more than three profiles did not add another distinctive profile. Therefore, the three-profile solution was chosen as the final model. The entropy value was 0.96, which indicates that the three-profile solution provided a clear classification.

The profiles we identified (see Figure 2) were very similar to the profiles before the transition but in a different order regarding their frequency; a 'low quality' profile (43.8%), a 'high quantity' profile (30.7%), and a 'high quality' profile (25.5%).

Table 6. Information criteria values for different profile solutions with motivational dimensions at T2.

Number of profiles	Log Likelihood	BIC[a]	BLRT p-value[b]	Entropy	Group sizes
1	-6185.74	12443.27	-	-	1311
2	-3407.87	6966.49	.00	.98	727, 584
3	-2698.63	5626.97	.00	.96	575, 402, 334

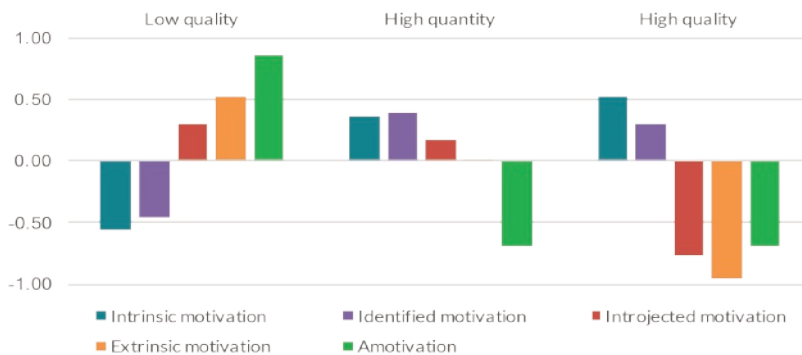*Notes.* [a] Bayesian information criteria. [b] Bootstrap likelihood ratio.

Figure 2. Students' z- scores of motivational dimensions as a function of group membership at Time 2.

3.3 Motivational change

Research Question 2 addressed the question of how students change regarding their motivational profiles after the transition to higher education. The combination of the three motivational profiles at Time 1 and Time 2 provided nine possible configurations. From each possible Time 1 profile, students could remain in the same profile, or move to two other profiles at Time 2.

Table 7 presents the longitudinal shifts of group memberships between profiles. Among all the possible combinations, three were identified as Types (i.e., particularly frequent combinations), which all referred to cells representing stability of group membership (i.e., same profile at both measurement points). In other words, these three Types indicate that more frequently than expected, these students displayed the same motivational profile across the two measurement points. Furthermore, it was untypical for students with a high quality profile to move to a low quality profile and for students with a high quantity profile to move to a high quality profile (Antitypes). Additionally, it was untypical for students with a low quality profile to move either to a high quality profile or a high quantity profile. In other words, these four Antitypes indicate that less frequently than expected, these students displayed the same motivational profile across the two measurement points.

Table 7. Configural frequency analysis on Time 1 and Time 2 motivational profiles.

	Time 1	Time 2	Observed f	Expected f	χ	p	Types
1	High quality	High quality	215	141.91	6.14	0.00	Type
2	High quality	High quantity	173	170.80	0.17	0.43	
3	High quality	Low quality	169	244.30	-4.82	0.00	Antitype
4	High quantity	High quality	89	114.39	-2.37	0.01	Antitype
5	High quantity	High quantity	164	137.68	2.24	0.01	Type
6	High quantity	Low quality	196	196.93	-0.07	0.47	
7	Low quality	High quality	30	77.70	-5.41	0.00	Antitype
8	Low quality	High quantity	65	93.52	-2.95	0.00	Antitype
9	Low quality	Low quality	210	133.77	6.59	0.00	Type

In general, from Table 8 we can infer that fewer students (14.0%) moved to a more favourable profile (e.g., high quantity to high quality) and most students (41.0%) moved to a less favourable profile (e.g., high quantity to low quality). Finally, almost half (45%) of the students did not change motivational profiles at all.

Table 8. Longitudinal shifts in cluster membership.

Before commencement (T1)	Ten weeks after commencement (T2)			
	1	2	3	Total
1.High Quality	215	173	169	557 (42.5%)
2.High Quantity	89	164	196	449 (34.2%)
3.Low Quality	30	65	210	305 (23.3%)
Total	334 (25.5%)	402 (30.7%)	575 (43.8%)	1,311 (100%)

3.4 Associations between students' need satisfaction and motivation

Research Question 3 examined whether our four proxy indicators of students' need satisfaction were positively associated with high quality motivation (in this case the high quality profile). The results of the multinomial logistic regressions are presented in Table 9. These results suggest that scores on the proxies of students' need satisfaction (except in one case of self-efficacy) were positively associated with high quality motivation. Participants' score on satisfaction with choice (b = -2.87, p < .001), social adjustment (b = -1.79, p < .001), academic adjustment (b = -2.46, p < .001), and self-efficacy (b = -0.88, p < .001) predicted a reduced likelihood of belonging to the low quality profile compared to being a student belonging to the high quality profile. Furthermore, participants' score on satisfaction with choice (b = -0.62, p < .001), social adjustment (b = -0.47, p < .01), and academic adjustment (b = -0.42, p < .05) predicted a reduced likelihood of belonging to the high quantity profile, compared to being a student belonging to the high quality profile. Effect sizes were the largest for satisfaction with choice (R^2 = .35, Cox & Snell and R^2 = .40, Nagelkerke) followed by academic adjustment (R^2 = .27, Cox & Snell and R^2 = .30, Nagelkerke), social adjustment (R^2 = .22, Cox & Snell and R^2 = .25, Nagelkerke), and self-efficacy (R^2 = .16, Cox & Snell and R^2 = .18, Nagelkerke).

Table 9. Odds ratios for basic needs satisfaction proxies and covariates with the motivational profiles (T=2) as dependent variables.

Predictors	Low quality T2						High quantity T2					
				95% CI for Odds Ratio						95% CI for Odds Ratio		
	b	SE	Wald	Lower	Odds Ratio	Upper	b	SE	Wald	Lower	Odds Ratio	Upper
Intercept	13.41***	1.26	114.02				2.68*	1.19	5.09			
Gender	0.14	0.18	0.58	0.81	1.14	1.62	0.05	0.17	0.08	0.76	1.05	1.45
Age	-0.05	0.04	1.56	0.88	0.95	1.03	0.00	0.04	0.00	0.93	1.00	1.07
Low quality motivation T1	1.69***	0.25	46.68	3.34	5.43	8.82	0.88***	0.25	12.30	1.47	2.41	3.93
High quantity motivation T1	0.99***	0.19	27.03	1.85	2.69	3.91	0.82***	0.17	23.85	1.64	2.28	3.17
Satisfaction with choice	-2.87***	0.22	175.11	0.04	0.06	0.09	-0.62***	0.21	8.34	0.36	0.54	0.82
Intercept	8.65***	1.07	65.35				2.05	1.06	3.73			
Gender	.31	.16	3.47	.98	1.36	1.87	.09	.16	.27	.79	1.09	1.50
Age	-.10**	.04	6.88	.84	.91	.98	-.02	.04	.26	.91	.98	1.06
Low quality motivation T1	1.93***	.23	69.23	4.37	6.89	10.85	.92***	.25	13.68	1.54	2.50	4.06
High quantity motivation T1	1.02***	.18	33.69	1.96	2.76	3.90	.83***	.17	24.23	1.65	2.29	3.19
Social adjustment	-1.79***	.18	103.50	.12	.17	.24	-.47**	.17	7.40	.44	.62	.88
Intercept	9.51***	1.05	82.35				1.51	1.02	2.18			
Gender	-0.01	0.17	0.00	0.71	0.99	1.38	0.04	0.17	0.07	0.75	1.04	1.44
Age	-0.04	0.04	0.91	0.90	0.96	1.04	-0.01	0.04	0.03	0.93	0.99	1.07
Low quality motivation T1	1.78***	0.24	56.71	3.74	5.94	9.45	0.91***	0.25	13.42	1.53	2.48	4.04
High quantity motivation T1	1.05***	0.18	33.75	2.00	2.85	4.05	0.83***	0.17	24.48	1.65	2.30	3.20
Academic adjustment	-2.46***	0.20	144.80	0.06	0.09	0.13	-0.42*	0.20	4.61	0.45	0.66	0.96

4

Table 9. (continued) Odds ratios for basic needs satisfaction proxies and covariates with the motivational profiles (T=2) as dependent variables.

Predictors	Low quality T2						High quantity T2					
				95% CI for Odds Ratio						95% CI for Odds Ratio		
	b	SE	Wald	Lower	Odds Ratio	Upper	b	SE	Wald	Lower	Odds Ratio	Upper
Intercept	4.35***	0.86	25.42				0.89	0.86	1.06			
Gender	0.28	0.16	3.04	0.97	1.32	1.81	0.08	0.16	0.22	0.78	1.08	1.49
Age	-0.07	0.04	3.34	0.87	0.94	1.00	-0.01	0.04	0.04	0.93	0.99	1.07
Low quality motivation T1	2.09***	0.23	83.98	5.15	8.05	12.58	0.97***	0.25	15.38	1.62	2.63	4.27
High quantity motivation T1	1.00***	0.17	34.68	1.95	2.71	3.78	0.83***	0.17	24.18	1.65	2.29	3.19
Self-efficacy	-0.88***	0.12	49.86	0.33	0.42	0.53	-0.25	0.13	3.93	0.61	0.78	1.00

Note. Gender: 0 = male, 1 = female. Motivation was a categorical variable with three categories (high quality profile, high quantity profile, and low quality profile). The high quality profile served as reference category. Satisfaction with choice: R^2 = .35 (Cox & Snell), R^2 = .40 (Nagelkerke). Model $\chi^2(10)$ = 568.35, p < .001. Social adjustment: R^2 = .22 (Cox & Snell), R^2 = .25 (Nagelkerke). Model $\chi^2(10)$ = 319.26, p < .001. Academic adjustment: R^2 = .27 (Cox & Snell), R^2 = .30 (Nagelkerke). Model $\chi^2(10)$ = 408.87, p < .001. Self-efficacy: R^2 = .16 (Cox & Snell), R^2 = .18 (Nagelkerke). Model $\chi^2(10)$ = 226.63, p < .001.

4. Discussion

The purpose of this study was to examine to what extent students' motivation changes after the transition to higher education and how students' need satisfaction is associated with this motivation.

Our first research question focused on the identification of motivational profiles. We identified three motivational profiles: a high quality profile, a high quantity profile, and a low quality profile before as well as after the transition. Our three profiles are analogous to profiles observed in other studies (e.g., Grund, 2013). Therefore, Hypothesis 1 was partly supported. We found no profile with low autonomous motivation, low controlled motivation, and average amotivation, in contrast with some previous studies focusing on higher education (e.g., González et al., 2007). The absence of the low quantity profile is perhaps due to the fact that commencing a program in higher education is a voluntary choice (as opposed to secondary education) and some level of motivation can be assumed to be present, even though it might be controlled motivation.

Our second research question focused on the students' change between motivational profiles after the transition to higher education. Because we identified three analogous motivational profiles before as well as after the transition, we obtained nine motivational change configurations. We expected less stability than the ones found in other studies (62%: Corpus and Wormington, 2014; 56.5%: Hayenga & Corpus, 2010). We found that almost half of the students (45%) significantly displayed a stable motivational profile over time. Therefore, Hypothesis 2 was supported. Overall, the mean levels of motivation between Time 1 and Time 2 decreased, which has been already found in previous Dutch research (e.g., Hofman et al., 2001; Veen, et al, 2005). Similarly, most of the changes in group memberships were directed toward groups with less favourable motivational profiles. A possible explanation could be that some students might not have had a realistic picture of the program and based their motivation on unrealistic expectations, resulting in disappointment in the first months of the study (Van Bragt, Bakx, Teune, Bergen, & Croon, 2011).

Our findings regarding a mean-level decline in motivation are in line with the stage-environment theory (Eccles et al., 1993) which posits that after school transitions (to secondary education) motivation declines. Likewise, we found a decline in quality of motivation after the transition to higher education. Means of autonomous types of

motivation decreased, means of controlled types of motivation increased, and 41% of the students switched to less favourable motivational profiles. According to the stage-environment theory this decline can be attributed to the lack of fit between students' developmental needs and the new school environment, assuming a positive association between need satisfaction and motivation. Indeed, that is what we found regarding Research Question 3.

Regarding our third research question, we found that, as expected, the four proxies of students' need satisfaction were positively associated with autonomous motivation (i.e., the high quality profile). These findings were in accordance with previous findings (Baily & Philips, 2016; Dennis, et al., 2005; Wach, et al., 2016; Veen, et al., 2005). Thus, Hypothesis 3 was supported. These findings are in accordance with SDT (Ryan & Deci, 2000b). In line with SDT we found that students with self-determined motivational profiles (i.e., the high quality profile) were more likely to display need satisfaction in the form of satisfaction with choice, social adjustment, academic adjustment, and self-efficacy.

4.1 Limitations and future research

The present study should be considered in light of some limitations. First, although the sample was very large and unique (a large sample of secondary education students making the transition to higher education who were measured at two time points in two different educational contexts), participants measured at Time 2 may not have been representative for the total population that started their bachelor's program. As stated already, attrition between both time points was rather substantial. Some students might have already dropped out in the first weeks. Because filling out the questionnaire at Time 2 was voluntary, self-selection could have taken place.

Furthermore, we associated four proxies regarding students' need satisfaction with motivation. These four proxy indicators were chosen because they have been regularly examined in association with motivation in research on higher education (e.g., Schunk & Pajares, 2002; Suhre, Jansen, & Harskamp, 2007; Wigfield, Eccles, & Rodriguez, 1998). An alternative would have been to measure need satisfaction more directly. Future research might use existing scales for this purpose (e.g., Chen, Vansteenkiste et al., 2015: Sheldon, Elliot, Kim, & Kasser, 2001). However, we felt that certain items of these scales

were too generally phrased for new students to answer after ten weeks (e.g., 'I feel my choices express who I really am').

A final limitation is that our design did not give insight in which specific feelings, experiences, or thoughts, necessary for autonomous motivation, ensure that students feel that their needs for autonomy, relatedness, and competence are satisfied. An avenue for future research to gain more fine-grained insight into the cause-and-effect associations between students' needs and motivation would be to collect data by means of experience sampling. This would be an ideal way to map emotional and cognitive processes that influence need satisfaction and motivation on a micro-level.

Furthermore, more in-depth knowledge could be gained by a mixed-method approach in which quantitative as well as qualitative methods are combined (e.g., by means of interviews). Thus, students could be asked what they believe they need after a transition, by means of 'voicing' (i.e., the challenge to give students a voice in their own learning- and development process, by articulating their internal experiences; Otter, 2015).

4.2 Conclusion

Our results indicated that there are indeed individual differences in the quality of motivation, but that on average this quality decreases during a transition. Results indicated, when investigating our third research question on students' need satisfaction, that it might be possible to counter this decrease, however. Specifically, it seems promising to put some extra effort in satisfying students' needs, especially during the first few weeks in the new university environment. Consistent with SDT, students feel more engaged in school when they feel welcome, safe, more efficacious, and autonomous (Connell & Wellborn, 1991; Wentzel, 2009; Wigfield, Eccles, Fredricks, Simpkins, Roeser, & Schiefele, 2015). One way to promote this may be to let all students have a moment of reflection after having entered the new university environment to give thought to how these needs are (or are not) met. Follow-up interventions can then be devised to boost the satisfaction of these basic needs.

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"If you align expectations with reality, you will never be disappointed"

- Terrell Owens (American football player)

Chapter 5

Student teachers' motives for participating in the teacher training program: a qualitative comparison between continuing students and switch students

Abstract

This study sought to gain insight into student teachers' motives for enrolling, continuing or withdrawing from a primary teacher training program, and compare these motives between continuing students and switch students before and after their enrolment. Twenty-two Dutch student teachers (continuing students: $N = 10$; 70.0% females, $M_{age} = 20.00$, switch students: $N = 12$; 66.7% females, $M_{age} = 20.83$) participated in this interview study. Several motives regarding the teacher training program were identified. Both groups primarily cited intrinsic motives for enrolling in the program. Disappointment in the profession, as well as content of the program and difficulty level of the program, were the main motives to leave. Enthusiasm about the profession and the social environment were the primary motives to continue the program.

1. Introduction

As in many other countries, the Netherlands is facing a shortage of teachers in primary and secondary education (Moses, Berry, Saab, & Admiraal, 2016), presumably because many teachers are approaching the retirement age (OECD 2016). Over the last few decades, the Netherlands has experienced three other problems with regard to teacher shortages: too few candidates entering teacher education (recruitment problem), too many teachers leaving teacher training or the teacher profession after a short period (attrition problem; Day & Gu, 2010), and a considerable proportion of teacher education graduates not entering the teaching profession (job entry problem; Rots, Aelterman, & Devos, 2014). In the current study, we focus on the problem of attrition during teacher training.

In order to gain more insight into the attrition problem in teacher education, it is useful to gather information on the motives of different groups of student teachers in order to set up and improve policies specifically targeted toward retention (De Cooman et al., 2007; Richardson & Watt, 2006). A closer look at students' *motives for withdrawal* is obviously of interest, but understanding successful students' *motives for continuing* is also considered to be useful as a benchmark for increased retention (Van Bragt, Bakx, Teune, & Bergen, 2011). A profile of different student groups regarding their motivations was conducted by Struyven, Jacobs, and Dochy (2013) and examined in terms of students' gender, age, and educational background. However, few studies have profiled students in terms of 1) student teachers who continue their education after the first year (continuing students) and 2) student teachers who withdraw from the teacher training program and switch to another program within the university in or after the first year (from now on referred to as switch students). Another part of understanding the attrition problem is to gain insight into student teachers' motives for *enrolling* in the teacher training program in the first place (Andersson & Linder, 2010; Corts & Stoner, 2011). Hence, the central goal of this study is to gain insight into the differences between the motives given by continuing students and switch students for enrolling, continuing or leaving a primary teacher training program (from now on referred to as a *teacher training program*) and to compare these motives before and after enrolment. Such insights can add knowledge to the current literature on the topic and could be of practical use for developing necessary

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interventions to reduce attrition problems. Before we present our specific research questions, we now turn to the existing literature on student teachers' motives.

1.1 Theoretical background: Student teachers' motives

Motivations for choosing teaching as a career have been studied for several decades (Heinz, 2015). According to Sinclair, Dowson, and McInerney (2006), it is important to attract student teachers with the 'right' motives, because students with these motives 'engage deeply in their pre-service preparation and their subsequent professional lives' (Sinclair et al., 2006, p. 1138). Many studies have already focused on student teachers' motives for choosing a teacher training program. These studies consistently show that, in general, intrinsic motivations are central (e.g., working with young people, the desire to make a difference to society, and reasons related to the profession itself) but also motives like job security, holidays and teaching as a fall-back career are considered to be important (Hobson & Malderez, 2005; König & Rothland, 2012; Younger, Brindley, Pedder & Hagger, 2004).

Researchers have characterized motives for choosing teaching as a career in different ways. For example, some researchers describe such motives as falling into two groups, (i.e., professional versus material reasons; Huberman & Grounauer, 1993) or five groups (i.e., social status, career fit, prior considerations, financial reward, and time for family; Richardson & Watt 2006). The most common distinction is the three category distinction of altruistic, intrinsic, and extrinsic motives by Bastick (2000). Altruistic motives refer to individual perceptions of teaching as a socially valuable or important job, to the desire to help children and young people succeed, and to improve society. Intrinsic motives contain reasons inherent to the job itself. Student teachers cite intrinsic reasons when they refer to their passion and vocation for the activity of teaching children in general (e.g., 'I have always wanted to teach'; Fokkens-Bruinsma & Canrinus, 2014). Extrinsic motives are related to job characteristics not inherent to the job itself, such as the level of salary and employment opportunities (Struyven et al., 2013). Bruinsma and Jansen (2010) divided the extrinsic motives into two subcategories; extrinsic adaptive motives and extrinsic maladaptive motives. When extrinsic motives promote lasting and effective engagement in a task (e.g., a student wants to become a teacher because it offers him good career opportunities) this extrinsic motive is considered to be adaptive. Maladaptive motives,

on the other hand (e.g., a student wants to become a teacher because he could not get into the first choice of study), promote only superficial engagement in an activity or the profession or do not promote engagement at all.

A large body of research has examined motives for *enrolling* in (choosing) the teacher training program as the start of a career. However, to our knowledge, little research has examined why student teachers *continue* in the program or why they *withdraw* from the program. The relation between enrolling on the one hand, and continuing/withdrawing on the other hand is important to understand because student teachers' motives for becoming teachers may be a key factor for explaining why they do not complete their studies (Bruinsma & Jansen, 2010). In Fokkens-Bruinsma and Canrinus (2015) quantitative study, the motive of 'wanting to shape the future of children' was identified as a reason to stay in teacher training programs. Other research has suggested that additional factors may contribute to the withdrawal of student teachers. Murtagh, Morris and Thorpe (2013) found that 1) an idealised perception of the workload of teachers (i.e., a lack of recognition among some student teachers of the complexities involved in learning to teach; Younger et al., 2004), and 2) concerns regarding the behaviour of children, were two of these factors. Furthermore, Hobson and colleagues (2006) discovered that 1) inability to manage the workload (i.e., the different requirements students experience from the training program on the one hand and the traineeship at the school placement on the other hand), 2) changing one's mind regarding teaching as a career, and 3) non-enjoyment of one's school placement, were three main reasons for withdrawal from the teacher training program. Additionally, Chambers and Roper (2002) cited that student teachers who withdrew were the ones who figured out that the demands and reality of teaching were more than they could cope with after enrolling in the program.

Previous research has focused on motives for enrolling and continuing/leaving the teacher training program. Watt and Richardson (2007) found that there was a positive correlation between reasons for entering a teacher training program and aspirations on completing a teaching qualification. Furthermore, Su (1997) examined reasons for choosing and leaving the teacher training program. The current study also focuses on motives for enrolling (choosing) in, continuing, and leaving the teacher training program in continuing students and switch students, but specifically focuses on the *comparison* of

motives between these two student groups. This approach has two advantages. First, we can compare two types of students (i.e., continuing students versus switch students) and two types of motives (see horizontal axis in Figure 1). Previous research indicates that two types of motives regarding satisfaction and retention exist, also known as 'satisfiers' versus 'dissatisfiers' (Herzberg, Mausner, & Snyderman, 1967). The first type results in satisfaction and commitment when adequately fulfilled. The second type is a potential source of dissatisfaction and withdrawal when deficient (Cryer & Elton, 1990). Taken together, satisfiers make students more motivated when present but not demotivated when absent. Dissatisfiers make students demotivated when absent, but not more motivated when present.
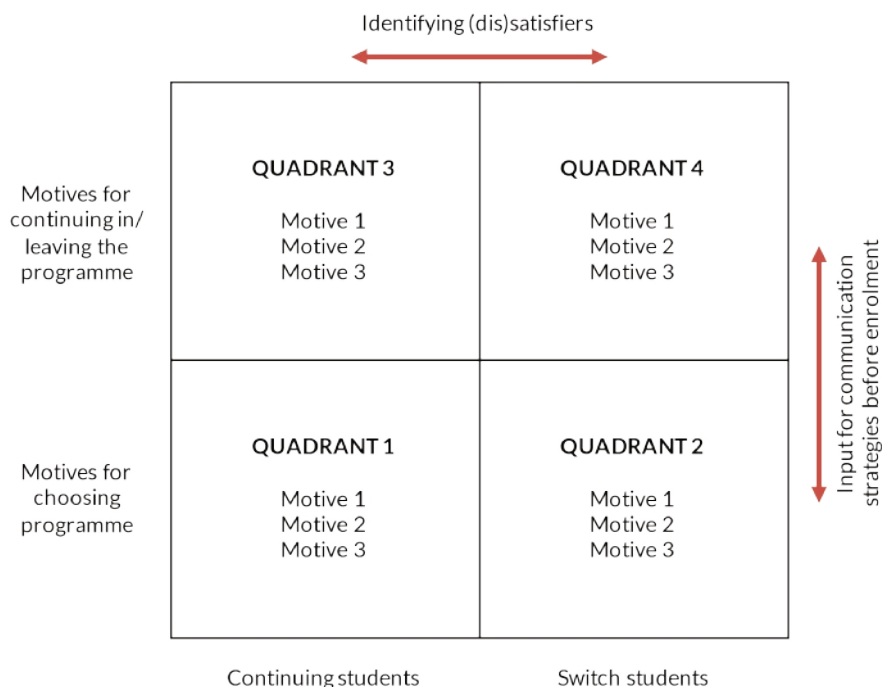

Figure 1. Comparison of motives regarding 1) two types of students (horizontal axis) and 2) before and after enrolment (vertical axis)

Another advantage of our approach is that a comparison between the motives before and after enrolment can be made (vertical axis in Figure 1). For example, if the motive

for enrolling in the program (e.g., the curriculum is interesting) is the same as for leaving the program (the curriculum is not interesting), the information of the program that was given before enrolment was not perceived correctly by the prospective student. On the other hand, if the reason for enrolling the program (e.g., the curriculum is interesting) was different from the reason to leave the program (e.g., the style of education is not preferred), the information that prospective students used to base one's educational choice on was not complete. In this example, essential information about the style of education might not have been part of the information given beforehand.

1.2 The context of the study: teacher training in the Netherlands

In the Netherlands, teachers in primary schools instruct pupils from when they are four-years-old until they are 12-years-old. To become a qualified teacher in primary education, students must complete a four-year bachelor's program (4 x 60 credit points) at a university of applied sciences. Students from pre-university education, higher general secondary education, or intermediate vocational education can apply for this bachelor's program. Since August 2015, new admission requirements are used: students who want to enter the program for primary school teachers, need to successfully complete a set of assessments (tests on language, arithmetic, geography, history and science & technology) before enrolment (OCW, 2014). Due to these assessments, the amount of applications for the bachelor's program entitled Teaching in Primary Education has declined with 30% since August 2015. On average, after four years, only 45% of the students graduate (CPB, 2017). The declining amount of applications, combined with high drop-out rates and many in-service teachers approaching their retirement age, has led to a shortage of teachers in primary education in the Netherlands (OECD 2016).

The first year of the program contains a number of courses given at the university (e.g., Dutch language, English language, music, and history) and a traineeship at a primary school (i.e., school placement). By doing a traineeship, the student teachers experience what it is like to be a teacher in real life and they can conduct their practical assignments. Furthermore, in this first year, it is obligatory to pass a calculation test, which contains tasks like mental arithmetic, geometry, and fracture calculation. If student teachers do not pass this calculation test, they have to leave the program.

Secondary and tertiary education offer prospective students the opportunity to explore teacher training programs before enrolment. In general, activities like open education days and educational fairs are organised by administrators of tertiary education (Van den Broek et al., 2017). Additionally, secondary education gives prospective students information about these programs. In some cases, however, the student takes the initiative to organise a short traineeship to experience the teacher profession before starting the program.

2. The present study

The primary objective of this study is to gain insight into the differences between the motives given by continuing students and switch students for enrolling, continuing or leaving the teacher training program, and to compare these motives before and after enrolment. The motives found were placed into four categories of motives: altruistic, intrinsic, adaptive extrinsic, and maladaptive extrinsic. This approach combines the three categories of Bastick (2000) and the distinction between adaptive and maladaptive extrinsic motives of Bruinsma and Jansen (2010). The following three research questions were addressed:

1. What altruistic, intrinsic and (mal)adaptive extrinsic motives are reported for enrolling in the teacher training program, and what are the differences between continuing students and switch students? (Comparing quadrant 1 and quadrant 2 in Figure 1)

2. What altruistic, intrinsic and (mal)adaptive extrinsic motives are reported for continuing in or leaving the teacher training program, and what are the differences between continuing students and switch students? (Comparing quadrant 3 and quadrant 4 in Figure 1)

3. What differences can be identified when comparing the motives for enrolling in and continuing in or leaving the teacher training program among continuing students and switch students? (Comparing quadrant 1 and quadrant 3 versus quadrant 2 and quadrant 4 in Figure 1).

3. Method

The three research questions were addressed by means of a qualitative semi-structured interview study. Because this topic is relatively new, this study has a somewhat exploratory character. Therefore, a qualitative approach seemed appropriate because we did not want to influence the student teachers' responses (e.g., by using a questionnaire with fixed items).

3.1 Participants

In order to conduct this interview study, we interviewed continuing students and switch students of a primary teacher training program at a Dutch university of applied sciences. Switch students are students who withdrew from the teacher training program, but did not leave tertiary education. They changed from one program to another within the same university.

We recruited 10 continuing students from a lecture for second year students. Of the 78 students present, 32 volunteered. We selected ten continuing students from one location in order to minimize the influence of factors that differ between various locations (e.g., different teachers). To recruit switch students, we asked the aforementioned volunteers to give names of past fellow students who switched programs in or after their first year. Beside the students mentioned, we contacted other switch students, who were identified in the registration system, by email. The 13 switch students who expressed interest in participating had changed to another bachelor's program within the same university. The ten continuing students and thirteen switch students together resulted in a sample of 23 participants before the member check (see below). Each of these participants signed a consent form which stated the goal of the study, the description of the project and information on participation, privacy of data, and the results of the interview.

3.2 Instruments

A semi-structured interview guideline was developed for interviewing the 23 participants. The goal of the interview was to find out why certain students stayed in the program and why others did not. The two main questions that we asked in this study were: 1) What are the three most important reasons for enrolling in this teacher training

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program? 2) What were your motives for continuing/leaving this program within/after the first year?

3.3 Procedure

All interviews were conducted by the first author and another researcher. These two researchers were not part of the teacher education staff of the program. To be sure that the two interviewers asked the exact same questions in the same order, an interview protocol was developed with a semi-structured script. Students were interviewed individually during face-to-face meetings of about 30 minutes; the interviews were audio taped and transcribed. A member check procedure was used to check the correctness of the transcripts (e.g., Hoffart, 1991) such that each interviewee was asked to give his/ her consent, stating that the transcript was indeed the input of the interviewee, and accurate for use in the study. The transcripts were approved by all participants, except for one participant who did not reply at all. Therefore, we decided to not include this interviewee in the final sample of 22 participants (continuing students: N = 10; 70.0% female, M_{age} = 20.00, switch students: N = 12; 66.7% female, M_{age} = 20.83). One student suggested a small change, which we adopted.

3.4 Data analysis

A grounded theory approach was used for analysing the interview transcripts. A grounded theory approach involves careful analytic attention by applying specific types of codes to data through an iterative process of coding that eventually leads to the development of a theory (Saldaña, 2009). For the initial coding of the data, 'In Vivo' coding as a first cycle coding method was used (Saldaña, 2009). This code refers to a word or short phrase from the actual language found in the qualitative data record – 'the terms used by participants themselves' (Strauss, 1987, p. 33). Second, ´Focused Coding´ was applied to search for the most frequent or significant initial codes to develop the most salient categories in the data (Charmaz, 2006, p. 46, 57). The first author and the other interviewer independently coded the answers on the questions with respect to half of the interviews. After this, their themes (codes) were compared and temporary (sub)themes were determined using consensus. Using these temporary themes, a coding manual was written to ensure agreement about what was understood by a certain theme.

This coding manual contained definitions and an example for every theme. After coming to a consensus for all themes, definitions, and examples, the coding manual was finalized (see Table 1 for an example) after which interview fragments were colour-highlighted according to these themes.

Table 1. Themes for continuing in or leaving the program (RQ 2).

Themes	Description
Intrinsic motivation for the profession	The activities belonging to the profession are deemed to be enjoyable. ('I like to work with children', 'I find my traineeship enjoyable').
Disappointment in the profession	The activities belonging to the profession are deemed to be hard and difficult. ('I am getting extremely tired after a traineeship day', 'I could not explain things to the children in the way that was needed').
Social environment	The environment in which students learn and the way they are (not) connected to their peer-students or teachers. ('I like my classmates', 'I like that fact that everybody knows each other').
Organization of the program	The logistics of the program, the way of teaching, the order in which courses were offered, and communication about the program.
Content of the program	The content of the courses offered (e.g., Dutch language, English language, Music, and History).
Level of the program - Too high	The level of the program is deemed to be too difficult. For example, students did not pass tests like the obligatory calculation test.
Level of the program - Too low	The level of the program is deemed to be easy. Students experienced that they were not challenged enough and got bored in class.
Level of the program - Adequate	The level of the program is deemed to be just right. The fact that students could cope with the speed and level of the program gave them a feeling of self-efficacy.
Personal characteristics or considerations	These individual differences between students differ from personal characteristics (e.g., persistence) to personal considerations (e.g., a student wanted to move on purpose to another city, to get away from his parents).
External forces regarding the future	Extrinsic motives like for instance having job security, and getting a bachelor's diploma as opposed to the inherent appeal of the profession.
Identification with future profession	Following the teacher training program to become a teacher in primary education in the future. So, nothing is said about the inherent appeal of the profession here.
Congruence with one's interests	The congruence between the student's interests and the content of the program or profession. ('The study is too broad', 'I like the social content of the profession', 'I am doubting whether I find the program interesting enough') .

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A reliability check was conducted according to the gold standard/master coder approach (Syed & Nelson, 2015). In this approach, one coder serves as the gold standard or master coder (the first author in this study) and someone else serves as the reliability coder (the other interviewer in this study). The master coder assigned 50% of the data, randomly assigned using SPSS, to the reliability coder for an interrater reliability check, satisfying the suggested 20% by Lilgendahl & McAdams (2011). Similarities and differences in coding were noted down in a matrix and statistically examined using Cohen's kappa (κ). The definition of κ is the proportion of agreement between raters that is not due to chance[2]. The components of the formula were computed with two tables per question, separately for continuing students and switch students (see for an example, Table 2a and Table 2b). The reliabilities were computed by summing up the kappas for the continuing students and switch students (per question) and then divided by two. For Research Question 1 and 2 the kappas were κ =.93, and κ = .88, respectively.

After the reliability check, the master coder coded all interviews. The rationale for this was that a certain percentage of the data cannot be coded before reliability is reached. By counting the number of times particular themes were mentioned by either continuing students or switch students, it was possible to see differences between these two types of students.

Finally, as a last step, the master coder and reliability coder applied 'Theoretical coding' by reorganizing the identified themes into the theoretical core categories of altruistic, intrinsic and (mal)adaptive extrinsic motives. In theoretical coding, all categories and subcategories become systematically linked with the central core category, the one 'that appears to have the greatest explanatory relevance' for the phenomenon (Corbin & Strauss, 2007, p. 104).

The process of data analysis resulted in several themes per research question. For Research Question 1, nine themes were found, subdivided in the categories of altruistic motives, intrinsic moves, adaptive extrinsic motives, and maladaptive motives (Table 3). For Research Question 2, 11 themes were found, subdivided into the same four categories (Table 3).

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$$\kappa = \frac{\text{observed proportionate agreement} - \text{probability of random agreement}}{1 - \text{probability of random agreement}}$$

Table 2a. Calculation of the observed proportionate agreement (an example)

Rater 1	Theme 1	Theme 2	Theme 3	Theme 4	Total
Rater 2					
Theme 1	5				5[*]
Theme 2	1	1			1
Theme 3			2		2
Theme 4				1	1
Total	6[**]	1	2	1	10[***]

Note. Observed proportionate agreement = (5+1+2+1)/10=.90

Table 2b. Chance frequencies for calculation of the probability of random agreement belonging to Table 2a

Rater 1	Theme 1	Theme 2	Theme 3	Theme 4
Rater 2				
Theme 1	(5[*] x 6[**])/10[***] =3			
Theme 2		(1*1)/10 =.2		
Theme 3			(2*2)/10=.4	
Theme 4				(1*1)/10=.1

Note. Probability of random agreement = 3+.2+.2+.1 = 3.7

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Table 3. Types and themes identified for RQ 1 and 2.

Research Question 1: Motives reported for enrolling in the teacher training program

Motives	Themes identified
Altruistic	1. Ideological motives
Intrinsic	2. Previous experiences with similar activities
	3. Expectations of the profession
	4. Identification with the profession
	5. Expectations of the program
	6. Congruence with interests
Adaptive extrinsic	7. Expectations of the social environment
	8. External forces regarding the future
Maladaptive extrinsic	9. Practical considerations

Research Question 2: Motives reported for continuing in or leaving the teacher training program

Motives	Themes identified
Intrinsic	1. Intrinsic motivation/ disappointment in the profession
	2. Identification with the profession
	3. Content of the program
	4. Congruence with interests
Adaptive extrinsic	5. Social environment
	6. External forces regarding the future
	7. Organization of the program
	8. Level of the program: too high
	9. Level of the program: too low
	10. Level of the program: adequate
Maladaptive extrinsic	11. Personal / practical considerations

4. Findings

4.1 Motives for enrolling in the program

Twenty students, continuing students as well as switch students, mentioned the theme of their *expectations of the profession* as a motive for enrolling in the teacher training program (see Table 4). This theme represents the inherent appeal of the tasks of the job, which is an intrinsic motive. 'I like to work with children', was a phrase that was

very often used. Others were somewhat more comprehensive in their explanation for choosing the bachelor's program, for example: 'I really like to associate with children and to learn them something. It seemed a challenge to me to give every pupil the kind of education that suits them.'

Four continuing students and two switch students mentioned motives with an *ideological standpoint* of view. 'I want to contribute something to society', or 'I want to be a teacher that is different from the rest and who really sees the child' were answers that were categorized into this theme. Third, *identification with the profession* was mentioned by eight students and is very typical for prospective student teachers to mention as a motive for enrolling the teacher training program. 'I have always wanted to become a teacher, since I was a kid' was a phrase that was often said. *External forces regarding the future*, mentioned by two continuing students, entails aspects like job security and growth opportunities. These are extrinsic types of motivation, but in such a way that, in most cases, it gives the student a certain goal to strive for. The theme *expectations of the program* (e.g., curriculum, way of teaching) was mentioned by two students as a reason for enrolment. *Practical considerations* was a theme that was mentioned only by two switch students, containing motives that were very practical and of extrinsic maladaptive nature: 'Well, it is not a real motive maybe, but it is real close by, just five minutes by bike, so that is a nice bonus. (…) and because my sister already enrolled the same program.'

Themes like *expectations of the social environment* (e.g., 'I really enjoyed myself during the taster days and really felt in place') and *congruence with one's interests* (e.g., being interested in a profession that comprises much social interaction) were mentioned sporadically.

4.1.1 Differences in motives for enrolling the program

When comparing the motives for enrolling in the program between continuing students and switch students, large differences could not be identified. The percentages mentioned in Figure 2 are based on the frequencies in Table 4. Only the proportion of continuing students (or switch students) is presented here, ignoring the fact that a particular student had more than one example/quotes on a particular theme.
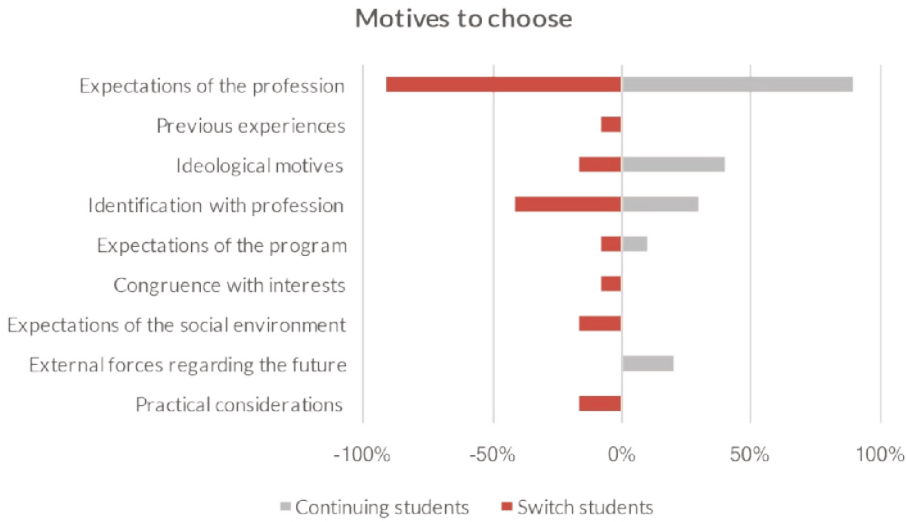
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Motives to choose

Motive	
Expectations of the profession	
Previous experiences	
Ideological motives	
Identification with profession	
Expectations of the program	
Congruence with interests	
Expectations of the social environment	
External forces regarding the future	
Practical considerations	

-100%   -50%   0%   50%   100%

■ Continuing students   ■ Switch students

Figure 2. Motives to choose. *Note.* Percentages represent the proportion of continuing students versus switch students mentioning the particular motive.

In general, the three main reasons for enrolling in the teacher training program were the *expectations of the profession*, *ideological motives*, and *identification with the profession*. The only difference worth mentioning was that the motive of ideology was indicated by twice as many continuing students (four) opposed to switch students (two). A motive only referred to by continuing students was the motive of *external forces with respect to the future job*. Furthermore, three themes only mentioned by switch students were *practical considerations*, *the social environment*, and *congruence with one's interests*. In general, the most mentioned motives by both types of students were intrinsically driven ones. Thus, no real differences were found when comparing the motives between the two groups of students.

Table 4. Frequency table of all themes mentioned regarding motives for enrolling in the program (RQ 1).

Themes (Motives)	Continuing students (N = 10)		Switch students (N = 12)	
	Number of times mentioned in the interviews	Number of students that mentioned this motive	Number of times mentioned in the interviews	Number of students that mentioned this motive
Altruistic motives				
1. Ideological motives	4	4	2	2
Intrinsic motives				
2. Previous experiences with similar activities	0	0	1	1
3. Expectations of the profession	12	9	13	11
4. Identification with the profession	3	3	5	5
5. Expectations of the program	1	1	2	1
6. Congruence with interests	0	0	1	1
Extrinsic motives				
7. Expectations of the social environment*	0	0	2	2
8. External forces regarding the future*	3	2	0	0
9. Practical considerations**	0	0	3	2

Note. * Adaptive extrinsic motive. ** Maladaptive extrinsic motive.

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4.2 Motives for continuing in or leaving the program

With regard to motives for continuing in or leaving the teacher training program, the most mentioned theme was the profession itself (see Table 5). Continuing students mentioned the positive experiences of their first-year traineeship and enjoyed the tasks accompanying the profession of a teacher in primary education (*intrinsic motivation for the profession*). However, switch students indicated that they were disappointed in the profession due to experiences gained during their first-year traineeship (*disappointment in the profession*).

Furthermore, the *organization of the program* was a reason for three continuing students to remain in the program and for three switch students to leave the program. Whereas the first type of student enjoyed the freedom and autonomy in the way of teaching ('I am allowed to be creative in the delivery of an assignment'), the latter type of students indicated that they experienced it as 'chaotic' and 'unstructured'.

One theme that was mentioned mostly by switch students was *the difficulty level of the program*. Most of them pointed out that the difficulty level was too high, evidenced by not passing obligatory tests. Because many students in the past years have had difficulties passing the 'calculation test', it has become obligatory to pass it in the first year. Three switch students mentioned this test explicitly as the reason they had to leave the program involuntarily. On the other hand, for two switch students, the level was too low and they did not find the program challenging enough. One student said, 'For me, it felt like I was not learning anything, but that we were repeating things over and over again'. A theme that was mentioned by six continuing students and by only one switch student was the *social environment*. An example mentioned by one continuing student: 'The ambience at the university pleases me. It is a small university in which everyone knows each other, I like that. (...) I like the fact that you can address every teacher and that teachers want to invest time in you.'

Table 5. Frequency table of themes mentioned regarding motives for continuing in / leaving (RQ 2).

Themes (Motives)	Continuing students (N = 10)		Switch students (N = 12)	
	Number of times mentioned in the interviews	Number of students that mentioned this motive	Number of times mentioned in the interviews	Number of students that mentioned this motive
Intrinsic Motives				
1. Profession: intrinsic motivation/ disappointment*	5	4	5	4
2. Identification with profession	3	3	1	1
3. Content of the program	0	0	4	4
4. Congruence with interests	2	2	1	1
Extrinsic motives				
5. Social environment*	6	6	1	1
6. External forces regarding the future*	2	2	0	0
7. Organization of the program*	3	3	3	3
8. Level of the program: too high*	0	0	5	5
9. Level of the program: too low*	0	0	2	2
10. Level of the program: adequate*	1	1	0	0
11. Personal / practical considerations**	1	1	2	2

Note. * Adaptive extrinsic motive. ** Maladaptive extrinsic motive.

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Another theme mostly mentioned by continuing students was *external forces regarding the future*. This entailed either job security (e.g., 'This is an intermediate step for the profession I really want to practice') or the *identification with the profession* (e.g., 'I wanted to become a teacher in primary education, since I was a kid'). Both represent (specific) goals for the future. Finally, two other themes were *personal considerations* (e.g., 'I wanted to move to another city') and *congruence with one´s interests* (e.g., 'I did not find it interesting anymore').

4.2.1 Differences in motives for continuing/leaving the program

By comparing the motives for either continuing or leaving the program, some interesting differences could be identified. The percentages mentioned in Figure 3 are based on the frequencies in Table 5.

The largest differences that we noted are discussed here. Four continuing students as well as four switch students mentioned *the profession* itself as a reason to stay or leave. Right after enrolment, student teachers have to participate in a traineeship for two days a week to experience what it is like to teach a class of toddlers. Where the continuing students mentioned they really liked the traineeship and that it confirmed their commitment to become a teacher, the switch students mentioned this as a reason to leave because they were disappointed in the job. Thus, it appears that gaining real-life experience with the profession either confirmed or disconfirmed student teachers' original educational choice.

The second reason for staying in the program was the *social environment*. Only continuing students (with one exception) mentioned the social environment as one of their reasons to continue the program. They really liked the learning environment in which peer students and teachers all know and help each other. Because this motive was mentioned largely by continuing students, the social environment could be defined as a satisfier; the presence of a nice social environment makes people more motivated, whereas the absence of it does not seem to decrease motivation or a reason to leave.

Furthermore, the *content of the program* was a reason for withdrawal for four switch students (no continuing students mentioned this theme as a reason to stay). They experienced that the content of the courses (i.e., the curriculum) was not something they found interesting. Therefore, it seems that the content of the program is a dissatisfier,

because absence of an interesting curriculum obviously leads to withdrawal. However, this was not mentioned specifically as a reason to continue the program by continuing students.

Another noteworthy difference, and mostly mentioned by switch students, was *the difficulty level of the program* being too high (for five switch students) or too low (for two switch students). Only one continuing student mentioned an adequate difficulty level as a reason to stay. Similar to an interesting content of the program it seems that the difficulty of level of education is a dissatisfier. Absence of an adequate difficulty level of education apparently leads to withdrawal, while presence of an adequate difficulty level of education is not an obvious remedy to get students more motivated to stay.
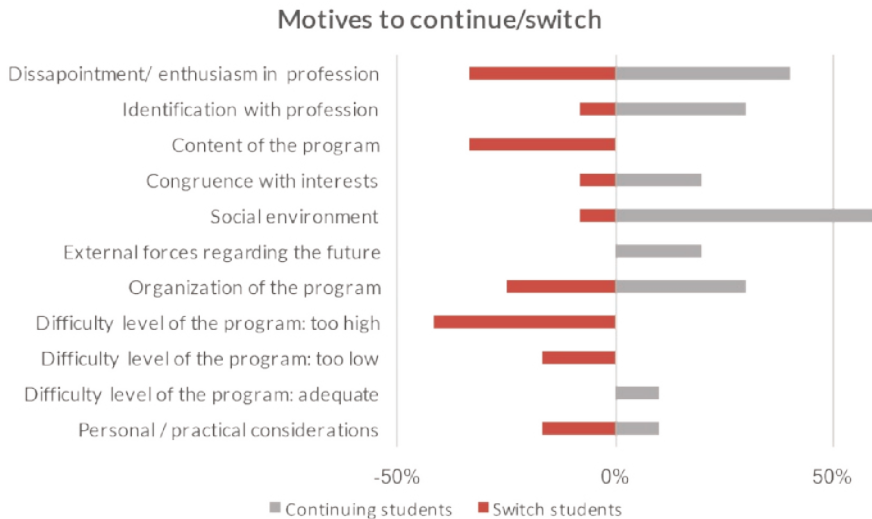

Figure 3. Motives to continue/ switch. *Note.* Percentages represent the proportion of continuing students versus switch students mentioning the particular motive.

4.3 Comparing motives before and after enrolment

After comparing the reasons to continue in or withdraw from the teacher training program, we also compared the motives for enrolling in the teacher training program and the reasons for continuing in or leaving the program for continuing students and switch students separately (Figure 4 and Figure 5, respectively). Regarding continuing students, we can infer from Figure 4 that the initial reason to enrol in a teacher training program

were the expectations of the profession. 40% of the continuing students also mentioned this theme (i.e., the enjoyment of the job) as a reason to stay, and felt reinforced in their educational choice. Furthermore, the social environment was another obvious reason to continue the program, but this motive was not initially mentioned as a motive for enrolling. Additionally, ideological motives were mentioned initially, but not as a reason to stay.
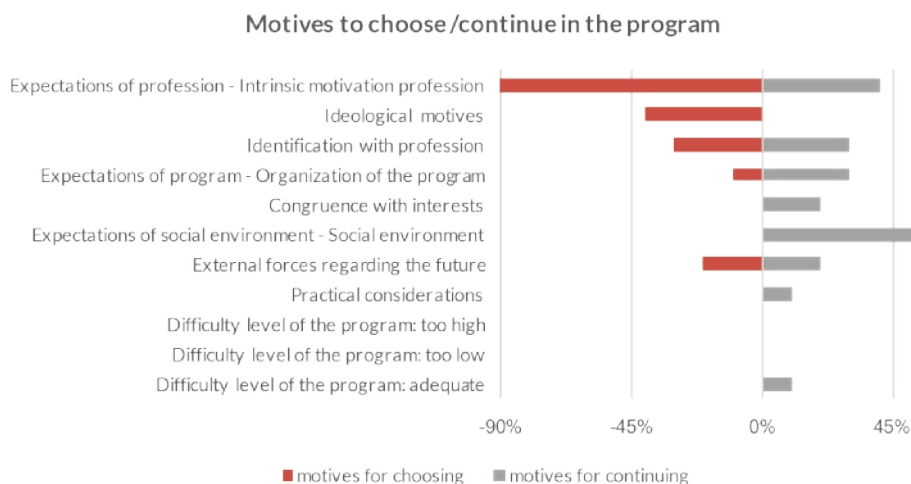
Motives to choose /continue in the program

Motive	
Expectations of profession - Intrinsic motivation profession	
Ideological motives	
Identification with profession	
Expectations of program - Organization of the program	
Congruence with interests	
Expectations of social environment - Social environment	
External forces regarding the future	
Practical considerations	
Difficulty level of the program: too high	
Difficulty level of the program: too low	
Difficulty level of the program: adequate	

-90%   -45%   0%   45%

■ motives for choosing   ■ motives for continuing

Figure 4. Motives to enroll and continue in the program. *Note.* Percentages represent the proportion of continuing students mentioning the particular motive.

Regarding switch students, we can infer from Figure 5 that the initial reason for enrolling in the teacher training program were the expectations of the job, just like for many continuing students. However, a third of the switch students cited disappointment in the profession and considered this as a reason to quit the program. Although most students (i.e., continuing students and switch students) did not mention the content of the teacher program as a reason for enrolment, switch students (33%) mentioned the content of the program as a reason for withdrawal (e.g., 'I considered a very small part of the courses offered interesting'). Furthermore, the difficulty level of the program (being too high or too low) was mentioned by almost 60% of the switch students as a reason to quit but not as a reason for enrolment.
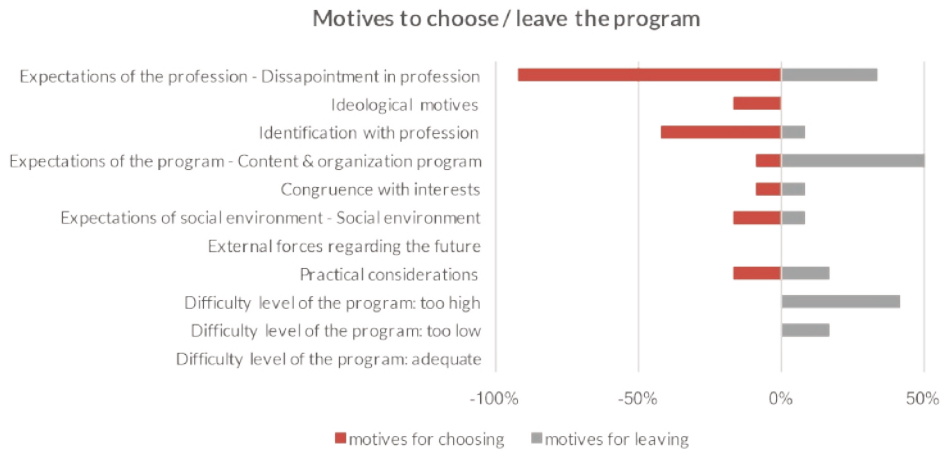
Motives to choose / leave the program

Figure 5. Motives to enrol in and leave the program. *Note.* Percentages represent the proportion of switch students mentioning the particular motive.

5. Discussion & conclusions

In order to deal with the attrition problem in primary teacher education, we wished to gain more insight into the motives of student teachers who either continued or left the program within or after the first year. The identified motives for enrolling in the teacher training program (Research Question 1) generally reflected altruistic and intrinsic motives for both groups of students (i.e., continuing students versus switch students). Although most reasons for enrolment were intrinsically driven, the expressions of these intrinsic reasons were not always comprehensive, but seemed to be based on expectations of the profession, and not on real experiences.

Regarding motives for continuing or leaving the program (Research Question 2), the experiences during the traineeship were, for some student teachers, a reason to continue their studies. For others, these experiences were a reason to withdraw, as these students became disappointed in the profession. Continuing students expressed that their positive teaching experiences were a reason to remain in the program. This finding supports previous research by Bruinsma and Jansen (2010), who also found this positive relation. Of note, all switch students that mentioned a disappointing experience during their traineeship had not had a real-life experience in their orientation phase. In other words, their initial intrinsic reason for enrolment was not based on real-life experiences,

thereby increasing the probability for disillusionment. Thus, the disappointing experience during the traineeship could have been prevented by exposing prospective student teachers to real-life experiences during their orientation on teacher training programs.

Furthermore, for a couple of switch students, the content and/or organization of the program was unsatisfactory and a reason to withdraw. Whereas the content of the program was about the congruence between the (activities of the) teacher program and the students' interests, the organisation of the program was more about the way the program was structured and planned. Possibly, these switch students did not inform themselves adequately on the course of events within the teacher training program of this university. Indeed, we found that whereas the program was not a reason for enrolment, it seemed to be a reason for withdrawal (Research Question 3). So again, better orientation and preparation by the student or a more in-depth experience offered by the university (for example by giving trial courses reflecting the teacher training program) could have prevented withdrawal to a certain extent.

Another motive that was mentioned by switch students for leaving, but not for enrolling in or continuing the program (Research Question 3), was the difficulty level of the program being too high or too low. Absence of an adequate difficulty level of education apparently leads to withdrawal, while presence of an adequate difficulty level of education was not an obvious reason to stay. An adequate difficulty level of education is something that seems to be expected and conditional and not an aspect for prospective students that makes a program more or less attractive. However, it is important to know about and experience the difficulty level of education before enrolling to avoid potential distress.

The difficulty level of the program taps into one of the three basic needs from Self-determination theory (SDT; Ryan and Deci, 2000), specifically the need for competence which is one's urge to have effect on and master one's environment. The satisfaction of this need, competence satisfaction, refers to an experience of effectiveness which results from mastering a task (Broeck, Vansteenkiste, Witte, Soenens, & Lens, 2010). Thus, academic performance is better (e.g., continuance of a program) when students feel competent in what they are doing.

Finally, only continuing students (with one exception) mentioned the social environment as one of their reasons to stay in the program. It seems that the presence

of an enjoyable social environment makes students more motivated to stay. Being socially connected taps into another basic need of SDT, the need for relatedness, which concerns the feeling that one is close and connected to others (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). Like the difficulty level of the program, the social environment was mentioned only a very few times as a motive to enrol this program.

Our primary qualitative findings are in line with previous (quantitative) research. Students' motivation (and retention) is largely determined by the extent to which universities provide educational and social environments meeting their needs for autonomy, relatedness, and competence (Ryan & Deci, 2000). This is especially appropriate during times of educational transition (Eccles et al., 1993). For example, Meens, Bakx, and Denissen (submitted) have previously shown that high need satisfaction (indicated by social adjustment and self-efficacy) is positively associated with higher intrinsic motivation. In other words, students who scored high on social adjustment and self-efficacy during the first few months had higher scores on intrinsic types of motivation. In line with this, we found that some switch students presumably lacked competence satisfaction by not passing certain tests and left the program as a consequence. Moreover, most continuing students experienced high relatedness satisfaction because they talked about satisfying contacts with teachers and peer-students.

5.1 Implications and recommendations

Our findings suggest that there were four main reasons for continuing in or withdrawing from the teacher training program: real-life teaching experiences, content of the program, level of the program, and the social environment. The last three motives were not mentioned as reasons for enrolment in the first place. With this knowledge, it was not possible to identify (un)successful students during selection or intake procedures before enrolment, because both types of students did not differ in their motives at that point. To make sure students end up in programs that suit them, it might be important to be very clear in advance about the reasons why students have left the program in the past. By allowing prospective student teachers experience the level or the content of the program or by incorporating these aspects into a selection/intake procedure (i.e., a representative test or a trial class with a real-life experience at a primary school), preconceptions will

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be managed impacting the first experiences during the program (Hobson & Malderez, 2005) resulting in less student teachers quitting the program within or after the first year. Furthermore, whereas the level and content of the program are risk factors for withdrawal, the social environment seems to be a protective factor. Investing in social integration, by creating a safe learning environment in which student teachers as well as their teachers interact with each other formally as well as informally, might also lead to better retention rates.

5.2 Limitations and future research

This study deals with some limitations that can be dealt with in future research. First, this study was limited to 22 participants, which is a relatively small sample and is not representative of all teacher students in the Netherlands or worldwide. Although the average gender and age were rather representative for the population of students following the teacher program at this university, the sample was a convenience sample. The switch students were students who voluntarily replied on an email. There is a possibility that these switch students were the ones who did not have a grudge or feelings of shame regarding their withdrawal. It is also important to note that these switch students were not real drop-outs. Drop-outs are students who withdraw from tertiary education as a whole and do not commence another program after quitting the one they had started. This means that the switch students that we interviewed quit the teacher training program because of reasons relating to the content of the program or profession itself (e.g., 'I did not like the profession after all'). Thus, the motives drop-outs generally have to withdraw (i.e., 'I don't want to study at all' or 'I want to work'), which could be confounding in our study, were not existent. Furthermore, although we considered saturation of the data presented, a greater variety of motives might have been shared during the dialogues if we had interviewed more students (e.g., 30-40 students).

Another limitation is that the motives given for enrolling, continuing in or withdrawing from the program were given in retrospect. We know from research that recall bias can occur when respondents self-report about events in the past (i.e., people may be more likely to search for explanations afterwards; Mausner & Kramer, 1985). It would have been better to ask the question about motives for leaving just after withdrawal and the

question about motives for enrolment together with their expectations right before commencement (because preconceptions about teaching and teacher training can impact students' experience of teacher training; Feiman-Nemser, McDiarmid, Melnick, & Parker, 1989).

5.3 Conclusions

Most research on attrition in teacher training has focused on the motives for enrolling in teacher training programs. By comparing the motives of continuing students versus switch students we discovered that there are some issues - like real-life teaching experiences, difficulty level of the program, and content of the program - that are important to know about and to experience for prospective student teachers on the one hand, and for those who conduct intakes to deal with before enrolment, on the other hand. Additionally, there are certain motives to care for after commencement, such as ones concerned with the social environment, so that students may flourish.

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"The meaning of life is to find your gift. The purpose of life is to give it away."

- Pablo Picasso

Chapter 6

General discussion

1. Introduction

The aim of this dissertation was to examine what role students' motivational differences play in educational choices and study success in higher education. Insights can be used in higher education to help prospective students to make suitable educational choices, decrease students' dropout rates, and increase study success. These insights were based on four studies on motivation. In this final chapter, a summary of the main findings of each study is presented, followed by elaboration and discussion on the meaning of these findings. Finally, practical implications, some limitations, possible directions for future research, and concluding remarks will be provided.

2. Summary of the main findings

The main research question of this dissertation was: *What role do students' motivational differences play in educational choices and study success in higher education?* To summarise, motivation played a role in the choice (prospective) students made in selecting and staying in a certain bachelor's program. Most importantly, autonomous motivation predicted objective study success (i.e., obtained credits and retention) and was associated with subjective study success (social-emotional adjustment). The main findings of each of the four studies are addressed in the subsequent sections and summarised in Table 1.

2.1 Educational choice and study success

Person-environment fit theory (Hunt, 1975) suggests that students have better academic achievement and are more satisfied when their interests are congruent with their educational environment (Allen & Robbins, 2008; Jansen & Kristof-Brown, 2006; Nye, Su, Rounds, & Drasgow, 2012; Smart, Feldman, & Ethington, 2000). We, therefore, started to investigate interests and skills as part of the concept of motivation. To facilitate prospective students in finding this person-environment fit in their educational decision-making process, Chapter 2 focused on the development and validation of an instrument assessing interests and skills. The result was the Interest and Skill Inventory on Educational Choices (ISEC), a short and publicly available instrument especially targeted for students in secondary education, helping them with their educational choice.

Table 1. Summary of the main findings of this dissertation

Chapter	Main findings
Chapter 2	- An interest and skills inventory was developed and validated. - Proper internal consistency, structural validity, and construct validity were established.
	- The investigative interest type was split into two sub-factors in a Dutch sample.
	- Predictive validity was found in four of the six interest types.
Chapter 3	- Identity commitment and identity profiles did not predict students' achievement.
	- Motivation dimensions and profiles predicted students' achievement.
	- Identity and motivation dimensions were integrated into five significantly distinct profiles.
	- Combined motivation-identity profiles predicted students' achievement.
	- (Lack of) commitment and exploration co-occurred with (lack of) autonomous motivation.
Chapter 4	- Three motivational profiles were replicated across two time points.
	- Group membership in these profiles was moderately stable (45%).
	- Four proxy indicators of students' need satisfaction (i.e., satisfaction with choice, social adjustment, academic adjustment, and self-efficacy) were positively associated with autonomous motivation (i.e., the high quality profile).
Chapter 5	- Various motives to enrol, continue or leave a teacher training program were identified.
	- Continuing students and students who switched to another program after the first year primarily cited intrinsic motives for enrolling in the program.
	- Social environment and positive experiences during the internship were the main motives to continue in the program. - Disappointing experiences during the internship, as well as the content and difficulty level of the program were the main motives to leave the program. - Motives for enrolment were different from motives to continue or leave the program.

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In a sample of 6,215 prospective Dutch students, the RIASEC interest types of Holland (1985) could be replicated. The investigative interest scale was split into two subscales (i.e., an investigative-humanities subscale, and an investigative-science subscale). Adequate internal consistency and construct validity were established for all scales. Criterion validity was established for four out of six scales (e.g., the correlation between students' conventional scores and their intentions to stay in a conventional bachelor's program was high and significant; see Figure 1). The overall results suggest that this instrument is reliable and valid as an orientation instrument in applied settings in

secondary and higher education. Further development of the instrument is needed to establish the predictive value for two of the six scales (i.e., the investigative and artistic scales).
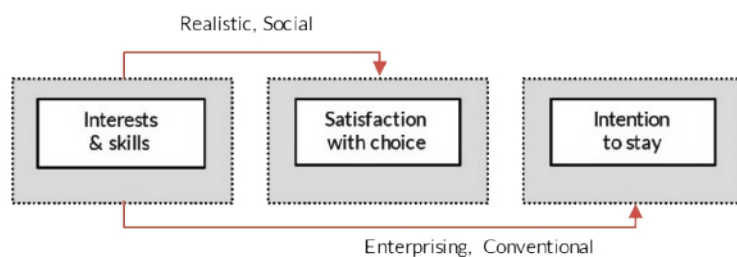

Figure 1. Main findings of Chapter 2

Study success is not only a matter of person-environment fit in terms of matching interests and skills to bachelor's programs. The extent to which one is willing to invest time and effort to live up to expectations might be a function of one's psychological commitment to her/his new role (Klimstra, Luyckx, Germeijs, Meeus, & Goossens, 2012). It is therefore also a matter of commitment to a newly chosen direction and environment. The new university setting comes with a whole new set of expectations. If students live up to these expectations, they would more likely experience study success.

Chapter 3 examined whether identity formation and motivation among prospective students at the moment of choosing a bachelor's program predicted their academic achievement in their first year. Making an erroneous educational choice (i.e., an identity commitment) and lack of motivation are two of the most important dropout reasons in higher education (Trevino & DeFreitas, 2014; Van den Broek et al., 2017; Van den Broek, Wartenbergh, Bendig-Jacobs, Braam, & Nooij, 2015). We combined identity commitment and motivation in Chapter 3, as these two constructs are conceptually related (Waterman, 1990; 2004). We examined whether identity and motivation separately predicted academic achievement, whether identity and motivation dimensions could be combined into new distinct profiles, and if these new profiles predicted academic achievement (i.e., objective study success). The following results were found:
- Regarding identity, we found that only exploration in depth was positively associated with academic achievement while ruminative exploration was negatively associated

with academic achievement, which is in line with the findings of Luyckx, Soenens, Goossens, Beckx, and Wouters (2008). No association with other identity dimensions or identity profiles were found (see the dashed arrow in Figure 2).

- Regarding motivation dimensions as well as profiles, autonomous motivation was positively associated with academic achievement, whereas controlled motivation and amotivation were negatively associated with academic achievement. These findings are similar to those of previous studies (Hayenga & Corpus, 2010; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). Thus, a significant association between motivation and objective study success was found (see lower arrow in Figure 2).

- Identity and motivation could be combined into five motivation-identity profiles (in a sequence of lower to higher levels of autonomous motivation): a 'controlled & troubled diffusion' profile, an 'amotivated' profile, a 'moderately negative' profile, a 'moderately positive' profile, and an 'autonomously achieved' profile. The moderately positive profile was positively associated with academic achievement, while the amotivated and the controlled & troubled diffusion profiles were negatively associated with academic achievement (see middle arrow in Figure 2). However, the combined profiles were no better predictors of academic achievement than the motivation-only profiles. Motivation by itself thus sufficed in the prediction of study success.
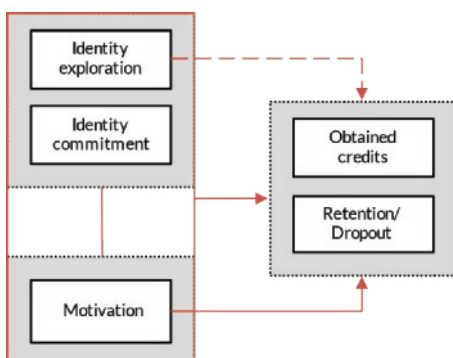

Figure 2. Main findings of Chapter 3

2.2 Expected versus experienced motivation

In the second and third chapters, (small) effects for motivational differences before enrolment were found and almost no effects for identity formation differences were found in the prediction of study success. We also wanted to examine how and to what extent motivation may change during the transition from secondary to higher education. Therefore, in the first part of Chapter 4, we assessed motivation both before and after enrolment and replicated three motivational profiles across these two time points. We labelled motivation before enrolment as 'expected motivation', since this motivation was mostly based on expectations. We labelled motivation after enrolment as 'experienced motivation', because this motivation was mostly based on the first experiences in the new university environment. The three motivational profiles identified both before and 10 weeks after enrolment resulted in nine (= 3 times 3) longitudinal possibilities. Although around 45% of the students turned out to be stable in their motivation after enrolment, some students increased their quality of motivation (autonomous motivation) and others decreased in their quality of motivation (more controlled motivation or amotivation). Thus, motivation certainly changed to a large extent, but not in the same way for every student.

To get a more comprehensive view on differences between motives for choosing a bachelor's program and staying in or leaving the program (i.e., expected motivation versus experienced motivation), a qualitative interview study among 22 students from a primary teacher training program was conducted in Chapter 5. More specifically, this study aimed at finding differences in motives of continuing students and switch students (i.e., students who switched to another program within or after the first year) for enrolling, continuing in, or withdrawing from a primary teacher training program. No differences in motivation for enrolling (i.e., expected motivation) were found between both groups of students. Both groups mentioned intrinsic reasons for finding the program and/or profession interesting as the main reasons to enrol. However, one of the primary reasons to withdraw from the program were real-life teaching experiences (i.e., realistic job experiences) during their placement (i.e., an internship at a primary school). Most likely, the initial intrinsic motivation for dropouts to enrol in the program might have been based on false expectations. The aspects of the job that were experienced as disappointing were, for example, the level of understanding of children in primary school

and students' own level of fatigue after a whole day of teaching. On the other hand, one of the main reasons for continuing students to stay was also this type of real-life teaching experiences. These students really enjoyed the tasks of being a teacher. Thus, for continuing students, reality seemed to exceed or match expectations, whereas for switch students reality turned out to be disappointing.

Summarising, in Chapters 4 and 5, we could identify the expected motivation based on (false) expectations before enrolment and the experienced motivation based on real experience after enrolment. In Chapter 5, we found that experienced motivation after enrolment distinguished continuing from switch students (Figure 3).
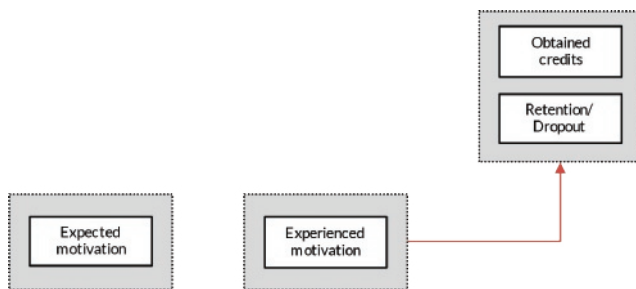

Figure 3. Main findings of Chapter 5

2.3 Social-emotional well-being (subjective study success) and motivation

In the second part of the fourth chapter, we incorporated the stage-environment theory that suggests that the fit between students' developmental needs and the educational environment is important for motivation (Eccles et al., 1993). This theory incorporates ideas related to the person-environment fit theory (Hunt, 1975) and Self-determination theory (SDT; Ryan & Deci, 2000b). It is based on the notion that students' motivation is largely determined by the extent to which the new environment (i.e., the new university) provides opportunities for a student to develop a sense of autonomy, positive relationships with others, and personal competence (i.e., SDT's three basic needs for autonomy, relatedness, and competence; Deci & Ryan, 1985, 2000; Reeve, 2002). The extent to which the university environment is perceived (experienced) by students to be supportive of these three needs will enhance motivation. How an individual perceives an environment may be just as important as the environment itself (Deci & Ryan, 1985).

Inspired by these theories, we wanted to examine students' need satisfaction in the new university environment 10 weeks after the transition and its association with motivation using a person-centred approach (i.e., using motivational profiles). Adopting a person-centred approach offers two advantages. First, it provides evidence of the internal validity of SDT that claims that the qualitative difference between autonomous and controlled motivation is important when describing students' motivation (González, Paoloni, Donolo, & Rinaudo, 2012). Second, viewed from a more practical perspective, students with certain profiles can be identified, which facilitates diagnosis resulting in appropriate interventions within universities. The proxy indicators representing students' need satisfaction were the following: satisfaction with the educational choice made (which had parallels with the need for autonomy), social adjustment (which had parallels with the need for relatedness), academic adjustment, and self-efficacy (which had parallels with the need for competence).

Our findings suggest that all four proxy indicators representing students' need satisfaction were positively associated with motivation after enrolment (see Figure 4). The strongest associations were for satisfaction with choice and academic adjustment. Hence, it might be promising to put some extra effort into satisfying students' needs, especially in the first few weeks after the transition to higher education.
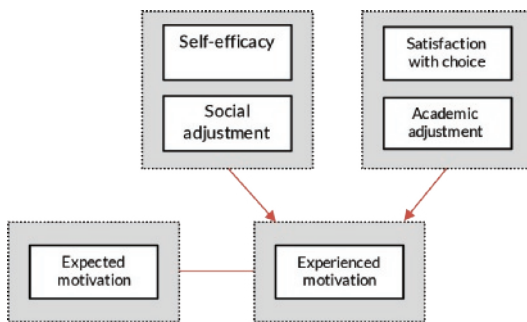

Figure 4. Main finding of Chapter 4

Figure 5 represents the model of this dissertation where all associations found are indicated by arrows (bold arrows for clear associations, and dashed arrows for unclear associations). In the following section, the implications of these findings will be discussed.
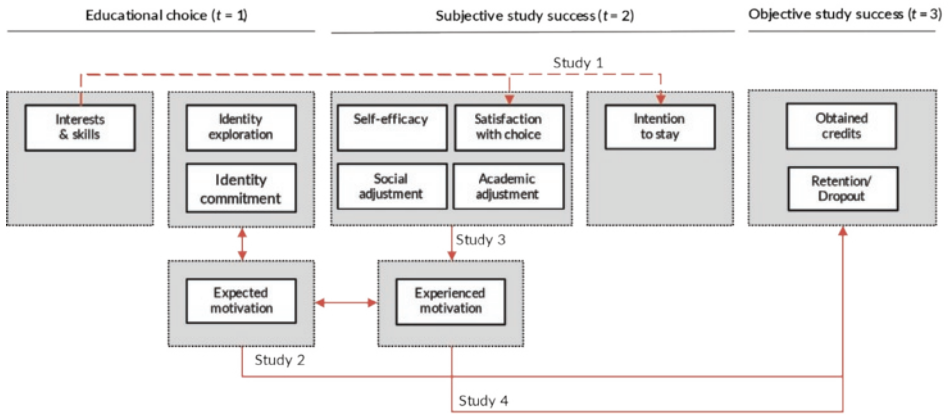
Figure 5. Associations found in this dissertation

3. Discussion

3.1 Identity formation

This dissertation did not find support for the hypothesis that healthy identity formation (an achieved identity) results in study success. To understand these findings, we will need to pay attention to our specific target group of (prospective) students within the specific Dutch context.

Our study on identity formation was among the first to be performed on a large Dutch sample of emerging adults. Research on identity profiles has shown that globally, within samples of emerging adults, the same identity profiles appear. That is, studies conducted in different countries, such as Germany (Luyckx, Seiffge-Krenke, Schwartz, Crocetti, & Klimstra, 2014), Italy (Crocetti, Luyckx, Scrignaro, & Sica, 2011), the United States (Schwartz et al., 2011), and France and Switzerland (Zimmermann, Lannegrand-Willems, Safont-Mottay, & Cannard, 2015) found the same set of identity profiles among emerging adults. Although the set of identity profiles was identical in our Dutch sample, the distribution across profiles was different. The profiles with above-average commitment levels (i.e., an achieved identity and a foreclosed identity profile) accounted for only nearly one-fifth of the Dutch sample, compared to a third in the countries mentioned above. Additionally, more than half of the Dutch students did not have noteworthy levels of exploration. A possible explanation might be that in the

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Netherlands only a limited amount of exploration is feasible in the educational domain. Adolescents have to make educational choices very early, often before they are ready to handle sufficient information seeking and before they can make career decisions like these (Julien, 1999). For example, by the third grade of secondary education, 14-year-old students already need to decide on a selection of subjects that may exclude some bachelor program options later on.

Because these imposed directions in the current Dutch educational system may have contributed to modest/low levels of exploration among the students in our sample, it might be important to provide opportunities that facilitate identity exploration and commitment. In our late modern Western societies, several authors (e.g., Arnett, 2000; 2007) have suggested that identity formation has been extended to the period of emerging adulthood (i.e., age period from the late teens through the mid-to-late 20s). For emerging adults who attend university, this institutional environment serves as an opportunity through which the process of identity formation can be prolonged (Montgomery & Côté, 2003). During emergent adulthood, when students have entered the new university environment, a wide array of exploration possibilities arise (Waterman & Archer, 1990). Therefore, higher education is the ideal time for identity exploration and experimentation (Arnett, 2000), providing the likelihood that most students will be exploring different future plans when they are in a university context (Luyckx, Duriez, Klimstra, & De Witte, 2010). The restricted opportunities for exploration in Dutch secondary education combined with our findings that many students had insignificant levels of exploration, makes it desirable to offer students exploration possibilities during higher education that help them become self-determining adults.

3.2 Person-environment fit theory

The findings of this dissertation found partial support for person-environment fit theory, which suggests that students have better academic achievement and are more satisfied when their interests are congruent with their educational environment (Allen & Robbins, 2008; Nye, Su, Rounds, & Drasgow, 2012; Smart, Feldman, & Ethington, 2000). In this dissertation, the effect of intrinsic motivation, which is strongly related to interest (Wigfield & Cambria, 2010), had a predictive effect on academic achievement. However, the association between interests and satisfaction with choice/intention to stay was not

significant for the investigative and artistic types of students and bachelor's programs. This lack of predictive effect of interest may be partly explained by looking at person-environment fit more dynamically by incorporating the adjustment aspect. This will be explained in further detail in the next paragraphs.

Person-environment fit was only assessed at one point in time, before enrolment. It is likely that students' interests are subject to external influences because students encounter the phase of emerging adulthood in which they are still exploring their identities (Arnett, 2000). As known from previous research, two types of interests exist (Renninger, 2000): more stable individual interests that only develop over time, and situational interests that are less stable and environmentally triggered (Hidi, 2000). Since students might still be forming their identities and interests by exploring new situations, their individual interests are likely prone to change.

The interest type itself is likely to be a possible moderator of the association between changing fit and outcomes. Obviously, after assessing person-environment fit at a certain point in time, the person and/or the environment will change after that particular moment. When individuals perceive a lack of fit, it can be restored when the person adapts to the environment or when the environment adapts to the person, which is the main principle of work adjustment theory (Dawis & Lofquist, 1984). The former is known as 'reactive adjustment', when people act on themselves by, for example, changing interests and values in response to their environments. The latter is known as 'active adjustment' whereby environments change in reaction to people's personal characteristics (Wille & De Fruyt, 2004). The way of adjusting might not work identically for every student. Regarding reactive adjustment, certain students might be more open to or curious about new events than others. A way of increasing person-environment fit, from an active adjustment point of view, would be to manipulate the environment. Students can affect changes in their day-to-day experiences, by changing tasks (e.g., courses), organising their study work differently, or changing the relationship with others (e.g., joining a study association). This kind of proactive person-environment fit behaviour (Parker & Collins, 2010) that shapes different aspects of the environment can be compared with the principles of job crafting, a phenomenon taken from organisational research (Wrzesniewski & Dutton, 2001). These behaviours are likely to be undertaken

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more by proactive students, such as students with an enterprising interest type (Bakker, Tims, & Derks, 2012).

In conclusion, the person-environment fit paradigm is a valuable framework for matching students with bachelor's programs. However, we did not find interests to be predictive for all types of students. Likely, the way of obtaining a person-environment fit in a new environment may work differently for different types of students, which might be a reason for not finding predictive effects in all our cases.

3.3 Self-determination theory

This dissertation found support for SDT. In line with previous research (Faye & Sharpe, 2008), our findings showed that students with self-determined motivational profiles (i.e., the high quality profile) were more likely to display need satisfaction in the form of satisfaction with choice, social adjustment, academic adjustment, and self-efficacy.

After a transition, need fulfilment may not be equally important for all three basic psychological needs. We found that academic adjustment (a parallel with competence satisfaction) and satisfaction with choice (a parallel with autonomy satisfaction) had the most significant effects on motivation after the transition to higher education. Regarding competence satisfaction, these findings are in line with those of Ullrich-French and Cox (2014) who studied the transition to middle school, and Naude, Nel, Van der Watt, and Tadi (2016) who studied the transition to university. Regarding autonomy satisfaction, Grolnick and colleagues (2015) concluded that specifically autonomy support was associated positively with autonomous motivation after the transition to middle school. However, this effect of autonomy support was not found by Ullrich-French and Cox (2014).

We also found an effect of social adjustment (a parallel with relatedness satisfaction) on motivation, although this effect was somewhat smaller than the effect of competence satisfaction and autonomy satisfaction. Likewise, the effect of relatedness satisfaction on motivation was found by other authors (Naude et al., 2016; Swenson, Nordstrom, & Hiester, 2008; Ullrich-French & Cox, 2014).

These three needs were not examined at the same time by the studies mentioned above and, therefore, could not compare the differences in effect sizes, as we could. Only Ullrich-French and Cox (2014) studied these three needs simultaneously and found

effects for competence and relatedness, but not for autonomy. Thus, when comparing it seems plausible that the satisfaction of one specific need is more important than the satisfaction of the other two. It might be that the functional significance of each need seems sensitive to the context and, therefore, is likely to vary across contexts and development (Deci & Ryan, 2000; Ullrich-French & Cox, 2014). More research on the importance of specific need fulfilment is warranted, especially concerning the specific transition to higher education.

SDT and identity formation theory complemented each other in this dissertation. In Chapter 3 we found that healthy identity formation (i.e., the achievement profile) among students co-occurred with autonomous motivation within the autonomous achievement profile. This is in line with other studies in which identity achievement was positively associated with autonomous motivation (Faye & Sharpe, 2008; Waterman, 2004). Apparently, self-determined behaviours (i.e., autonomous motivation) and a strong sense of self (i.e., healthy identity formation) are related. Faye and Sharpe (2008) also linked SDT and identity formation theory and found that stronger identity formation resulted in autonomous motivation through increased perceptions of need fulfilment. They mentioned, for example, that the kind of motivation an individual has (autonomous versus controlled motivation) may contribute to the types of situations that an individual seeks out. Likewise, Luyckx, Vansteenkiste, Goossens, & Duriez, (2009) found that individuals who achieved a sense of personal identity through the use of proactive exploration strategies scored higher on all three needs. It is, therefore, possible that those students who have a strong sense of self (identity) perceive their environments as more supportive of their needs. After all, as already mentioned, how an individual perceives the environment could be just as important as the environment itself (Deci & Ryan, 1985). These findings in combination with our own findings are consistent with SDT, in which it is argued that the satisfaction of one's basic needs promotes the commitment toward a particular identity option.

3.4 A broader definition of study success
Our definition of study success was twofold. Like in many other studies, objective study success was operationalised as retention and obtained credits (e.g., de Koning, Loyens, Rikers, Smeets, & van der Molen, 2014; Vanthournout, Gijbels, Coertjens, Donche, &

Van Petegem, 2012). Furthermore, we took a broader look at study success by including subjective study success in the form of social-emotional well-being (e.g., Evans, Forney, Guido, Patton, & Renn, 2010). This broader vision on study success is supported by Biesta (2009) who claims that one of the aims of higher education is 'subjectification'. This term refers to the formation of distinctive self-determining or self-forming persons making their own pathway through life (Marginson, 2018). Subjectification thus has to do with independence and autonomy, that is, with being the agent of one's actions (Biesta, 2013).

Studying in higher education is most likely the first period in which students can practice and learn this kind of agency, as most of them are for the greater part independent from their parents now. Whether all forms of education actually contribute to subjectification is debatable. However, educating students to be self-determining persons should be one of the purposes of higher education (Biesta, 2009). Therefore, the development in this personal and identity formation process should be part of the definition of study success. As this success is not just about the study itself anymore, but also about the student's development in its broadest sense, a term like 'student success' would probably be more appropriate than 'study success'. In the next section, an effort is made to incorporate the findings and reflections of this dissertation in a new integrative model for student success.

3.5 The integrative model for student success

How can the theories, findings, and insights contained in this dissertation be applied to motivation, educational choices, and study success in higher education?

In our sample of Dutch emerging adults, we found that the level of exploration and commitment was low compared to other international samples. Although we did not examine the association between identity formation and subjective study success in this dissertation, we know from previous research that healthy identity formation is essential for autonomous motivation (e.g., Faye & Sharpe, 2008) and other educational outcomes (academic adjustment; e.g., Germeijs & Verschueren, 2007). Thus, as our prospective students are still forming their identities which seems to be linked to subjective types of study success, the definition of study success might be extended somewhat and be more centred around the identity formation process of the student. As already mentioned before, the university should also function as a place to find out what one wants

from life and be a playground for students to explore themselves and new situations to become a happy, motivated, and self-determining person. This process of identity formation resulting in self-determining professionals and citizens should be added to the current definition of study success. Hence, 'student success' is not just about academic achievement and social-emotional well-being, but also about autonomous motivation and self-determination. These expressions of student success are a combination of the intended outcomes of person-environment theory and SDT.

Furthermore, an integration of the theories employed in this dissertation gives a more comprehensive view of students and study careers. Basically, when bringing identity formation theory, person-environment fit theory, stage-environment theory, and SDT back to their essence, these theories claim generally the same: it is important to pursue congruence to get positive outcomes. Identity formation is about bringing identity (commitments) in congruence with the self (which is defined differently by different authors; e.g., Berzonsky, 1986; Soenens & Vansteenkiste, 2011). The other three theories aim for congruence between the person and her/his environment.

Looking more specifically at the person-environment fit, this paradigm comprises two long-standing traditions of research (Muchinsky & Monahan, 1987). One tradition of the person-environment fit paradigm is based on the concept of supplementary fit, which exists when a person and the environment possess matching or similar characteristics. This tradition is most typically represented by vocational psychology research (cf. Holland's interest types, 1985) and in this dissertation operationalised by examining the congruence between a student's interest type and her/his bachelor's program associated with subjective study success.

The second tradition is based on the idea of complementary fit, which occurs when the characteristics of a person or environment provide what the other wants. This kind of fit is represented by research on psychological need fulfilment (Edwards, 1991). Likewise, SDT points out that when the environment meets a person's basic psychological needs (e.g., autonomy, competence, relatedness) this will result in motivation, well-being, performance, and satisfaction (Gagné & Deci, 2005; Sheldon, Turban, Brown, Barrick, & Judge, 2003). The stage-environment theory (in Chapter 4) could be considered as a specification of the second tradition. This theory posits that it is not only particularly the person, but the developmental phase the person faces (the stage) that needs attention

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in this fit (Eccles et al., 1993). So, in this case, a new university environment has to be congruent with the basic needs of a student in the stage of emergent adulthood to result in student success. This second tradition was examined in Chapter 4 when we found that students' need satisfaction was positively associated with motivation.

How can all employed theories be applied to higher education concerning educational choices and the broader definition of student success? Figure 6 shows an endeavour to integrate the theories into higher education practice. The red core of the figure represents the broader definition of student success. As mentioned, student success is not just about academic achievement and social-emotional well-being, but also about autonomous motivation and self-determination. In our qualitative study, mainly the students who continued in the teacher training program mentioned the inherent appeal of the teacher job, their identification with this job, and being passionate and happy as motives to stay. Therefore, it is not just a matter of getting good grades, obtaining credit points, and staying in or finishing the program, but also a matter of healthy social-emotional adjustment, staying or becoming autonomously motivated, and learning how to be a self-determining person. In some cases, these different expressions of student success may not be compatible. For example, a student might experience that a certain program does not meet her/his psychological needs and therefore has a good reason to switch to another program. In terms of retention, this may not be very successful, but in terms of self-determination, this student acted according to what (s)he needed as a person to flourish.

The grey circle around the red core in Figure 6 represents SDT showing that three psychological basic needs must be fulfilled to experience well-being and intrinsic motivation, eventually resulting in student success. To meet these needs the 'student' or the 'stage' the student faces (the 'S' in Figure 6) requires 'environments' or 'experiences' (the 'E' in Figure 6) that fulfil these needs. This ongoing clockwise cycle between the student and her/his environment/experiences represent the person-environment fit theory and the stage-environment theory. The student has to find an environment (e.g., university, a bachelor's program, or social community) that fits her/his values, interests, and needs.
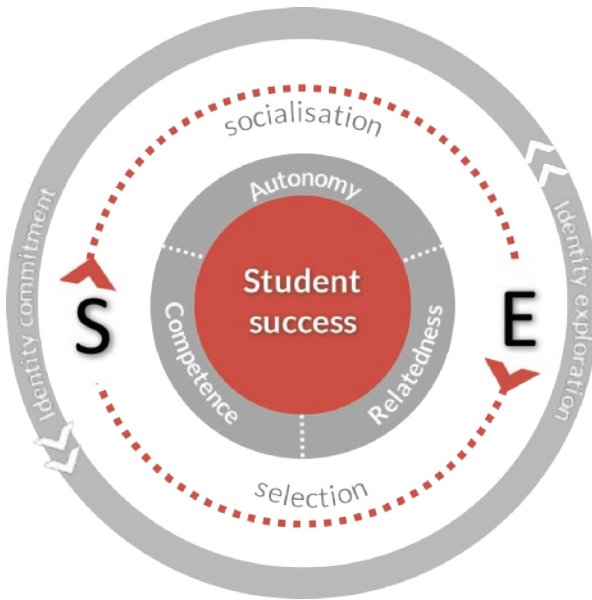
Figure 6. The integrative model for student success

As mentioned before, when students encounter the phase of emergent adulthood, it is likely the first time that they are making their own, independent, decisions (Arnett, 1998). This increased agency enlarges the influence on the congruence between themselves and their environment. As students reach the age at which they can make independent decisions, they can choose, create, or steer towards certain experiences or environments, based on their needs, personality, or values (i.e., the selection effect; Pascarella & Terenzini, 1991). On the other hand, the experiences in the university environment can shape students, which represent a socialization effect (e.g., Pascarella & Terenzini 1991).

The outer grey circle, turning counter-clockwise, represents the identity formation process, which, when performed properly, results in autonomous motivation, self-determination, and social-emotional adjustment. Emerging adulthood is the period of life that offers the most opportunity for identity change, exploration, and experimentation (Luyckx, Schwartz, Goossens, & Pollock, 2008). As already mentioned, the university is the place where emerging adults can try out various possibilities that prepare them for the future. During identity exploration, experiences (E) have an impact on the student's identity (S). After having explored several possibilities and gradually knowing what the

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student wants out of life, the student could be making more enduring decisions, which exemplify identity commitment. Hence, identity commitment represents a situation in which the student's identity (S) is determinative for the selection of experiences (E). At first, choices define our identity, but as time passes by, identity defines our choices, since individuals are getting more committed to their choices.

One particular nuance that needs to be pointed out are the dashed lines between the three basic needs which imply that there is no given optimal level of need fulfilment for every student, stage, or environment. We already mentioned that the functional significance of each need seems sensitive to the context and, therefore, is likely to vary across contexts and development (Deci & Ryan, 2000). Cable and Edwards (2004) proposed there can be a difference between the *importance* of a specific need (e.g., how important autonomy is to the individual) and the desired *amount* of a specific need (e.g., how much autonomy an individual wants). Depending on a student's developmental phase, it is likely that psychological needs will change over time. 'In fact, in different settings, any one of the three needs will emerge to 'take the lead' in terms of its association with wellness outcomes, even as the other two remain important' (Ryan & Deci, 2017, pp. 247). For example, several authors have found that after enrolment it is very important to feel socially integrated into the new university environment (e.g., Naude, et al., 2016; Swenson et al., 2008). These findings are in line with the results of our qualitative study mentioned in Chapter 5, where students only mentioned the social environment as the main reason to stay within or after the first year.

Our findings along with this integrative perspective on student success have implications for practice that are discussed in the next section.

4. Implications for practice

4.1 Optimising congruence before enrolment

We have concluded in the previous section that congruence is important to let students flourish. Therefore, it is sensible to optimise congruence before enrolling in a program as much as possible. In the Netherlands, students are required to specialize immediately upon entering higher education. After completing secondary education they need to choose a suitable bachelor's program out of 243 programs (Vereniging Hogescholen,

2018). The Interest and Skill Inventory on Educational Choices (ISEC) can help students in secondary education by giving them a sense of direction in the labyrinth of bachelor's programs. By completing the ISEC, students in secondary education get to know their main interest type(s). Counsellors in secondary education can use this instrument with their students as a starting point in career counselling by matching students' interest types to certain domains of education. Furthermore, this instrument can be used in higher education as a basis for matching prospective students to specific bachelor's programs, since the inventory can be accompanied by a feedback tool that links interest profiles to a list of congruent bachelor's programs (see for example, Fonteyne, Wille, Duyck, & De Fruyt, 2017). By identifying successful profiles for every bachelor's program, prospective students can base their educational decision on the degree of congruence between themselves and a particular program. Alternatively, teachers of these programs can base their recruiting or selection strategies on this congruence as well. By using this instrument to facilitate prospective students choosing a bachelor's program that fits their interests and skills, a potential result could be less dropouts as a consequence of erroneous educational choices.

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Furthermore, we learned that students' motivation before enrolment is based on expectations rather than reality and that this motivation can change after their enrolment due to real-life experiences. Nonetheless, in the Netherlands, all universities have set up activities aimed at matching students to the 'right program', often entailing prospective students' self-reports on their motivation (Warps et al., 2017). Whereas it seems logical to ask about students' motivation before starting a program, it is, in light of our findings, not sufficient in a matching process. Thus, it would be more beneficial to portray a realistic image of the bachelor's program during open education days and explore the expectations of prospective students before they decide to embark on a certain bachelor's program. Activities created to reveal and check these expectations may be effective in improving educational choices based on subjective interests. By providing information about the content of the program, teachers, students, alumni, and professionals could inform prospective students about the difficulties of the program (or profession) and the reasons why former students dropped out. In summary, before enrolment, expectation management would be more valuable than motivation assessment.

Another effective way to inform prospective students about the content of a particular bachelor's program would be to introduce something like a 'realistic job preview', a technique known from industrial and organisational psychology. The realistic job preview is an attitude change technique designed to reduce turnover among newly hired employees (Popovich & Wanous, 1982) by providing job applicants with positive and negative facets of the job (Sims, 1994). It shows all the characteristics of a particular job so applicants learn exactly what they can expect from it. Something like a 'realistic *study* preview' could explain the advantages and disadvantages of a particular bachelor's program. It could even be deployed as a real-life experience with study assignments, lectures, and trial-studying tests during 'taster days' as if a student already had started the program. In this way, prospective students could have a clearer expectation and might be less disappointed with the content of the program after enrolment.

Specifically, a trial-studying test can be considered as (part of) a realistic study preview, as some studies already found that these tests predicted educational success in the first year of higher education (Niessen, Meijer, & Tendeiro, 2016; Visser, van der Maas, Engels-Freeke, & Vorst, 2012). Trial-studying tests are simulations of educational programs or a representative course in the program (Niessen et al., 2016) and could be a valuable method to achieve self-selection and better matching before enrolment. Results have shown that prospective students with lower scores on the trial-studying test were significantly less likely to enrol in the program (Niessen et al., 2016).

4.2 Enabling and rewarding identity exploration after enrolment

The suggestions mentioned above to optimise congruence before enrolment by improving the quality of the educational decision-making process might not be sufficient to reduce the issue of dropout in higher education. Previous research has shown that emerging adults, like prospective students, face a stage in which certain executive functions are not full-grown yet, resulting in difficulties with planning and looking ahead (Kirby, Edwards, & Sugden, 2011), as well as with making career-decisions (Julien, 1999). A lot of prospective students might make insufficient use, or no use at all, of exploration opportunities (cf. Schwartz, Côté, & Arnett, 2005) and will start a program without any articulate reason. Especially for these students, it could be beneficial to develop interventions at the university that encourage exploration and experience to

help students figure out what program or direction suits them best. Universities could introduce broad programs in the first weeks or first year for every educational domain (e.g., the economic domain, the social domain, etc.) allowing students to experience what type of courses match their interests and skills best, so they can choose a more focused direction within that domain after this particular period.

As already mentioned, the restricted opportunities for exploration in Dutch secondary education combined with our findings that many students had insignificant levels of exploration, points out the need to offer them exploration possibilities in higher education. Therefore, it may be essential to include students' identity developmental courses and track identity work throughout the university years (Luyckx et al., 2008), as part of the curriculum for example. In addition, it may be valuable to direct counselling and intervention efforts towards students that endlessly explore or for whom the commitments made did not help to lessen identity confusion (Schwartz et al., 2005).

4.3 Fulfilling students' needs

For students in general, it would be valuable to put some extra effort into fulfilling their needs for relatedness, competence, and autonomy, especially during the first few weeks in the new university environment. Consistent with SDT, students feel more engaged in school when they feel welcome, safe, efficacious, and autonomous (Connell & Wellborn, 1991; Wentzel, 2009; Wigfield, Eccles, Fredricks, Simpkins, Roeser, & Schiefele, 2015). Therefore, it is important for all students to have a moment of reflection after entering the new university environment to give thought to how these needs are (or are not) met. Together with their counsellor or teacher, students can look back on their first experiences. Questions such as 'How has this program met my expectations?', 'Am I still satisfied with my educational choice?', 'Do I (begin to) feel at home at this university?', and 'What experiences do I need to be (more) sure about my educational choice?' would be important questions to reflect on. After having experienced that the program does not suit the student, the choice can be reconsidered, and reflection can steer the student toward specific coaching from the university, necessary to find alternatives or solutions.

In addition, specific interventions can be established to meet specific needs. First, to satisfy the need for autonomy, counsellors and teachers could adopt an autonomy-supportive style (Deci, Spiegel, Ryan, Koestner, & Kauffman, 1982). An example of

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autonomy-supported behaviour would be to ask students specifically what they want or desire. This could be about which particular study task a student wants to start with, but also in which way the student wants to execute a specific assignment. On a larger scale, this could also include composing one's own personal study program that fulfils students' needs or matches the students' interests, analogous to the job crafting principle (job crafting behaviours represent self-initiated changes that employees make in the design of their job; Tims & Bakker, 2010).

Second, the fulfilment of the need for relatedness is important when entering an environment that is not familiar (e.g., Swenson et al., 2008). To help students feel more welcome and let them get used to the new culture and environment, universities could create opportunities for students to integrate socially. Social integration plays an essential role in student success: when students feel at home they put more effort in their study (Severiens et al., 2011), and social integration leads to less dropout (Prins, 1997). Braxton and McClendon (2001) presented several evidence-based institutional practices to promote social integration and feelings of relatedness. One of these practices was to introduce a student orientation program that takes place before the beginning of classes. The primary goals of such programs are to familiarise students with administrative and academic regulations, bring student services to their attention, and create possibilities to interact socially with their peers and teachers. Research has shown that peer involvement during the first semester exerts a positive influence on social integration (Berger & Milem, 1999; Milem & Berger, 1997).

Another practice Braxton and McClendon (2001) proposed was collaborative learning. Previous research has shown that the use of collaborative or cooperative learning fosters the development of peer groups that play a role in both the learning of course content and the establishment of memberships in social communities at the university (Tinto, 1997). Naude and colleagues (2016) found that specific group work was essential after the transition to university to meet students' need for relatedness. Thus, teachers should consider forms of cooperative learning with peer students, especially in the first semester, to increase the social integration of their students.

Peer-students could also be deployed in fulfilling the need for competence after the transition to university. A feeling of competence is especially important since students enter a new environment with certain insecurities. A powerful way to increase students'

self-efficacy is to use peer models and have students watch them performing well on particular tasks (Schunk, 2001). By observing how peer-students overcome mistakes, students with similar abilities often realize they also have these capacities (Zimmerman, 2000). Many begin to believe, '(S)he is like me. If (s)he can do this, I can do this' (Schunk, 2001).

Possibilities for creating one's own study program (cf. job crafting; Tims & Bakker, 2010) can also be a way to provide students with possibilities to meet all three basic needs. This proactive kind of behaviour to craft one's study may be key for students to match their needs and abilities with the opportunities and demands of their environment and this is likely to result in person-environment congruence (Kristof-Brown, Zimmerman, & Johnson, 2005). On the one hand, 'study crafting' can provide students with autonomy, variety, and learning opportunities, making them more competent and autonomous. On the other hand, meaningful connections with others can be created by engaging in conversations with teachers and peers for support, coaching, or feedback, resulting in the feeling of relatedness. In the Netherlands, flexible programs are already offered in adult education (Adviesrapport OCW, 2014). However, in regular higher education, ideas on tailor-made study programs have just recently developed.

5. Limitations and future directions

This dissertation offers a more comprehensive view of a societal relevant topic in higher education. However, when interpreting the findings several limitations should be considered.

First, in Chapter 4, the motivation we assessed before enrolment was different from the motivation we assessed after enrolment. Motivation assessed before enrolment was based on the motivation for a bachelor's program that was constructed in the prospective student's mind, based on (unrealistic) expectations. Motivation assessed after enrolment was based on their first experiences in the new program after getting acquainted with the program, peer-students and teachers. A potential concern with expectations before enrolment is the accuracy of forecasts. Students may not have a very clear idea of bachelor's programs they have not started yet, and hence their forecasts can be subject to errors (Arcidiacono, Hotz, & Kang, 2012). In line with previous

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research (Stinebrickner & Stinebrickner, 2014), we found that students enter university quite optimistically, but many of them drop out. We learned from this that a positive association between motivation and study success does not necessarily imply that more successful students had more or a better quality of motivation (autonomous motivation) before enrolment. It says more about whether students' positive expectations were met after enrolment.

Second, a later moment of assessing identity and an increased time span could have discovered (stronger) associations with educational outcomes. As already mentioned, the university environment serves as an important place for exploring future plans and furthering identity formation (Luyckx et al., 2010; Montgomery & Côté, 2003). Looking at the configurations of our sample in terms of identity profiles, it seemed that most students were still exploring or had not even started exploring when they entered university. Furthermore, the time span we investigated between identity formation and study success covered only one year. Identity achievement, the healthiest way of identity formation (Luyckx et al., 2010) is something that pays off only after some time. In the study of Luyckx and colleagues (2010) the foreclosed profile co-occurred with comparably favourable adjustment in the short run (compared to the achievement identity profile), but in the longer run, the achieved profile was the most favourable one. In our sample, it would be informative to see how students enter the labour market after graduation. Bachelor's programs often represent an imperative route to get a job. It is possible that the students in our sample with an achieved identity will get jobs in which they feel or perform better. However, the time span of this dissertation did not provide for the opportunity to examine this.

Third, a mixed methods approach was employed in this dissertation that combined the advantages of obtaining quantitative data from large samples with the advantage of getting a more comprehensive qualitative view of our variables of interest. However, the timing of the qualitative interview study may not have been ideal, as we assessed in retrospect the motivation for enrolling, continuing, or withdrawing from a primary teacher training program. Recall bias can occur when respondents self-report about events in the past (i.e., people may be more likely to search for explanations; Mausner & Kramer, 1985) and individuals' current self-views can influence their recollections (Wilson & Ross, 2003). It would have been better to ask questions about motivations

for leaving just before or after withdrawal, and questions concerning motivations for enrolment together with their expectations right before starting the program (because preconceptions about teaching and teacher training can impact students' experience of teacher training; Feiman-Nemser, McDiarmid, Melnick, & Parker, 1989).

Although we assessed motivation and study success at different time points, another limitation was that these data-collections were not gathered from the same sample. Data-collection from the same sample at different time points would probably have discovered some associations that were not investigated in the current dissertation. For example, we could not investigate the association between experienced motivation and objective study success, as we did not collect these data in one sample.

Furthermore, the type of bachelor's program was not considered as a moderator variable in our dissertation. A business student and an art student will likely be dissimilar when it comes down to motivation. Doing research on subsamples of different kinds of students could be of interest to the stakeholders of different bachelor's programs.

An avenue for future research to avoid recall bias and get a more fine-grained insight into certain associations is to collect data by means of experience sampling. Participants in experience sampling method studies are impelled to record where they are, what they are doing, and how they feel several times throughout the day or week (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). Furthermore, this technique enables insights into cause-and-effect associations between motivation and student success. For example, we could get a better understanding of how motivation affects student success by collecting certain data on motivation during the weeks in which the student has to study for a specific exam. On the other hand, we could collect data on motivation after the student got back her/his grade, to get a better comprehension of how student success affects motivation. Additionally, the experience sampling method could give insight regarding which experiences ensure that a student feels autonomous, related, or competent. Therefore, the experience sampling method would be an ideal way to map emotional and cognitive processes that influence motivational experiences on a micro-level.

Certain aspects need to be further examined to evaluate whether the introduced integrative model for student success is valid. Foremost, it would be useful to do (qualitative) research on the definition of student success by asking students themselves

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what *they* deem student success to be. More often, student well-being is mentioned in the media and scientific literature, proposing that a considerable amount of students experience high levels of stress (Cotton, Dollard, & Jonge, 2002; Jacobs & Dodd, 2003; Stoeber, Childs, Hayward, & Feast, 2011) due to academic overload, the burden to succeed, and the strong desire to obtain high grades (Tosevski, Milovancevic, & Gajic, 2010). So, 'feeling healthy' next to 'performing well' might be an aspect that also needs to be incorporated in the definition of student success. Therefore, it would be recommended to ask students what they believe student success entails for them by means of 'voicing' (i.e., the challenge to give students a voice in their own learning and development process, by articulating their internal experiences; Otter, 2015).

Furthermore, longitudinal measurements of congruence during the entire study period (and investigating what aspects are the most important in defining this congruence) could be of added value in research on educational choices and student success. Educational choices might be considered not just as the choice for a certain bachelor's program, but also as the choices made during the whole study career. Finally, if progression in identity formation will actually be seen as a purpose of higher education, and included as such in the definition of student success, it would be worthwhile to research the trajectories students go through and how these trajectories are associated with motivation, well-being, and other forms of student success.

6. Concluding remarks

The studies in this dissertation investigated different associations regarding students' motivation and their educational choices and study success. Motivation, especially autonomous motivation, played a role in the choice (prospective) students make to enrol or stay in a certain bachelor's program and their study success. However, assessing motivation before students enrol in bachelor's programs seems not sufficient, as this motivation might be based on (false) expectations. Therefore, it seems better to assess and manage expectations before enrolment and let students experience the program after enrolment. Assessing their motivation after gaining these experiences accompanied by customised counselling can ensure that students' needs are fulfilled, or that guidance and support are undertaken if this is not the case. Furthermore, universities should be regarded as environments to experiment and explore identities. This way, students will

not only be educated academically to become qualified professionals but also become self-determining adults, prepared to add value to society and become happy in life.

Are you happy with the career choices you have made so far? How many 'mistaken' decisions were needed to get you to a place where you felt at your utmost best? Sure, important decisions should be made deliberately. However, decisions can have different outcomes than expected. Most likely, it is only then that a real opportunity to learn will reveal itself. So, we need experiences to make the right decisions. However, experience is gained by making decisions we might regret afterwards. Hence, wrong choices might eventually take us to the right places - at least, in my case.

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7. Appendices

APPENDIX A

Odds ratios of identity dimensions and covariates with the students' achievement groups as dependent variables

Predictors	Successful dropouts					Unsuccessful stayers					Unsuccessful dropouts				
	b (SE)	Wald	95% CI for Odds Ratio			b (SE)	Wald	95% CI for Odds Ratio			b (SE)	Wald	95% CI for Odds Ratio		
			Lower	Odds Ratio	Upper			Lower	Odds Ratio	Upper			Lower	Odds Ratio	Upper
Intercept	.29	.09				-2.86***	62.50				-2.01***	37.99			
Gender	-.09	.28	.66	.92	1.27	-0.34**	25.93	0.62	0.71	0.81	-0.63***	114.29	0.47	0.53	0.60
Age	-.13**	8.15	.80	.88	.96	0.12**	56.57	1.09	1.13	1.17	0.13***	78.73	1.11	1.14	1.17
Economic	.17	.58	.77	1.18	1.82	0.07	0.69	0.90	1.08	1.28	-0.06	0.58	0.81	0.94	1.10
Social	.22	.86	.79	1.24	1.95	-0.64***	36.50	0.43	0.53	0.65	-0.55***	37.88	0.49	0.58	0.69
Health	-1.74**	8.16	.05	.18	.58	-1.37***	55.50	0.18	0.25	0.37	-0.98***	52.92	0.29	0.38	0.49
ICT	-.76	3.00	.20	.47	1.11	0.33*	6.84	1.09	1.39	1.78	-0.89***	45.43	0.32	0.41	0.53
Science & Tech	-.58	3.62	.31	.56	1.02	0.28*	7.40	1.08	1.32	1.62	-0.35***	13.25	0.59	0.71	0.85
Commitment making	-.11	.92	.71	.90	1.12	0.06	1.84	0.97	1.07	1.17	-0.01	0.08	0.91	0.99	1.07
Intercept	0.69	0.45				-2.87***	56.11				-1.83***	28.11			
Gender	-0.09	0.31	0.66	0.91	1.26	-0.34***	25.69	0.63	0.71	0.81	-0.63***	114.34	0.47	0.53	0.60
Age	-0.13**	8.21	0.80	0.88	0.96	0.12**	58.86	1.10	1.13	1.17	0.13***	81.01	1.11	1.14	1.17
Economic	0.16	0.54	0.77	1.17	1.80	0.06	0.54	0.90	1.07	1.27	-0.07	0.80	0.80	0.93	1.09
Social	0.21	0.82	0.78	1.23	1.94	-0.64***	37.42	0.43	0.53	0.65	-0.55***	39.06	0.48	0.57	0.68
Health	-1.73**	8.12	0.05	0.18	0.58	-1.37***	55.75	0.18	0.25	0.36	-0.98***	52.98	0.29	0.38	0.49
ICT	-0.76	3.07	0.20	0.47	1.09	0.32*	6.62	1.08	1.38	1.77	-0.90***	46.52	0.31	0.41	0.53
Science & Tech	-0.59	3.74	0.30	0.55	1.01	0.27**	7.08	1.07	1.32	1.61	-0.36***	14.04	0.58	0.70	0.84
Identification with comm.	-0.21	2.42	0.62	0.81	1.06	0.06	1.21	0.95	1.06	1.18	-0.06	1.55	0.85	0.94	1.04

Predictors	Successful dropouts					Unsuccessful stayers					Unsuccessful dropouts				
			95% CI for Odds Ratio					95% CI for Odds Ratio					95% CI for Odds Ratio		
	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper
Intercept	-0.10	0.01				-3.00***	63.53				-2.20***	42.34			
Gender	-0.09	0.30	0.66	0.91	1.26	-0.34***	25.99	0.62	0.71	0.81	-0.63***	114.76	0.47	0.53	0.60
Age	-0.14**	8.94	0.80	0.87	0.95	0.12***	57.75	1.10	1.13	1.17	0.13***	77.42	1.11	1.14	1.17
Economic	0.21	0.91	0.81	1.23	1.87	0.05	0.32	0.89	1.05	1.25	-0.06	0.56	0.81	0.94	1.10
Social	0.24	1.12	0.81	1.27	2.00	-0.65***	38.88	0.42	0.52	0.64	-0.55***	38.09	0.49	0.58	0.69
Health	-1.73**	8.08	0.05	0.18	0.58	-1.37***	55.78	0.18	0.25	0.36	-0.98***	52.85	0.29	0.38	0.49
ICT	-0.72	2.73	0.21	0.49	1.14	0.32*	6.33	1.07	1.37	1.76	-0.88***	45.28	0.32	0.41	0.53
Science & Tech	-0.55	3.21	0.32	0.58	1.05	0.27**	6.92	1.07	1.31	1.60	-0.34**	12.94	0.59	0.71	0.86
Exploration in breadth	0.02	0.01	0.77	1.02	1.34	0.11	3.57	1.00	1.11	1.25	0.05	1.03	0.95	1.05	1.17
Intercept	-0.01	0.00				-2.39***	41.45				-1.55***	21.28			
Gender	-0.09	0.29	0.66	0.91	1.26	-0.33***	25.24	0.63	0.72	0.82	-0.63***	112.60	0.47	0.53	0.60
Age	-0.14**	8.83	0.80	0.87	0.95	0.13***	62.32	1.10	1.14	1.17	0.13***	83.27	1.11	1.14	1.18
Economic	0.20	0.90	0.80	1.23	1.87	0.04	0.22	0.88	1.04	1.24	-0.08	0.99	0.80	0.93	1.08
Social	0.24	1.10	0.81	1.27	2.00	-0.66***	39.49	0.42	0.52	0.64	-0.56***	39.48	0.48	0.57	0.68
Health	-1.73**	8.08	0.05	0.18	0.58	-1.37***	55.88	0.18	0.25	0.36	-0.98***	52.89	0.29	0.38	0.49
ICT	-0.72	2.74	0.21	0.49	1.14	0.29*	5.38	1.05	1.34	1.72	-0.92***	48.78	0.31	0.40	0.52
Science & Tech	-0.55	3.22	0.32	0.58	1.05	0.25*	5.71	1.05	1.28	1.56	-0.37***	15.40	0.57	0.69	0.83
Exploration in depth	-0.02	0.01	0.75	0.98	1.29	-0.09	2.51	0.82	0.92	1.02	-0.16**	10.29	0.77	0.85	0.94

Predictors	Successful dropouts					Unsuccessful stayers					Unsuccessful dropouts				
				95% CI for Odds Ratio					95% CI for Odds Ratio					95% CI for Odds Ratio	
	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper
Intercept	-.63	.44				-2.69***	58.76				-2.24***	50.13			
Gender	-.08	.25	.67	.92	1.27	-.34***	25.57	.63	.71	.81	-0.63***	113.10	0.47	0.53	0.60
Age	-.13**	8.49	.80	.88	.96	.13***	60.98	1.10	1.13	1.17	0.13***	80.81	1.11	1.14	1.17
Economic	.15	.51	.76	1.17	1.78	.05	.32	.88	1.05	1.25	-0.07	0.91	0.80	0.93	1.08
Social	.21	.793	.78	1.23	1.93	-.65***	38.78	.42	.52	.64	-0.56***	39.61	0.48	0.57	0.68
Health	-1.73**	8.05	.05	.18	.59	-1.37***	55.85	.18	.25	.36	-0.98***	52.84	0.29	0.38	0.49
ICT	-.76	3.08	.20	.47	1.09	.31*	6.07	1.07	1.36	1.75	-0.90***	46.97	0.31	0.41	0.53
Science & Tech	-.58	3.62	.31	.56	1.02	.26*	6.44	1.06	1.30	1.59	-0.36***	14.10	0.58	0.70	0.84
Ruminative exploration	.21*	3.96	1.00	1.23	1.51	.01	.04	.93	1.01	1.10	0.07	3.71	1.00	1.08	1.16

Note. The group of successful stayers was the reference group. The variable type of bachelor's program was a categorical variable with six categories (Economy, Social, Health, ICT, Science & Technology and Education. Education served as reference category). Commitment Making: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(24)$ = 661.95, p < .001. Identification with commitment: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(24)$ = 665.29, p < .001. Exploration in breadth: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(24)$ = 661.63, p < .001. Exploration in depth: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(24)$ = 668.51, p <.001. Ruminative exploration: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model $\chi^2(24)$ = 665.32. p < .001. * p < .05, ** p < .01, *** p < .001.

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APPENDIX B

Statistical analyses regarding identity profiles

Latent profile analysis model fit indicators up to six identity profiles.

Profile solutions	Log Likelihood	BIC[a]	BLRT *p*-value[b]	Entropy
1	-33754.26	67598.37	0.00	1.00
2	-30509.13	61206.93	0.00	0.71
3	-28314.23	56915.98	0.00	0.79
4	-27387.16	55160.67	0.00	0.77
5	-26749.08	53983.34	0.00	0.75
6	-26380.45	53344.91	0.00	0.75

Notes. [a] Bayesian information criteria. [b] Bootstrap likelihood ration

ANOVA mean comparisons of identity profiles on identity dimensions.

Identity profiles	Undifferentiated	Moratorium	Carefree diffusion	Troubled diffusion	Foreclosure	Achievement	Wald value	R^2
	$N = 2230.73$	$N = 1756.94$	$N = 1495.73$	$N = 1001.61$	$N = 758.72$	$N = 737.28$		
Identity dimensions	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)		
Commitment making	4.06 (.01)[a]	3.49 (.01)[b]	3.60 (.01)[c]	2.66 (.01)[d]	4.61 (.01)[e]	4.74 (.01)[f]	22579.70***	0.95
Identification with commitment	4.04 (.01)[a]	3.55 (.01)[b]	3.71 (.01)[c]	2.98 (.01)[d]	4.56 (.01)[e]	4.63 (.01)[f]	16625.94***	0.86
Exploration in breadth	3.71 (.01)[a]	3.98 (.01)[b]	3.00 (.01)[c]	3.18 (.01)[e]	3.19 (.02)[d]	4.37 (.02)[f]	6206.97***	0.80
Exploration in depth	3.68 (.01)[a]	3.73 (.01)[b]	2.83 (.01)[d]	2.78 (.01)[c]	3.22 (.02)[e]	4.25 (.02)[f]	7328.71***	0.81
Ruminative exploration	2.37 (.01)[a]	3.47 (.01)[b]	2.11 (.01)[c]	3.17 (.02)[d]	1.40 (.02)[e]	2.48 (.03)[f]	9530.86***	0.85

*** $p < .001$. Notes. Similar superscripts indicate that the estimated means of the identity profiles are significantly different from the other profiles, while a superscript of another profile suggest that the means of this profile are not significantly different from that profile ($p < .001$).

APPENDIX C

**Odds ratios of motivation dimensions and covariates with the students'
achievement groups as dependent variables**

Predictors	Successful dropouts		95% CI for Odds Ratio			Unsuccessful stayers		95% CI for Odds Ratio			Unsuccessful dropouts		95% CI for Odds Ratio		
	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper	b (SE)	Wald	Lower	Odds Ratio	Upper
Intercept	0.91	0.73				-2.51***	37.25				-0.50	1.83			
Gender	-0.41*	5.72	0.66	0.48	0.66	-0.37***	32.18	0.69	0.61	0.69	-0.61***	110.70	0.54	0.49	0.54
Age	-0.10	0.39	0.90	0.66	0.90	0.12***	64.98	1.13	1.10	1.13	0.12***	78.27	1.13	1.10	1.13
Economic	0.26	1.44	1.29	0.85	1.29	0.03	0.16	1.03	0.88	1.03	-0.01	0.02	0.99	0.86	0.99
Social	0.30	1.79	1.35	0.87	1.35	-0.68***	48.36	0.51	0.42	0.51	-0.52***	38.85	0.59	0.50	0.59
Health	-1.46**	7.44	0.23	0.08	0.23	-1.38***	63.61	0.25	0.18	0.25	-0.87***	47.71	0.42	0.33	0.42
ICT	-0.71	2.69	0.49	0.21	0.49	0.28*	5.22	1.32	1.04	1.32	-0.83***	41.93	0.43	0.34	0.43
Science & Tech	-0.46	2.49	0.63	0.35	0.63	0.24*	5.98	1.27	1.05	1.27	-0.32*	11.83	0.73	0.61	0.73
Autonomous	-0.41*	5.72	0.66	0.48	0.66	-0.01	0.02	0.99	0.87	0.99	-0.34**	29.40	0.71	0.63	0.71
Intercept	-0.14	0.02				-2.66	67.00***				-1.93***	42.78			
Gender	-0.19	1.46	0.60	0.82	1.13	-0.36	30.65***	0.62	0.70	0.79	-0.64**	121.19	0.47	0.53	0.59
Age	-0.11*	6.43	0.83	0.90	0.98	0.12	65.51***	1.10	1.13	1.16	0.11***	70.62	1.09	1.12	1.15
Economic	0.32	2.25	0.91	1.37	2.08	0.03	0.13	0.88	1.03	1.21	0.02	0.09	0.88	1.02	1.18
Social	0.32	2.06	0.89	1.37	2.12	-0.68	48.54***	0.42	0.51	0.61	-0.50***	36.21	0.51	0.61	0.71
Health	-1.46**	7.48	0.08	0.23	0.66	-1.38	63.64***	0.18	0.25	0.35	-0.89***	49.20	0.32	0.41	0.53
ICT	-0.65	2.24	0.22	0.52	1.22	0.27	5.04*	1.04	1.31	1.67	-0.82***	40.13	0.34	0.44	0.57
Science & Tech	-0.41	1.95	0.37	0.66	1.18	0.24	5.88*	1.05	1.27	1.53	-0.29**	9.98	0.63	0.75	0.90
Controlled	-0.33*	4.74	0.53	0.72	0.97	0.06	1.33	0.96	1.07	1.19	0.07	1.80	0.97	1.07	1.18

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| Predictors | Successful dropouts | | | | | Unsuccessful stayers | | | | | Unsuccessful dropouts | | | | |
| | b (SE) | Wald | 95% CI for Odds Ratio | | | b (SE) | Wald | 95% CI for Odds Ratio | | | b (SE) | Wald | 95% CI for Odds Ratio | | |
			Lower	Odds Ratio	Upper			Lower	Odds Ratio	Upper			Lower	Odds Ratio	Upper
Intercept	-0.91	1.08				-2.80***	73.20				-2.37***	63.81			
Gender	-0.13	0.68	0.64	0.88	1.20	-0.35***	29.17	0.62	0.71	0.80	-0.60***	108.17	0.49	0.55	0.61
Age	-0.10*	6.28	0.83	0.90	0.98	0.12***	66.94	1.10	1.13	1.16	0.12***	74.18	1.09	1.12	1.15
Economic	0.29	1.94	0.89	1.34	2.03	0.03	0.12	0.88	1.03	1.21	0.01	0.04	0.88	1.01	1.17
Social	0.32	2.03	0.89	1.37	2.12	-0.68***	48.83	0.42	0.51	0.61	-0.51***	37.03	0.51	0.60	0.71
Health	-1.46**	7.46	0.08	0.23	0.66	-1.37***	62.85	0.18	0.25	0.36	-0.87***	47.02	0.33	0.42	0.54
ICT	-0.68	2.49	0.22	0.51	1.18	0.27	4.93	1.03	1.31	1.67	-0.83**	41.50	0.34	0.44	0.56
Science & Tech	-0.43	2.12	0.37	0.65	1.16	0.24*	5.89	1.05	1.27	1.53	-0.29**	10.26	0.62	0.75	0.89
Amotivation	0.16	0.83	0.83	1.17	1.65	0.17*	6.08	1.04	1.19	1.36	0.39***	38.92	1.31	1.47	1.67

Note. The group of successful stayers was the reference group. The variable type of bachelor's program was a categorical variable with six categories (Economy, Social, Health, ICT, Science & Technology and Education. Education served as reference category). Autonomous = autonomous motivation (intrinsic motivation and identified motivation): R^2 = .08 (Cox & Snell), .09 (Nagelkerke).). Model χ^2(24) = 734.94, p < .001. Controlled = controlled motivation (introjected motivation and extrinsic motivation): R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model χ^2(24) = 704.37, p < .001. Amotivation: R^2 = .08 (Cox & Snell), .09 (Nagelkerke). Model χ^2(24) = 735.74, p < .001. * p < .05, ** p < .01, *** p < .001.

APPENDIX D

Statistical analyses regarding motivation-only profiles

Latent profile analysis model fit indicators up to three motivation-only profiles.

Profile solutions	Log Likelihood	BIC[a]	BLRT p-value[b]	Entropy
1	-14585.56	29225.25	0.00	1.00
2	11516.65	-22916.02	0.00	1.00
3	16064.21	-31947.98	0.00	0.99

Notes. [a] Bayesian information criteria. [b] Bootstrap likelihood ration

ANOVA mean comparisons of motivation profiles on motivation dimensions.

Motivation-only profiles	High quality	Low quality	Amotivated	Wald value	R^2
	N = 3288.51	N = 2612.33	N = 2578.16		
Motivation dimensions	M (SE)	M (SE)	M (SE)		
Autonomous motivation	4.36 (.01)[a]	4.09 (.01)[b]	3.91 (.00)[c]	1775.4***	0.16
Controlled motivation	1.60 (.01)[a]	1.84 (.01)[b]	1.99 (.00)[c]	804.8***	0.08
Amotivation	1.00 (.00)[a]	1.55 (.01)[b]	2.00 (.00)[c]	23637569.7***	0.88

*** $p < .001$. Note. Similar superscripts indicate that the estimated means of the motivation-only profile are significantly different from of the other profiles, while a superscript of another profile suggests that the means of this profile are not significantly different from that profile ($p < .001$). Standard errors are between brackets.

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APPENDIX E

Statistical analyses regarding combined motivation-identity profiles

Latent profile analysis model fit indicators up to five combined motivation-identity profiles.

Profile solutions	Log Likelihood	BIC[a]	BLRT *p*-value[b]	Entropy
1	-45816.62	91776.68	0.00	1.00
2	-19846.08	39988.02	0.00	0.99
3	-16740.92	33930.12	0.00	1.00
4	-13739.34	28079.38	0.00	0.95
5	-11948.94	24651.00	0.00	0.93

Notes. [a] Bayesian information criteria. [b] Bootstrap likelihood ration

ANOVA mean comparisons of combined motivation-identity profiles on identity and motivation dimensions.

Motivation based identity profiles	Moderately positive	Amotivated	Moderately negative	Autonomously achieved	Controlled and troubled diffused	Wald value	R^2
	4751.4252	1041.7636	771.8626	714.5600	549.3886		
Dimensions	M (SE)	M (SE)	M (SE)	M (SE)	M (SE)		
Commitment making	3.78 (.01)[a]	3.49 (.02)[b]	3.89 (.02)[c]	4.77 (.02)[d]	3.07 (.03)[e]	4084.46***	0.38
Identification with commitment	3.85 (.01)[a]	3.57 (.01)[b]	3.91 (.02)[c]	4.72 (.01)[d]	3.20 (.03)[e]	5614.05***	0.41
Exploration in breadth	3.57 (.01)[c]	3.50 (.01)[e]	3.63 (.02)[a]	3.91 (.02)[d]	3.41 (.03)[b]	290.78***	0.06
Exploration in depth	3.42 (.01)[a]	3.31 (.01)[b]	3.51 (.02)[c]	3.90 (.02)[d]	3.11 (.03)[e]	621.38***	0.11
Ruminative exploration	2.51 (.01)[a]	2.88 (.02)[b]	2.62 (.03)[c]	1.94 (.03)[d]	3.25 (.03)[e]	1289.10***	0.18
Autonomous motivation	4.30 (.01)[a]	3.93 (.01)[e]	4.22 (.01)[c]	4.75 (.01)[d]	3.90 (.02)[b]	3488.08***	0.28
Controlled motivation	1.62 (.01)[d]	1.99 (.01)[b]	1.84 (.02)[e]	1.55 (.02)[a]	1.82 (.03)[c]	732.00**	0.08
Amotivation	1.00 (.00)[d]	2.00 (.00)[b]	1.42 (.01)[c]	1.00 (.00)[a]	1.56 (.02)[e]	36692263.18***	0.90

*** $p < .001$. *Note*. Similar superscripts indicate that the estimated means of the motivation-only profile are significantly different from the other profiles, while a superscript of another profile suggests that the mean of this profile is not significantly different from that profile ($p < .001$). Standard errors are between brackets.

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APPENDIX F

Memberships and classification probabilities

Memberships of both motivation-only and combined motivation-identity profiles

	Combined motivation-identity profiles				
	Moderately positive	Amotivated	Moderately negative	Autonomous achieved	Controlled and troubled diffusion
Motivation-only					
High quality	4597	-	-	701	30
Low quality	-	-	700	-	458
Amotivated	-	1055	-	-	2

Note. Due to missings on the identity dimensions on the one hand and outliers concerning both the motivation-only and combined profiles on the other hand, $N = 7{,}543$.

Classification probabilities of individuals in both the high quality profiles and controlled and troubled diffusion profile

	Classification probabilities motivation-only profiles			Classification probabilities combined motivation-identity profiles				
	1	2	3	1	2	3	4	5
Individual 1	1.00	0.00	0.00	0.49	0.00	0.00	0.00	0.51
Individual 2	1.00	0.00	0.00	0.49	0.00	0.00	0.00	0.51
Individual 3	1.00	0.00	0.00	0.48	0.00	0.00	0.00	0.52
Individual 4	1.00	0.00	0.00	0.44	0.00	0.00	0.00	0.56
Individual 5	1.00	0.00	0.00	0.44	0.00	0.00	0.00	0.56
Individual 6	1.00	0.00	0.00	0.44	0.00	0.00	0.00	0.56
Individual 7	1.00	0.00	0.00	0.42	0.00	0.00	0.00	0.58
Individual 8	1.00	0.00	0.00	0.42	0.00	0.00	0.00	0.58
Individual 9	1.00	0.00	0.00	0.39	0.00	0.00	0.00	0.61
Individual 10	1.00	0.00	0.00	0.38	0.00	0.00	0.00	0.62
Individual 11	1.00	0.00	0.00	0.38	0.00	0.00	0.00	0.62
Individual 12	1.00	0.00	0.00	0.38	0.00	0.00	0.00	0.62
Individual 13	1.00	0.00	0.00	0.37	0.00	0.00	0.00	0.63
Individual 14	1.00	0.00	0.00	0.37	0.00	0.00	0.00	0.63
Individual 15	1.00	0.00	0.00	0.34	0.00	0.00	0.00	0.66
Individual 16	1.00	0.00	0.00	0.34	0.00	0.00	0.00	0.66
Individual 17	1.00	0.00	0.00	0.33	0.00	0.00	0.00	0.67
Individual 18	1.00	0.00	0.00	0.33	0.00	0.00	0.00	0.67
Individual 19	1.00	0.00	0.00	0.27	0.00	0.00	0.00	0.73
Individual 20	1.00	0.00	0.00	0.21	0.00	0.00	0.00	0.79
Individual 21	1.00	0.00	0.00	0.20	0.00	0.00	0.00	0.80
Individual 22	1.00	0.00	0.00	0.16	0.00	0.00	0.00	0.84
Individual 23	1.00	0.00	0.00	0.14	0.00	0.00	0.00	0.86
Individual 24	1.00	0.00	0.00	0.13	0.00	0.00	0.00	0.87
Individual 25	1.00	0.00	0.00	0.12	0.00	0.00	0.00	0.88
Individual 26	1.00	0.00	0.00	0.12	0.00	0.00	0.00	0.88
Individual 27	1.00	0.00	0.00	0.07	0.00	0.00	0.00	0.93
Individual 28	1.00	0.00	0.00	0.04	0.00	0.00	0.00	0.96
Individual 29	0.99	0.01	0.00	0.01	0.00	0.00	0.00	0.99
Individual 30	0.99	0.01	0.00	0.00	0.00	0.00	0.00	1.00

Note. Regarding motivation-only profiles: profile 1 = high quality, profile 2 = low quality, profile 3 = amotivated. Regarding combined motivation-identity profiles: profile 1 = moderately positive, 2 = amotivated, 3 = moderately negative, 4 = autonomous achievement, 5 = controlled and troubled diffusion. Rows display the classification probabilities. In this example, individual 1 has a 100% chance of belonging to profile 1 regarding the motivation-only profiles. Regarding the combined motivation-identity profiles Individual 1 has a 49% chance of belonging to profile 1 and a 51% chance of belonging to profile 5. In general, individuals are assigned to the class for which the classification probability is the largest.

Frequencies of classification probabilities of individuals in the autonomous achieved profile (N = 701)

Probabilities	Frequencies
0.51	3
0.52	5
0.53	5
0.54	4
0.55	3
0.56	3
0.57	7
0.58	2
0.59	2
0.60	3
0.61	1
0.62	1
0.63	6
0.64	3
0.65	4
0.66	7
0.67	8
0.68	5
0.69	2
0.70	3
0.71	5
0.72	2
0.73	5
0.74	0
0.75	4
0.76	7
0.77	1
0.78	2
0.79	2
0.80	3
0.81	9
0.82	4
0.83	10
0.84	6
0.85	9
0.86	11
0.87	8
0.88	5
0.89	9
0.90	8
0.91	11
0.92	15
0.93	14
0.94	11
0.95	17
0.96	16
0.97	26
0.98	48
0.99	95
1.00	261

8. Summary

Chapter 1

General introduction

Study success in higher education has been an important research theme for several decades (Van der Zanden, Denessen, Cillessen, & Meijer, 2018). Most students who drop out of university do so during or immediately after the first year (Credé & Niehorster, 2012). In Chapter 1 we describe that two of the main reasons for dropout in higher education are lack of motivation and making an erroneous educational choice (Wartenbergh & Van den Broek, 2008; Van den Broek, Wartenbergh, Bendig-Jacobs, Braam, & Nooij, 2015). The overarching premise we wanted to investigate was the influence of motivation in educational choices and study success. Thus, the main research question was: *What role do students' motivational differences play in educational choices and study success in higher education?* The three main variables of this dissertation, being motivation, educational choice, and study success, were brought together in a model inspired by Tinto's Student Integration Model (1993). The concept of motivation was taken from Self-determination theory (SDT; Deci & Ryan, 2000). Educational choice was seen as a process of identity exploration and identity commitment according to the identity status paradigm of Marcia (1966). Study success in this dissertation includes objective study success, such as retention and obtained credit points, but also subjective study success comprising social-emotional well-being. Associations between educational choices and study success and between motivation and study success were quantitatively and qualitatively examined and described in four scientific articles (i.e., Chapter 2 to 5).

Chapter 2

Study 1: The development and validation of an Interest and Skill inventory on Educational Choices

To facilitate prospective students during their orientation on their next educational choice in higher education, a study on the development and validation of the Interest and Skill Inventory on Educational Choices (ISEC) was conducted and presented in Chapter 2. The ISEC is a 76-item questionnaire consisting of items on interests and skills representing the six interest types of Holland (1997): realistic type, investigative type,

artistic type, social type, enterprising type, and conventional type. In four subsequent studies adequate structural validity, internal consistency, and construct validity were established. A seven-factor structure was found, consisting of the six Holland types, of which the investigative type was split into two subscales (an 'investigative-humanities' subscale and an 'investigative-science' subscale). Criterion validity was established for four out of the six interest types (i.e., the realistic, social, enterprising, and conventional interest type). The overall results suggested that the ISEC is reliable and valid as an orientation instrument and can facilitate individual students in secondary education during their educational choice process. By completing the ISEC, students in secondary education get to know their main interest type(s). Counsellors in secondary education and higher education can use this instrument for their students as a starting point in career counselling by matching students' interest types to certain domains of education.

Chapter 3
Study 2: The association of motivation and identity with students´ achievement in higher education

Study success is not only a matter of matching interests and skills to bachelor's programs. It is also a matter of making choices by means of identity exploration (exploring and comparing different options) and identity commitment (choosing one option and staying committed). At the same time, the motivation behind the commitment made can be of influence on study success. That is why it was interesting to combine the constructs of identity formation and motivation in one study. The study in Chapter 3 examined whether identity and motivation separately predicted first-year academic achievement (i.e., objective study success). Furthermore, the study examined whether identity and motivation dimensions could be combined into new distinct profiles and whether these new profiles predicted academic achievement. Participants were divided into four student achievement groups: 1) 'successful dropouts' (dropouts who obtained all 60 credits), 2) 'successful stayers' (stayers who obtained all 60 credits), 3) 'unsuccessful stayers' (stayers who did not obtain all 60 credits), and 4) 'unsuccessful dropouts' (dropouts who did not obtain all 60 credits). Results indicated that autonomous

types of motivation (e.g., intrinsic motivation[3]) were positively associated and that identity was barely associated with academic achievement. Identity and motivation could be integrated into five combined motivation-identity profiles (in a sequence of lower to higher quality of motivation): a 'controlled & troubled diffusion' profile, an 'amotivated' profile, a 'moderately negative' profile, a 'moderately positive' profile, and an 'autonomously achieved' profile. The 'moderately positive' profile was *positively* associated with academic achievement and the 'controlled & troubled diffusion' profile, as well as the 'amotivated' profile, were *negatively* associated with academic achievement. However, the combined profiles were no better predictors of academic achievement than the motivation-only profiles. Motivation by itself thus sufficed in the prediction of objective study success.

Chapter 4

Study 3: The association between students' need satisfaction and their motivation: the longitudinal change and stability of motivational profiles during a transition

To gain a more comprehensive understanding of motivation in relation to study success, in this chapter we examined how and to what extent motivation may change during the transition from secondary education to higher education. Therefore, motivation before enrolment (labelled as 'expected motivation') and motivation after enrolment (labelled as 'experienced motivation') were assessed. Motivational scores could be described by three replicated motivational profiles across two time points: a 'high quality' profile, a 'high quantity' profile, and a 'low quality' profile. Whereas around 45% of the students turned out to be stable in their motivation, some students increased their quality of motivation and others decreased their quality of motivation after enrolment. Hence, motivation changed to a large extent, but not in the same way for every student. As claimed by previous research (Eccles, et al., 1993), a reason for a decline in motivation might be due to the fact that the new educational environment is not aligned with students' needs. According to Self-determination theory, these needs comprise the need

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3   Intrinsic motivation describes the motivation to perform a behaviour because it is experienced as inherently interesting or enjoyable (e.g., a student who reads a book because (s)he finds the subject interesting or is curious about it).

for autonomy, relatedness, and competence. Subsequently, we examined the association between students' need satisfaction and motivation. The four proxy indicators representing students' need satisfaction in our study were: satisfaction with educational choice, social adjustment, academic adjustment, and self-efficacy. Our findings suggested that all four proxy indicators of students' need satisfaction were positively associated with motivation after enrolment and that the greatest effect was for satisfaction with educational choice and academic adjustment. This suggests that it might be beneficial to establish interventions to ensure that student's first experiences are positive, especially concerning their satisfaction with the chosen program and their academic adjustment.

Chapter 5

Study 4: Student teachers' motives for participating in the teacher training program:
a qualitative comparison between continuing students and switch students

This chapter sought to gain a more comprehensive view on differences between motives for choosing a bachelor's program (i.e., expected motivation) and motives for staying in or leaving this program (i.e., experienced motivation). A qualitative interview study was conducted in a primary teacher training program. The study aimed at finding differences among continuing students and students who switched to another program (switch students) regarding motives for enrolling, continuing in, or withdrawing from this program. No differences in motivations for enrolling were found between both groups of students as both mentioned intrinsic reasons for selecting the program and/or their professional interest as the main reasons to enrol. However, one of the main reasons to withdraw from the program, besides the difficulty level, were the real-life teaching experiences switch students got during their school placement (i.e., an internship at a primary school). Most likely, after having experienced the program and the profession in 'real life', the initial intrinsic motivation for switch students to enrol in the program might have been based on false expectations. On the other hand, one of the main reasons for continuing students to stay, besides the social environment, were also these real-life teaching experiences. Continuing students really enjoyed the tasks of being a teacher at their school placement. Thus, for continuing students, reality seemed to exceed or match expectations, whereas for switch students, reality turned out to be disappointing.

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Chapter 6
General discussion

Chapter 6 provided an overall discussion of the results. The insights from this dissertation could be used in higher education to increase the likelihood of prospective students making suitable educational choices, decreasing students' dropout rates and increasing study success within or after the first year.

Motivation, especially autonomous types of motivation such as intrinsic motivation, plays a role in the choice (prospective) students make to enrol in or stay in a certain bachelor's program and their study success. This autonomous type of motivation seems to go together with healthy identity development ('identity achievement'). However, assessing motivation before enrolment might not always be sufficient, as it could be based on (false) expectations leading to a decline in motivation after enrolment. Therefore, it is better to assess expectations before enrolment, let students experience the program after enrolment, and correct an erroneous educational choice as soon as possible. Assessing motivation after gaining experiences within the actual educational setting, accompanied by customised counselling, could facilitate that students' needs are fulfilled, or that guidance and support are undertaken if this is not the case.

The limited opportunities for exploration in Dutch secondary education, combined with our findings that many students had insignificant levels of exploration, points out the need to offer students exploration possibilities in higher education. That way they can make more deliberate suitable educational choices, likely resulting in study success.

Finally, this dissertation's results and insights were integrated with previous findings and well-known theories such as Person-environment fit theory (Hunt, 1975), Stage-environment theory (Eccles et al., 1993), Self-determination theory (Ryan & Deci, 2000) and the Identity status paradigm (Marcia, 1966). As a result the integrative model for *student success* was proposed. This model argues for a broader definition of study success, consisting of academic achievement and social-emotional well-being, but also comprising autonomous motivation, self-determination, and identity development.

9. Nederlandse samenvatting
(Dutch summary)

Hoofdstuk 1

Algemene introductie

Studiesucces is sinds een aantal decennia een belangrijk thema in het hoger onderwijs (Van der Zanden, Denessen, Cillessen, & Meijer, 2018). De grootste uitval onder studenten in het hoger onderwijs vindt plaats in of direct na het eerste studiejaar (Credé & Niehorster, 2012). In hoofdstuk 1 wordt beschreven dat een gebrek aan motivatie en het maken van een verkeerde studiekeuze twee hoofdredenen van uitval zijn (Wartenbergh & Van den Broek, 2008; Van den Broek, Wartenbergh, Bendig-Jacobs, Braam, & Nooij, 2015). In dit proefschrift werd daarom onderzocht wat de invloed van motivatie in studiekeuze en studiesucces is, met als hoofdvraag: *Welke rol spelen aan motivatie gerelateerde verschillen bij studenten in studiekeuzes en studiesucces in het hoger onderwijs*?

De drie hoofdvariabelen in dit proefschrift, te weten, motivatie, studiekeuze en studiesucces waren bijeengebracht in een model dat geïnspireerd was op Tinto's 'Student Integration Model' (Tinto, 1993). Het concept motivatie, bestaande uit verschillende typen, was afgeleid van de Zelfdeterminatietheorie (SDT; Deci & Ryan, 2000). Het proces van studiekeuze werd beschouwd als een proces van identiteitsexploratie (het exploreren van verschillende keuze-opties) en identiteitscommitment (het committeren aan een bepaalde keuze) volgens de theorie van onder anderen Marcia (1966). Studiesucces in dit proefschrift, betreft objectief studiesucces in de vorm van retentie en behaalde studiepunten, maar ook subjectief studiesucces zoals sociaal-emotioneel welbevinden. Verbanden tussen motivatie en studiesucces enerzijds, en studiekeuze en studiesucces anderzijds, werden zowel kwantitatief als kwalitatief onderzocht en beschreven in vier wetenschappelijke artikelen (hoofdstukken 2 tot en met 5).

Hoofdstuk 2

Studie 1: The development and validation of an Interest and Skill inventory on Educational Choices

Een verkeerde studiekeuze is één van de meest voorkomende redenen dat studenten binnen of na het eerste jaar uitvallen in het hoger onderwijs. Om aankomende

studenten te ondersteunen bij de oriëntatie op hun studiekeuze, werd er een studie gedaan betreffende de ontwikkeling en validering van een studiekeuzetest. Deze studiekeuzetest bestaat uit 76 vragen met betrekking tot interesses en vaardigheden die de zes persoonlijkheidstypen van Holland (1997) representeren: het realistische type, het intellectuele type, het artistieke type, het sociale type, het ondernemende type en het conventionele type. Na een eerste gedegen constructie van schalen en het inwinnen van advies van scholieren en experts in binnen- en buitenland, zijn er verschillende validatietoetsen gedaan. In vier opeenvolgende deelstudies werden gedegen structurele validiteit, betrouwbaarheid en constructvaliditeit vastgesteld. Een zeven-factor structuur werd gevonden, bestaande uit de zes persoonlijkheidstypen van Holland, waarbij het intellectuele type opgesplitst werd in twee sub schalen (een 'humanities'-type en een 'science'-type). Criteriumvaliditeit werd vastgesteld voor vier van de zes persoonlijkheidstypen (te weten het realistische, sociale, ondernemende en conventionele type).

De resultaten bevestigen dat de studiekeuzetest een veelbelovend oriëntatie-instrument is voor zowel scholieren in de laatste fase van het middelbaar (beroeps)onderwijs, alsook voor studenten in de beginfase van het hoger (beroeps)onderwijs. Door het invullen van de studiekeuzetest leren aankomende studenten hun dominante persoonlijkheidstype(n) kennen. Decanen in het voortgezet onderwijs, middelbaar beroepsonderwijs en hoger onderwijs kunnen dit instrument voor hun leerlingen en studenten gebruiken als een startpunt in hun studieloopbaanbegeleiding door de persoonlijkheidstypen van deze studenten te koppelen aan een bepaald type opleiding.

Hoofdstuk 3

Studie 2: The association of motivation and identity with students´ achievement in higher education

Studiesucces is niet alleen een kwestie van het matchen van interesses en vaardigheden met bachelorprogramma's in het hoger onderwijs. Het is tevens een kwestie van op de juiste wijze tot een keuze komen, waarbij je eerst verschillende keuze-opties onderzoekt en vergelijkt (identiteitsexploratie) en daarna je committeert aan een bepaalde keuze (identiteitscommitment). Ook de motivatie achter deze keuze kan van invloed zijn op

studiesucces. Daarom was het interessant om te onderzoeken of identiteitsexploratie en identiteitscommitment enerzijds, en motivatie anderzijds, apart van elkaar studiesucces konden voorspellen. Tevens wilden we weten of een combinatie van deze twee concepten iets aan die predictie kon toevoegen. Respondenten werden verdeeld in vier groepen: 1) succesvolle drop-outs (drop-outs die hun propedeuse hebben gehaald), 2) succesvolle blijvers, (blijvers die hun propedeuse hebben gehaald), 3) onsuccesvolle blijvers (blijvers die hun propedeuse nog niet hebben gehaald) en 4) onsuccesvolle drop-outs (drop-outs die hun propedeuse niet hebben gehaald). Resultaten gaven aan dat motivatie(profielen) met een hoge kwaliteit (voornamelijk intrinsieke[4] motivatie) een positief verbanden had(den) met studiesucces, en dat identiteit(sprofielen) nauwelijks verband had(den) daarmee. Identiteitsvorming en motivatie werden gecombineerd, resulterend in vijf motivatie-identiteitsprofielen: een 'controlled & troubled diffusion' profiel, een 'amotivated' profiel, een 'moderately negative' profiel, een 'moderately positive' profiel, en een 'autonomously achieved' profiel. Het 'moderately positive' profiel had een *positief* verband met studiesucces. Het 'controlled & troubled diffusion' profiel en het 'amotivated' profiel hadden een *negatief* verband ermee. Echter, de gecombineerde profielen waren geen betere voorspellers voor studiesucces dan de motivatieprofielen. Motivatie op zichzelf staand, voldeed dus het meest in de voorspelling van objectief studiesucces in het eerste jaar.

Opvallend was dat aankomende studenten die minder goed exploreren en/of zich minder aan keuzes committeren, tevens de studenten zijn die vanuit extrinsieke[5] redenen of zonder specifieke motieven aan een opleiding beginnen. Dit betreft, gezien de resultaten van dit onderzoek, een risicogroep voor uitval. Met deze wetenschap kunnen ouders, decanen op middelbare scholen, en 'intakers' in het hoger (beroeps) onderwijs deze risicogroep ondersteunen door ze te stimuleren deel te nemen aan open dagen, proefstudeerdagen of meeloopdagen, om op basis daarvan bewuster voor een studie te kiezen.

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4   Intrinsieke motivatie betreft een vorm van motivatie waarbij bepaald gedrag wordt vertoond omdat de activiteit zelf als interessant of prettig wordt ervaren (bijvoorbeeld een student die een boek leest, omdat hij nieuwsgierig is naar het onderwerp).

5   Extrinsieke motivatie betreft een vorm van motivatie waarbij bepaald gedrag wordt vertoond om een gewenste uitkomst te bereiken of straf te vermijden (bijvoorbeeld een student die een bepaalde studie kiest om een hbo-diploma te behalen of om kritiek van zijn ouders te vermijden).

Studie 3: The association between students' need satisfaction and their motivation: the longitudinal change and stability of motivational profiles during a transition

Om een uitgebreider beeld van motivatie in relatie tot studiesucces te krijgen, was het eerste doel in deze studie te onderzoeken hoe motivatie verandert tijdens de transitie van het secundair onderwijs naar het tertiair onderwijs. Om die reden werd motivatie zowel voor aanvang van de studie (verwachte motivatie) als motivatie tien weken na aanvang van de studie (ervaren motivatie) gemeten. De scores op verschillende typen motivatie resulteerden in drie motivatieprofielen zowel vóór als na aanvang van de studie: een motivatieprofiel met hoge kwaliteit, een motivatieprofiel met hoge kwantiteit, en een motivatieprofiel met lage kwaliteit. Ongeveer 45% van de studenten bleef stabiel in hun kwaliteit van motivatie, terwijl de rest ofwel steeg ofwel daalde in hun kwaliteit van motivatie tien weken na aanvang van de studie. Dus, motivatie veranderde over het algemeen, maar niet voor iedere student op dezelfde manier.

Een overgang van secundair onderwijs naar hoger onderwijs is dus een risicofactor voor de motivatie van studenten. Wanneer de verandering van de studie-omgeving niet aansluit bij de behoefte van studenten naar autonomie, verbondenheid en competentie (onderdelen die het welbevinden van de student bepalen), kan dit leiden tot een daling in motivatie (Eccles, et al., 1993). Het tweede doel van deze studie was te onderzoeken hoe de vervulling van de hierboven genoemde drie behoeften verband hield met kwaliteit in motivatie. Deze drie behoeften hebben we gemeten aan de hand van vier indicatoren: tevredenheid met de studiekeuze (autonomie), sociale integratie (verbondenheid), academische integratie en zelfvertrouwen (competentie). Studenten met een relatief hoge score op tevredenheid met de studiekeuze, sociale integratie, academische integratie en zelfvertrouwen na de eerste tien weken, hadden een hogere kwaliteit in motivatie (dat wil zeggen voornamelijk intrinsieke motivatie). Studenten die lager op deze vier indicatoren scoorden, vertoonden een lagere kwaliteit in motivatie, te weten voornamelijk extrinsieke vormen van motivatie. De effecten voor tevredenheid met de studiekeuze en academische integratie waren het grootst. We weten dat gebrek aan motivatie één van de meest voorkomende redenen van uitval is. Naar aanleiding van deze studie heeft het dus zin om na de eerste lesweken en tentamens te bekijken

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hoe studenten ervoor staan wat betreft hun tevredenheid met de studiekeuze, sociale en academische integratie, en het zelfvertrouwen, en bij ontoereikendheid hierop in te spelen. Op deze manier kunnen studenten gemotiveerder raken en wordt uitval tegengegaan.

Hoofdstuk 5

Studie 4: Student teachers' motives for participating in the teacher training program:
a qualitative comparison between continuing students and switch students

In dit hoofdstuk beschrijven we hoe we zochten we naar een completere kijk op de verschillen in motieven van studenten om voor een bepaald bachelorprogramma te kiezen (verwachte motivatie) en de motieven om die studie voort te zetten of deze af te breken (ervaren motivatie). Hiervoor werd een kwalitatief onderzoek verricht op een Pabo waarbij 10 'blijvers' en 12 'switchers' (studenten die binnen of na het eerste jaar vanuit de Pabo voor een andere studie kozen) werd gevraagd naar hun redenen om voor de Pabo te kiezen en hier hun studie voort te zetten c.q. deze af te breken. Aan de hand van interviews werden de motieven geïdentificeerd en op wetenschappelijk verantwoorde wijze gecodeerd. Beide groepen, blijvers en switchers, gaven voornamelijk intrinsieke redenen met betrekking tot het beroep aan, daar waar het ging om de keuze voor de Pabo. Waarom 'switchers' de Pabo opleiding dan toch voortijdig verlieten, had naast de moeilijkheidsgraad en inhoud van de opleiding, ook en vooral te maken met de ervaringen die zij opdeden voor de klas tijdens hun stage. Deze negatieve ervaringen bleken één van de meest genoemde redenen om de opleiding te beëindigen. Het lijkt er dus op dat de intrinsieke motieven om aan een opleiding te beginnen, gebaseerd zijn op zelf-geconstrueerde (vaak niet reële) beelden en niet op opgedane reële ervaringen. Voor 'blijvers' echter, waren reële ervaringen voor de klas dé hoofdreden om te blijven. Voor deze studenten pakte de realiteit ogenschijnlijk goed uit. Een ander motief dat alleen 'blijvers' aangaven om hun opleiding voort te zetten, was een goede sociale omgeving. Het heeft er alle schijn van dat dit een randvoorwaarde is om een studie te continueren. Een van de aanbevelingen is dan ook extra aandacht te besteden aan de sociale integratie tijdens het eerste jaar. Sociale integratie kan een beschermende factor zijn tegen uitval. Gezien de hoofdredenen van uitval is het tevens aan te bevelen om de moeilijkheidsgraad

van de opleiding, de inhoud van de opleiding, en de inhoud van het beroep op open dagen en meeloopdagen beter op de kaart te zetten. Nog beter zou het zijn om vóór de start van de studie de student het niveau en de inhoud van het curriculum te laten ervaren aan de hand van representatieve opdrachten.

Hoofdstuk 6

Algemene discussie

In hoofdstuk 6 werden alle resultaten besproken en bediscussieerd. De gewonnen inzichten uit dit proefschrift kunnen in het hoger (beroeps)onderwijs worden benut om de kans te vergroten dat aankomende studenten passende studiekeuzes maken en studiesucces behalen in hun eerste jaar.

Motivatie, voornamelijk intrinsieke motivatie, speelt een hoofdrol bij de studiekeuze. Ook is zij een conditie om bij een opleiding te blijven en tevens voorwaarde voor studiesucces. Deze vorm van motivatie lijkt samen te gaan met een gezonde manier van identiteitsvorming (identiteitsexploratie gevolgd door identiteitscommitment). Echter, het meten van motivatie voordat studenten aan de studie zijn begonnen, heeft weinig nut. Deze kan immers vaak gebaseerd zijn op verwachtingen die niet lijken uit te komen. Als zodanig kunnen zulke verwachtingen bij studenten na de start van de studie leiden tot een motivatiedaling. Het is daarom beter om vooraf de student omtrent zijn verwachtingen te bevragen, daarna hem of haar het programma een aantal weken te laten ervaren, om dan een eventueel verkeerde studiekeuze zo snel als mogelijk te herstellen. Het meten van motivatie nadat de student ervaringen heeft opgedaan in een reële onderwijssetting, vergezeld van persoonlijke begeleiding, kan ervoor zorgen dat er tegemoet gekomen wordt aan de behoeften van de student.

De beperkte exploratiemogelijkheden in het Nederlandse secundaire onderwijs, gecombineerd met onze bevinding dat veel studenten weinig aan noemenswaardige verkenning doen, maakt het wenselijk en noodzakelijk hun deze exploratiemogelijkheden alsnog in het hoger (beroeps)onderwijs aan te bieden. Zo kunnen zij een verantwoorde, goede studiekeuze maken met bijbehorend studiesucces.

Tenslotte werden de conclusies uit dit proefschrift geïntegreerd in eerdere bevindingen uit andere onderzoeken waarin gebruik werd gemaakt van theorieën zoals de Person-

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environment fit theory (Hunt, 1975), Stage-environment theory (Eccles et al., 1993), Self-determination theory (Ryan & Deci, 2000) en het Identity status paradigma (Marcia, 1966). Dit resulteerde in het voorstel voor een integratief model voor *studentsucces*. Dit model houdt mijns inziens een bredere definiëring van de term studiesucces in. Naast academische prestaties en sociaal-emotioneel welbevinden zou *studentsucces* ook intrinsieke motivatie, zelfdeterminatie en identiteitsontwikkeling moeten bevatten.

10. Curriculum Vitae

About the author

Evelyne Meens (1977) was born in Heerlen in the south of the Netherlands. After spending six years at pre-university education (Gymnasium), just like many of the students described in this dissertation, she did not know in what direction to pursue her school career. Business Economics, Psychology, and Sociology were three possible directions that had been short-listed, and just as many prospective students do nowadays, she chose 'the safest option' of Business Economics at Maastricht University. For she was a conscientious student, she passed all exams and decided to become an accountant. However, in the third year of the accountancy program, she visited accountants in their daily working practice and realised only then that this was not something she wanted to do the rest of her life. Because it was not wise to quit the master program at this point, for there was only one more year to graduation, she altered the content of her study program to her own needs and graduated in Organisational Science.

Matching individuals with (study) careers is a central theme in Evelyne's professional life. Her favourite target group is young adults. She finds this target group interesting as young adults are still developing their identity, but are in a stage of life in which they make their own choices and create their own life course. Therefore, Evelyne worked for almost six years in recruitment, matching young adults to starting positions. She ended up as a team leader but felt 'out of place' in this commercial environment. After deliberating for quite a while she took a big step and quit her job as a team leader to start a fulltime master program at Twente University. This time she chose Psychology, in which all her expectations came true. After graduating cum laude, she started as a lecturer at Fontys University of Applied Sciences at the school for Human Resource Management & Psychology and combined being a lecturer with the position of student career counsellor. Subsequently, she became policy advisor and part of a large project called the 'Study Choice Check' with the main goal of matching prospective students

to suitable bachelor's programs. It was then that Evelyne decided to realise one of her ambitions: doing a PhD study in Psychology.

The current PhD study was conducted at Tilburg University at the department of Developmental Psychology along with a research and policy advisor job at Fontys University of Applied Sciences. During the four years Evelyne spent writing this dissertation, she travelled many times to organise and participate in several international conference symposia. Additionally, she has been invited regularly to present at national conferences. Furthermore, she was selected to participate in the 2016 summer school of the European Association for Research on Adolescence (EARA) and the Society for Research on Adolescence (SRA) in Atlanta. In 2018 she was invited to Københavns Professionshøjskole in Denmark for a short research visit to share her expertise and knowledge regarding student success, study choices, and motivation. This year she was also awarded the 'Fontys Research Award 2018' which was a true acknowledgement of her work.

For the near future, Evelyne will continue her research at Fontys University of Applied Sciences and is currently examining the possibilities to make this research part of a lectureship ('lectoraat') to put research on student success 'on the map'. Her ultimate goal with this research is that students feel safe and cared for within their university environment and free to explore different directions, allowing them to discover what their added value in society can be and what they eventually want out of life.

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List of publications

Published

Meens, E.E.M., Bakx, A.W.E.A., Klimstra, T.A., & Denissen J.J.A. (2018). The association of motivation and identity with students´ achievement in higher education. *Learning and Individual Differences, 64,* 54-70.

Submitted

Meens, E.E.M., Bakx, A.W.E.A, & Denissen J.J.A. (revise and resubmit). *The development and validation of an Interest and Skill inventory on Educational Choices (ISEC).*

Meens, E.E.M., Bakx, A.W.E.A, & Denissen J.J.A. (submitted). *The association between students' academic need satisfaction and their motivation: the longitudinal change and stability of motivational profiles during a transition.*

Meens, E.E.M., Bakx, A.W.E.A. (under revision). *Student teachers' motives for participating in the teacher training program: a qualitative comparison between continuing students and switch students.*

List of presentations

Meens, E.E.M., Bakx, A.W.E.A., & Denissen J.J.A. The association between students' need satisfaction and motivation: the longitudinal change and stability of motivational profiles during a transition. *Presentation in a paper session at the AARE Conference (Australian Association for Research in Education), Sydney, Australia, December 2018.*

Meens, E.E.M., Bakx, A.W.E.A., Klimstra, T.A., & Denissen J.J.A. The association of identity and motivation with students' achievement in higher education. *Presentation in a paper session at the AARE Conference (Australian Association for Research in Education), Sydney, Australia, December 2018.*

Meens, E.E.M., Bakx, A.W.E.A., Klimstra, T.A., & Denissen J.J.A. The association of identity and motivation with students' achievement in higher education. *Presentation in a paper session at the International Conference on Motivation of the European Association for Research on Learning* and Instruction (*EARLI), Aarhus, Denmark, August 2018.*

Meens, E.E.M. Motivational individual differences in students' educational choices and study success: theory and practice. *Invited lectures at Københavns Professionshøjskole, Copenhagen, Denmark, June 2018.*

Meens, E.E.M., & Bakx, A.W.E.A. De motieven van studenten om voor de Pabo te kiezen en hier te blijven of deze te verlaten. *Presentation in a symposium called 'De transitie van secundair naar tertiair onderwijs: Hoe dragen studiekeuzeprocessen bij aan het succes in het tertiair onderwijs?' at the Onderwijs Research Dagen (ORD), Nijmegen, the Netherlands, June 2018.*

Meens, E.E.M., Bakx, A.W.E.A., & Denissen J.J.A. The association between students' academic need satisfaction and their (change in) motivation during a transition. *Presentation in a paper session at the European First Year Experience (EARA) Conference in Utrecht, the Netherlands, June 2018.*

Meens, E.E.M., Bakx, A. W. E. A., & Denissen J.J.A. Motivation and academic well-being at times of an educational transition. *Presentation in a paper session at the International Conference on Well-being in Education Systems organized by the European Educational Research Association (EERA) in Locarno, Switzerland, November 2017.*

Meens, E.E.M., Bakx, A. W. E. A., Klimstra, T.A., & Denissen J.J.A. (2016). Students' identity formation and motivation in association with educational success and dropout. *Presentation in a symposium called 'The five-dimensional identity model in different contexts' at the Conference of the European Association of Research on Adolescence (EARA) in Cádiz, Spain, September 2016.*

Meens, E.E.M. Presentation of my PhD project. *Presentation at the EARA (European Association of Research on Adolescence) and SRA (Society for Research on Adolescence) Summerschool (obtained grant), Atlanta, the United States, May 2015.*

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