

Excellence in higher education:

Students' personal qualities and the effects of
undergraduate honours programmes

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Excellence in higher education:

Students' personal qualities and the effects of
undergraduate honours programmes

Excellentie in het hoger onderwijs:

Persoonskwaliteiten en de effecten van honours programma's
(met een samenvatting in het Nederlands)

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Chapter 1

General introduction

Introduction

Stimulating the best and brightest students to get the most out of their study is important not only for their own future, but also in the view that excellent, academically well-trained students are crucial for a country's economic welfare (Breton, 2011; Hanushek & Woessmann, 2011).

Although excellence in higher education receives more and more attention over the last decade in The Netherlands and worldwide, expanding the empirical knowledge base for developing and maintaining excellence in higher education is still needed. This knowledge base contributes to the foundation of the design of educational programmes for excellent students and selection procedures.

This thesis contributes to the empirical knowledge base by examining (a) the role of personal qualities with regard to excellence in higher education, and (b) the effects of educational programmes (so called honours programmes) designed for students who are already doing well and are motivated to learn.

Problem description and context

In Dutch national programmes to improve the quality of higher education, recently the focus changed from preventing dropout and giving priority to students who were lagging behind to a focus on excellence (Segers & Hogenveen, 2012). A strong incentive for this shift were results of international comparative studies in primary and secondary education, which showed that Dutch students were doing relatively well in the lower ranges, but that the best students were falling behind (Martin, Mullis, & Kennedy, 2007; PISA, 2009; Van der Steeg, Vermeer, & Lanser, 2011). At the same time, it was signalled that a relatively large number of students in Dutch higher education was feeling insufficiently challenged and inspired (Van den Broek et al., 2007).

In 2008, the Ministry of Education, Culture and Science decided to make excellence development in higher education a government priority and launched the 'Sirius Programme'. The aim of the Sirius Programme was to support higher education institutions to facilitate their best students by providing funding for the

development of special honours programmes (www.siriusprogramma.nl). Through this programme, a total of 20 Dutch higher education institutions received funding for the establishment of such programmes in their undergraduate bachelor education. This financial incentive has caused a rapid increase in the number of honours programmes across the country. Nowadays, honours programmes are offered in nearly all higher education institutions in The Netherlands (Wolfensberger, 2015). The Netherlands is presently ahead of most other European countries regarding the development and implementation of honours programmes, but over the last decade excellence in education has certainly gained a higher place on the European Union policy agenda as well (Wolfensberger, 2015). Also on a global scale an increasing number of students are enrolled in honours programmes (Long & Mullins, 2012).

Due to these developments, institutions now have to deal with relatively new considerations, such as the design of honours programmes, identifying students with the personal qualities that fit the excellence ambition, and evaluating the impact of honours programmes over time (Segers & Hoogeveen, 2012). This shift has led to a growing demand for an empirical knowledge base to further support the incorporation of honours programmes.

This introduction continues with a brief theoretical overview to frame the research questions regarding the two topics of this thesis, the role of personal qualities and the effects of honours programmes. Also a description of the data collection is provided.

Excellence and personal qualities

An extensive effort has been undertaken in explaining why certain students are more excellent than others. Over the past decades, numerous theories and models regarding the relation between personal qualities and various measures of excellence have been put forward. Two leading perspectives on excellence define excellence (a) in terms of *current* performance (e.g., Ericsson, Krämpe, & Tesch-Römer, 1993; see also Simon & Chase, 1973) and (b) in terms of *potential* for excellent performance (e.g., Mönks & Katzko, 2005; Renzulli, 1978). Studies applying the first perspective

consider students who perform best (e.g., have the highest grades) as the most excellent students, while studies applying the latter perspective describe a specific combination of personal qualities as a condition required to perform on an excellent level. The first perspective states that superior performance can be achieved through engaging in highly structured activities for a long period of time with the specific goal of improving performance, also referred to as deliberate practice (Ericsson et al., 1993). Motivation and perseverance to sustain deliberate practice are thus crucial on the road to excellence (Ericsson, Nandagopal, & Roring, 2005). Studies using the second perspective, with the “three ring concept of giftedness” as a well-known example, are mostly based on retrospective research on professionals who have been recognized for their creative contributions and unique accomplishments. According to this perspective, students require above-average intellectual ability, but also, and equally important, high levels of motivation and creativity in order to become successful and innovative professionals (Renzulli, 1978). These qualities can be developed by external factors like challenging learning environments and frequent interactions with equal level peers (Mönks & Katzko, 2005). Higher education students with above-average intellectual ability and high levels of motivation and creativity thus show the most potential for success. Creativity is described as the ability to come up with novel, innovative ideas, openness to new experiences, and a willingness to take risks (Renzulli, 1978).

In most research on current achievement and potential for achievement personal qualities, such as motivation, are viewed as stable personal characteristics students possess in varying degrees. However, this suggestion of immutability is at odds with both empirical evidence, especially in young adults, and aims of educational programmes (e.g., Duckworth & Yeager, 2015; Specht, Egloff, & Schmukle, 2011). There is hardly any knowledge available on the change of personal qualities over time and how this may be related to changes in performance. Moreover, there is hardly any research on whether (changes in) personal qualities are equally beneficial for excellent students compared to less excellent students. These questions are important in order to increase understanding on how to optimally support students

across their study career, for the identification of potential honours students based on personal qualities, and to understand the effectiveness of honours programmes.

To contribute to the knowledge base on excellence in higher education with this thesis, it was decided to select personal qualities from studies based on both perspectives on excellence, as both the design of honours programmes and the identification of students for these programmes are often based on a combination of the two perspectives (Scager et al., 2012). On the one hand students need to have given proof of excellent academic achievement, indicated by a certain Grade Point Average (GPA), to be considered for honours programme participation. On the other hand, there seems to be consensus on the fact that a sole focus on grades is too narrow when identifying excellent students (Wolfensberger, 2012, p.77). Consequently, in addition to GPA, many honours programmes are also geared towards students' non-cognitive qualities that are considered important for excellent professionals, including for example motivation, innovativeness, or social engagement (Scager et al., 2012; Weerheijm & Weerheijm, 2012). To contribute to insights in the change over time of personal qualities and academic achievement we designed longitudinal studies.

Effectiveness of honours programmes

The increasing focus on excellence in higher education has led to the provision of honours programmes, which are special education programmes for excellent students. In general, research on the effects of honours programmes in higher education is scarce (Achterberg, 2005). Studies that are available largely originate from the United States and other countries with a longer history on honours education. Findings suggest that honours students, for example, gain a higher GPA than students with similar SAT scores (i.e., a standardized test widely used for college admissions in the United States; Cosgove, 2004; Shushok, 2003), develop more critical thinking skills (Seifert et al., 2007), are more open to new ideas and experiences (Kaczvinsky, 2007; Long & Lange, 2002), have a greater desire to learn

and to excel, are more creative (Scager et al., 2012), or are more academically confident than their non-honours peers (Rinn, 2007).

What complicates these studies, and the evaluation of educational programmes in general is, that it is often impossible to distinguish the actual effects of the programmes from differences in personal qualities that were already present before the start of the programme. Simply comparing (self-)selected students to a non-selected group of students can yield misleading results (Vaughan, Lalonde, & Jenkins-Guarnieri, 2014). Specifically for studies evaluating honours programmes it is complicated to find a suitable control group, since honours students are not average students, but are (in general) high achieving and motivated (Achterberg, 2005).

Examining the effectiveness of honours programmes is relevant because it has been questioned whether it is justifiable to invest in rather costly programmes, aimed at a relatively small number of students. Unequal opportunities for non-honours graduates may be generated, since honours graduates may be more attractive for job recruiters. Besides, whether or not honours programmes are the optimal method to support excellent students, deepening our understanding of the effects of the programmes is required in order to make informed, evidence-based decisions regarding honours education. Additionally, research so far (see above) has mainly focussed on short-term effects of honours programmes, predominantly assessed within the context of higher education. To gain more knowledge on whether these programmes are also valuable outside this context it is interesting to study the effect of honours programmes on, for example, (early) professional careers of former honours students.

Research questions

Considering the existing knowledge and the variety of challenges higher education institutions face due to the focus on supporting excellent students, this thesis aimed at further examining (a) the role of personal qualities that are considered important for excellence in higher education and (b) the effects of honours programmes.

The main research questions therefore are:

- (1) *How are students' personal qualities and academic achievement related over the course of the undergraduate bachelor programme?*
- (2) *What is the effect of honours programme participation during and after the undergraduate bachelor programme?*

Four studies were conducted, two focussing on research question 1 and two studies focussing on question 2. The former two used longitudinal multilevel (moderation) modelling to analyse differences *between* students and *within* students over time (Hox, Moerbeek, & van der Schoot, 2010). The latter two studies involved propensity score matching to simulate randomization in honours/non-honours cohorts and a retrospective design to examine effects of honours programmes in students' early careers.

In **chapter 2** we examined motivation, a personal quality that is referred to in nearly all theories and studies on excellence. Moreover, besides GPA, it is the most important selection criteria for honours programmes. The question on how and why students' motivation changes provides insight in how educators may strengthen the motivation of their students and how students can be supported to regulate their own motivation. In order to know if and how motivation changes over the course of the undergraduate programme, we examined the change of motivational goal orientations with two distinct types of goals, i.e., mastery and performance goal orientation, across the entire three-year undergraduate programme. In addition to how these goal orientations change over the course of the undergraduate programme, we also examined to what degree gender, (changes in) academic achievement, and (changes in) self-efficacy explained differences in mastery and performance goals *between* students and *within* students over time. We applied multilevel modelling to analyse differences *between* students and *within* students over time (Hox et al., 2010) using questionnaire data of 2402 individual health profession students, a subpopulation of undergraduate students at Utrecht University, with a total of 4910 measurement occasions.

In **chapter 3** we examine two other personal qualities that have been related to excellence, i.e., perseverance and innovativeness. We used a multilevel moderation model to examine whether students with a different academic aptitude, i.e., one's proven ability to learn and perform within the academic context, benefit equally from perseverance and innovativeness in terms of grades. By using multilevel modelling on a sample of 2272 individual students from 17 different undergraduate programmes, with at least three repeated measures for each student, we were able to differentiate between possible moderation effects *between* students and *within* students over time.

In **chapter 4** we looked at possible spin-off effects of honours programme participation during the early phase of graduates' careers. Examining whether honours alumni can actually be distinguished from non-honours alumni once graduated is a first step in determining possible long-term effects of honours programmes. Moreover, since honours programmes sometimes select students on creative-related qualities, which are mentioned as important prerequisites for success later in life (Renzulli, 1978), it seems likely that differences between honours and non-honours students can be distinguished after graduation on work related outcomes. In this chapter we retrospectively investigated whether 72 honours alumni from three different honours programmes could be distinguished from 72 non-honours alumni matched on high-school grades in terms of final study GPA, perceived job resources, and work engagement.

In **chapter 5** we applied propensity score matching in order to compare a group of 47 honours students with 47 similar non-honours students on their ability, motivation, and creativity, as well as on their GPA. Propensity score matching simulates randomization in honours/non-honours cohorts based on characteristics measured before students applied for an honours programme. This way, we were able to compare possible changes in personal qualities of honours students from nine different undergraduate honours programmes over time to that of similar students in regular programmes.

Lastly, the concluding **chapter 6** provides an overview of the conclusions of the previous chapters, and theoretical and practical implications.

Research context

The studies were conducted among undergraduate bachelor students and alumni of Utrecht University, The Netherlands. Utrecht University is a large research university with about 30.000 students, offering education in a wide variety of disciplines. There are more than 50 undergraduate programmes at seven different faculties, and four special honours undergraduate colleges. In The Netherlands an undergraduate bachelor programme has 180 ECTS-credits and a normative duration of three years.

In 1993, the first honours programmes at this university were developed at the faculties of veterinary medicine and geosciences. Since the start of the Sirius programme in 2008, new honours programmes have been implemented, and currently all seven faculties offer undergraduate honours programmes. Approximately 5% of all students are participating in an honours programme. Some programmes are designed to broaden students' knowledge, while others provide deeper understanding of the subject matter, but most programmes combine these two goals. Like elsewhere in the world, honours programmes at this university use different models, comparable to those in the United States (Scager et al., 2012). Honours students follow at least 25% of the undergraduate bachelor courses at honours level, which means that they annually have to obtain an additional 15 ECTS on top of the 60 ECTS of the regular programme. Depending on the type of honours programme, students are selected based on GPA and motivation, but also other aspects, such as interest in research, innovativeness, or extracurricular activities, are often considered important.

In order to answer the research questions, data were collected among students from seventeen different study programmes (medical sciences, veterinary sciences, pharmacy, chemistry, information sciences, psychological sciences, pedagogical sciences, mathematics, physics and astronomy, history, language and culture, communication and information sciences, law, economics and business

economics, human geography, biomedical sciences, and liberal arts and sciences), comprising all faculties at Utrecht University and a special university college. At the beginning of five consecutive semesters starting in March 2010 and ending in March 2012 an online questionnaire with invitation was sent to all students of the participating study programmes who were in the undergraduate phase of their study (see Figure 1.1). This way, it was possible to follow cohorts of students through different stages of their undergraduate programme. For example, at the first wave of data collection (wave 1) in March 2010, a student in cohort A was just starting his or her second semester. Six months later at the second wave of data collection (wave 2), this student in cohort A was now starting the third study semester. Depending on the students' decisions to participate, the dataset contained a maximum of five completed questionnaires.

Students were asked to rate themselves on a variety of personal qualities. With active informed consent of all participants, questionnaire outcomes were complemented with undergraduate grades and high-school grades, drawn from the university's files. The total dataset consisted of 12,094 individual students who together completed 24,413 web-based questionnaires (68% female; response rate 38%).

		WAVES OF DATA COLLECTION				
		March 2010	October 2010	March 2011	October 2011	March 2012
BACHELOR	Semester 1		Cohort D		Cohort E	
	Semester 2	Cohort A		Cohort D		Cohort E
	Semester 3		Cohort A		Cohort D	
	Semester 4	Cohort B		Cohort A		Cohort D
	Semester 5		Cohort B		Cohort A	
	Semester 6	Cohort C		Cohort B		Cohort A

Figure 1.1. Timeline of data collection. Data were collected among students of seventeen different study programmes at Utrecht University. At the beginning of five consecutive semesters (in March and October), all undergraduate students were invited to participate in an online questionnaire by means of an email

Chapter 2

Goal orientations of health profession students throughout the undergraduate programme: A multilevel study

A. Kool, M.T. Mainhard, M. Brekelmans, P. van Beukelen, A.D.C. Jaarsma

Abstract

The achievement goal theory defines two major foci of students' learning goals 1) primarily interested in truly mastering a task (mastery orientation), and 2) striving to show ones competences to others (performance orientation). The present study is undertaken to better understand if and how health profession students' goal orientations change during the undergraduate programme and to what degree gender, academic achievement, and self-efficacy are associated with mastery and performance orientation *between* students and *within* students over time. By means of an online questionnaire, students of medical, pharmaceutical, and veterinary sciences (N = 2402) were asked to rate themselves on mastery orientation, performance orientation, and self-efficacy at the beginning of five consecutive semesters. Data on grades and gender were drawn from university's files. Multilevel analyses were used for data analysis. Students' goal orientations showed relative stability over time, but substantial fluctuations *within* individual students were found. These fluctuations were associated with fluctuations in self-efficacy. Students' gender, high-school grades, study grades, and self-efficacy were all associated with differences in mastery or performance orientation *between* students. Self-efficacy was the strongest predictor for mastery orientation and grades for performance orientation. The relatively strong association between the goal orientations and students' self-efficacy found in this study emphasizes the potential of enhancing self-efficacy in health profession students. Also, for educators and researchers, fluctuations of both goal orientations *within* individual students are important to consider.

Authors' contributions

All authors made substantial contributions to the study conception and design. AK collected the data in collaboration with TM. MB provided advice on the method and TM and AK conducted the analyses. PvB and DJ contributed to the interpretations of the results and discussions. AK wrote the first draft of the article. All authors participated in finalizing the manuscript, approving it and are accountable for the accuracy and integrity of the content.

Introduction

According to the achievement goal theory, two major foci of students' learning goals are 1) being primarily interested in learning and in truly mastering a task (mastery orientation), and 2) striving to outperform peers and showing ones competences to others (performance orientation) (Dweck, 1986; Elliot & McGregor, 2001). Students can endorse both goals at the same time (Pintrich, 2000), and may revise their goals as they progress in their study (Wrosch, Scheier, Miller, Schultz, & Carver, 2003; Fryer & Elliot, 2007). Educational researchers refer to achievement goals as the reason why students engage in a task. Moreover, the achievement goal theory is one of the most important frameworks to analyse student motivation and to study its effects on learning and performance. The type of goal students pursue influences their learning outcomes and behaviour (Pintrich, 2000). Mastery goals have been linked to continued interest in the subject (Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997), persistence in the face of obstacles (Simons, Dewitte, & Lens, 2004), self-regulated learning (Pintrich & De Groot, 1990), help-seeking behaviour (Butler & Neuman, 1995), and the use of deep processing strategies (Dupeyrat & Mariné, 2005). Orientation towards performance is associated with the use of more shallow processing strategies (Dupeyrat & Mariné, 2005), but also higher academic achievement (Senko, Hulleman, & Harackiewicz, 2011). In the health professions domain both goal orientations have a significant function, since professionals are expected to focus on performance for the sake of their patients, while continuously need to learn new skills (Teunissen & Bok, 2013). Knowledge on how and why students' goal orientations change during the study programme and why students differ in their goal orientations provides educators with insights in how to strengthen a specific type of motivation in their students. For students, it is important to gain insight in how to regulate their goal orientations in the light of lifelong learning and for the good of their future patients. The present study was undertaken to investigate if and how health profession students' goal orientations change during the first three study years (undergraduate bachelor programme) and what constructs drive this process.

Studies outside the health professions domain suggest that students' goal orientations remain stable or decline during the first year at university (Hastings, West, & Song, 2005; Corker, Donnellan, & Bowles, 2013). Fryer and Elliot (2007) found that mastery orientation declined, while performance orientation remained stable within one academic year in a sample of psychology students. Within the health professions domain, hardly any studies on this topic have been conducted. An exception is a study conducted by Artino and colleagues (2012), who showed that first- and third-year medical students were more mastery oriented compared to second-year students, while students did not differ in their performance orientation. This suggests that mastery orientation of medical students fluctuates somewhat over time, however this study's design was cross-sectional, making it hard to draw firm conclusions on developmental issues. Further, Senko and Harackiewicz (2005) noted that goal orientations can change either by *intensification*, representing an increase or decrease of a single goal orientation or multiple goals in the same direction, or by *switching*, which refers to a concurrent decrease in one goal orientation and an increase in the other. Knowledge on possible fluctuations in goal orientations has important theoretical implications, since conclusions regarding the effect of goal orientations on students study behaviour and outcome measures (e.g., academic achievement) may partly depend on when those goal orientations are measured. Our study adds to the present literature by examining stability and change in goal orientations both independently and in relation to each other by using a sample of health profession students over time.

Previous studies examined factors that may explain differences in goal orientations *between* students and *within* students over time (Fryer & Elliot, 2007; Senko & Harackiewicz, 2005). This distinction is important, since both approaches provide different insights. Differences between students may provide insight in relations between goal orientations and students' personal characteristics, while differences within students refer to the question whether the strength of goal orientations can actually change over time and how this change can be achieved. In literature, three prevalent constructs that have been related to differences in goal

orientation are gender, academic achievement, and self-efficacy (i.e., the extent or strength of a students' belief in their own ability to complete certain tasks) (Bandura, 1986; Diseth, 2011; Senko & Harackiewicz, 2005). Male students are generally more performance orientated, while female students are more mastery oriented (Kusurkar, Croiset, Galindo-Garre, & Ten Cate, 2013). Similarly, students with a higher study Grade Point Average (GPA) show higher levels of mastery and performance orientation (Senko et al., 2011). Also, students with a high self-efficacy, thus those who expect to perform well, report higher levels of mastery and performance orientation (Duda & Nicholls, 1992; Wolters, Yu, & Pintrich, 1996; Kaplan & Midgley, 1997) as compared to students with lower self-efficacy. The relation between both academic achievement and self-efficacy with goal orientations however seems to be complex. Self-efficacy has been found to be a direct predictor of goal orientations, but also a moderator on the relation between academic achievement and goal orientations (Diseth, 2011). Moreover, academic achievement has been studied as an outcome of goal orientations (Senko et al., 2011; Diseth, 2011), but also as a predictor of goal orientations (Diseth, 2011). Fluctuations in goal orientations *within* students over time may be related to changes in academic achievement and self-efficacy through time within a single student. For example, a students' level of self-efficacy may change during the academic year due to exam failure (Senko & Harackiewicz, 2005), subsequently causing fluctuations in levels of mastery and performance orientation or vice versa. Thus, self-efficacy and academic achievement are important associates of goal orientations *between* and *within students* and may be a framework for the development of interventions. In this study, we only investigate direct relations between self-efficacy and previous academic achievement with goal orientations.

Up to now, little research has focused on correlates of *within-student* fluctuations of goal orientations (Fryer & Elliot, 2007). In the current study, multilevel analyses were used to examine to what degree stable as well as time varying variables are associated with differences in mastery and performance orientation among students (between-student differences) as well as with fluctuations

within individual health profession students over the undergraduate bachelor programme (within-student differences). The following research questions are addressed:

- i) How do mastery and performance orientations change in health profession students (medical sciences, pharmaceutical sciences, and veterinary sciences) over the course of the undergraduate bachelor programme?
- ii) To what degree do gender and (changes in) academic achievement, and self-efficacy explain differences in mastery and performance orientation *between* students and *within* students over time?

Methods

Participants and procedure

This study involves students from three undergraduate professional programmes: medical sciences, pharmaceutical sciences, and veterinary sciences at Utrecht University, The Netherlands. The professional programmes offer a three-year (undergraduate) bachelor programme, followed by a two-year (graduate) master programme for pharmaceutical sciences and a three-year master programme for medical- and veterinary sciences. Each undergraduate academic year is divided into two semesters consisting of multiple courses. Although the bachelor curricula of all three programmes include basic science knowledge, but also clinical science knowledge and practical skills, organization of the curriculum differs between the programmes.

Students in this sample were drawn from a dataset containing data on student self-perceptions over time including 12,094 students from sixteen different undergraduate programmes at Utrecht University. The first author obtained the primary dataset. All undergraduate students of the involved undergraduate programmes were invited to participate in an online questionnaire at the beginning of five consecutive semesters starting in March 2010 and ending in March 2012. Thus students from different cohorts were followed during (a part of) their undergraduate programme between 2010 and 2012. This implies that students who were already in

their third undergraduate year at the time of the first data collection could participate only once, while students who were in their first year at that time received an invitation for all five data collections.

For the present study, the sample consisted of 2,402 individual students (42% medical sciences, 34% veterinary sciences, and 25% pharmaceutical sciences; 77% female respondents) who together completed 4,910 questionnaires (students participated for the first ($N = 1097$), second ($N = 568$), third ($N = 401$), fourth ($N = 206$) or fifth ($N = 130$) time (response rate data collection 1 = 53%, 2 = 56%, 3 = 43%, 4 = 37%, 5 = 37%).

Instruments

The online questionnaire designed included existing, validated subscales to measure mastery orientation, performance orientation, and self-efficacy.

Goal orientations

Mastery ($\alpha = .73$) and performance goal orientation ($\alpha = .88$) were measured using scales of the Achievement Goal Questionnaire (AGQ; Elliot & McGregor, 2001). This questionnaire is a widely applied instrument to assess mastery and performance goal orientation (Briley, Domiteaux, & Tucker-Drob, 2014). Both scales consisted of three items on a 7-point Likert scale, ranging from 1 (not at all true of me) to 7 (very true of me). A mastery score and a performance score were calculated per student and per semester by averaging the three items.

Self-efficacy

Self-efficacy ($\alpha = .65$) was measured with three items on a 7-point Likert scale using the PISA index of general academic self-efficacy (Adams & Wu, 2000). As an indicator of a student's general self-efficacy we calculated the average across the entire research period for each student and as an indicator of fluctuations in self-efficacy *within* individual students we calculated the semester specific deviation from a student's average self-efficacy.

Academic achievement

Grade Point Averages (GPA) were used as a measure of academic achievement. With active informed consent of all participants, students' responses were linked with high-school grades, and university test grades all drawn from the university's files. As an indicator of a student's academic achievement we calculated the GPA across the entire research period for each student and as an indicator of fluctuations in academic achievement *within* individual students we calculated the semester specific deviation from a student's general GPA. High-school GPA, calculated from final exam grades, was included as a measure of academic achievement at university entrance. In this study GPA is a weighted average calculated with pass-marks only. Grades range from 1 (lowest) to 10 (highest), but in order to pass an exam a score of at least 5.5 is required. In our sample study GPA ranged between 6.00 and 9.00, $M = 7.05$, $SD = 0.54$. High-school GPA ranged between 5.78 and 9.60, $M = 7.35$, $SD = 0.69$.

Data analysis

Given the rather uncommon dataset used in the current study, a design that combines cross-sectional with longitudinal data, we employed complex multilevel modelling analyses that have not been used much in medical education (but see for example McManus & Ludka, 2012). An advantage of multilevel longitudinal modelling is that it accounts for differences between students in number of times they participated. This way, all participants contribute to the estimation of the tested models (Hox et al., 2010).

Multilevel analysis further allows decomposing the variance in goal orientations into variance *between* students and variance *within* students (Hox et al., 2010). Variance *between* students indicates how different students differ in their goal orientations, while variance *within* students refers to how individual students fluctuate in their goal orientations over time. A next step is to explain potential differences in goal orientations between students or within students over time by the inclusion of explanatory variables (e.g., gender or a students' self-efficacy). In this

study we used gender, high-school GPA, overall study GPA, and average self-efficacy of a student to explain potential differences between students (see Table 2.1 and Table 2.2 for descriptives). In order to explain differences in goal orientations within individual students over time we used students' fluctuations in self-efficacy and in GPA over time (see Lütke, Robitzsch, Trautwein, & Kunter, 2009).

Table 2.1

Descriptives of study variables, N = 2402 students

	<i>M</i>	<i>SD</i>	Minimum	Maximum
Mastery orientation (1-7)	5.28	0.88	1.33	7.00
Performance orientation (1-7)	4.24	1.39	1.00	7.00
Self-efficacy (1-7)	4.89	0.86	1.33	7.00
Study GPA (1-10)	7.05	0.54	6.00	9.00
High-school GPA (1-10)	7.35	0.69	5.78	9.60

Table 2.2

Levels of mastery and performance orientation over time, N = 2402 students

	Mastery (1-7)	Performance (1-7)
	<i>M (SD)</i>	<i>M (SD)</i>
Semester 1	5.44 (0.83)	4.45 (1.34)
Semester 2	5.36 (0.86)	4.31 (1.39)
Semester 3	5.21 (0.89)	4.13 (1.42)
Semester 4	5.26 (0.85)	4.21 (1.35)
Semester 5	5.12 (0.91)	4.08 (1.43)
Semester 6	5.30 (0.89)	4.24 (1.39)

We modelled mastery and performance orientation together in one multivariate model as two aspects of goal orientation. This way, it was possible to examine whether both goal orientations are similarly affected by our explanatory variables while accounting for the correlation of the two goal orientations. This strategy thus

makes it possible to investigate the relatedness of the two goal orientations through time and if goal switching occurs. We followed the analysis strategy for multilevel analysis as described by Hox and colleagues (2010) fitting three subsequent multilevel models. (1) The first model comprised an ‘empty’ or variance decomposition model with only mastery and performance orientation as dependent variables and no explanatory variables added to the model. (2) In order to answer the first research question on how both goal orientations change during the undergraduate programme, time was added to the model as an explanatory variable as a second step. (3) Finally, the third model was fitted which also included the other explanatory variables (i.e., gender, achievement, self-efficacy) in order to answer the second research question on whether the explanatory variables explain differences in mastery and performance orientation *between* students and *within* students over time.

Since our sample comprised three different professional programmes, the professional programme was entered as a control variable into the model. Whether the model improved by adding the explanatory variables was tested with a Chi-square tests on the deviance of the multilevel models (i.e., a measure of discrepancy between the data and the model; Hox et al., 2010). Analyses were conducted in MIWiN (Version 2.27).

Results

When entering a health profession study, the average student is somewhat more oriented on mastery ($M = 5.44$) than on performance ($M = 4.45$), with more dispersed scores for performance ($SD = 1.34$) than for mastery ($SD = 0.83$) orientation. To investigate how mastery and performance orientations change over the course of the undergraduate bachelor programme and to what degree the gender, academic achievement, and self-efficacy explain differences in the goal orientations *between* and *within* students, three subsequent multilevel models were fitted. The first model, an ‘empty’ model, was required in order to decompose the variance in goal orientations into variance *between* students (mastery: .445, $p < .01$; performance: 1.377, $p < .01$) and variance *within* students over time (mastery: .332, $p < .01$;

performance $.572, p < .01$). The model showed that for mastery and performance orientation respectively 57% and 70% of the variance was due to differences *between* students and 43% and 30% was due to differences *within* students over time. This indicates that goal orientations differ between students, but also that goal orientations of individual students fluctuate from semester to semester.

To examine changes in mastery and performance orientation over time (research question 1), a second model was fitted with time added to the model as an explanatory variable. This multilevel model showed that both goal orientations decreased slightly over time, and that the decrease decelerated at the end of the third year ($\Delta\chi^2(7) = 293.78$; mastery: linear $B = -0.17, p < .01$, quadratic $B = 0.02, p < .01$; performance: linear $B = -0.17, p < .01$, quadratic $B = 0.02, p < .01$). Results of the model also showed that students differed somewhat in how they change over time (mastery: slope variance = $0.015, p < .01$; performance: slope variance = $0.036, p < .01$). According to the model, a student entering the professional programme with a mastery orientation with an average score of 5.55, may at the end of the third year have a mastery orientation score between 3.97 and 6.41. This difference resembles almost three times the *SD* in mastery orientation. Similarly, for a student entering a professional programme with an average performance orientation score of 4.51, after three years of study, performance orientation may have increased to 6.07 or may have declined to 2.27. Again, this range equals almost three *SD* in performance orientation.

Explaining differences in goal orientations

In order to answer the second research question regarding to what degree gender, academic achievement, and self-efficacy explain differences in the goal orientations *between* and *within* students, a third model was fitted. In this model, the three explanatory variables as well as time were added. Students' gender, high-school GPA, study GPA, and general self-efficacy were all associated with differences *between* students in mastery and performance orientation (for an overview see Table 2.3). Students' fluctuations in self-efficacy were also related to differences in goal orientations *within* students over time. Grades obtained during the previous semester

were not related to individual students' goal orientations. Adding these explanatory variables largely improved the model.

Table 2.3

Predictors of mastery and performance orientation of undergraduate health profession students: Fixed effects of the multivariate multilevel growth model

	Mastery	Performance
	<i>B/SE (β)</i>	<i>B/SE (β)</i>
Intercept	5.39 (0.06)**	4.47(0.09)**
Time	-0.21/0.04 (-0.42)**	-0.19/0.05 (-0.24)**
Time squared	0.023/0.006 (0.02)**	0.020/0.008 (0.01)**
<i>Between students</i>		
Gender	0.20/0.04 (0.10)**	ns
High-school GPA	-0.13/0.04 (-0.10)**	0.15 /0.06 (0.08)**
Pharmaceutical Sciences ^a	ns	0.29/0.08 (0.09)**
Veterinary Sciences ^a	0.19/0.04 (0.10)**	ns
Self-Efficacy	0.27/0.02 (0.26)**	0.32/0.03 (0.20)**
Study GPA	0.25/0.06 (0.16)**	0.58/0.09 (0.22)**
Time* Study GPA	0.045/0.016 (0.63)**	0.066/0.022 (0.58)**
<i>Within students</i>		
Self-Efficacy_dev	0.23/0.02 (0.11)**	0.21/0.03 (0.06)**
Study GPA_dev	ns	ns
$\Delta\chi^2$ (deviance)	-6472.09	

*Note. B refers to unstandardized effects, SE refers to the standard errors of these effects, and β refers to the standardized effect. Between student variance for mastery and performance was 0.576** and 1.352**. Within student variance was 0.259** and 0.458**.*

* $p < .05$; ** $p < .01$ (all tested one-sided).

^a reference group is Medical Sciences.

Mastery orientation

On average, female students were more mastery oriented than male students ($B = 0.20, p < .01, \beta = 0.10$) and higher performing students reported to be more mastery orientated compared to their peers ($B = 0.25, p < .01, \beta = 0.16$). A high study GPA also tended to buffer against a decline in mastery orientation over time ($B = 0.05, p < .01, \beta = 0.63$). Thus, students with a high GPA in general showed a smaller decline in mastery orientation over time. Also, veterinary students showed more mastery orientation than students from the other professional programmes ($B = 0.19, p < .01, \beta = 0.10$). General self-efficacy of a student was the strongest associate of mastery orientation ($B = 0.27, p < .01, \beta = 0.26$). Students with a general self-efficacy of +1 *SD* reported on average 0.52 *SD* higher mastery orientation as compared to students with a self-efficacy of -1 *SD*. High-school GPA was negatively associated with mastery orientation ($B = -0.13, p < .01, \beta = -0.10$). The level of mastery orientation at the start of the study was related to the decline in mastery over time; students entering the professional programme with higher levels of mastery orientation tended to show a greater decline over time (intercept-slope $r = -.55$; see Table 2.4).

Table 2.4

Variances (diagonal) of mastery and performance orientation of undergraduate health profession students and their correlations (off-diagonal): student level random effects of the multivariate multilevel growth model

	1. Initial mastery	2. Slope mastery	3. Initial performance	4. Slope performance
1. Initial mastery	0.576**			
2. Slope mastery	-.55**	0.018**		
3. Initial performance	.38**	-.02	1.352**	
4. Slope performance	-.60**	.66**	-.48**	0.027**

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

Fluctuations in mastery orientation *within* students over time were positively related to students' fluctuations in self-efficacy ($B = 0.23, p < .01, \beta = 0.11$). Grades obtained during the previous semesters were not related to the level of subsequent mastery orientation.

Performance orientation

A higher self-efficacy was associated with higher scores on performance orientation ($B = 0.32, p < .01, \beta = .20$). Also, study GPA was positively associated with performance orientation ($B = 0.58, p < .01, \beta = .22$). According to our model, students with a study GPA of +1 *SD* were 0.44 *SD* more performance oriented as compared to students with a study GPA of -1 *SD*. Students with a relatively higher study GPA tended to show a smaller decline in performance orientation over time ($B = 0.07, p < .01, \beta = .58$). A higher high-school GPA tended to be positively associated with performance orientation too ($B = 0.15, p < .01, \beta = 0.08$). Pharmaceutical science students were in general somewhat more performance orientated compared to their peers from medical and veterinary sciences ($B = 0.29, p < .01, \beta = .09$).

Students entering the professional programme with high levels of performance orientation were more likely to decline in performance orientation over time ($r = -.48$; see Table 2.4). Interestingly, higher levels of mastery orientation at the start of the study in general also showed a greater decline in performance orientation ($r = -.60$).

Fluctuations in performance orientation *within* students over time were slightly positively associated with fluctuations in self-efficacy ($B = 0.21, p < 0.01, \beta = .06$). When students' self-efficacy was higher than usual, the level of performance orientation tended to increase as well. Grades obtained during the previous semesters were not related to subsequent performance orientation.

Discussion

In this study we investigated the stability and change of health profession students' mastery and performance orientation over the undergraduate programme and

whether study GPA, high-school GPA, self-efficacy and gender are associated with this process. The use of multilevel analyses and the accelerated longitudinal design of this study provided insight on correlates of differences in goal orientations *between* students and *within* individual students over time. It is important to gain knowledge on the stability and changes of goal orientations, since goal orientations are associated with various aspects of learning and behaviour (e.g., Dupeyrat & Mariné, 2005; Senko et al., 2011). Also, identifying constructs that are associated with fluctuations in goal orientations provide educators insight in how to strengthen their students' goal orientations and for example how to slow down possible declines of goal orientations over time.

According to our results, students differ largely in their goal orientations. The overall conclusion regarding the first research question on stability and change of the goal orientations over time is that the average levels of mastery and performance orientations do not increase or decline across the undergraduate professional programmes, however individual students fluctuate quite substantially in their reported goal orientations from semester to semester.

In line with this, since the two goal orientations correlated positively no support for goal switching was found (see also Fryer & Elliot, 2007; Senko et al., 2011), which indicates that students did not increase the level of one goal orientation at the expense of the other goal orientation. The average stability, with only a small decline in both goal orientations during the undergraduate programme, was in line with former studies (Hastings et al., 2005; Ciani, Sheldon, Hilpert, & Easter, 2011; Corker et al., 2013). This implies that students entering the professional programme with relatively low levels of the goal orientations are not likely to experience an overall gain in these orientations. In addition to the relatively stable average trend over time across students we found rather substantial fluctuations *within* students, which accounted for more than one-third of the variance in goal orientations. This is an important finding with implications for future research, since such fluctuations are not captured when using cross-sectional data, only one or two measurement points, or when only average trends are calculated. Moreover, the substantial fluctuations in

levels of the goal orientations *within* individual students are also relevant to consider for health profession educators. Individual students' mastery and performance orientation seems to decline and increase during the academic year. This indicates that goal orientations change according to the learning environment and experience.

The second research question was aimed at providing insight in constructs associated with these fluctuations *within* individual students as well as differences in goal orientations *between* students. Self-efficacy indeed occurred to be an important correlate of both differences in levels of goal orientations *between* students and *within* student fluctuations, especially for mastery orientation. Students with a high average level of self-efficacy showed higher levels of mastery and performance orientation. Also for individual students, when self-efficacy in a student peaked, levels of both goal orientations were also high. This highlights the importance of enhancing self-efficacy in health profession students. Our results confirm previous research from general education on this topic (Wolters et al., 1996; Kaplan & Midgley, 1997) for the health professions domain.

Additionally, high-school GPA was associated with differences between students. Students with a relatively higher high-school GPA were generally less mastery oriented and more performance oriented as compared to lower-achieving peers. These findings are particularly relevant to the health profession domain, since there is a lot of emphasize on high-school grades in many selection procedures of health profession studies (Salvatori, 2001). Selecting on the basis of high-school grades may thus possibly bias the student population towards a performance orientation. The question arises whether this is what health educators aim for. Although a performance orientation is certainly useful in in health care professions (Teunissen & Bok, 2013), the importance of a life-long learning approach is essential in becoming an expert health professional too (Ericsson, 2004). Moreover, the strength of mastery orientations at the beginning of the professional programme was also substantially associated with how performance orientation developed through time. A stronger mastery orientation at the start of the professional programme buffered to a certain degree a decline in performance orientation.

Interestingly, our study did not confirm that *within students*, changes in academic achievement are associated with subsequent changes in goal orientations (see for example Senko et al., 2011). Possibly students' self-efficacy acts not only as a direct predictor for goal orientations, but also as a mediator between academic achievement and goal orientations. For example, Diseth (2011) found in a sample of psychology students that academic achievement influenced self-efficacy, which in turn predicted mastery and performance orientation (see also Elliot & Church, 1997). In order to identify what students need to enhance their learning, more research on the relations between academic achievement, goal orientations, and self-efficacy in the medical education context is required.

Finally, it is important to consider that students entering the professional programme with high mastery or performance orientation experienced a greater decline over time. Possibly, highly motivated students enter the professional programme with somewhat exaggerated expectations. Studies in the health profession are intense and require hard work, adequately informing future students about the content and workload of the professional programme may prevent a decline in motivation as a result of unfulfilled expectations.

Study limitations

Although our sample included three largely independent health profession programmes, the study had a single-institution design. Also, students participated in the study on voluntary basis and it is not clear whether the results can be generalized to students who decided not to participate. However, study GPA range and mean of our sample (range = 6.0-9.1, M = 7.0) was very similar to that of all invited students (range = 6.0-9.4, M = 6.9).

Further, we used self-reports, which may have resulted in a certain bias, for example, students may have responded in a socially desirable (Holden, 2007) or self-serving way. We tried to diminish this by guaranteeing the participants that questionnaires would only be used for research purposes. Also, the reported ranges

in mastery and performance goals do not seem to indicate a bias towards reporting exaggerated levels of motivation.

This study was designed as a first step toward more understanding on changes and stability of goal orientations over time using a large, heterogeneous sample. Future studies examining goal orientation over time in relation with other contextual and performance assessment data and in smaller, more homogeneous samples would be a valuable addition to the present study.

Students who decided to complete only one measurement occasion may have different levels of goal orientations than their peers who participate in all subsequent measurements. We checked whether there was a correlation between the ratio of participation (number of times a student participated divided by the maximum number a student possibly could have participated) and the goal orientations. There was no correlation between the ratio of participation and performance orientation. There was a very small, but significant ($r = 0.06, p < 0.01$) correlation between the ratio of participation and mastery orientation. It should therefore be noted that our sample included students who were slightly more mastery oriented than the overall sample.

Another issue we would like to raise is that mastery and performance orientation are also used in a 2x2 framework (Elliot & McGregor, 2001), in which both goal orientations are sub-divided into approach and avoidance components. In this study we focused on the more positive approach components, following other recent studies in the educational field (Senko et al., 2011) and related constructs in medical education literature (Kusurkar et al., 2013). However, we are not certain how including the avoidance components would have changed the results. Further, we used validated scales for mastery orientation, performance orientation, and self-efficacy. The scales also proved to be reliable in our sample. However, as there are more, and also more elaborate, scales available, other scales may lead to deviant results. Nonetheless, in general our findings were in line with earlier research in professions other than health-care (e.g., Ciani et al., 2011; Corker et al., 2013).

Implications

Results of this study yield several practical implications for health profession education. Fluctuations of goal orientations within students over time indicate that students' goal orientations actually change during the academic years. For individual students, an important first step in the regulation of their goal orientations is awareness that their goals are actually fluctuating. Educators can increase this awareness in students, and further guide them in regulating their goal orientations. Moreover, the adaptive nature of the goal orientations also provides opportunities for health profession educators to facilitate the adoption of a mastery or performance orientation by students through the way they provide instructions to students (Artino et al., 2012). Emphasising the importance of performance outcomes, stimulating competition between students, and testing students frequently would lead to a performance orientation in classrooms. On the other hand, a mastery orientation can be supported by tasks and feedback promoting innovativeness and risk taking, emphasising the importance of truly understanding the material, and providing formative feedback focusing on progress made by students (Meece, Anderman, & Anderman, 2006).

For health profession researchers, results show that studies addressing mastery and performance orientation should be aware that outcomes partly depend on *when* the goal orientations are measured. The use of multilevel analyses with at least three moments of measurement and the inclusion of random slopes when examining goal orientations of health profession students over time is therefore strongly recommended.

The study showed that self-efficacy was an important correlate of differences in goal orientations *between* and *within* students. This indicates that we should attempt to enhance and stabilize self-efficacy in health profession students. When students learn to regulate their self-efficacy, this would benefit their levels of mastery and performance orientation when working as individual health professionals. High levels of goal orientations support lifelong learning in the health profession domain and leads to improved performance (Teunissen & Bok, 2013).

According to Bandura (1986) students base their self-efficacy on four major sources of information: previous performances, vicarious experience, verbal persuasion, and psychological state. By providing positive and constructive feedback, teachers can therefore directly influence a student's self-efficacy. This type of feedback focuses on the process of learning. Teachers can provide information on the progress that has been made and show the gap between current knowledge and the desired end goal (Hattie & Timperley, 2007).

Finally, it seems that especially students who show high initial levels of the goal orientations at the start of the study are not able to maintain their levels of the goal orientations throughout the study. This underpins the importance of identifying those students who increase in their emphasis on mastery and performance orientation in order to delineate those factors that motivate students.

Conclusion

Although mastery and performance orientation are relatively stable across the undergraduate professional programmes, individual students differ largely in their goal orientations. Students' gender, high-school grades, study grades, and self-efficacy are all associated with differences in mastery or performance orientation *between* students. Also, *within* students quite substantial fluctuations in their reported goal orientations occur from semester to semester. These fluctuations are associated with a students' level of self-efficacy.

Chapter 3

Do students with varying academic aptitude benefit equally from personal qualities? Applying inter- and intra-individual perspectives

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Abstract

This study examined whether students with varying academic aptitude benefit equally from perseverance and innovativeness in terms of academic achievement. In addressing this question two perspectives were applied: an inter-individual perspective, focussing on differences between students, and an intra-individual perspective, focussing on differences within students across semesters. By means of an online questionnaire, undergraduate students were asked to rate themselves on perseverance and innovativeness at the beginning of five consecutive semesters. Based on multilevel models, results indicate that students with a high academic aptitude benefit substantially more from perseverance and are slightly more hampered by innovativeness than students with a low academic aptitude. Also, individual students fluctuate quite substantially in their reported perseverance and innovativeness from semester to semester. Results implicate that it is important to take a students' academic aptitude into account when studying the relation between personal qualities and academic achievement, at least for perseverance and innovativeness.

Authors' contributions

All authors made substantial contributions to the study conception and design. AK collected the data in collaboration with TM. MB and AK conducted the analyses and TM provided advice on the method. PvB and DJ contributed to the interpretations of the results and discussions. AK wrote the first draft of the article. All authors participated in finalizing the manuscript, approving it and are accountable for the accuracy and integrity of the content.

Introduction

With a great emphasis in higher education on students' grade point average (GPA) (Brown & Campion, 1994; Thoms, McMasters, Roberts, & Dombkowski, 1999), academic achievement is a vital issue. Consequently, a substantial effort has been made to understand why certain students are more successful in achieving high grades than others (e.g., Chamorro-Premuzic & Furnham, 2008; Poropat 2009). Traditionally, 'being smart' has been considered the most significant predictor of students' academic achievement (Kuncel, Hezlett, & Ones, 2004). However over the last decades, there has been a growing interest in associations of non-cognitive personal qualities (e.g., motivation) on achieving high grades (e.g., Chamorro-Premuzic & Furnham, 2008; Duckworth & Yeager, 2015; Richardson, Bond, & Abraham, 2012; Rosen, Glennie, Dalton, Lennon, & Bozick, 2010; von Stumm, Hell, & Chamorro-Premuzic, 2011). Although the importance of non-cognitive personal qualities for academic achievement has been confirmed, the degree to which such qualities are related to academic achievement varies considerably between studies (O'Connor & Paunonen, 2007; Poropat, 2009). For example, the review of O'Connor and Paunonen (2007) of empirical studies on the Big-Five construct Openness showed that according to some studies students seem hampered by high levels of Openness, while in other studies Openness appears beneficial for attaining high grades (90% CI for the population correlations ranged from $r = -.10$ to $r = .22$). Academic ability may moderate these effects of non-cognitive qualities on academic achievement (e.g., Heaven & Ciarrochi, 2012; Ziegler, Knogler, & Bühner, 2009). That is, associations between personal qualities and academic achievement may depend on one's academic ability. In the present study we explore such effects to investigate to what extent certain personal qualities do have the same association with academic achievement for all students. Knowledge on possible moderation effects can provide information about the effectiveness of educational interventions for different students and, conversely, can explain why certain students are not reached through an intervention.

Academic ability as a moderator

The mixed results regarding the importance of personal qualities for academic achievement suggest that moderators might be needed to be taken into account (Richardson et al., 2012). For example, for the effect of Openness, Heaven and Ciarrochi (2012) showed that Openness was positively associated with academic achievement among students with high cognitive ability scores, but not amongst students with lower scores. Beaujean and colleagues (2011), on the other hand, found that Openness had a stronger positive effect on mathematics scores among lower intelligence students, compared to high-intelligence students. Lozano, Gordillo, and Pérez (2014) investigated the role of ability in the relation between impulsivity and academic achievement. Among students high in ability, high levels of impulsivity were associated with lower academic achievement. Among students with lower ability scores, this relation between impulsivity and academic achievement was almost non-existent. Also the effect of achievement striving seems to be moderated by academic ability. Ziegler and colleagues (2009) found that intelligence and achievement striving interact in predicting academic achievement.

Together, these studies show that constructs reflecting ones' academic ability may play a complex role in the personal qualities-achievement relationship. In the present study we examine possible moderating effects of academic ability with two non-cognitive qualities that are often discussed in educational literature (Chamorro-Premuzic & Furnham, 2008; Duckworth & Seligman, 2005; von Stumm et al., 2011) and among university teachers: *perseverance* and *innovativeness*. *Perseverance* refers to the quality to maintain determination and motivation to reach goals, even in the face of obstacles (Duckworth & Quinn, 2009). *Innovativeness* is defined as a quality attributed to those who enjoy engaging in effortful novel thinking (von Stumm & Ackerman, 2013). Both qualities have frequently been related to enhanced academic achievement (Duckworth & Seligman, 2005; Pintrich, 2004; Poropat, 2009; von Stumm et al., 2011).

As a measure of academic ability we used in the present study a pre-university exam that students passed before entering university (compare SAT,

Noftle & Robins, 2007), representing one's proven ability to learn and perform in the academic context, which we refer to in the remaining article as *academic aptitude*.

Inter- and intra-individual perspective

So far, studies investigating the effects of personal qualities on academic achievement typically aimed at explaining why certain students are more successful than others, using average levels of achievement (GPA) and measures of personal qualities at one moment in time (Cheng, Ickes, & Verhofstadt, 2012). Implicitly, such an approach assumes that personal qualities are stable, trait-like characteristics, which are similar across courses and teachers, and are not responsive to experiences or educational programmes (see also Duckworth & Yeager, 2015). This suggestion of immutability is at odds with empirical evidence and aims of educational programmes, especially for young adults. For example, Specht and colleagues (2011) showed that Big Five constructs not only changed due to maturation, but also in reaction to the experience of life events. Moreover, not only personal qualities but also academic achievement varies over time (Bacon & Bean, 2006).

To accommodate variability over time within individuals, in the current study we do not only examine how academic aptitude moderates the association between perseverance and innovativeness with academic achievement between students (inter-individual perspective), but also extend present literature by exploring this moderation mechanism within students (intra-individual perspective). That is, we also focus on individual students' fluctuations in academic achievement and their personal qualities. This intra-individual perspective represents a more situational point of view.

The current study

The general question of the current study is whether students with varying academic aptitude benefit equally from personal qualities. We (1) examine the possible

moderating role of academic aptitude and (2) apply both an inter- and intra-individual perspective on this effect.

We used repeated measures of perseverance, innovativeness and academic achievement to examine the role of academic aptitude in the relationship between perseverance and innovativeness with academic achievement. We used an inter-individual perspective to study differences *between students* and an intra-individual perspective to study variability *within students* across semesters.

Method

Participants and procedure

Undergraduate students of a large research university in The Netherlands participated in the present study, which was part of a larger research project on academic achievement in undergraduate programmes. At the start of a semester (five times between March 2010 and March 2012), students of 17 different undergraduate programmes (i.e., Science, Humanities, Medical Sciences, Social Sciences, Geosciences, Law and Economics, and Liberal Arts and Sciences) were invited to report their perseverance and innovativeness. Data on academic achievement were drawn from the university files at the end of a semester.

Students were invited by email stating the goal of the study, and upon invitation students had two weeks to decide to participate. It was made clear that all information would be treated strictly confidential and would only be used for scientific research. Upon opening the link to an online questionnaire provided in the email, students were first asked to provide their consent for participation and for access to the university files in order to retrieve information on achievement and high-school final exam grades. In total, 24,413 questionnaires were completed by 12,094 individual students (68% female; response rate 38%). Students with data available for at least three waves during the first eight semesters of their study were selected from the dataset to study between and within student variability (following Tabachnick & Fidell, 2007, p. 835). In The Netherlands an undergraduate bachelor programme has a normative duration of three years. The selection procedure resulted

in a sub-sample of 2,272 students (73% female; $N = 8,516$ questionnaires, $M = 3.75$ per student).

Measures

Perseverance

We used three items of the Perseverance of Effort subscale of the Grit questionnaire by Duckworth and Quinn (2009). An example item is 'I finish whatever I begin'. Items were assessed on a Likert scale ranging from 1 (not at all true of me) to 7 (very true of me). Reliability (Cronbach's α) was .77. *Student-averaged perseverance* scores represented general perseverance.

Innovativeness

Innovativeness was measured with the items reflecting the ideas facet of the Openness to Experiences scale (Gerris, et al., 1998; Goldberg, 1992). Students were asked to indicate to which degree an adjective was an adequate description of themselves (seven-point Likert scale, ranging from 1 (disagree) to 7 (agree)). The subscale consisted of three items ($\alpha = .60$) and an example is 'I am innovative'. Student-averaged innovativeness scores represented general innovativeness.

Academic achievement

A GPA score was computed as a measure for academic achievement during a semester (semester GPA). In The Netherlands, grades range from 1 (lowest) to 10 (highest). In order to pass an exam, a score of at least 5.5 is required for each course. At the university where the present study was conducted, a semester is in general composed of four courses (representing 210 hours of study time each). The semester GPA score was based on the scores for the courses that were passed and therefore ranged between 5.5 and 10.

Academic aptitude

Academic aptitude is typically measured by standardized tests, such as the SAT in the United States (Nofle & Robins, 2007). In The Netherlands no SAT scores were available. However, all pupils in high-school pre-university education take the same final exams for their school subjects. Therefore, we used students' high-school final exam grades, drawn from the university's files, as an indicator for academic aptitude.

Analyses

We performed multilevel analysis (SPSS MIXED, version 22) with semester-GPA as the dependent variable and semester as the repeated measure unit. Students represented the second-level units. Level 1 predictors (i.e., time variant predictors: semester- perseverance and semester-innovativeness) were student centred. Level 2 predictors (student-averaged perseverance, student-averaged innovativeness, academic aptitude) were grand mean centred. This approach allowed us to differentiate between (a) inter-individual or between student effects of (trait-like) perseverance and innovativeness and (b) intra-individual or within student effects of fluctuations across semesters in perseverance and innovativeness.

In Model 1 (M1) we used student-averaged perseverance and innovativeness, and their interaction terms with academic aptitude to test the moderating role of academic aptitude at the between student-level. With Model 2 (M2) we tested the effects of the time variant predictors at the within student-level. Random slopes were tested on a variable-by-variable basis, as suggested by Hox and colleagues (2010). Only random slopes that showed a significant improvement of the model fit are presented and only for those variables cross-level interactions with academic aptitude were examined.

Assumptions

Level-1 and level-2 standardized residuals in both the intercept-only and final model were inspected (Hox et al., 2010). To test for outliers we assessed the number of standardized residuals in excess of 3.29 (Tabachnik & Fidell, 2007, p.73). Inspection

of (detrended) normal Q-Q plots suggested normal distributions of all residuals (skewness, kurtosis between 0.17 and 0.73). Inspection of plots of standardized residuals against predicted values and bivariate scatterplots did not indicate strong violations of assumptions of linearity and homoscedasticity. In a single level regression analysis collinearity diagnostics were no cause for concern (condition indices < 2 , Tabachnick & Fidell, 2007, p. 91). In view of the large N we concluded that outliers lay within an acceptable range (below 0.3% in Model 0, below 0.5% in the final model). As testing the final model with and without outliers revealed comparable conclusions, results are presented with outliers included.

Results

Descriptive statistics for perseverance, innovativeness, academic achievement and academic aptitude at the student level are displayed in Table 3.1. Correlations were all in expected directions.

Table 3.1

Descriptive Statistics of the Study Variables (Student level, N=2,272)

	1.	2.	3.	<i>M</i>	<i>SD</i>	Min	Max
1. Academic achievement	-			7.11	0.55	6.00	9.29
2. Academic aptitude	.59**	-		7.18	0.65	5.50	9.23
3. Perseverance	.35**	.24**	-	5.29	0.88	1.67	7.00
4. Innovativeness	.07**	.11**	.24**	4.96	0.70	2.44	7.00

* $p < .05$. ** $p < .01$.

Results of the multilevel analyses are presented in Table 3.2. The intercept-only model (M0) showed significant random variance in semester-GPA with a substantial amount of variance (41%) within students (intraclass correlation = .59). For perseverance and innovativeness, the ICC was .69 and .64 respectively.

In M1, we first tested the hypothesis that students with different academic aptitude differ in their association of perseverance and innovativeness with academic achievement. The model improved significantly compared to the intercept-only

model; $\chi^2(5) = 1211, p < .01$. Together the predictors explained 49% of between student differences in academic achievement. For perseverance, there was a statistically significant main effect and a statistically significant interaction with academic aptitude. Perseverance strengthened achievement, and this effect was stronger for higher aptitude students, who profited more from perseverance than lower aptitude students with similar reported levels of perseverance. Unexpectedly, for innovativeness there was a negative main effect. Innovativeness weakened achievement, and the statistically significant interaction with academic aptitude indicated that this effect was stronger for higher aptitude students (controlling for the effect of perseverance).

In M2 we then tested effects *within students*. For perseverance the effect was in the same direction as the between-student effect: reporting relatively higher perseverance at the beginning of a semester was on average associated with relatively higher achievement during that semester. This effect differed across students (i.e., significant random slopes, 95CI [-.16; .32]). On average and within individual students, each scale point raise in perseverance resulted in an increase in academic achievement of 0.08 point in that semester (0.12 *SD* semester GPA). A significant intercept-slope covariance indicated that students with higher GPA scores benefitted more from extra perseverance in a given semester ($r = .35$). There was no additional moderating mechanism (cross-level interaction) of academic aptitude and perseverance fluctuations within students; $B(SE) = 0.02(.02), p = .256; \chi^2(1) = 1.288, p > .05$.

In contrast to the between-student effect of innovativeness, the within-student effect was positive: relatively higher innovativeness in a semester was associated with somewhat higher grades during that semester. This effect was small and did not vary across students (i.e., no significant intercept slope co-variance or random slopes). The final within student model (with random slopes for perseverance, but no moderating effect of academic aptitude improves significantly from the between student model; $\chi^2(4) = 103.29, p < .01$). The within student predictors added in this model, explained 4% of the variance at the semester level.

Table 3.2

Multilevel models for semester academic achievement explained by academic aptitude and between and within student differences in perseverance and innovativeness

	Intercept only	Between-student model	Within-student model		
	M0	M1	M2		
	<i>B</i> (<i>SE</i>)	<i>B</i> (<i>SE</i>)	β	<i>B</i> (<i>SE</i>)	β
Fixed part					
Intercept	7.11 (.01)	7.10 (.01)		7.10 (.01)	
Level-2					
Academic aptitude (AA)		0.45 (.01)**	.29	0.45 (.01)**	.29
Perseverance-trait		0.16 (.01)**	.14	0.16 (.01)**	.14
Innovativeness-trait		-0.04 (.01)**	-.03	-0.04 (.01)**	-.03
Aptitude * Perseverance-trait		0.10 (.02)**	.06	0.10 (.02)**	.06
Aptitude * Innovativeness-trait		-0.04 (.02)*	-.02	-0.05 (.02)*	-.02
Level-1 effects					
Perseverance-semester				0.08 (.01)**	.04
Innovativeness-semester				0.02 (.01)*	.01
Random part					
Level 1 residual variance	.174 (.003)**	.174 (.003)**		.167 (.003)**	
Level 2 intercept variance	.255 (.009)**	.130 (.005)**		.132 (.005)**	
Intercept-slope covariance				.015 (.004)**	
Perseverance					
Random slope Perseverance				.015 (.005)**	
-2 Loglikelihood	13481.26	12270.62		12167.34	
Δ -2 Loglikelihood		1210.63**		103.28**	

* $p < .05$. ** $p < .01$.

For the ease of interpretation, we also predicted (based on our final model) academic achievement scores for students with different combinations of academic aptitude and perseverance. We compared the means of predicted scores for academic achievement for 10% of the students with the lowest academic aptitude scores (5.5-6.4), 10% of the students with scores around the median of academic aptitude (7.0-7.2), and 10% of the students with the highest scores (8.1-9.2). Within each aptitude group we predicted scores for the highest decile of perseverance, 10% around the median, and 10% lowest perseverance scores (see Table 3.3).

Table 3.3

Prediction of mean GPA for students with different levels of academic aptitude and perseverance (10% High, Median, and Low)

			Perseverance		
			High	Median	Low
			6.3-7.0	5.3-5.5	1.7-4.1
Academic aptitude	High	8.1-9.2	8.11	7.69	7.16
	Median	7.0-7.2	7.22	6.95	6.86
	Low	5.5-6.4	6.81	6.77	6.63

According to the predictions as presented in Table 3.3, students with low academic aptitude profit less from perseverance (predicted difference in GPA= 0.18 between low and high perseverance, about one-third of *SD* in semester GPA) than students with a high academic aptitude (predicted difference in GPA= 0.95, nearly two *SD*'s in GPA). In The Netherlands a common admission criterion for honours programmes is a GPA of 7.50 or higher. According to our model, it seemed unlikely that students with a low (and even median) academic aptitude could meet this criterion just through extra perseverance. Students with a high academic aptitude would need at least a median perseverance to meet this criterion.

To illustrate the combined effects of perseverance and innovativeness, we predicted the scores for students with one standard deviation above and below average academic aptitude and one standard deviation above and below average perseverance and innovativeness (see Table 3.4). Students with high academic aptitude and high levels of perseverance, but low innovativeness, were predicted to be most successful in terms of academic achievement.

Table 3.4

Prediction of mean GPA for students with different academic aptitude, perseverance and innovativeness (+/- 1 SD)

		Perseverance / Innovativeness			
		+1SD/+1SD	+1SD/-1SD	-1SD/+1SD	-1SD/-1SD
Academic aptitude	+1 SD	7.65	7.71	7.08	7.14
	- 1 SD	6.98	6.96	6.66	6.64

Discussion

In the present study, we investigated whether students with varying academic aptitude benefit equally from personal qualities. By using multilevel modelling for repeated measures, we were able to examine effects of academic aptitude on the relationship of perseverance and innovativeness with academic achievement from both an inter-individual perspective, focussing on differences between students, and an intra-individual perspective, focussing on differences within students across semesters. We investigated whether a student's academic aptitude moderated the effect of his or her perseverance and innovativeness on grades from these two perspectives.

Based on the results the main conclusion is that not all students benefit equally from perseverance and innovativeness. Students with a high academic aptitude benefit substantially more from perseverance and are slightly more hampered by innovativeness than students with a low academic aptitude. Also, individual students fluctuate quite substantially in their reported perseverance and innovativeness from semester to semester. A students' academic aptitude, however, did not affect the associations between perseverance and innovativeness with grades within individual students.

Inter-individual differences

From an inter-individual perspective, results indeed showed that higher aptitude students benefited more from perseverance, while they were more hampered by innovativeness compared to their lower aptitude peers. This implies that it is

important to take a students' academic aptitude into account when studying the relation between personal qualities and academic achievement, at least for perseverance and innovativeness.

Although all students profit from a high general level of perseverance during their undergraduate study years (see also Duckworth & Seligman, 2005; Richardson et al., 2012), students with a high academic aptitude profit substantially more. Students could only marginally compensate a lower academic aptitude by working hard. It may be that students with a high academic aptitude have more cognitive resources available that will be mobilized when working hard and persisting in the face of obstacles (Brekelmans, van den Eeden, Terwel, & Wubbels, 1997). The mobilization of additional cognitive resources may result in a larger increase in academic achievement compared to students with lower aptitude and less additional resources available. More research is needed, as other studies showed different results. Beaujean and colleagues (2011), using math scores for achievement, found that students with lower cognitive ability benefit more from conscientiousness than high ability students and can somewhat compensate by working hard.

Unexpectedly, all students were slightly hampered by innovativeness, and high aptitude students even more so. This suggests that in the undergraduate programmes that were studied here, being innovative is not reflected in higher grades, especially not for students with a higher academic aptitude. Possibly students, at least in the current study, were assessed in ways that did not take their innovativeness into account. This seems to be in contrast to what job recruiters demand, as they often seek for creative employees (Miron, Erez, & Naveh, 2004). A study of Chamorro-Premuzic (2006) suggests that the relation between innovativeness and grades varies by the method of assessment used to test students. In British university students, scores on creative thinking were positively correlated with final thesis grades, while they were much weaker related to block assessment and final exam scores. Indeed in the university under study, students are mostly assessed by standardized exams. This method of assessing seems to favour students with high perseverance and low innovativeness over others. Given the results of Chamorro-Premuzic (2006), final

theses grades, rather than overall GPA, possibly provide job recruiters with a better indication of students' innovativeness, especially for high aptitude students.

Zhang and Ziegler (2015) further suggest that being innovative may not be beneficial in an academic context for students with high intelligence, since it might lead to distraction and lower interest in the content taught. For lower intelligence students this negative effect is possibly reduced because the study content may satisfy their levels of curiosity.

Intra-individual differences

Since former studies investigating the personal qualities-achievement relationship mainly focused on explaining differences in achievement between students (Cheng et al., 2012), we also investigated intra-individual fluctuations in achievement. Specifically, it was investigated whether more or less perseverance and innovativeness in a semester had a different effect on achievement for students with varying levels of academic aptitude. Again, the effect of innovativeness was minor, and no moderation effect was found for academic aptitude. We found, however, that fluctuations in grades were positively associated with fluctuations in students' perseverance. Although there was no evidence that this effect was different for low versus high academic aptitude students, we found that students who on average performed better at the university profited more from extra perseverance in a given semester. Thus when studying intra-individual associations between personal qualities and achievement, general achievement levels seem to play a role.

On a more general note, our results confirm the assumption of Duckworth and Yeager (2015) that personal qualities change (in our study from semester to semester) according to the environment and students' experiences, and may indeed be responsive to educational interventions. A next step would be to examine what specific elements of educational courses and programmes can be related to the peaks and troughs in personal qualities in order to delineate those factors that stimulate students' personal qualities.

Strengths, limitations and future research

The study was conducted across different study programmes in addition to the more common data collection in Psychology programmes. Scholars have criticised the over representation of samples based on psychology students in this area of research (Busato, Prins, Elshout, & Hamaker, 2000; Farsides & Woodfield, 2003; Vedel, 2014).

In order to establish a rather large sample, we employed self-reports to measure perseverance and innovativeness. We agree with Duckworth and Yeager (2015) that self-report questionnaires are arguably better suited than any other measure for assessing internal psychological states, because they typically ask individuals to integrate numerous observations of thoughts, feelings or behaviour over a specific period of time. The use of self-reports may, however, result in a certain bias, for example, students may respond in a socially desirable or self-serving way (Holden, 2007). We tried to diminish this by guaranteeing the participants that questionnaires would only be used for research purposes and that results would be presented anonymously. Furthermore, if we assume that all students are affected by social desirability in similar ways, this would merely result in an overestimation of the means of the variables studied here. Nevertheless, future studies using alternative ways to measure personal qualities, such as divergent thinking tests to measure innovativeness (Feist, 1998) would be a great addition to the present study.

Further, in order to gain a rather large sample, we used high-school pre-university final exam grades as a proxy for academic aptitude. SAT scores have been reported to be an adequate measure of general intelligence (Frey & Detterman, 2004), and also standardized IQ tests could be an alternative option.

We recommend future studies to investigate the role of academic aptitude on personal qualities - academic achievement associations with additional constructs and other possible moderators to get a broader insight into why certain personal qualities may not have the same effect on academic achievement for all students alike.

Practical Implications

Results of this study yield several practical implications for higher education practice. For educators, a first step in supporting students is awareness that stimulating certain qualities may not have the same effect on academic achievement for all students alike. If future studies would confirm our findings, interventions designed to enhance perseverance, for example by stimulating a students' mind-set that abilities can be developed through effort and practice (Dweck, 2009), may be expected to be more effective for students who already perform relatively well. On the other hand, stimulating innovativeness among high aptitude students may have negative effects in terms of achievement on standardized tests. Our findings therefore support a more personalized approach when guiding students.

Moreover, fluctuations of perseverance and innovativeness show that personal qualities do actually vary during the academic year. For individual students, it is important to be aware of these changes. Educators can further guide students in regulating their personal qualities by addressing personal development and reflection in their courses (Korthagen & Vasalos, 2005). For educational researchers, the fluctuations in personal qualities indicate that outcomes partly depend on *when* qualities are assessed.

Finally, results suggest that students with high academic aptitude and perseverance, but low innovativeness were most successful in our sample. Universities should consider whether it is indeed their aim to stimulate students to match this profile. Various methods of assessment and different forms of assignments including essays, oral presentations, or thesis grades may be used to tap and reward innovativeness among students (Chamorro-Premuzic, 2006). Especially high aptitude students may benefit from this, as results in this study indicate that they, in terms of academic achievement, are more hampered by their innovativeness than their peers with a lower academic aptitude. Also, selective programmes aimed at creativity and innovativeness should be cogent of possibly negative associations with academic outcomes in settings where achievement is assessed in more classical, standardized ways.

Chapter 4

Academic success and early career outcomes: Can honours alumni be distinguished from non-honours alumni?

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Abstract

This study compared Dutch alumni who previously participated in an honours programme ($n = 72$) to non-honours alumni who entered university as high-achieving high-school students ($n = 72$) with regard to (1) final university grade point average (study GPA) and (2) early career outcomes. Grades were drawn from university files. Using an online questionnaire, participants were asked to rate themselves on work engagement and other characteristics in their current jobs. Results indicate that, compared to the non-honours control group, honours alumni had a higher study GPA and higher work engagement after graduation, while job characteristics were found to be similar. Implications for educators and job recruiters are discussed.

Authors' contributions

All authors made substantial contributions to the study conception and design. AK collected the data. PvB, TM and DJ provided advice on the study design and method. AK conducted the analyses in collaboration with TM. MB contributed to the interpretations of the results and discussions. AK wrote the first draft of the article. All authors participated in finalizing the manuscript, approving it and are accountable for the accuracy and integrity of the content.

Introduction

Over the last decade, the number of honours programmes offered at universities has increased in Europe and elsewhere (Long & Mullins, 2012). Honours programmes can take various forms. For example, they can offer a broader vision of the educational material or a deeper study of the subject matter (Byrne, 1998). Furthermore, teacher-to-student ratios are usually higher (Fischer, 1996) and students in these programmes are part of a community of highly motivated peers. Admission to honours programmes is often based on achievement in high-school or in university, combined with a letter of motivation or interview (Rinn & Plucker, 2004).

In The Netherlands, an important reason for the government's investment in honours education is the need for more highly educated employees who can handle complex, multidisciplinary problems (Ministry of Education, Culture, and Science, 2011). Indeed, according to Hoekman, McCormick, and Gross (1999) honours programmes offer an opportunity for motivated and high-achieving students to fully develop these talents and to prevent a decline in motivation due to insufficiently challenging curricula.

However, despite these ambitions, it is unclear whether any cognitive or non-cognitive differences between honours alumni and non-honours alumni can actually be found when students graduate from university and during their early careers. The current study was designed to examine possible differences between honours and non-honours alumni of a large Dutch research university in terms of (1) final grade point average (GPA) and (2) early career outcomes (i.e., work engagement and perceived job resources). In order to assess this, a group of honours alumni was compared to a group of non-honours alumni who entered university with similar final high-school grades.

Study GPA

Study GPA is a frequently used measure of achievement in the selection of applicants, not only for educational programmes and graduate schools but also among job recruiters (Achterberg, 2005; Imose & Barber, 2015). For example,

Thoms and colleagues (1999) showed that résumés with high GPAs were significantly more often selected for job interviews than identical résumés with lower GPAs. For students, it is therefore important to maintain a high GPA, also while attending honours courses.

On the one hand, honours programmes may have a positive impact on GPA, because these programmes are designed to be more challenging for high-achieving, motivated students and offer advantages such as smaller classes or deeper exploration of the study material (Byrne, 1998). On the other hand, honours programmes represent an additional workload beyond the regular programme (Van Eijl, Wolfensberger, Van Tilborgh, & Pilot, 2004), which may in turn have a negative effect on academic achievement, thus resulting in a lower GPA. Findings from previous studies addressing differences in GPA between honours and non-honours students are varied. Cosgrove (2004) found that honours students had higher GPAs at the end of the study, considering three groups of students; honours students, students who started the honours programme but did not complete it, and high-ability non-honours students identified based on SAT scores (i.e., a standardized test widely used for college admissions in the United States), and high-school class ranks. In contrast, Astin (1993) found no differences between the GPA of honours students and non-honours students in his study among a nationwide sample of 25,000 students from the United States. Finally, Shushok (2003) reported that while honours students in the Mid-Atlantic States had a higher GPA compared to equally qualified non-honours students after one year of study, after four years of study, the difference in GPA between honours and non-honours students had levelled out. Rinn (2007), however, found that honours students from a large university in the United States had higher self-reported GPAs compared with high-achieving non-honours students. Thus, although some studies report that honours students differ from non-honours students with respect to GPA, others do not find any such differences. Additionally, it is not clear whether possible differences in GPA persist through graduation. Finally, the majority of studies on this topic originate from the United States and it is not certain whether these results can be generalized to Europe or other educational

contexts. Compared to American students for example, Dutch students have less drive to excel, probably since the education system is less competitive (Scager et al., 2012). The present study investigates whether Dutch honours alumni enter the job market with a different final GPA than non-honours students.

Early career outcomes

When developing honours programmes in higher education, an important aim of the Dutch government was to deliver professionals who would add value to the job market and become future leaders in their field (Ministry of Education, Culture, and Science, 2011). However, little is known about these more distant effects of honours programmes. A first step in examining possible effects is to investigate whether honours alumni can actually be distinguished from non-honours alumni once graduated in terms of how they experience their jobs.

To our knowledge, no studies of differences between the work experiences of honours and non-honours alumni have been published. Rinn (2007) compared career aspirations of honours and high-achieving non-honours students and reported no differences between the two. Differences in career aspirations may nevertheless emerge once students graduated. Other studies, not involving honours alumni, have examined the relationship between academic success and later earnings. Vermeulen and Schmidt (2008), for example, showed that among alumni from different majors at a Dutch university, self-reported GPA had a positive relationship with earnings and job satisfaction in the initial phase of a graduate's working career. Additionally, Thomas (2000) noted that alumni with high grades during their studies were later more successful in terms of earnings. It remains unclear, however, whether different results are to be found for honours alumni.

In order to investigate whether work-related differences between honours and non-honours alumni exist once students have graduated, we used two well-studied concepts from the literature on occupational health and performance: *job resources* and *work engagement* (e.g., Schaufeli & Bakker, 2004). Generally, jobs differ in the amount of job resources provided, such as possibilities for personal

development, autonomy, or task variety. More broadly defined, job resources are: “physical, psychological, social, or organizational aspects of the job that either/or (1) reduce job demands and the associated physiological and psychological costs; (2) are functional in achieving work goals; (3) stimulate personal growth, learning and development” (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001, p. 501). The type and quality of job resources are crucial as they play an important motivational role, both intrinsic by enhancing growth, learning, and development, and extrinsic by facilitating the achievement of work goals (Schaufeli & Bakker, 2004). Job resources can be assessed in any type of profession and may have a positive influence on work engagement (e.g., Hakanen, Bakker, & Schaufeli, 2006).

Work engagement is defined as “a positive, fulfilling, affective-motivational state of work-related wellbeing” (Bakker & Leiter, 2010, p.1). Work engagement has been related to a number of positive outcomes, such as the experience of better health for the individual (Schaufeli & Bakker, 2004), higher organizational outcomes, and enhanced performance (Salanova, Agut, & Peiró, 2005). Additionally, engagement is important, as engaged workers are energetic, enthusiastically involved in their job (Bakker, Schaufeli, Leiter, & Taris, 2008), and are able to create a positive overall working climate (Bakker, van Emmerik, & Euwema, 2006). Engaged workers show more pro-active behaviour (Salanova & Schaufeli, 2008) and experience low burnout levels (González-Romá, Schaufeli, Bakker, & Lloret, 2006). Thus, work engagement is a much-desired state for both the individual and the organization.

In this study we measure graduates’ perceptions of job resources and work engagement to examine whether honours alumni enter different types of jobs and are more engaged in their work compared to their non-honours peers.

The current study

This study is designed to examine differences between honours and non-honours alumni with regards to (1) final GPA and (2) early career outcomes. In order to compare honours alumni with a control group of non-honours alumni with similar potential for high-achievement when entering university, we matched honours

alumni to non-honours alumni based on final high-school grades. The research questions addressed are:

- 1) *Do honours alumni differ from non-honours alumni in terms of final GPA at the end of their studies?*
- 2) *Do honours alumni experience similar or different job resources and work engagement during their early career compared to non-honours alumni?*

Method

Participants

This study was conducted among alumni of a large university in The Netherlands who were high-achieving during high-school. In The Netherlands, all pupils in high-school at pre-university level take the same final exams for their school subjects, although subject combinations vary between students. These final grades are highly predictive of academic success in university (Koning & Loyens, 2011).

At the university where this study was situated, most programmes only recently (<5 years) started to offer honours programmes. To examine possible differences between honours and non-honours alumni during their early careers, participants were selected from study programmes with a sizeable annual population of honours alumni ($N \geq 20$) (i.e., pharmaceutical sciences, veterinary sciences, and human geography) and only alumni with a maximum of ten years' work experience were invited to participate.

In order to get a comparable control group in this study, each honours alumnus/alumna was matched to a non-honours alumnus/alumna from the same study programme using the average final high-school grade (high-school GPA).

Of the resulting 144 participants (50% honours) 40 graduated in pharmaceutical sciences, 62 in veterinary sciences, and 42 in human geography. Of the participants we had background information on, 71% were female, ages ranged between 26 and 36 years at the time of survey ($M = 29.9$ years, $SD = 2.3$), and participation in the study ranged between two and ten years since graduation ($M = 5.7$, $SD = 1.3$).

Study programmes

All three programmes from which alumni were selected for this research offer an honours programme for which students are selected based on a letter of motivation or interview and an above-average GPA. As elsewhere in the world, honours programmes at this university may take various forms, which are comparable to those in the United States. Two models that are often used are (1) programmes that offer honours assignments and activities in addition to the regular curriculum, and (2) full programmes that are especially designed for honours students. Honours programmes at the university under study, however, most frequently use a combination of the two models in which students follow part of the regular program, honours courses are offered in addition to the regular programme, and other parts of the regular curriculum are substituted by honours activities. The pharmaceutical sciences and veterinary sciences honours programmes were aimed at conducting research-focused enrichment programmes, and applied the first model by offering honours courses in addition to the regular programme. Students who wanted to continue a career in science often applied for these programmes as honours activities included designing and conducting scientific research. The honours programme for human geography applied a combined model, with honours courses substituting parts of the regular programme and other courses offered in addition to the regular programme. This programme aimed at developing a broader vision on academic subjects and stimulating deeper understanding. An important activity of this programme was to work on interdisciplinary assignments to prepare students for a leading role in society (van Eijl, Wolfensberger, Schreve-Brinkman, & Pilot, 2007).

Measures

GPA

With active informed consent of all participants, survey outcomes were matched with final university GPA and final high-school GPA as archived in the university's files. In The Netherlands, grades range from 1 (*lowest*) to 10 (*highest*). In order to pass an exam, a score of at least 5.5 is required. Therefore, the final study GPA of students

who successfully finished their university studies could theoretically range from 5.5 to 10. For the current sample of students who were high achieving during high school, this GPA ranged from 6.4 to 8.9 ($M = 7.5$, $SD = 0.54$). As the reliability of GPA scores has been questioned (Poropat, 2009) and given the important role of GPA in this study, we used intra-class correlations of course grades (which sum up to GPA scores) to investigate the reliability of the study GPA scores. These correlations showed that four course grades, which is equal to the minimum number of tests completed during one semester, were sufficient to get a reliable GPA measure, $ICC(k=1) = .37$, $ICC(k=4) = .70$ (Lüdtke, Robitzsch, Trautwein, & Kunter, 2009).

Early career outcomes

Job characteristics. The job characteristics addressed in the questionnaire can be divided into two groups: job background characteristics and job resources.

Job background characteristics. Background characteristics were *number of work hours per week*, *net salary per month*, and *job sector*. For each participant, the weekly work hours were measured with an open question. Participants were asked to indicate their income in terms of six ranges of salary (0-1000, 1000-1500, 1500-2000, 2000-2500, 2500-3000, or >3000 Euros). Salary was controlled for weekly work hours. Participants chose the relevant job sector from a list: scientific research, education, government industry, business industry, paid employment in pharmaceutical/veterinary clinic (for pharmaceutical sciences and veterinary sciences only), and entrepreneur.

Job resources. The job resources considered in this study were *autonomy*, *task variety*, *personal development*, *pay satisfaction*, and *task significance*. These specific job resources were selected during a panel meeting with five recently graduated alumni from different study programmes. Scales from existing, validated questionnaires were used to measure the selected job resources, using the original Likert scales. Autonomy, task variety, and personal development were measured with the Dutch questionnaire on perception and evaluation of work (VBBA; van Veldhoven & Meijman, 1994). This questionnaire is a widely-used instrument for

assessing job characteristics and psychological wellbeing in The Netherlands (van Veldhoven, Taris, de Jonge, & Broersen, 2005). Items were rated on a scale ranging from 1 (*never*) to 5 (*always*). Autonomy was measured with an 11-item scale (e.g., “Can you influence the planning of your activities?”; $\alpha = .91$). Task variety was assessed with six items (e.g., “Does your work require creativity?”; $\alpha = .83$). The personal development scale consisted of four items (e.g., “Does your job offer you the possibility for personal growth and development?”; $\alpha = .81$). Following Sweeney and McFarlin (2005), pay satisfaction was measured with three items ranging from 1 (*disagree*) to 5 (*agree*). An example item is “I am satisfied with my current pay” ($\alpha = .93$). Task significance was measured with a three-item scale ($\alpha = .77$) derived from the Job Diagnostic Survey (JDS; Hackman & Oldham, 1975). An example item is, “This job is one where many other people can be affected by how well the work gets done.” Task significance was measured on a 7-point Likert scale ranging from 1 (*very inaccurate*) to 7 (*very accurate*).

Work engagement. Work engagement was measured using the nine-item Dutch short version of the Utrecht Work Engagement Scale (UWES; Schaufeli & Bakker, 2003). Example items are, “At my work, I feel bursting with energy” and “I am enthusiastic about my job.” Items were scored on a scale ranging from 0 (*never*) to 6 (*always*). Cronbach’s α for this scale was .90.

Results

Descriptives of the study variables are presented in Table 4.1 and Table 4.2.

Table 4.1

Descriptives of study variables, mean and standard deviation for honours and non-honours alumni

Variable (scale)	Honours students (n = 72)		Non-honours students (n = 72)	
	M	SD	M	SD
GPA (5.5-10)	7.79	0.45	7.23	0.48
Work engagement (1-6)	5.34	0.82	5.10	0.70
Weekly work hrs. (20-80)	41.74	9.59	40.54	9.84
Autonomy (1-5)	3.90	0.72	3.65	0.64
Task variety (1-5)	3.96	0.57	3.83	0.59
Pers. development (1-5)	4.25	0.57	4.11	0.62
Pay satisfaction (1-5)	3.27	1.12	3.10	1.03
Task significance (1-7)	5.64	0.86	5.58	0.85

Table 4.2

Descriptives of study variables, Pearson correlations among dependent variables (N = 144)

	1.	2.	3.	4.	5.	6.	7.	8.
1. GPA	-							
2. Weekly work hours	.14	.-						
3. Salary	.17*	.22**	-					
4. Autonomy	.16*	.07	.27**	-				
5. Task variety	.16*	.17*	.13	.45**	-			
6. Pers. Development	.09	.19*	.15	.51**	.77**	-		
7. Pay satisfaction	.10	-.03	.46**	.44**	.18*	.29**	-	
8. Task significance	.11	-.15*	.12	.19*	.28**	.41**	.13	-
9. Work engagement	.17*	.25**	.17*	.41**	.55**	.64**	.25**	.32**

Note: * $p < 0.05$. ** $p < 0.01$.

The results in Table 4.2 show a significant medium-to-strong correlation between work engagement and other aspects of the job (compare Schaufeli & Bakker, 2004).

Study GPA

A two-way ANOVA with major as the first factor and honours programme participation as the second factor was used to compare the GPA of honours and non-honours alumni at the end of their studies, while controlling for the specific programme of study (see Table 4.3). Final study GPA of honours alumni was higher (7.8) than that of non-honours alumni (7.2). The effect of the difference in study GPA between honours and non-honours alumni was large (partial $\eta^2 = .28$, compare: small effect: $\eta^2 = .01$, medium effect: $\eta^2 = .06$, large effect: $\eta^2 = .14$; Cohen, 1988).

Table 4.3

Summary table of two-way ANOVA for effect of honours programme and study major on GPA (N = 144)

Variable	<i>df</i>	<i>F</i>	<i>p</i>	Partial η^2
Study major	2	9.62	<.01	.12
Honours programme	1	52.45	<.01	.28
Honours x Study	2	1.86	.16	.03
Error	138			

Early career outcomes

Job background characteristics

A two-way ANOVA with major as the first factor and honours programme participation as the second factor was used to examine differences between honours and non-honours alumni in terms of weekly work hours. Participants indicated that work-related activities took on average 41.4 hours per week ($SD = 9.7$). No significant main effect of honours participation, $F(1,135) = 0.31$, $p = .58$, and no significant interaction effect with study, $F(2,135) = 0.47$, $p = .63$, was found.

The distribution of the participants over the categories of salary was compared using the Mann-Whitney U test, The distribution of salary across the categories was the same for honours and non-honours alumni, $U = 2350$, $p = .46$. Net

salary per month, controlled for weekly work hours was 2000 euro's or more for 51% of the alumni, over 3000 euro's for 9%.

The distribution of participants over the job sectors was compared for honours and non-honours using a Chi-square test. For the Chi-square test results to be valid, we limited the amount of job sector categories to three, i.e., (1) scientific research, (2) clinic (veterinary sciences and pharmaceutical sciences), or business industry (human geography), and (3) other sectors. For alumni of pharmaceutical sciences, $\chi^2(2) = 9.21$, $p < .05$, and for veterinary sciences, $\chi^2(2) = 8.31$, $p < .05$, there were significant differences between honours and non-honours alumni. At the time of data collection, relatively more honours alumni of both pharmaceutical and veterinary sciences were working in scientific research than non-honours alumni. Based on odds-ratios, honours alumni were 12.7 times (pharmaceutical sciences) and 8.0 times (veterinary sciences) more likely to work in scientific research than non-honours alumni. There were no differences between honours and non-honours alumni of the human geography programme in terms of distribution over the job sectors, $\chi^2(2) = 0.44$, $p = .80$. See Table 4.4 for an overview of the distribution of participants across job sectors.

Table 4.4
Distribution of participants (N = 144) over the job sectors

		1.	2.	3.	Total
Veterinary Sciences	Honours	11	15	5	31
	Non-honours	2	24	5	31
Pharm. Sciences	Honours	8	3	9	20
	Non-honours	1	10	9	20
Human geography	Honours	3	7	11	21
	Non-honours	2	6	13	21

Note: Categorization of job sectors: 1. Scientific research 2. Clinic (veterinary and pharmaceutical sciences) / Business industry (human geography) 3. Other

Job resources

The amount of perceived job resources was compared for honours and non-honours alumni with a MANOVA. After controlling for major, no significant interaction between honours participation and major, $F(5,134)=1.26, p=.29$, Wilk's $\Lambda=.955$, and no differences between honours and non-honours alumni in terms of perceived amount of job resources, $F(10,268)=0.68, p=.74$, Wilk's $\Lambda=.951$, were found (see Table 4.5). Despite the insignificant multivariate results, the univariate results of the job resources were examined in order to reveal possible indications for further research into this relationship (Field, 2009). The results indicate that honours programme participation might result in more perceived job autonomy. We found no differences between honours and non-honours alumni in their perception of task variety, personal development, pay satisfaction, and task significance (see Table 4.5).

Table 4.5

Multivariate and univariate analyses of variance of differences in job resources between honours alumni (n = 72) and non-honours alumni (n = 72)

	<i>F</i>	<i>p</i>
<u>Multivariate results^a</u>		
Job Resources	1.26	.29
<u>Univariate results^b</u>		
Autonomy (1-5)	6.13	.02
Task variety (1-5)	1.69	.20
Pers. Development (1-5)	1.23	.27
Pay satisfaction (1-5)	1.05	.31
Task significance (1-7)	0.08	.78

Note. *F*-ratio was generated from Wilks' $\Lambda (.955)$.

^a Multivariate *df* = 5, 134. ^b Univariate *df* = 1, 138.

Work Engagement

An ANCOVA was conducted to test for differences in work engagement between honours and non-honours alumni with years since graduation as a covariate and controlling for major. Honours alumni perceived their work engagement as somewhat higher compared to non-honours alumni, but marginally significant result and small effect (see Table 4.6).

Table 4.6

Summary table ANCOVA for effect of honours programme on work engagement while controlling for years of work experience (N = 144)

Variable	<i>df</i>	<i>F</i>	<i>p</i>	Partial η^2
Work experience (covariate)	1	0.11	.737	.001
Study major	2	3.12	.047	.045
Honours programme	1	2.99	.086	.022
Honours x Study	2	1.00	.370	.015
Error	134			

Discussion

In this study, differences between honours and non-honours alumni were examined at two stages: when entering the job market and during early career. Results from this study suggest that honours alumni attained a higher GPA at the end of their studies compared to non-honours alumni. They were working more often in scientific research than non-honours alumni, and might perceive higher autonomy and work engagement.

Study GPA

Honours alumni had a higher GPA than non-honours alumni at the end of their course of study, and, consequently, honours alumni entered the job market with a higher GPA than their non-honours peers. The effect of this difference was large. In general, these results correspond to the findings of Cosgrove (2004) and Shushok (2003), who

found that honours programme participation was positively associated with academic achievement during the first year of study, and Rinn (2007), who found a positive association between honours enrolment and self-reported GPA later on during a student's academic career.

There are different possible explanations for the higher GPA of honours compared with non-honours alumni. There may be differences that can be attributed to enrolment in an honours programme, such as lower student-teacher ratios, providing more opportunities for interaction between teacher and student. Supportive teachers positively affect students' learning (Kember, 2004). Additionally, teacher feedback offers opportunities for improvement of skills and increased learning (Hattie & Timperley, 2007). Another component of the learning environment is peer-to-peer interaction (Vermeulen & Schmidt, 2008). High-quality interactions with peers are considered important for learning outcomes (Astin, 1993). Students in an honours programme are surrounded by highly motivated peers, probably increasing the quality of peer-to-peer interactions. This advantage may lead to better learning outcomes and might positively affect the GPA of students in an honours programme.

Additionally, the difference in GPA between honours and non-honours students might also be influenced by the students' self-concept. Rinn (2007) found that the academic self-concept of honours students was higher compared with that of high-achieving non-honours students. This improved self-concept might, in turn, enhance learning outcomes (Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005). The self-concept may have changed as a result of honours programme enrolment, or may have been different before students entered the programme. For example, students who decide to apply for honours programmes may be more motivated or have different personal characteristics compared to students who do not apply. For educators and students considering honours programme participation, our results nevertheless may yield important information, as our outcomes suggest that honours enrolment is unlikely to lead to a decline in GPA, and a high final GPA may increase the chances of getting an interesting job (Thoms et al., 1999).

Although GPA seems a frequently used selection tool in the job recruitment processes, it is important to consider that grades do not necessarily reflect all skills valued in the job market. For example, job recruiters often seek creative employees, but creativity is generally weakly associated with GPA (Chamorro-Premuzic, 2006; Miron et al., 2004, and see also chapter 3 this thesis). Therefore, insights into differences between honours and non-honours alumni on non-cognitive traits may yield important additional information.

Early career outcomes

Comparisons of job background characteristics and job resources of honours and non-honours alumni indicated that alumni could not be distinguished in terms of salary, number of weekly work hours, and other job resources. The similarity in salary between the two groups is especially remarkable, given the previously demonstrated positive relationship between college grades and salary (e.g., Rumberger & Thomas, 1993; Vermeulen & Schmidt, 2008). Since our results showed that, in general, honours alumni earn a higher GPA than non-honours alumni, it could be expected that this would be reflected in the size of the salaries they reported. Contrary to the current study, the previous two studies did not specifically focus on high-achieving or honours students. Possibly, these students are less concerned with high salaries when compared with other students (Trank, Rynes, & Bretz, 2002) and might therefore make different career decisions when entering the job market (i.e., they may prioritize other factors than salary when choosing a job). In addition, perhaps no significant results in terms of salary and weekly work hours were found because all participants in this study were at the relative upper end of both scales. It should be noted that participants in the current study entered the job market before the start of the economic crisis in 2008. Now, with higher unemployment rates all over Europe (CEDEFOP, 2013), it may be that differences between honours and non-honours alumni have become more evident. With more applicants for available jobs, it may become increasingly important to differentiate oneself from other applicants. An honours certificate may offer an advantage in the

job market, but only when job recruiters recognize the potential value of attending an honours programme. In The Netherlands, university honours programmes are still in their infancy, so the concept and potential benefits of an honours programme may still be unclear. Studies on the differences between honours and non-honours alumni provide additional knowledge on this topic.

The specific focus of the honours programmes was related to the distribution of graduates over different job sectors. Honours alumni of pharmaceutical sciences and veterinary sciences, both focusing on the development of scientific research skills, worked more often in scientific research compared with non-honours alumni. This was not the case for alumni of the human geography honours programme, which focused on developing a more interdisciplinary set of skills. Students who apply for the research-oriented honours programmes may either already have an interest in conducting research and/or may strengthen such an interest later on. Given the large difference between the honours and non-honours alumni in terms of the number of participants that worked in the research sector, it is fair to conclude that attending these honours programmes do at least further encourage students to pursue a career in scientific research.

As differences in job resources could not substantially account for differences in honours and non-honours alumni, other factors seem relevant. For example, Xanthopoulou, Bakker, Demerouti, and Schaufeli (2007) showed that self-efficacy, organizational-based self-esteem, and optimism were positively related to work engagement in highly educated employees (see also Bakker, Gierveld, & van Rijswijk, 2006). Similarly, Salmela-Aro and Nurmi (2007) reported that self-esteem during university was positively related to work engagement and job satisfaction 10 years later. It is possible that differences in such characteristics already existed before the start of the honours programme. Due to the retrospective design of our study, it was not possible to gather data on pre-enrolment characteristics. It is, of course, possible that students who attend an honours programme develop differently on such characteristics (Rinn, 2007), which may affect their work engagement later on.

Limitations and further research

Although this study provides insights into the differences between honours and non-honours alumni, there are a few limitations that need to be addressed. As mentioned in the discussion, no pre-enrolment characteristics of the participants were collected. It is possible that students who decided to apply for an honours programme already differed from students who decided not to apply or enrol. Moreover, our sample only included honours alumni who had successfully finished the programme. Students who dropped out of the programme were not captured in the honours sample, but may also differ from the honours alumni in this sample, for example regarding their motivation or level of perseverance. Future studies including longitudinal designs that capture trajectories of individual students, including pre-enrolment characteristics, are therefore highly recommended.

Like many similar studies, this study uses self-reports. A possible problem with this method is that self-reports may result in a certain bias, for example, students may respond in a socially desirable (Holden, 2007) or self-serving way. We tried to diminish this by guaranteeing the participants that questionnaires would only be used for research purposes and that results would only be presented anonymously. Nevertheless, we encourage future studies to use additional methods of measuring early career outcomes.

Further, honours programmes are diverse, and this study involved three programmes from only one university. Although the models for honours programmes used in The Netherlands are comparable to, for example, those in the United States (Scager et al., 2012), generalizing the results to other types of honours programmes may be problematic. Also, the specific focus of the honours programmes (e.g., research oriented versus a broader focus) may influence early career outcomes. Unfortunately, for the present study a comparison of the results of the three programmes lacked sufficient power. We emphasise that more research involving different types of honours programmes is needed before general conclusions can be made.

Results of this study revealed some differences between honours and non-honours alumni. Future research could focus on the causes of these differences.

Chapter 5

Effects of honours programme participation in higher education: A propensity score matching approach

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Abstract

Honours programmes have become part of higher education systems around the globe, and an increasing amount of students is enrolled in such programmes. So far, effects of these programmes are largely under-researched. Two gaps in previous research on the effects of such programmes were addressed (1) most studies lack a comparable control group of students not enrolled in honours programmes and (2) few studies have longitudinally investigated effects of honours programmes on student characteristics other than academic achievement. By using propensity score matching, the current study investigated the effects of honours programme participation on students' ability, motivation, and creativity (Renzulli, 2002). Students' self-perceived ability, perseverance, mastery orientation, performance orientation, innovativeness, and self-efficacy, as well as students' gender and study grades were used to match undergraduate honours students to non-honours students (N = 94). Results showed no overall differences in ability, motivation, and creativity after six months of honours programme, although honours students seemed to slightly increase in innovativeness, while non-honours students tended to decrease in mastery orientation. Outcomes of the study give rise to considerations about the role of honours programmes in curricula.

Authors' contributions

All authors made substantial contributions to the study conception and design. AK collected the data in collaboration with TM. MB and AK conducted the analyses. PvB, TM, and DJ contributed to the interpretations of the results and discussions. AK wrote the first draft of the article. All authors participated in finalizing the manuscript, approving it and are accountable for the accuracy and integrity of the content.

Introduction

Honours programmes have become part of higher education systems around the globe, and an increasing amount of students is enrolled in such programmes (Long & Mullins, 2012). These programmes aim at providing high-achieving and motivated students enriched experiences through, for example, small classroom teaching, a broader vision on study material, and a deeper elaboration of the subject matter (Byrne, 1998), thereby facilitating students to fully enhance the development of graduate attributes and to ultimately contribute to science and society (Jansen & Suhre, 2015). In Europe, honours programmes are a relatively new phenomenon, and the added value of the programmes remains largely under-researched (Wolfensberger, 2012). Also in other parts of the world, such as the United States or Australia, there is a call for more empirical studies on the effects of such programmes (Achterberg, 2005; Alan, 2011). To justify the existence of honours programmes, questions have arisen as to whether, and how, honours students benefit from these programmes.

When reviewing the existing literature on effects of honours programmes, two gaps become apparent: (1) most studies lack a comparable control group of students not enrolled in honours programmes and (2) few studies have longitudinally investigated the effects of honours programmes on student characteristics other than academic achievement. The present study addresses these gaps by using propensity score matching (Rosenbaum & Rubin, 1983) to investigate the effects of honours programme participation. Propensity score matching is a statistical technique that controls for (self) selection bias, thereby allowing for the estimation of effects of programmes (i.e., interventions) in non-randomized or quasi-experimental studies (Rosenbaum & Rubin, 1983).

To move beyond academic achievement as an outcome measure of honours programmes the current study focussed, in accordance with Renzulli (2002) and Scager and colleagues (2012), on students' ability, motivation, and creativity, which are hypothesized to be required in order to become highly productive and creative professionals. In the next sections, previous studies on the effects of honours

education as well as the variables ability, motivation, and creativity, which have also been summarized as professional excellence (Scager et al., 2012), are discussed in more detail.

Effects of honours education

Gaining insight into how honours programme participation benefits students is challenging. Previous studies have examined possible benefits in different ways. Alan (2011), for example, asked honours students in an interview to reflect on their past year in the programme. Jansen and Suhre (2015) applied a similar approach, using questionnaires to measure motivation and perceived graduate attributes of honours students retrospectively. Both studies concluded that students benefitted from the programmes. Although these studies provide valuable insights, a possible downside of this method may be that students are inclined to give social-desirable answers or the memory reconstruction process might suffer from memory failure and distortions (Veenman, 2011). Moreover, it remains uncertain whether these students would have developed similarly in the regular programme. Therefore, in order to draw causal conclusions a comparable control group is required (Montgomery, 2005).

However, a simple comparison between a group of honours and non-honours students is likely to result in a biased estimate of effects of honours programmes due to (self) selection. Pflaum, Pascarella, and DUBY (1985), for example, compared the Grade Point Average (GPA) of college freshmen participating in the university honours programme to that of peers who were invited for the programme but decided not to participate, and found that after one year in the programme honours freshmen had higher GPAs. Similarly, Cosgrove (2004) found that honours students had higher GPAs at the end of the study, but considered three groups of students; honours students, students who started the honours programme but did not complete it, and high-ability non-honours students identified based on SAT scores (i.e., a standardized test widely used for college admissions in the United States), and high-school class ranks. Shushok (2003) took yet another approach and matched honours

students to non-honours students based on high-school grades, SAT scores, gender, race, and place of residency. Whereas honours students in the Mid-Atlantic States had a higher GPA compared to non-honours students after one year of study, after four years the difference in GPA between honours and non-honours students had leveled out. Although the study design of Shushok (2003) employed the most rigorous approach, it still remains unclear whether differences in GPA and self-reported differences between honours and non-honours students are simply the result of pre-enrolment characteristics or selection bias. Students who decide to apply for an honours programme may differ from students who do not apply in first place, for example in self-efficacy.

In order to be reasonably confident that a possible difference in the development of self-perceived ability, motivation, and creativity does not simply reflect an underlying difference between honours and non-honours students in academic ability and/or other pre-enrolment characteristics, we applied a quasi-experimental approach using propensity score matching (Rosenbaum & Rubin, 1983). Propensity score matching is viewed as one of the best alternatives for randomized experiments in cases where randomization is not possible or desired (Vaughan et al., 2014).

A second challenge for studies examining effects of honours programmes is that the goals of honours programmes are often broad, including, for example, the fostering of intellectual diversity and creativity (Wolfensberger, 2012). This implies that when evaluating the programmes, a sole focus on academic achievement may provide an incomplete picture. Moreover, GPA may not be an important predictor of success during professional life (e.g., Bretz, 1989; Taylor, Albo, Holland, & Brandt, 1985), and therefore other outcome measures may be more valuable when evaluating effects of honours programme participation. Indeed, Jansen and Suhre (2015) showed that according to Dutch honours students, the honours programme contributed strongly to their skill development, especially to their research and communication skills. Additionally, Shushok (2003) reported larger self-perceived gains in liberal arts and sciences, and technology in honours compared to non-honours students, but

no difference in terms of self-reported gains in critical thinking and analytical skills. In contrast, Seifert and colleagues (2007) did demonstrate a positive effect of honours programme participation on critical thinking as well as mathematics, and cognitive development during the first year of college.

In sum, the present body of research on effects of honours programmes shows that the establishment of a comparable control group is a major challenge and outcomes other than GPA need further examination. In this study we add to the present literature by focussing on student qualities regarded to be essential for excellent performance in professional life (Renzulli, 2002; Scager et al., 2012).

Ability, motivation, and creativity

As honours programmes are designed to fully foster students' talents and stimulate contributions to science and society (Scager et al., 2012), an assumption is that these students develop personal qualities required for successful accomplishments later in life. In the current study, we therefore focused on qualities of excellent professionals. Excellent professionals have been identified in many different ways, such as winning awards, or the number of publications for researchers (Trost, 2000). Over the last decades, several retrospective analyses on excellent professionals have been conducted in order to identify antecedents of their achievements. High levels of three basic clusters of human characteristics, i.e. ability, motivation, and creativity, have been described as a prerequisite for becoming an excellent professional (Gagné, 1995; Heller, Perleth, & Lim, 2005; Renzulli, 2002). In the present study we therefore used measures to tap these three characteristics in order to test the effects of honours programme participation.

An increasing number of models on excellence have a developmental perspective and specify external factors as important facilitators or inhibitors of the development of excellent performance (e.g., Callahan, 2000; Gagné, 1995). For example, Mönks and Katzko (2005), focussed on external factors like school, peers and family. In their view, ability, motivation, and creativity can be developed by a challenging learning environment and frequent interactions with equal level peers

(Mönks & Katzko, 2005). Assuming that honours programmes provide such an environment, students participating in honours programmes may develop differently as compared to students similar to them in regular programmes.

In this study, and comparable to Scager and colleagues (2012), we approached ability by measuring students' self-perceived intellectual ability, motivation by perseverance, mastery- and performance orientation, and creativity by students' innovativeness.

Ability

There is a large body of research showing the importance of ability as a predictor of job performance in professional life (e.g., Gottfredson, 1997; Kuncel et al., 2004). In line with this, a meta-analysis on job performance antecedents by Judge and Bono (2001) showed that self-perceived ability was one of the best predictors of job performance. Regarding the effects of honours programme participation on self-perceived ability, two possible, but opposite, effects are described in literature (Dai & Rinn, 2008). First, the Big-Fish-Little-Pond effect (BFLPE; Marsh, Kong, & Hau, 2000) assumes that students' self-perception of ability is derived from the comparison with peers. A student participating in an honours programme is surrounded by highly-able peers, and due to social comparison his/her self-perceived ability is expected to be lower compared to a similar student enrolled in the regular programme. In contrast, the reflected glory effect (Marsh et al., 2000) refers to the phenomenon that individuals associate themselves with success of others. Being a member of a successful, selective group of peers, such as honours students, may thus in itself enhance students' self-perceived ability. Thus, merely knowing that one is accepted for an honours programme may already affect a students' self-perceived ability. The two effects may balance each other, or one of the two may be more prevalent (Rinn, 2007). To be able to control for a possible reflected glory effect when studying the effects of honours programme participation, we examined this effect in the present study.

Motivation

In this study we approached motivation by perseverance, mastery orientation, and performance orientation. In order to stay engaged in a task, perseverance is essential (Ericsson et al, 1993). Ericsson and colleagues (1993) showed that excellent performances are only achieved after at least a decade of intense daily practice, for which perseverance is indispensable. Perseverance has also been found to predict performances in higher education (Duckworth & Seligman, 2005).

Mastery and performance orientation are two important sources of motivation for a task (Elliot & McGregor, 2001). Mastery orientation is defined as a desire to learn, in which the student's focus is on acquiring and developing competence and new knowledge (Senko et al., 2011). Performance orientation, on the other hand, refers to a focus on demonstrating competence and outperforming others and is sometimes seen as the opposite of mastery orientation (Senko et al., 2011). However, a combination of both mastery and performance orientation seems most beneficial for performance (Pintrich, 2000).

Creativity

Creativity includes the ability to come up with novel ideas and ways to solve problems. Research on successful professionals has shown that excellent performances and creativity are related (Subotnik, Olszewski-Kubilius, & Worrell, 2011). Already for high-school students creativity seems to be a better predictor of later work accomplishments than for example intelligence (Milgram & Hong, 1993). Openness to experience, one of the Big-Five traits, is associated with creativity as measured by tests of divergent thinking (Feist, 1998; McCrea, 1987). Openness to experience includes several facets like fantasy or aesthetics but also innovativeness (Costa & McCrae, 1992). In this study we focus on innovativeness, which we deemed most relevant for excellent professionals.

The current study

By examining the effects of honours programme participation on other variables than academic achievement and by using propensity score matching, the current study adds to the existing literature.

The research question addressed is “*What is the effect of honours programme participation on students’ ability, motivation, and creativity?*”. In order to single out the reflective glory effect (Marsh et al., 2000) as an alternative explanation for the effect of actually following the programme, we also asked the following question “*What is the effect of mere honours programme acceptance (rather than actually following the programme) on students’ ability, motivation, and creativity?*”.

In order to reduce (self) selection bias, randomization was simulated in honours/non-honours cohorts based on pre-enrolment characteristics, that is, characteristics measured *before* students applied for an honours programme.

Method

Matching of participants before the start of the honours programme

We used a dataset containing longitudinal data on student self-perceptions, measured at the beginning of five consecutive semesters. Honours programmes in the current study all started in semester 3. Consequently, it was possible to collect data on students’ self-perceptions *before* the start of the honours programme. Using data collected at the start of semester 2, before the start of the honours programmes, a propensity score was calculated for each student. In essence, a propensity score is a single score that balances multiple observed covariates, so that the distribution of the covariates is the same for the treatment group and the control group (i.e., honours and non-honours students). Based on these propensity scores, honours students were later retrospectively matched to non-honours students and then compared on *ability, motivation, and creativity* at the start of the honours programme (semester 3) to check whether the reflected glory effect was present, and halfway into the programme (semester 4) to evaluate effects of programme participation.

Participants and procedure

The study was conducted at Utrecht University, The Netherlands. Ninety four students participated, 47 honours and 47 non-honours students, of nine undergraduate programmes (44% psychology, 23% medical sciences, 10% biomedical sciences, 7% physics and astronomy, 7% pedagogical sciences, 3% chemistry, 3% geosciences, 2% pharmaceutical sciences, and 1% information sciences). Females (overall 79%) were overrepresented compared to the general gender distribution in the undergraduate programmes (67% female). Considering our sample size, power for a large effect (.80) was .84, for a medium effect (.50) .40, and for a small effect (.15) .07 (Cohen, 1992).

Students in this sample were drawn from a larger sample including 12,094 students, 5.7% of whom were honours students. This is representative for the percentage of honours students in the total student population at Utrecht University. All undergraduate students of the involved study programmes were invited to participate in an online questionnaire at the start of five consecutive semesters starting in March 2010 and ending in March 2012 (average overall response rate = 38%). Students who participated in their first year and then at three subsequent moments in time were selected for the present study, resulting in a subsample of 54 honours students and 594 non-honours students. Using propensity scores, an adequate match was found for 47 honours students.

Like elsewhere in the world (Byrne, 1998; Kiley, Boud, Cantwell, & Manathunga, 2009), honours programmes at Utrecht University may take various forms. For this study, we only included one-year undergraduate honours programmes that were similar regarding starting time, form, and selection criteria. During semester 2, students with a GPA of 7.5 and higher were invited to apply for these programmes by means of a motivation letter. Subsequently, selection interviews took place and the selection committee decided which students were accepted into the programme. These students then started the honours programme at the start of semester 3. Honours students followed at least 25% of the courses at honours level

and had to obtain an additional 15 ECTS on top of the 60 ECTS of the regular programme (1 ECTS equals 28 hours of study).

Measures

Besides the variables that measured ability, motivation, and creativity, the longitudinal dataset used in the present study also included measures on self-efficacy (Adams & Wu, 2000), extraversion (Goldberg, 1992), and self-described mathematical and verbal ability (Marsh & O’Niell, 1984). For the calculation of the propensity scores, we included pre-enrolment characteristics (measured at semester 2, before the programme had started) that were statistically related (total sample of 12094 students) to either self-perceived ability, perseverance, mastery and performance orientation, or innovativeness at semester 4 (halfway into the programme).

Factor analyses were conducted on the scales of ability, motivation, and creativity and the scales included in the propensity model to test for scale unidimensionality and scale reliability (Cronbach’s α) was established.

Ability, motivation, and creativity variables

Ability

Students’ ability was measured by self-perceived ability. Three items of the Smart Scale (Trapnell, 1994) were used. The Smart Scale uses extreme qualifiers; an example is ‘I am considered exceptionally or unusually intelligent’. Items were measured on a nine point Likert scale, ranging from 1 (not at all true of me) to 9 (very true of me) (scale unidimensionality; $\alpha = .92$).

Motivation

Perseverance, mastery orientation and performance orientation were used to determine students’ motivation. Mastery and performance orientation were assessed with the mastery approach and performance approach scales of Elliot and McGregor (2001). Both scales consisted of three items scored on a 7-point Likert scale, ranging

from 1 (not at all true of me) to 7 (very true of me). An example item of mastery orientation ($\alpha = .76$) is 'I want to learn as much as possible in my study'. An example for performance orientation ($\alpha = .89$) is 'It is important for me to do better than other students'. The perseverance of effort subscale of the grit scale by Duckworth and Quinn (2009) was used to tap students' perseverance. Three items were assessed on a scale ranging from 1 (not at all true of me) to 7 (very true of me) ($\alpha = .77$). An example item is 'I finish whatever I begin'. All scales showed unidimensionality.

Creativity

Creativity was measured with the openness to experience scale (Goldberg, 1992). A nine-point Likert scale was used from 1 (low) to 9 (high) on which participants indicated the extent to which each item was an accurate self-description. Factor analyses showed that the six openness items originally included in the openness scale divided into two subscales. One focused on artistic qualities and fantasy, and the other focused on innovativeness. The finding that openness comprises at least two distinct lower order trait dispositions has been described in literature (see Von Stumm & Ackerman, 2013). We included the subscale focussing on innovativeness, since we deemed this construct more relevant for the professional context. The unidimensional subscale consisted of three items ($\alpha = .60$) and an example is 'I am innovative'.

Additional propensity model variables

GPA

With active informed consent, grades were drawn from the university's files. In The Netherlands, grades range from 1 (lowest) to 10 (highest). In order to pass an exam, a score of at least 5.5 is required. For each student, GPA was calculated by averaging all grades obtained during the study programme for the exams that were passed at the specific moment of each data collection, corrected for the amount of credits per course. Therefore, the range of GPA is between 5.5 and 10.

Self-efficacy, extraversion, mathematical- and verbal ability

Self-efficacy (scale unidimensionality; $\alpha = .69$) was measured with three items on a 7-point Likert scale using the PISA index of general academic self-efficacy (Adams & Wu, 2000). An example item is 'I am confident I can do an excellent job on assignments and tests'. Extraversion (Big Five, six items, $\alpha = .90$), and self-perceived mathematical- (five items, $\alpha = .85$) and verbal ability (10 items, $\alpha = .81$) were not statistically related to one of the outcome variables and were excluded from the model.

Gender

Students' gender was retrieved from the university's files.

Propensity scores

Propensity scores were obtained with a logistic regression model using honours programme participation as the binary response. The initial step was to determine which pre-enrolment characteristics should be included in the logistic model used to calculate propensity scores. In general, three different options exist regarding the selection of pre-enrolment characteristics for the propensity model (Brookhart et al., 2006). A focus on characteristics that affect (1) the probability of receiving a treatment (i.e., being selected for the honours programme), (2) the outcome variables, or (3) both the probability of treatment and the outcome. Following Rubin and Thomas (1996) we applied option 2 and included all pre-enrolment characteristics in the propensity model that were significantly related to the outcome variables, that is aspects related to ability, motivation, and creativity, measured halfway into the honours programme.

Regression analyses were conducted to determine which pre-enrolment variables measured before the start of the honours programme (semester 2) had a significant effect on one of the outcome variables. Self-perceived ability, perseverance, mastery orientation, performance orientation, innovativeness, self-efficacy, GPA, and gender measured at semester 2, were all significantly related to

the ability, motivation, and creativity variables at semester 4, and were included in the model.

The next step was to match honours students with non-honours peers based on the propensity score. We used Thoemmes' SPSS tool Propensity Score Matching (2012) to calculate propensity scores and to apply 1:1 matching with a caliper of 0.1 (the caliper width is the maximum allowed difference in the propensity score between the matches and was determined in several steps considering both the number of realized matches and the balance of the pre-enrolment variables between the two groups). To evaluate the matching, we used Rubin's (2001) criteria. Propensity score means were found to be 0.23 for honours (SD = 0.17) and 0.23 for non-honours (SD = 0.17). These similar means indicate that the difference of the mean propensity scores of the two groups is within the recommended limit of 0.5 standard deviation. The ratio of the propensity score variances in the two groups was 1, which is the optimal ratio as indicated by Rubin. The ratios of the residual error variances were calculated by linear regression for the continuous variables, and logistic regression for gender. All ratios were well within the acceptable range of 0.50-2.00 (see Table 5.1). Overall, the three criteria outlined by Rubin (2001) were met, indicating an adequate matching of the groups. Final examination of the matching using an independent sample t-test showed that there were no significant differences between the non-honours and honours group on any of the pre-enrolment characteristics included in the model. Table 5.1 shows the descriptives for the pre-enrolment characteristics included in the propensity model for honours and non-honors.

Table 5.1

Descriptives, residual error variance ratios, and p values for differences between pre-enrolment characteristics of honours and matched non-honours students

Pre-enrolment variables (semester 2)	Honours students (n = 47)		Non-honours students (n = 47)		p	Residual error variance ratio
	M	SD	M	SD		
Perceived ability (1-9)	6.25	1.37	5.76	1.53	.11	1.20
Mastery orientation (1-7)	5.84	0.66	5.72	0.80	.40	1.24
Performance orientation	5.08	1.12	5.11	1.07	.90	0.72
Perseverance (1-7)	5.67	0.81	5.58	0.86	.59	0.76
Innovativeness (1-9)	5.13	0.70	4.96	0.75	.26	1.12
Self-efficacy (1-7)	5.33	0.90	5.27	1.01	.77	1.01
GPA (5.5-10)	7.98	0.59	8.00	0.65	.83	1.39
Gender (ratio females)	0.77	0.43	0.81	0.40	.62	0.87

Note: The acceptable range of the residual error variance ratio is 0.50-2.00 (Rubin, 2001).

Results

Honours programme participation

Before answering the research question we performed preliminary analyses. We used paired t-tests to examine whether scores on the ability, motivation, and creativity variables changed between semester 2 (before the start of the honours programme) and semester 4 (halfway into the honours programmes). Table 5.2 summarizes our findings. Overall, non-honours students increased significantly in self-perceived ability between semester 2 and semester 4. Mastery orientation decrease for these students was marginally statistically significant. For honours students on the other hand, mastery orientation was stable and innovativeness increased between semester 2 and semester 4.

Given the focus of the previous studies on effects of honours programme participation on academic achievement (GPA), we also tested whether GPA of

honours and non-honours in our study was significantly different at semester 4 (halfway into the honours programme). We found that GPA did not significantly differ between honours ($M = 7.76$, $SD = 0.58$) and non-honours students ($M = 7.83$, $SD = 0.70$); $t(91) = 0.50$, $p = .62$.

Table 5.2

Results of paired t-tests on differences in ability, motivation, and creativity aspects between semester 2 and semester 4 for honours students and non-honours students

	Honours ($n = 47$)				Non-honours ($n = 47$)			
	Semester 4		Difference with semester 2		Semester 4		Difference with semester 2	
	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Perceived ability (1-9)	6.38	1.30	-.82	.42	6.11	1.38	-2.36	.02*
Mastery orientation (1-7)	5.86	0.75	-.15	.88	5.52	0.81	1.94	.06
Performance orientation (1-7)	5.01	1.34	.45	.65	4.90	1.18	1.65	.11
Perseverance (1-7)	5.67	0.94	.07	.94	5.63	1.00	-0.55	.59
Innovativeness (1-9)	5.35	0.76	-2.10	.04*	4.94	0.77	0.21	.84

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

To answer the research question on the glory effect we examined whether being accepted for an honours programme in itself affected ability, motivation, and creativity. Ability, motivation, and creativity were compared for honours and non-honours students at semester 3. At that time, students were already accepted for the honours programmes, but the programmes had not started. A two-sample Hotelling's T^2 test was conducted (Tabachnick & Fidell, 2007) to compare both groups simultaneously on the five ability, motivation, and creativity variables used in this study and no difference between the groups was found just before the start of the programmes ($T^2 = 0.03$, $F = 0.57$, $df = 5, 88$, $p = .73$).

To answer the main research question whether honours programme participation had an effect on the aspects related to ability, motivation, and creativity, honours and non-honours students were compared after six months of honours

programme (semester 4). Results of Hotelling's T^2 test showed no significant difference between honours and non-honours students on the combined dependent variables at semester 4 (see Table 5.3). Keep in mind that given the power due to our sample size we were only able to detect large effects. Thus, at least no *large* effect on students' ability, motivation, and creativity was found. For sake of further exploration we also checked the univariate tests and found significant differences between honours and non-honours students in mastery orientation ($F = 4.45, p = .04$) and innovativeness ($F = 6.84, p = .01$). The difference in mastery orientation seemed to correspond with the small (but not significant) decrease of this type of motivation in non-honours students between semester 2 and semester 4. Innovativeness increased between semester 2 and semester 4 for honours students. Following Tabachnick and Fidell (2007) the results of the univariate tests are presented as a guide for future research.

Table 5.3

Multivariate and univariate results of Hotelling's T^2 test between honours students ($n = 47$) and non-honours students ($n = 47$) after six months of honours programme

	T^2	F	p
<u>Multivariate results^a</u>			
Ability, motivation, and creativity	0.12	2.13	.07
<u>Univariate results^b</u>			
Perceived ability (1-9)		0.90	.35
Mastery orientation (1-7)		4.45	.04
Performance orientation (1-7)		0.20	.65
Perseverance (1-7)		0.03	.86
Innovativeness (1-9)		6.84	.01

^a Multivariate $df = 5, 88$. ^b Univariate $df = 1, 92$.

Discussion

In this study we examined effects of participating in an honours programme on students' ability, motivation, and creativity. We addressed two gaps in the present literature (1) most studies lack a comparable control group of students not enrolled in honours programmes and (2) few studies have longitudinally investigated effects of honours programmes on student characteristics other than academic achievement. By using propensity score matching, we were able to apply a quasi-experimental approach to compare ability, motivation, and creativity between honours students and non-honours students. Insight in the effects of honours programmes on students is important for the justification of the programmes (Seifert et al., 2007) and provides valuable information to both honours educators and (potential) honours students.

Based on the results the main conclusion is that, although there were small differences between honours and non-honours students in mastery orientation and innovativeness after six months of participation in the programme no large overall effects of honours programme participation were found on ability, motivation, and creativity.

Results of our study complement findings of Scager and colleagues (2012), who showed that honours students in a Utrecht University differed from non-honours students in ability, motivation, and creativity. Scager et al. concluded that (self-) selection processes play an important role in characteristics of the honours population. Our study confirmed that differences between honours and non-honours students in ability, motivation, and creativity are indeed likely to result from such (self-) selection processes instead of developmental differences due to honours programme participation. To our opinion, as the present study is one of the first to examine effects of honours programmes using propensity score matching, more research is needed before drawing firm conclusions on the effects of honours programmes.

In the present study also no differences were found in GPA between honours and non-honours students. Our results are in contrast to some previous studies that did find differences in the development of honours and non-honours students in terms

of GPA (Cosgrove, 2004; Pflaum et al., 1985; but see Shushok, 2003). Our findings might indicate that these differences found were due to a selection bias and differences already existed before students entered honours programs or university. It is likely that students who decided not to apply for an honours programme although invited (Pflaum et al., 1985) or students who participated but quit the programme (Cosgrove, 2004), have different personal characteristics (e.g., self-perceived ability, perseverance) than students who apply for and complete an honours programme. These differences in personal characteristics may also affect GPAs. For example, perseverance has been found to predict grades (Duckworth & Seligman, 2005).

Although propensity score matching is an adequate approach to control for (self-) selection bias, it is challenging in itself. Students who participate in honours programmes are (in general) high-achieving and very motivated (Achterberg, 2005). Finding comparable matches is complicated, and therefore a large sample of non-honours students has to be obtained. In the present study, the sample of non-honours students participating in semester 2, 3 and 4 ($N = 594$) was not large enough to find an adequate match for all honours participants (47 out of 54 honours students).

If future studies would confirm our findings, the question may arise whether it is justifiable to provide rather costly and time-consuming educational programmes for high-achieving students when effects of these programmes are limited. At the same time we have to keep in mind however, that honours programmes may have effect on aspects that cannot easily be measured (Wolfensberger, 2012). In the present study, univariate tests of mastery orientation and innovativeness both showed a difference after six months of honours programme. Although these results should be interpreted with care, this may be a starting point for future research. In studying innovativeness and mastery orientation of high achieving students for example difference in teaching approach or the frequency of interaction with equal peers may be included as earlier research has shown that - according to both Dutch and American teachers- offering freedom of choice regarding subject matter and assignments distinguishes their honours education from their regular education (Wolfensberger, 2012).

Limitations and further recommendations

Given the power of the sample size in the present study to find differences between honours and non-honours on the combined aspects of ability, motivation, and creativity, it should be kept in mind that our sample size was adequate to find a *large* effect, but chances of finding a small effect were low (i.e., 7%; Cohen, 1992). As described earlier, obtaining a larger sample with adequate non-honours matches is challenging given that honours students are a special group of students (Achterberg, 2005). However we would like to encourage future studies to use our strategy with sample sizes that also allow the detection of medium and small effects of honours programmes.

What also needs to be considered is that we looked into differences between honours and non-honours students only halfway into the programmes (6 months). It is not unlikely that differences only appear after being enrolled in the programmes for a longer period. We were not able to examine longer-term effects of honours programme participation, due to the loss of participants over time. Nevertheless, halfway the programme students had received approximately 210 hours of honours education. Given that, for example, 80 hours of training is often used as a standard for effective professional development projects for teachers (Supovitz & Turner, 2000), it seems reasonable to assume that after 210 hours of honours education changes can be measured.

Further, honours programmes are diverse (Byrne, 1998) and this study involved one type of honours programme and students from one university and generalizing the results to other types of honours programmes may be problematic. Therefore, more research involving different types of honours programmes is needed before general conclusions can be drawn.

Finally, we used self-reports of variables related to ability, motivation, and creativity. Using self-reports may result in socially desirable responses (Holden, 2007). We tried to diminish this by guaranteeing the participants that questionnaires would only be used for research purposes and that results would only be presented anonymously. Nevertheless, future studies using alternative ways to measure

creativity, such as divergent thinking tests (Feist, 1998) would be a great addition to the present study.

Concluding remarks

The results provide reason for administrators to reflect upon the role of honours programmes in their curricula. If effects of honours programmes are limited with regard to measureable results, such as GPA or ability, motivation, and creativity, one can debate whether it is justifiable to invest in rather costly programmes for a small number of students. It may even generate unequal opportunities for non-honours graduates, since honours alumni might be more attractive for job recruiters. On the other hand a cautious trend showed that honours programmes may be effective in sustaining levels of mastery orientation and increasing innovativeness, while this seemed less the case in regular programmes. Therefore, honours programmes may be essential for high-achieving and motivated students to maintain their desire to learn and at the same time provide opportunities to increase levels of innovativeness. Consequently, it may be valuable to explore what elements in honours programmes can be implemented in the regular undergraduate programmes to help prevent a possible drop in mastery orientation over time and to stimulate innovativeness in students.

Chapter 6

General conclusion and discussion

The general aim of this thesis was to provide further insight into excellence in higher education by studying the relation of students' personal qualities and academic achievement across the undergraduate programme, and by studying effects of honours programmes on personal qualities and grades. We used both a current achievement perspective on excellence (e.g., Ericsson et al., 1993) and a potential for excellence perspective (e.g., Mönks & Katzko, 2005). We included both current achievement variables (i.e., GPA) and variables measuring personal qualities linked to (a potential for) excellence. These are variables pertaining to motivation (in this thesis master and performance orientations, perseverance, and self-efficacy), creativity (in this thesis innovativeness) and intellectual ability (in this thesis academic aptitude in terms of high-school grades and self-perceived intelligence). A retrospective study and longitudinal studies using a variety of statistical approaches were performed to examine the following research questions:

- (1) *How are students' personal qualities and academic achievement related over the course of the undergraduate bachelor programmes? (chapter 2 and 3)*
- (2) *What is the effect of honours programme participation during and after the undergraduate bachelor programme? (chapter 4 and 5)*

Besides contributing to the knowledge base on excellence in higher education, the studies that were conducted may help to determine how to optimally support students with different personal qualities across their study career, how to identify potential honours students, and how to increase the effectiveness of honours programmes.

Summary of conclusions from individual studies

In **chapter 2 and 3** we examined personal qualities that are considered important from both a current performance and a potential excellence perspective (e.g., Mönks & Katzko, 2005; Ericsson et al., 1993). Our focus was on differences *between* students with regard to these qualities, and on variability and change of qualities *within* students over time. Studying possible changes in personal qualities *within* individual students, in addition to differences in qualities *between* students, represents a more situational point of view focusing on variability within students

across semesters. This provides insight in how educators may strengthen the qualities of their students and how students can be supported to regulate their own qualities.

In **chapter 2** multilevel analyses were used to investigate variability in achievement goal orientations in a sample of 2,401 health profession students. There were considerable differences between students in their general levels of mastery and performance orientation, but there were also substantial fluctuations in goal orientations *within* students during the undergraduate programmes. Differences *between* students were associated with high-school grades, GPA, and general levels of self-efficacy. Self-efficacy was in particular a strong positive predictor for a student's mastery orientation, while high-school grades had a strong positive relation with performance orientation and a slightly negative relation with mastery orientation. Self-efficacy was also the most important positive associate for fluctuations in goal orientations *within* students. These results may implicate that (a) when selection in undergraduate programmes is based on high-school grades the student population may be biased towards the adoption of a performance orientation, and (b) enhancing students' self-efficacy may be beneficial both on the short and the long term.

The main question of the study in **chapter 3** was whether students with different academic aptitude (measured with high-school grades) benefit equally from perseverance and innovativeness in terms of current academic achievement (i.e., GPA). We applied multilevel moderation analyses on a sample of 2272 individual students with data for at least three semesters, sampled from 17 different undergraduate programmes. Results showed that general levels of perseverance were positively associated with student GPA, while innovativeness was slightly negatively related to GPA. Both effects were stronger for students with a high academic aptitude. These students thus profited more from enhanced perseverance compared to students with a lower academic aptitude. Further, and in accordance with results from Chapter 2, levels of both perseverance and innovativeness fluctuated *within* students over semesters. Within students' deviances per semester from their average level of perseverance were positively related to semester GPA. For innovativeness

we also found a significant positive, albeit weak association at the within student level with academic achievement. Our study showed that personal qualities indeed fluctuated during the undergraduate programme (compare Duckworth & Yeager, 2015) and that they have a different effect on academic achievement for students with a different academic aptitude.

In **chapter 4 and 5** we examined effects of honours programme participation.

In **chapter 4** we investigated whether former honours students could be distinguished from their non-honours peers after graduation during the first years of their professional career. For a group of 72 honours alumni from three different study programmes (pharmaceutical sciences, veterinary sciences, and human geography) final study GPA and early career outcomes (i.e., work engagement and perceived job resources) were compared to a group of 72 non-honours alumni, who entered university with similar high-school grades. We found that on average honours alumni had a higher final study GPA and higher work engagement. Our outcomes suggest that honours programme participation is unlikely to lead to a decline in study GPA, as is sometimes feared because of the workload that comes on top of the regular programme (Van Eijl et al., 2004).

In **chapter 5** we elaborated on the results of Chapter 4 by applying a longitudinal study design to the evaluation of honours programmes that included students' pre-enrolment qualities, that is, qualities measured before the start of the honours programme. By using propensity score matching, we were able to control for (self) selection bias, thereby allowing for a better estimation of effects of honours programmes (Rosenbaum & Rubin, 1983). Students' personal qualities as collected one year before the start of the honours programmes, were used to match 47 non-honours students to 47 honours students. After six months students were compared on their personal qualities considered important from an excellence perspective, as well as on academic achievement. Results showed no overall differences between the two groups. These findings suggest that differences found in earlier research between honours and non-honours students in GPA (e.g., Cosgrove, 2004; Pflaum et al., 1985;

and see chapter 4) and differences in ability, motivation, and creativity (Scager et al., 2012) could be due to a (self) selection bias and may have already existed before students entered an honours programme.

Contribution to research on excellence in higher education

In this section, the contributions of this thesis to research on excellence in higher education are discussed.

Excellence and personal qualities

As already stated earlier, this thesis combines two leading perspectives defining excellence in terms of (a) *current* achievement (e.g., Ericsson et al., 1993; see also Simon & Chase, 1973) and (b) *potential* for excellent achievements (e.g., Mönks & Katzko, 2005; Renzulli, 1978). The findings in this thesis showed that personal qualities like mastery orientation, and especially performance orientation and perseverance are indeed related to academic achievement (see chapter 2 and 3), and therefore, viewed from the current achievement perspective, to excellence.

So far, most studies on personal qualities have focused on explaining differences between students and most studies employed only one measurement occasion (Cheng et al. 2012). This thesis showed that personal qualities fluctuated over the course of the undergraduate bachelor programmes (see chapter 2 and 3). Thus, this challenges the common practice to view personal qualities as stable, trait-like constructs. Investigating personal qualities in terms of variability and change within individual students over time is a valuable addition and for example offers more opportunities to design educational interventions, because variability also opens the door for development via educational programmes.

The variability in personal qualities also raises some methodological issues. When personal qualities are measured at only one moment this may not be representative for a student's quality across an undergraduate programme, and associations between personal qualities and other variables may not be generalizable to the whole of the undergraduate programme period. Besides a more representative

and powerful way to study the association between personal qualities and academic achievement, repeated measurements afford the possibility to determine the direction of effects (Richardson et al., 2012), which can provide insight in the possible responsiveness of these qualities to educational interventions (Duckworth & Yeager, 2015).

Further, findings from this thesis extend the present literature on the role of personal qualities in academic achievement (e.g., Richardson et al. 2012; Rosen et al. 2010) by showing the importance of taking possible moderators into account when examining this relationship (chapter 3). Information on moderating factors is theoretically and practically important in order to explore when and for whom certain changes affect academic achievement (Richardson, 2012). As this thesis showed (chapter 3), personal qualities do not seem to have a comparable effect for all students alike. Describing for example the association of perseverance with academic achievement in general is too simple. Including variables like academic aptitude provides a more refined and therefore more adequate picture.

We used GPA to measure academic achievement. GPA is by far the most dominant measure of academic achievement in educational research (Kuncel, Credé, & Thomas, 2005). Our findings regarding innovativeness may point out the necessity to take a closer look at the nature of the tests underlying GPA, to determine whether these tests are sensible to the personal qualities thought to be associated with excellence.

Effectiveness of honours programmes

The contribution of this thesis to the evaluation of honours programmes is mainly of a methodological nature. The use of propensity score matching is a valuable tool to evaluate educational programmes in general (Vaughan et al., 2014) and this also applies to the evaluation of honours programmes. Our findings suggest that possible differences between honours and non-honours students found in other studies (e.g., Scager et al., 2012; Seifert et al., 2007) as well as the findings in our own retrospective study (chapter 4), may be the result of (self-) selection processes instead

of developmental differences due to honours programme participation. If our conclusions would be confirmed in other studies, it may be difficult to justify the existence of rather costly programmes aimed at only a small number of students. Although we recommend the use of propensity score matching we realize a specific challenge. Since honours students are not average students, it may be difficult to match honours students to comparable non-honours students (see chapter 5). A sufficient large pool of adequate non-honours matches is therefore a prerequisite.

Limitations and future research

Self-reports

Except for academic achievement (GPA) and academic aptitude (high-school grades) the data on personal qualities was self-reported. Although self-report questionnaires are arguably suited for assessing internal psychological states because they typically ask individuals to integrate numerous observations and thoughts, feelings or behaviour over a specific period of time (Duckworth & Yeager, 2015), the use of self-reports has been criticized as well. For example, one potential threat to the validity of self-reported data is that students may respond in a socially desirable or self-serving way (Holden, 2007). In our studies, we tried to diminish this by emphasizing in the invitation email that questionnaires would only be used for research purposes and that results would be presented anonymously. Nevertheless, social desirability may have affected the measures used in the reported studies. A second issue with regard to self-reports is that students use a certain frame of reference to make their judgements. When frames of reference differ systematically across respondents this creates a “reference bias” (Heine, Lehman, Peng, & Greenholtz, 2002). For example, Kruger and Dunning (1999) found that the more competent an individual is in a given domain the more stringently he or she tends to judge him or herself. Such a process may have affected our measures as well, for example in case of the self-report of innovativeness of excellent students. Although the use of self-reports also has many practical advantages, such as the possibility to achieve large sample sizes, future studies examining personal qualities may want to

explore alternative ways of assessment, such as divergent thinking tests to measure innovativeness.

Validity of GPA

Academic achievement, assessed through GPA, plays a central role in all four studies in this thesis, and in many other studies within the higher education context. Scholars have operationalized academic achievement in different ways, one-dimensional (e.g., one grade or one test), or multidimensional (such as GPA), but also as class behaviour or class rank (Robbins et al., 2004). Although research shows that GPA is an objective measure with a high internal reliability (Bacon & Bean, 2006), it is not without its shortcomings. Grades can be influenced by all kinds of circumstances that affect their representativeness of student academic achievement. For example, differences in grading between study programmes included in this thesis might threaten validity and reliability of grades (Johnson, 2003). Using a multidimensional measure such as GPA can reduce this error. More research is needed on the association between various personal qualities and the different methods of assessment underlying the grades included in a GPA. Some assessments, like for example writing an essay, may be more sensitive to differences in for example innovativeness than others.

Practical implications

We are aware that formulating practical implications based on the results of the correlational design of the present study presupposes causality, and that this is not evidenced. We still think some points of action can be explored in designing higher education.

Student motivation

Results from chapter 5 suggest that, while students enrolled in an honours programme maintained their initial levels of mastery orientation over time, their matched non-honours peers tended to decrease in mastery orientation. In the same

vein, students who entered the undergraduate programme with high initial levels of mastery orientation also showed a much greater decrease of mastery orientation over time compared to their less motivated peers (chapter 2). These findings seem to indicate that honours programmes may have the potential to motivate students, or put differently, may be essential to keep students motivated. These differences may be caused by, for example, a lower student to teacher ratio, being part of a group of equally motivated peers, or challenging assignments (Byrne, 1998). Not all potential honours students, for various reasons, participate in an honours programme (Rinn & Plucker, 2004). It is therefore not sufficient to rely on honours programmes for the support of excellent students' motivation over time. Motivating elements and assignments as applied in honours programmes can be offered to excellent highly motivated non-honours students as a form of differentiation in the regular programme.

Building personal qualities across the undergraduate programme

For students, an important first step in the regulation of their personal qualities is awareness of the level and variability of their qualities (see chapter 2 and 3). This awareness can be increased by educators, by integrating reflection in their courses (Korthagen & Vasalos, 2005) and providing progression feedback on students' assignments and personal qualities to emphasize what students already have learned and what progress they have made towards a desired goal (Voerman, Meijer, Korthagen, & Simons, 2012). An important personal quality to enhance, at least to strengthen students' goal orientations, seems to be for example self-efficacy (chapter 2).

However, findings of the current thesis also showed that interventions designed to enhance students' personal qualities might not be effective for all students alike. Students with higher academic aptitude seem to benefit more from enhanced perseverance, while they also seem more hampered by enhanced innovativeness compared to peers with lower academic aptitude. Therefore, reinforcing a student's perseverance, for example by stimulating a student's mind-

set that abilities can be developed through effort and practice (Dweck, 2009), seems most effective in honours programmes and among students with a relatively high academic aptitude in regular programmes. On the other hand, the role of innovativeness in these programmes should be carefully considered in line with the assessments that are employed. For example, more open ways of assessment, such as essays or projects in which complex problems need to be solved, seem an interesting addition to standardized tests (Chamorro-Premuzic, 2006).

Selection of students for honours programmes

Results of the current thesis showed that students with higher grades are likely to have higher levels of perseverance (chapter 3), and are likely to be more performance oriented (chapter 2) than students with lower grades. Moreover, they also seem to be slightly less innovative and mastery oriented (see chapter 2 and 3). This indicates that by selecting on GPA or high-school grades, the most frequently used selection criteria for honours programmes (Rinn & Plucker, 2004), students are attracted with a specific profile. Given that goals of honours programmes are often broad, including, for example, creativity (Carnicom & Snyder, 2010; Wolfensberger, 2012), it is questionable whether a strong focus on grades in selecting students is desirable. Honours programmes should consider to include more and different personal qualities in their selection procedure which are in alignment with the goals of their programmes. Moreover, by also looking beyond grades, diversity in personal qualities within the programmes is probably fostered.

Effects of honours programme participation after graduation

Although a high GPA does not necessarily reflect all skills valued in the job market, job recruiters do often use a graduate's GPA as a selection criterion (Imose & Barber, 2015). Students and educators in honours programmes will therefore appreciate the findings from this thesis, indicating that it is unlikely that a student's GPA decreases after honours programme enrolment as a result of the additional workload (Van Eijl et al., 2004). For job recruiters, the somewhat higher work engagement of honours

compared to non-honours alumni found in this thesis demonstrates potential benefits of hiring an honours graduate. Holding an honours degree may therefore be an interesting aspect in the job selection process.

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Nederlandse samenvatting

Excellentie in het hoger onderwijs staat de afgelopen jaren zowel binnen als buiten Europa hoog op de agenda. In Nederland kreeg het excellentie onderwijs in 2008 een grote impuls doordat het Ministerie van OCW het “Sirius programma” lanceerde. Het doel van dit programma was om hoger onderwijsinstellingen te faciliteren onderwijsprogramma’s te ontwikkelen gericht op het uitdagen en ondersteunen van de beste en meest gemotiveerde studenten. Deze onderwijsprogramma’s, meestal honoursprogramma’s genoemd, worden inmiddels in vrijwel alle hoger onderwijsinstellingen in Nederland aangeboden, en ook wereldwijd groeit het aantal honoursstudenten.

Door de ontwikkeling van honoursprogramma’s kregen instellingen te maken met relatief nieuwe uitdagingen, zoals het identificeren van studenten met specifieke kwaliteiten, het ontwerpen van cursussen voor honoursstudenten en het in kaart brengen van effecten van de honoursprogramma’s. Hierdoor is behoefte ontstaan aan een empirische kennisbasis met betrekking tot excellentie om het leren van alle studenten verder te faciliteren, en meer specifiek, honoursprogramma’s verder in te bedden in het hoger onderwijs.

Het doel van deze dissertatie is om bij te dragen aan deze kennisbasis. Er is gekozen voor een brede aanpak met focus op twee verschillende thema’s, om zodoende inzicht te krijgen in verschillende aspecten rondom excellentie. Het eerste thema van de dissertatie gaat in op de rol van persoonskwaliteiten in excellentie. Het tweede thema focust op de opbrengsten van honoursprogramma’s.

Achtergrond van de studies en onderzoeksvragen

Hoofdstuk 1

Achtergrond thema 1: De rol van persoonskwaliteiten in excellentie

In deze dissertatie bestudeerden wij excellentie, en met name de rol van persoonskwaliteiten daarbij, vanuit twee verschillende theoretische kaders waarin excellentie gedefinieerd is als (1) de huidige studieprestaties en (2) potentie om later,

na de studie, tot goede prestaties te komen. Studenten die het beste presteren (d.w.z. de hoogste cijfers halen), worden vanuit het eerste kader als het meest excellent beschouwd. Vanuit het tweede kader wordt uitgegaan van een combinatie van drie persoonskwaliteiten die succesvolle en innovatieve professionals moeten bezitten: bovengemiddelde intelligentie, motivatie en creativiteit. Bovengemiddeld intelligente studenten die daarnaast een hoge motivatie en creativiteit laten zien, hebben dus de meeste potentie om later succesvol te worden.

Vanuit beide kaders is er weinig onderzoek gedaan naar hoe stabiel persoonskwaliteiten, zoals motivatie en creativiteit, binnen personen door de tijd heen zijn en door welke factoren deze kwaliteiten eventueel beïnvloed worden. Ook is er weinig bekend over of het ontwikkelen van deze kwaliteiten voor alle studenten hetzelfde effect heeft. Deze vragen leidden tot de eerste overkoepelende onderzoeksvraag: Hoe hangen persoonskwaliteiten en studieprestaties samen gedurende de bachelor opleiding?

Achtergrond thema 2: Effecten van honoursprogramma's

Het onderliggende principe van honoursprogramma's is om gemotiveerde en goed presterende studenten uit te dagen en te ondersteunen in hun leren (Byrne, 1998). Ondanks de sterke groei van het aantal programma's de afgelopen decennia is er nog weinig onderzoek gedaan naar mogelijke effecten. Studies die er zijn komen veelal uit landen met een langere honoursgeschiedenis (zoals de Verenigde Staten). Deze tonen aan dat honoursstudenten over het algemeen een hoger gemiddeld eindcijfer behalen dan studenten die geen honoursprogramma volgen en dat zij bijvoorbeeld meer openstaan voor nieuwe ervaringen.

Het simpelweg vergelijken van een groep honoursstudenten met een groep reguliere studenten zoals veelal gebeurt, kan echter misleidende resultaten geven, doordat deze twee groepen mogelijk al voor de start van het honoursprogramma verschillen. Daarnaast zijn er ook geen gegevens bekend over eventuele effecten van honoursprogramma's na het afstuderen. Dit leidde tot de tweede overkoepelende

onderzoeksvraag van deze dissertatie: Wat zijn de effecten van deelname aan een honoursprogramma op studenten tijdens en na de bacheloropleiding?

Resultaten van de studies

Hoofdstuk 2

In de hoofdstukken 2 en 3 zijn persoonskwaliteiten die een rol spelen bij excellentie bestudeerd. Om meer inzicht te krijgen in mogelijke veranderingen van motivatie gedurende de bachelor opleiding stonden in hoofdstuk 2 leer- en prestatiemotivatie centraal. Studenten die een hoge mate van leermotivatie vertonen stellen zich als doel de stof te doorgronden en zoveel mogelijk te leren, terwijl studenten die meer georiënteerd zijn op prestatiemotivatie met name gericht zijn op het behalen van hoge cijfers en beter presteren dan hun studiegenoten. In deze studie werd onderzocht hoe de leer- en prestatiemotivatie van studenten zich door de tijd heen gedragen en in welke mate studiecijfers, vertrouwen in het eigen kunnen (self-efficacy) en geslacht daarmee samenhangen. Door het gebruik van multilevel analyses kon onderscheid worden gemaakt tussen het verklaren van verschillen in leer- en prestatiemotivatie tussen studenten en fluctuaties van de motivatie binnen individuele studenten door de tijd heen.

Er werd gebruikgemaakt van 4910 ingevulde vragenlijst van 2402 individuele studenten die een gezondheidszorgstudie volgden. De resultaten lieten zien dat studenten onderling niet alleen behoorlijk verschilden in hun hoeveelheid leer- en prestatiemotivatie, maar ook dat binnen individuele studenten substantiële fluctuaties van leer- en prestatiemotivatie optraden gedurende de bachelor opleiding. Verschillen in de hoeveelheid leer- en prestatiemotivatie tussen studenten werden in verband gebracht met verschillen in gemiddeld eindexamencijfer, studieprestatie en het vertrouwen dat studenten gemiddeld in zichzelf hadden. Met name het vertrouwen dat studenten in zichzelf hadden hing positief samen met de hoeveelheid leermotivatie die studenten hadden. Het behalen van hoge cijfers hing vooral samen met de hoeveelheid prestatiemotivatie die een student had. Studenten die op de middelbare school geslaagd waren met een hoog gemiddeld eindexamencijfer

scoorden ook wat hoger op prestatiemotivatie en juist wat lager op leermotivatie dan studenten die een lager eindexamencijfer hadden. Het selecteren van studenten op basis van eindexamencijfer kan tot gevolg hebben dat er een studentenpopulatie ontstaat die verhoudingsgewijs meer op prestaties georiënteerd is. Het vertrouwen dat studenten in een bepaald semester in zichzelf hadden was de belangrijkste factor in het verklaren van fluctuaties in beide typen motivatie gedurende de bacheloropleiding. Het versterken van het vertrouwen in eigen kunnen bij studenten zou daarom de motivatie op zowel de korte als lange termijn kunnen bevorderen.

Hoofdstuk 3

In hoofdstuk 3 werden twee andere persoonskwaliteiten bestudeerd, namelijk doorzettingsvermogen en innovativiteit. De centrale vraag in dit onderzoek was of studenten met een hogere mate van academische geschiktheid (gemiddeld VWO eindexamencijfer) op dezelfde manier profiteren van doorzettingsvermogen en innovativiteit als studenten met een lagere mate van academische geschiktheid. Ook in dit hoofdstuk werd onderscheid gemaakt tussen verschillen in doorzettingsvermogen en innovativiteit tussen studenten en binnen individuele studenten op verschillende momenten in hun bacheloropleiding. Gegevens van 2272 studenten uit 17 verschillende bacheloropleidingen werden geanalyseerd door middel van multilevel moderatie analyses.

Resultaten wezen uit dat doorzettingsvermogen positief samenhang met studieprestatie. Daarentegen hing de mate van innovativiteit van een student licht negatief samen met diens studieprestatie. Beide gevonden effecten waren nog sterker voor studenten met een hoge academische geschiktheid dan voor studenten met een lage academische geschiktheid.

Verder lieten de resultaten zien dat ook de mate van doorzettingsvermogen en innovativiteit binnen individuele studenten fluctueerden gedurende de bacheloropleiding. Goed presterende studenten bleken bovendien extra te profiteren van meer doorzettingsvermogen, ook binnen een bepaald semester. Over het geheel genomen liet deze studie zien dat persoonskwaliteiten inderdaad fluctueren

gedurende de bacheloropleiding en dat het versterken van deze kwaliteiten een ander effect op de studieprestatie kan hebben voor studenten met een hoge academische geschiktheid dan voor andere studenten.

Hoofdstuk 4

In hoofdstuk 4 en 5 is ingegaan op de effecten van deelname aan een honoursprogramma. De eerste stap was om in hoofdstuk 4 te bekijken of er verschillen gevonden konden worden tussen voormalige honoursstudenten en reguliere studenten na het afstuderen. Een groep van 72 honoursalumni (van de opleidingen farmacie, diergeneeskunde en sociale geografie) werd gekoppeld aan 72 reguliere alumni die de universiteit waren binnengekomen met vergelijkbare eindexamencijfers. Vervolgens werden de twee groepen vergeleken op het gemiddelde eindcijfer van hun opleiding en op werkbevlogenheid en gepercipieerde kenmerken van hun baan (job resources; Schaufeli & Bakker, 2004).

Honoursalumni hadden een hoger gemiddeld studie eindcijfer dan reguliere alumni en stonden gemiddeld iets meer bevlogen in hun werk na hun afstuderen. De baankenmerken van de twee groepen waren vergelijkbaar. Hoewel soms wordt verondersteld dat de hogere werkbelasting van een honoursprogramma ervoor zorgt dat studenten lagere cijfers behalen, lijken resultaten van deze studie dat niet te bevestigen. Verder werd het verschil in werkbevlogenheid tussen de twee groepen niet verklaard door verschillen in baankenmerken. Een verklaring voor de hogere werkbevlogenheid van honoursalumni kan zijn dat zij andere persoonskwaliteiten hebben dan reguliere alumni. Deze studie vormt hiermee een aanleiding voor verder onderzoek naar verschillen.

Hoofdstuk 5

Hoofdstuk 5 beschrijft een longitudinale studie waarbij persoonskwaliteiten gemeten zijn vóór de start van het honoursprogramma en nogmaals een jaar later, halverwege het honoursprogramma. Met behulp van 'propensity score matching' zijn 47 honoursstudenten gekoppeld aan 47 reguliere studenten op basis van verschillende

kenmerken gemeten voor aanvang van het honoursprogramma (semester 2). Vervolgens zijn de groepen vergeleken op hun gepercipieerde intelligentie, motivatie (leer- en prestatie-motivatie en doorzettingsvermogen) en innovativiteit, en op studieprestaties.

De resultaten laten zien dat er geen verschillen waren in gepercipieerd intelligentie, motivatie, innovativiteit en studieprestaties zes maanden na de start van het honoursprogramma. Wel lijken honoursstudenten na een jaar in het honoursprogramma iets hoger te scoren op innovativiteit. Bij reguliere studenten lijkt er sprake te zijn van een afname van leermotivatie. Deze resultaten suggereren dat verschillen in studieprestaties tussen honours en reguliere studenten gevonden in eerdere studies, inderdaad veroorzaakt kunnen zijn door verschillen tussen studenten die al aanwezig waren voor de start van het honoursprogramma.

Implicaties voor onderzoek en praktijk

Hoofdstuk 6

Implicaties voor onderzoek

De meeste studies die zich gericht hebben op de samenhang tussen studieprestaties en persoonskwaliteiten van studenten baseerden hun bevindingen op gegevens die op één bepaald moment waren verzameld. De longitudinale benadering in deze dissertatie laat zien dat de persoonskwaliteiten die wij in het onderzoek betrokken hebben, niet stabiel zijn gedurende de bacheloropleiding. Voor onderzoek betekent dit dat er niet zomaar van uitgegaan kan worden dat een meting van een persoonskwaliteit op een bepaald moment in de opleiding een representatief beeld geeft van de betreffende kwaliteit van de student gedurende de hele opleiding.

Onderzoek naar de rol van persoonskwaliteiten bij studieprestaties kan een nauwkeuriger inzicht in deze samenhang bieden wanneer rekening gehouden wordt met verschillen tussen studenten. Onderzoek in deze dissertatie toonde bijvoorbeeld aan dat studenten die de universiteit binnenkomen met hogere VWO-eindexamencijfers meer profiteren van doorzettingsvermogen dan de medestudenten

met lagere VWO-eindexamencijfers. Het opnemen van zogenaamde moderatoren in het onderzoeksdesign brengt veel nauwkeuriger in beeld voor welk type student bepaalde veranderingen in persoonskwaliteiten van invloed zijn op de studieprestaties.

De verbanden die in deze dissertatie gevonden zijn ten aanzien van de samenhang tussen innovativiteit en GPA roept de vraag op in hoeverre toetsing in de (Utrechtse) universitaire context gevoelig is/zou moeten zijn voor innovativiteit van studenten. Bij de validiteit van de operationalisatie van academische kwaliteiten in onderzoek door middel van GPA moet met deze (beperkte) sensitiviteit rekening gehouden worden

De bijdrage van deze dissertatie aan het onderzoek naar de effecten van honoursprogramma's betreft het belang van het betrekken van persoonskwaliteiten die al voor de start van het honoursprogramma aanwezig waren bij het onderzoek (bijv. via propensity score matching). Indien dit niet gebeurt, kunnen gevonden effecten onterecht worden toegewezen aan honoursprogramma's,

Belangrijke beperkingen van het onderzoek in deze dissertatie zijn het gebruik van zelfrapportages en het onvoldoende rekening houden met verschillen tussen bacheloropleidingen (o.a. wat betreft toetsing en beoordeling). In aansluiting op het gebruik van zelfrapportages zou vervolgonderzoek zich kunnen richten op andere manieren van data verzamelen, zoals testen op het gebied van divergent denken om innovativiteit te meten. Ook kan worden onderzocht in hoeverre verschillende typen toetsvormen een andere samenhang met persoonskwaliteiten laten zien.

Implicaties voor de praktijk

We zijn ons ervan bewust dat de designs van de studies in deze dissertatie niet toelaten om op basis van bewezen causaliteit aanbevelingen te doen voor de praktijk. We willen toch een aantal actiepunten formuleren die wij zinvol achten om verder te verkennen in de praktijk van het universitaire onderwijs.

Honoursprogramma's die selecteren op eindexamencijfers of

studiegemiddelde, moeten zich realiseren dat een dergelijke groep studenten ten aanzien van persoonskwaliteiten (zoals doorzettingsvermogen, prestatiemotivatie, leermotivatie, innovativiteit) tamelijk homogeen zal zijn. Indien heterogeniteit gewenst is, zou het te overwegen zijn in de selectieprocedure meer, en meer uiteenlopende, persoonskwaliteiten op te nemen.

Docenten kunnen proberen of zij prestaties van hun studenten kunnen bevorderen door hen te ondersteunen bij het reguleren van hun persoonskwaliteiten, bijvoorbeeld door studenten te laten reflecteren op hun leren gedurende de cursus en door in feedback ook nadruk te leggen op wat een student al heeft bereikt. Bevorderen van bepaalde persoonskwaliteiten heeft mogelijk niet voor elke student hetzelfde resultaat. Goed presterende studenten profiteren bijvoorbeeld extra van een groter doorzettingsvermogen in vergelijking met studenten met lagere cijfers, en het stimuleren hiervan lijkt dus met name relevant in honoursprogramma's en voor reguliere studenten met goede studieprestaties. Voor deze laatste groep lijkt het ook belangrijk om voldoende uitgedaagd te worden, zodat de leermotivatie gehandhaafd blijft.

De rol van innovativiteit verdient speciale aandacht in honoursprogramma's, maar ook daarbuiten. Deze persoonskwaliteit die met name in de professionele loopbaan na het afstuderen een belangrijke rol speelt, komt mogelijk onvoldoende uit de verf door de wijze waarop getoetst wordt. Meer open toetsvormen kunnen wellicht beter aansluiten bij (de ontwikkeling van) innovatieve studenten.

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Ada

Curriculum Vitae

Ada Kool werd geboren in Alkmaar op 8 juni 1983. Na het behalen van haar eindexamen in 2001, ging zij biologie studeren aan de Universiteit Utrecht en later aan de Wageningen Universiteit. In 2008 studeerde ze cum laude af aan de masteropleiding Forest and Nature Conservation, waarvoor zij een aantal maanden veldwerk deed in een wildpark in Zuid-Afrika. Na



afronding van haar master volgde Ada de internationale variant van de lerarenopleiding aan de Universiteit Utrecht en behaalde daarmee haar eerstegraads lesbevoegdheid. Tijdens haar stage werkte zij een paar maanden op een tweetalige school in Granada, Spanje.

Na haar afstuderen begon Ada aan haar promotieonderzoek aan de Universiteit Utrecht binnen het Sirius project met als onderwerp excellentie in het hoger onderwijs. Het project betrof een samenwerking tussen de afdeling Educatie (faculteit sociale wetenschappen) en de leerstoel Kwaliteitsbevordering Diergeneeskundig Onderwijs (faculteit diergeneeskunde), en had als doel om bij te dragen aan de kennis omtrent excellentie en honours programma's in het hoger onderwijs. Tijdens haar onderzoek specialiseerde Ada zich in geavanceerde analysetechnieken (bv. De Utrechtse summerschool 'Advanced Mplus' en de ICO cursus 'Analysis of measurement instruments'), presenteerde zij resultaten van haar onderzoeken op diverse congressen (bv. ORD, NVMO) en leverde ze als onderzoeker input tijdens bijeenkomsten met honours coördinatoren. Ook was zij medeorganisator van het symposium getiteld 'Measuring teacher expertise'.

Sinds 2014 werkt Ada als adviseur en trainer bij Onderwijsadvies en Training voor het Centrum voor Onderwijs en Leren (faculteit sociale wetenschappen, Universiteit Utrecht) waar zij haar kennis over onderzoek en onderwijs inzet voor de praktijk. Ze is betrokken bij diverse projecten binnen het hoger- en voortgezet onderwijs, zoals de begeleiding van docenten en studenten op het gebied van onderwijsonderzoek, het verzorgen van trainingen voor docenten op

het gebied van Content and Language Integrated Learning (CLIL) en Wetenschapsoriëntatie (WON) en het Utrechtse dataproject dat zich richt op het gebruik van data in de school. Daarnaast volgt zij momenteel de opleiding tot Beeldcoach. In 2015 werd het NRO project “Excellentie door doceerstrategie” gehonoreerd, waaraan Ada met collega-onderzoekers van het UMCG (Groningen), Hogeschool Windesheim en de Hanze Hogeschool samenwerkt.

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