University of Applied Sciences

SAXION

X-factor for innovation:

Identifying future excellent professionals

Janina Banis-den Hertog

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Chapter 1

Introduction: Identifying potential excellent professionals

1.1 Introduction

In this study we want to identify which type of individual is capable of achieving professional excellence – however controversial that word may be today. Our aim is to examine the unique individual antecedents that identify whether a person has potential to excel. More specifically, we set out to investigate the effect of proactive personality - the entrepreneurial disposition - on excellence of young professionals. The reason why this study is highly relevant is that on the one hand industry seeks high potentials because selectively investing in them yields a high return on investment (Boudreau & Ramstad, 2005), but on the other hand science to date provides little insight in the identification of these excellent professionals.

The practical relevance of this study for industry seems evident. 'High potential', 'talent' and 'excellence' have become buzz-words as excellence has been high on the agenda in politics, education and industry for decades now. Talent Management is a rapidly growing field (Festing, Schäfer, & Scullion, 2013) because it is expected to help organizations achieve durable advantage over the competition (Collings & Mellahi, 2009; Lewis & Heckman, 2006). Managing talent seems to be a top priority in industry (Deloitte, 2014) worldwide (Iles, Preece, & Chuai, 2010).

The identification of talent[1] preferably takes place at an early stage so the talent is able to develop its potential (Guldemond, Bosker, Kuyper, & van der Werf, 2007). This study takes place at Saxion University, a medium-large University of Applied Sciences (UAS) in the East of The Netherlands, which aims to develop students into "professionals of the future" (Boomkamp & Van Oldeniel, 2016, p. 3). In 2008 government funding was made available to universities from the ministry of Education, Culture and Science (in Dutch: ministerie van OCW) to develop excellence programs to challenge talents to develop their potential (Wolfensberger, De Jong, & Drayer, 2011). These programs are

[1] *'Talent' is referred to in this chapter as both a characteristic of an individual (object approach) and a person (subject approach) (Gallardo-gallardo et al., 2013) and is later in this study operationalized more specifically*

intended to find highly talented students and develop them into excellent professionals (Wolfensberger et al., 2011). Because Saxion UAS offers excellence programs aimed at the identification and development of (future) excellent professionals, this university provides us with the ideal context to study potential excellent professionals. We will describe this context in more detail later in this chapter. Proper selection of potential (future) excellent professionals is crucial for the success of these excellence programs (Truijen, 't Mannetje, Banis, & Gellevij, 2015) and therefore our study has practical relevance for higher education as well.

Unfortunately, there is little consensus on what talent and excellence entails (Scager et al., 2012) to help both education and industry identify potential excellent professionals. Excellence is such a broad and ill-defined concept that it has become virtually meaningless in the context of education (Allan, 2010). There is a lack of theoretical foundation in the Talent Management literature as well (Gallardo-gallardo, Dries, & González-cruz, 2013; Lewis & Heckman, 2006; Vaiman & Collings, 2013). This limitation seems due to the fact that most literature is consultancy - or practitioner-based (Iles, Chuai, & Preece, 2010) and lacks a focus on 'who' the talent is, but instead focuses on talent practices ('how') (Gallardo-gallardo et al., 2013). A major challenge in Talent Management therefore is that the underlying construct 'talent' is ill defined and not adequately operationalized (Lewis & Heckman, 2006).

The theoretical relevance of this study is to create a model with individual antecedents as independent and a clear and updated operationalization of excellence for our context as a dependent variable. We need to focus on our definition of excellence first before we can identify antecedents of it. When it comes to adequately defining our dependent variable, we argue that traditional theories of performance, like goal setting theory and equity theory, have focused too much on passive behaviors of employees (Parker, Bindl, & Strauss, 2010) to paint a clear picture of what excellent behavior is in this day and age. These theories focus on shaping goals and rewards – aligned with organizational goals - for employees (Parker et al., 2010), whereas active employees can set their own goals and design their own rewards (Crant, 2000; Frese & Fay, 2001; Grant & Ashford, 2008).

Both top-managers and scholars are recognizing that active, innovative and entrepreneurial behaviors are essential for long term success of the organization (Shalley, Zhou, & Oldham, 2004; Wales, Monsen, & Mckelvie, 2011; Zhang & Bartol, 2010). The challenges in our society today are said to be increasingly more technological, more international/global, more complex and multidisciplinary (Parker,

2008). In the 21st century our society is moving from an industrial- to a knowledge-intensive economy (Voogt & Roblin, 2010), in which knowledge is a crucial resource. Many international initiatives (OESO, UNESCO and the European Union) claim that the so-called '21st century skills' are more crucial for professionals now than in previous centuries (Voogt & Roblin, 2010). Some of the most important skills mentioned are: cooperation, communication, ICT-fluency, social or cultural skills, creativity, critical thinking and problem solving (Voogt & Roblin, 2010).

The sum up, the aim of this study is to examine the unique individual antecedents that identify whether a person has potential to excel. Our main question therefore reads: Which individual antecedents predict professional excellence? Our goal is to be able to select (future) excellent professionals on these antecedents. To achieve that goal we build a theoretical model with an updated operationalization of professional excellence. In the next section we first try to find an adequate definition for professional excellence, by describing current excellent professionals and analyzing their behavior.

1.2 Describing Professional Excellence in the 21st Century

One example of what is meant by excellence today is illustrated by the work of Boyen Slat, a then 19-year-old student from the Netherlands. Boyen came up with a feasible and viable system that gathers plastic waste driven to a funnel by ocean currents. First he came up with this passive system, and next he generated 2 million dollars via crowd-funding for his invention. He started his own foundation and was awarded the prize for *Best Technical Design* at his University and *The Champions of the Earth* award by the UN Environment program. Boyen Slat combined environmentalism, entrepreneurship and technology to help solve an immense environmental problem.

Another example of excellence comes from the hand of the American entrepreneur Travis Cordell Kalanick, the co-founder and CEO of Uber. Uber is a mobile application that allows consumers to request a car-ride using their smartphone. Uber drivers are connected to passengers via this app and use their own car as a cab to bring passengers from A to B. Uber uses mobile technology, paired with a lower pricing strategy and extensive customer service to offer faster, cheaper, more convenient and more social cab services (Deloitte, 2016). The service is now available in 396

cities worldwide (Uber, 2016). The invention revolutionized the very conservative cab-hailing business which has led to social disruption. Governments and taxi companies are currently challenging Ubers legality, claiming that the service is both unsafe and illegal (Rogers, 2015).

The third example, closest to our context, is a German alumna from Saxion, Pola Hirschmann that studied Textile Engineering and Management. During her studies she was very active; she took part in the honors program Liberal Arts & Science on top of her regular bachelor program, worked as a shop assistant and as a member of an international promotion team (BorderConcepts). She then landed a prestigious sales internship at Dona Karen in New York. For her original graduate research on the problem of ill-fitting bras of Dutch women she discussed an unusual and underrated problem by addressing the complex interaction between the lingerie industry, science, media and the health sector. For her work she received a Saxion bachelor award and became a promotional prize-winner (Wilhelm-Lorch-Stiftung) and graduated cum laude. After her graduation she took a short course at London College of Fashion, did a master's program at ArtEZ – Institute for Arts and is now a design coordinator for ECCO Leather B.V.

These three cases of entrepreneurial individuals go beyond what is expected of simply good performing professionals. Ever since McCelland (1973) urged us to measure competencies rather that intelligence, we know that being a good professional in a specific field requires developing a combination of knowledge, skills and attitudes (competencies) fitted closely to that field. Good professionals need to possess all three of Aristotle's types of wisdom: Techné, Episteme and Phronesis. This means they possess the scientific knowledge (Episteme) from their field; they are real craftsmen (Techné); and are able to act in the context in a pragmatic and ethical way (Phronesis) (Arendt, 1990). However we do argue that excellent professionals go beyond mastering the competencies of their profession and have something extra in common that is relevant in a broader context.

Our position is backed up by professionals from industry that claim that excellent professionals share an additional set of skills (Wijkamp, Paans, & Wolfensberger, 2013). When we look at the three excellent professionals, Boyen, Travis and Pola described above, we see that despite the vast differences in the field in which they operate they have something in common. They are aware of changes and challenges in the world around them and feel a responsibility to intervene. They have a vast interest in other disciplines, while still being an expert in their own. They are willing to change the

status quo, to do something bold and risky for the context in which they operate. They are able to act on their feet and take advantage of unexpected opportunities. They seek change and come up with original ideas by combining knowledge and ideas from other disciplines and applying them in a new context.

According to Brynjolfsson and McAfee (2014), excelling in 'the second machine age' requires making new combinations of an endless supply of existing knowledge. At an individual level this means being able to integrate knowledge from various disciplines to solve complex societal problems without there being clear rules on the best way to do that. Therefore, excellent professionals need to be able to cooperate with others from different fields, cultures, ages and traditions by being a pleasant person to work with, having an open attitude, a can-do attitude and a good level of self-reflection. Moreover, they know how to actually convert their idea into a feasible plan and convince others to invest in their idea. They are not only inventors, but they get things done. This requires curiosity, motivation, ambition, a critical view and a certain level of maturation.

This description bears resemblance to the work related to the concept of entrepreneurial orientation (EO). In this literature dimensions predicting engagement in the entrepreneurial (strategy-making) process are identified (Rauch, Wiklund, Lumpkin, & Frese, 2009). Miller (1983) first identified three entrepreneurial attitudes and behaviors, namely innovativeness, risk taking and proactiveness. Later two other dimension of EO were added: autonomy and competitive aggressiveness (Lumpkin & Dess, 1996). Although these dimensions describe crucial attitudes and behaviors of excellent professionals, the literature on EO unfortunately focusses on the process, practices and decision making activities leading to the launch of a new venture (Lumpkin & Dess, 1996) and mostly focusses on the firm level of analysis (Rauch et al., 2009). For the purpose of this study we focus on the individual level of excellence which is not necessarily related to entrepreneurship per se.

We narrow down the complex array of knowledge, skills and attitudes necessary to excel as a professional to a model in which we focus on the behaviors needed to excel and the personal antecedents that influence those behaviors. Focusing on excellent accomplishments alone is problematic considering the fact that whether something is recognized as an excellent accomplishment depends very strongly on the context. However, some more general behaviors underlay these excellent accomplishments that we can include in our model as well.

1.3 Excellence defined in behavioral terms

Of course context matters when defining excellence. Within the context of science for example, making an original contribution to your research field is considered an excellent performance, while in politics being an opinion leader and an effective governor is considered excellent. What is excellent in both fields therefore is very different, yet we argue that these distinct accomplishments are preceded by similar individual behaviors. In order to excel and accomplish something noteworthy one first needs to come up with a good idea. This idea needs to be new within the domain for it to stand out. Also this idea needs to be implemented for it to make a difference. Therefore this idea needs to be valuable and useful in the situation.

A good idea within science might be the proposition of a new and better theory in a specific field; within politics it might be a better alternative to a deep-rooted law. In both examples professionals need to come up with their new and useful idea and need to make sure it gets implemented. This implementation might mean publishing their new theory in Science or organizing a debate in parliament. Again, these accomplishments are very dissimilar, but could - each within their own domain - be considered excellent. The behaviors described above could both be considered innovative behavior, since innovation is defined as *"the process of engaging in behaviors designed to generate and implement new ideas, processes, products and services"* (Unsworth & Parker, 2003, p. 181). In line with other research (Janssen, 2000) we define innovation in behavioral terms: "Innovation is the successful implementation of creative ideas within an organization" (also Amabile, 1996, p. 1). Regardless of the content of the change, when engaging in innovation one has to (1) generate a new idea (idea generation) and (2) implement the new idea (idea implementation).

We argue that an excellent professional shows both behaviors and that the two together precede excellent accomplishments. Innovative behavior of professionals proves crucial for the success of organizations (Axtell, Holman, Unsworth, Wall, & Waterson, 2000; Conti, Coon, & Amabile, 1996; Gatignon, Tushman, Smith, & Anderson, 2002; Unsworth & Parker, 2003; West & Farr, 1989; Woodman, Sawyer, & Griffin, 1993) and the professional themselves (Unsworth & Parker, 2003). Moreover Idea generation and innovation are currently the unique qualities that still separate men from machines. People that are able to create new ideas will be in high demand as that is fundamentally the one thing computers are still not better at than men (Autor, Levy, & Murnane, 2003; Brynjolfsson & McAfee, 2014; Davenport & Kirby, 2015; Levy & Murnane, 2007). Finally, innovative behavior brings about change and that is what we expect excellent professionals to do; to bring about change.

By focusing on innovative behavior as preceding excellent accomplishments, we can now systematically search for individual antecedents that predict this behavior. We choose to focus on personality as antecedent because the value of personality for individual, team and organizational functioning has been well established (Judge & LePine, 2007). Personality is used to describe the uniqueness of the individual and has been proven to generalize across cultures (Mccrae & Costa, 1997; Pulver, Allik, Pulkkinen, & Mämääinen, 1995), remain fairly stable over time (Costa & Mccrae, 1988, 1992a) and have a genetic basis (Digman, 1989).

Moreover, the entrepreneurial disposition – Proactive Personality – matches our description of the attitude of an excellent professional. As discussed above, an excellent professional has a future focus, a change-orientation and a willingness to challenge the status-quo. Bateman and Crant (1993) launched proactive personality as a dispositional construct that entails actively influencing the environment. A proactive personality describes *"one who is relatively unconstrained by situational forces, and who effects environmental change"* (Bateman & Crant, 1993, p. 105). Proactive individuals employ working behaviors that exceed official role expectations and normal job requirements instead of passively adapting to what is expected of them. They are likely to suggest new ways of doing things to improve performance (Seibert, Kraimer, & Crant, 2001). *"Proactive people scan for opportunities, show initiative, take action, and persevere until they reach closure by bringing about change."* (Bateman & Crant, 1993, p. 105).

1.4 The context of the study: excellence programs in education

The ideal place to research what excellence entails is arguably within excellence programs designed to identify and foster young (future) excellent professionals. Universities in The Netherlands typically have an inclusive approach to talent management (Wolfensberger, 2014), meaning they don't want to focus on the high potentials only, but want to develop the potential of every student. This strength-based approach to talent management derives from the positive psychology (Seligman & Csikszentmihalyi, 2000). This approach suggests we need to focus on the positive qualities of individuals because that leads people to flourish (Seligman & Csikszentmihalyi, 2000). A shift towards a focus on the inclusive approaches to talent

management and more strength-based approaches is expected for industry as well (Meyers, 2015).

However, since The Netherlands have an egalitarian tradition (Innovatieplatform, 2005), attention in education is typically paid to the low performing students (ROA, ITS, & CHEPT, 2015), and as consequence The Netherlands are among the best of the world on the left hand side of the skill distribution, but not on the right hand side (Minne, Rensman, Vroomen, & Webbink, 2007). Because the Netherlands have the ambition to reach to top of 5 knowledge economies in the world (ROA et al., 2015), government funding was made available to higher education in The Netherlands, including Saxion University, to develop excellence programs to challenge the high potentials (Sirius programma, 2014).

Currently at Saxion, two types of excellence programs (Top Talent Programs) are running: Excellence tracks and Honors Programs (Saxion, n.d.). The goal of both types of programs is to challenge talents to make the most of their potential (Van Dijk, Van der Donk, Gellevij, 't Mannetje, & Ter Woord, 2012). Excellence tracks offer a more in depth challenge within one discipline whereas honors programs offer a broader development in a multi-disciplinary setting (Saxion, n.d.). For this study we focus on honors programs.

Honors programs are designed for talented students that are willing and able to take on more than their regular program (Van Eijl, Pilot, & Wolfensberger, 2010). Honors programs have a long history in the United States, but are only recently gaining momentum in European (and Dutch) Higher Education (Wolfensberger, 2014). In Holland, the first program started in 1993 (Wolfensberger & Van Eijl, 2003) and since then many more programs were developed. First the development took place mainly in research universities, but later in universities of applied sciences as well. Currently 38 institutions in higher education in the Netherlands (Wolfensberger, 2014) offer honors programs to their most talented students. Within Saxion, honors programs are additional programs on top of the bachelor program and last 3 years (Wolfensberger, 2014). Often students earn an extra 30 ECTS (study credits). The programs are characterized by having few, highly motivated students and by being taught in small groups by enthusiastic teachers. There usually is a higher level of interaction and discussion in the honors classes than in regular classes (Van Dijk et al., 2012).

Honors programs are intended to better bridge the gap between higher education and professional life. Dutch Industry seeks graduates that are creative and involved and

able to look beyond their discipline to develop new products (Lappia, 2015). Although selection of honors students is a crucial element in an honors program (Truijen et al., 2015), selection criteria vary widely across institutions (Achterberg, 2005) and there is a severe lack of empirical evidence distinguishing honors student from non-honors students (Achterberg, 2005). The honors programs are diverse in content, style and selection procedure, but all claim to select and foster a type of student that has more potential for excellence in their life (Scager et al., 2012). Some programs focus mainly on science and philosophy, others focus on business creation and still others focus heavily on self-development and reflection (Saxion, n.d.). As diverse as the content of these programs is, so are the selection methods the programs use to select talented students. While all programs seem to value motivation (letter of motivation) and an active attitude (CV) in selection, some rely heavily on grades or previous level of education whereas others value self-selection the most (Banis et al., 2013).

Yet all honors students are expected be different from non-honors students, to have more potential to excel as a professional. We therefore include both honors students and non-honors students in this study to compare their levels of innovative behavior and proactive personality. We expect honors students to have a higher level of proactive personality and to be more innovative because of that trait, and not only because they are in honors education. At the same time we do expect an interaction-effect between personality and honors context.

1.5 Research goal

Our main question reads: Which individual antecedents predict professional excellence? After having discussed what excellence entails, we can formulate the aim of our study more specifically: We aim to indicate which type of individual is capable of innovating, because we argue that innovative behaviors precede excellent accomplishments Answering our main question hopefully allows us to select (future) excellent professionals on the proper antecedents.

Firstly, because we want to be able to select individuals, we choose to focus on personality traits as antecedents because traits generalize across cultures (Mccrae & Costa, 1997; Pulver et al., 1995) and remain fairly stable over time (Costa & Mccrae, 1988, 1992a). Our first research question reads: 1. How well do personality traits predict innovative behavior?

Secondly, we expect proactive individuals to be true innovators and that proactive personality is a crucial trait in the search for excellent high potentials. We therefore create a theoretical model with both proactive personality and more traditional personality traits as antecedents of innovative behavior. This allows us to answer the second research question: 2. Which personality trait is the strongest predictor for innovative behavior?

Thirdly, we want to gain a better understanding of the mechanism through which personality effects innovative behavior. Therefore we want to describe and understand more proximal antecedents of innovative behavior, namely cognitive-motivational states. Our third research question reads: 3. To what extent do the cognitive-motivational states mediate the relationship between personality and innovative behavior?

Finally, we expect honors students to be particularly proactive persons and to show innovative behavior. We expect their personality to predict innovative behavior, but we expect that the honors context enhances the influence of personality on innovative behavior. We therefore seek to study the interaction between personality and honors context in predicting innovative behavior. Our final research question therefore reads: 4. To what extent does being in honors education moderate the relationship between personality and innovative behavior?

1.6 Thesis structure

The fact that innovative behaviors are required for excellence in this day and age is outlined in this first chapter. In chapter 2 we pose our theoretical model in which we choose to focus on relatively stable personality traits as predictors of our dependent variables. Proactive personality is posited as the main predictor but more traditional traits are added to the model as well. In this chapter we argue which traits are the most relevant antecedents and we also explain the underlying cognitive-motivational process through which we expect the traits to influence both innovative behaviors. By describing this process we get a better understanding of how and why traits influence behavior. We also explain how the honors context has a moderating effect on the relationship between personality and cognitive-motivational states. We will present our full theoretical model and hypotheses at the end of this chapter.

We then continue in chapter 3 with describing and testing the measurement tool that we created especially for our research questions and our population of honors and non-honors students. This tool measures the antecedents that relate to professional excellence via creativity and proactivity. We describe both the development of the measurement tool and test its reliability and validity.

In chapter 4 we describe our research design and methodology. We explain the longitudinal quasi-experimental design of our study and describe our population and analyses. We describe how we measured the group of honors students and how we compared them to a group of non-honors students. This allows us to test whether the traits we described in chapter 2 are indeed capable of differentiating between the two groups. We also test the predictive value of these traits by performing regression analyses and repeated measures analyses. This allows us to measure the role personality plays versus context in predicting innovative behavior.

Next, in chapter 5, we explain and argue our operationalization of proactive and creative behavior. Since proactive and creative behavior both are important variables in our theory we extensively describe how we measured those behaviors and coded the data. We used three independent coders to code the ideas students put forth based on the level of creativity.

In chapter 6 we test our hypotheses and present the results. We start by presenting how the honors group differs from the non-honors group on the traits described in chapter 2. We also describe how they differ in actual creative and proactive behavior. Next we present the results from the regression analyses that express the extent to which personality plays a role in predicting innovative behavior and the process through which it does.

In the final chapter, chapter 7, we answer the central research question: Which individual antecedents predict professional excellence? We discuss the relative predictive power of proactive personality in predicting innovative behavior and discuss the mechanism through which personality predicts innovative behavior. We also discuss the interaction between personality and honors context in predicting innovative behavior. Finally we evaluate whether we are able, based on our study, to select (future) excellent professionals.

2

Theory:
X-factor for innovation

Chapter 2

Theory: X-factor for innovation

2.1 Introduction

The purpose of this chapter is to describe our theoretical model in which we choose to focus on relatively stable personality traits as predictors for our dependent variables. Proactive personality is posited as the main predictor, but more traditional traits are added to our model as well to determine the added value of proactive personality over these traits. We first define innovative behavior in more detail, splitting it into both creative and proactive behavior. We then explain that proactive personality is the trait that is most tailored to both these variables and argue why we expect proactive personality to be the strongest predictor in the model.

Next, we argue the underlying cognitive-motivational process through which we expect the traits to influence creative and proactive behavior. By describing this mediation process we get a more complete understanding of how and why traits influence behavior. We then discuss the moderating role the honors context plays on the relationship between personality and cognitive-motivational states.

Finally, we propose our full model in which proactive personality is added to more commonly suggested personality traits as predictors for innovative behavior, at the end of this chapter. This model includes all the mediators and moderators described above.

2.2 The rationale behind operationalizing innovative behavior in creative idea generation and proactive idea implementation

The hypothesized relationship between innovative behavior and excellent accomplishments as depicted in figure 1 was argued in chapter 1. We now first want to discuss the operationalization of innovative behavior before we move to arguing the relationship between personality and innovative behavior.

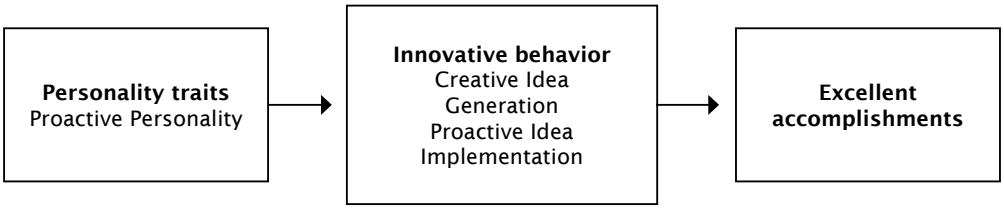


Figure 1. Proactive personality predicts excellent accomplishments via innovative behavior

The creation of new ideas constitutes the first stage of innovation and the implementation of those ideas is seen as the second stage (Amabile, 1996; Oldham & Cummings, 1996; Shalley et al., 2004; West & Farr, 1989). By defining innovative behavior as creative idea generation and proactive idea implementation, we choose to not add yet another definition for innovative behavior to the pile, but to encompass two existing streams of research, namely; creative behavior (idea generation) and proactive behavior (idea implementation). By operationalizing innovative behavior in this manner we add to the existing literature in two ways.

First, we include both processes of innovation, namely idea generation and implementation (Unsworth & Parker, 2003) in our operationalization of innovative behavior (argued in chapter 1). In previous work, innovative behavior has been operationalized in many ways. Sometimes a strong focus was placed on the creative process (Amabile, 1993, 1997; Conti, Coon, & Amabile, 1996; Hennessey & Amabile, 2010), sometimes on the implementation process (Janssen, 2005) and at other times the two distinct processes were narrowed down to just a single construct (Scott & Bruce, 1994). As a result, the distinct steps in the process of innovation are underexplored

(Binnewies, Ohly, & Sonnentag, 2007; Shalley et al., 2004). However it is of practical relevance for organizations to know which type of people are needed for which process of innovation (Rank, Pace, & Frese, 2004). While some individuals may have potential to come up with new ideas, others may be more equipped to implement those ideas (Caniëls, De Stobbeleir, & De Clippeleer, 2014).

Secondly, we focus on proactive idea implementation (Parker, Williams, & Turner, 2006), a relatively new dimension of proactive behavior that seems to be the missing link between creativity, innovation and proactivity. Many studies seek to clear up the overlap between creativity and innovation (Amabile, 1996; Anderson, de Dreu, & Nijstad, 2004; Anderson, Poto nik, & Zhou, 2014; King & Anderson, 2002; Oldham & Cummings, 1996; Rank et al., 2004; Unsworth, 2001) or between proactivity and innovation (Binnewies et al., 2007; Frese & Fay, 2001; Parker & Collins, n.d.; Rank et al., 2004; Tornau & Frese, 2013), but rarely creative and proactive behavior are both incorporated in the operationalization of innovative behavior.

Unfortunately, proactivity concepts as facilitators for innovation have been neglected in organizational science (Morrison & Phelps, 1999). Proactivity concepts such as voicing constructive suggestions for change (LePine & Van Dyne, 1998) and taking charge (Morrison & Phelps, 1999) seem crucial in the innovation process (Rank et al., 2004). Rank et al. (2004) explain that apart from creativity, personal initiative and voice are key variables that lead to innovation, which they define as the implementation of new products or processes. In their model, innovation in turn leads to individual, group or organizational level outcomes such as satisfaction and positive economic performance. Our operationalization of proactivity, namely proactive idea implementation, encompasses both proactive behavior, such as voice and taking charge (Parker et al., 2006) and what Rank et al. (2004) define as innovation (idea implementation).

2.3 Creative idea generation and proactive idea implementation

The generation of new ideas is best described as creative behavior. Creative behavior is defined as: “the production of novel and useful ideas in any domain” (Amabile, 1996, p. 1). Creativity and innovation have been researched together extensively since the nineties (Amabile, 1996; Anderson et al., 2004, 2014; King & Anderson, 2002; Oldham

& Cummings, 1996; Rank et al., 2004; Unsworth, 2001). In fact, the two are often used interchangeably (Amabile, 1996). Novel and useful are important components for ideas to be creative (Hennessey & Amabile, 2010). The 'novelty' criterion has elicited some criticism from researchers (Spiegelaere, Gyes, & Hootegem, 2014) who claim this criterion doesn't allow for incremental innovation. They say that although creativity can be the first step in the innovation process, it is not necessarily so. They argue that innovative ideas may also be copied from other domains and do not need to be original or new. It could also be an application of an existing idea in a different domain.

We agree that a copied idea from one domain to the other can be considered innovative while not seeming particularly creative. However, depending on the exact measurement and operationalization of creativity, we argue that an existing idea in a different context or in a new combination could still be considered somewhat creative as it is new for that particular context. Travis Cordell Kalanick (the CEO of Uber described in chapter 1) was able to combine existing technologies to create a new application for a new context and we find that pretty creative. Surely incremental innovation (relatively small changes) arguably requires lower levels of creativity than radical innovation (large changes involving higher risks), but that just means that radical innovation requires the novelty criterion to a higher degree. Moreover, not including the 'novelty' criterion in our study would be problematic, considering the fact that the high potentials we seek to indicate hopefully are radical innovators that dare to question the status quo. The other criterion (usefulness) is generally accepted. Useful means that the idea is appropriate for the goal at hand, that it is relevant and has meaning (Hennessey & Amabile, 2010).

Proactive idea implementation is defined as behavior that "involves an individual taking charge of an idea for improving the workplace, either by voicing the idea to others or by self-implementing the idea" (Parker et al., 2006, p. 637). It supplements idea generation with a behavior stemming from the stream of proactive behavior research. In line with research of Grant and Ashford (2008) and Parker, Williams and Turner (2006) we define proactive behavior as behavior that is self-initiated, future-oriented and change driven. In this study we choose to measure a specific dimension of proactive behavior as introduced by Parker, Williams and Turner (2006), namely proactive idea implementation. This dimension was developed to measure an individual taking charge of an idea for improving the workplace. This could be done by either voicing the ideas to others or by implementing the idea themselves. This dimension is an excellent operationalization of what is expected of an innovative professional; coming up with new ideas to improve the workplace, sharing them with others or taking charge of them on their own.

Now we have described which behaviors are necessary for innovation, we want to know which individuals have 'potential' or 'talent' to engage in these behaviors. In others words, how do we recognize the innovative high potential?

2.4 The role of proactive personality in predicting innovative behaviors

In social psychology it has been well established that behavior results from a combination of personality and situational causes (Hirschman, 1970; Lewin, 1938; White, 1959). Some individuals actively influence their circumstances while others passively adapt to them (Buss, 1987). Arguably the most active personality trait is proactive personality - the entrepreneurial disposition. Proactive personality is a dispositional construct that entails actively influencing the environment. It describes *"one who is relatively unconstrained by situational forces, and who effects environmental change"* (Bateman & Crant, 1993, p. 105).

Proactive personality is well tailored to our previous description of professional excellence (described in chapter 1). Proactive individuals have a future focus, are aware of changes in the world around them and take responsibility to intervene. They are willing to change the status quo and take advantage of unexpected opportunities. They seek change, come up with original ideas and are willing to take risks (Bateman & Crant, 1993). Moreover, it arguably is the most crucial personality trait in predicting innovative behavior. It is so closely linked to proactive behavior (Frese, 2008), that it took a meta-analysis from Tornau and Frese (2013) to separate the personality-construct from the behavioral-construct. The more a personality type is specifically tailored to an outcome, the more predictive validity a personality type has over other personality indicators (Schneider, Hough, & Dunnette, 1996).

We expect proactive personality to predict both creative idea generation and proactive idea implementation. The willingness of the proactive personality to question the status quo and to deviate from formal expectation makes proactive individuals more likely to develop new ideas to improve the work situation. Moreover, their initiative and perseverance will help them implement these ideas. Empirical research suggests that this trait increases various creative and proactive behaviors and related behaviors like voice, taking charge, and networking (Fuller & Marler,

2009) and proactive idea implementation (Parker et al., 2006) specifically. Our first two hypotheses therefore read:

Hypothesis 1: Proactive personality positively predicts creative idea generation

Hypothesis 2: Proactive personality positively predicts proactive idea implementation

2.5 Proactive personality in relationship to traditional personality models predicting innovative behavior

Because proactive personality is so well tailored to innovative behavior we expect this trait to be an important variable in predicting innovative behavior. Yet this trait has received little attention, whereas the well-known five factor taxonomy has received much research attention (Axtell, Holman, & Wall, 2006; Conti et al., 1996; Gatignon, Tushman, Smith, & Anderson, 2002; Unsworth & Parker, 2003; West & Farr, 1989; Woodman, Sawyer, & Griffin, 1993). We expect proactive personality to explain both behaviors over and above elements of the five factor taxonomy and hence to offer additional explanatory possibilities.

Proactive personality is considered a compound variable. "Compound personality traits are comprised of basic personality traits that do not all co-vary" (Schneider et al., 1996, p. 57). This means that this personality type is rather broad and includes aspects of other personality types as well. Because proactive personality is such a broad personality type, it includes aspects of the most well-known personality inventory, the five-factor taxonomy. The 'big five' is suggested to integrate all of the important parts of a personality (Mccrae et al., 2000) and should therefore overlap with proactive personality. Tornau and Frese (2013) found in their meta-analysis that all big five factors correlate with proactive personality. The strongest positive correlations were found for conscientiousness, extraversion and openness to experience. The smaller and negative correlations were found for agreeableness and neuroticism.

In this research we therefore only include extraversion, conscientiousness and openness as antecedents of creative idea generation and proactive idea implementation. These three traits were found to most strongly relate to either creativity (Feist, 1998; King, Walker, & Broyles, 1996) or proactive behaviors (Tornau & Frese, 2013). In order to test

the relative value of proactive personality in indicating potential for innovation we are including extraversion, conscientiousness and openness as control variables into our model (see figure 2). In the next section we explain why and how these traits relate to innovative behavior below.

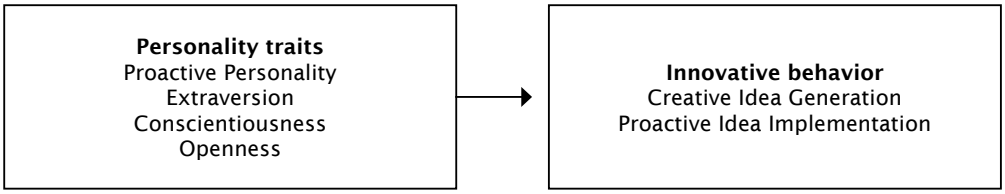


Figure 2. Conceptual model with personality antecedents of innovative behavior

Extraversion is associated with assertiveness, preference for emotional interaction and a need for activity and stimulation (McCrae & Costa, 1987). In our description of the excellent professional (chapter 1) we described that these professionals should be able to convince others of their ideas and be able to cooperate with others from various disciplines, cultures, ages and traditions. Extraverted individuals are more inclined to seek cooperation than introverted individuals (McCrae & Costa, 1987).

We expect extraversion to relate to innovative behavior probably via idea communication, which is an integral part of the innovation process (Hammond, Neff, Farr, Schwall, & Zhao, 2011). Extraverted individuals are outgoing, easily approach others and feel comfortable to push forward their ideas (Caniëls et al., 2014). Empirical evidence relates extraversion to proactive behavior (Jong & Hartog, 2007) because of its active component. After all, idea implementation requires action. Idea generation on the other hand is a more intra-individual cognitive process than a social process (Anderson & King, 1993; Rank et al., 2004). Therefore, extraversion might not be related or even negatively related to idea generation because social contact might distract from the problem at hand. We therefore expect extraversion to predict innovative behavior, but mostly by positively influencing proactive idea implementation. We hypothesize that:

Hypothesis 3: Extraversion positively predicts proactive idea implementation.

Conscientiousness is associated with motivation, persistence and goal-directedness (McCrae & Costa, 1987). It has played a major role in research relating personality to performance. Of the big five it is the most consistent predictor for performance in a variety of occupations (Barrick & Mount, 1991). Conscientiousness was found to

positively relate to proactive behavior (Jong & Hartog, 2007) because it includes action orientation and persistence which are important aspects in bringing about change. Conscientious individuals are reliable, hardworking and very disciplined (McCrae & Costa, 1987). They are careful; they plan, prioritize and follow rules and procedures. However, while on one hand this behavior is very helpful for implementing a new idea, it may on the other hand have a dissimilar effect on idea generation. In order to come up with a new idea one has to be willing to deviate from the expectancies of others. We expect conscientiousness to positively predict innovative behavior, mostly by influencing proactive idea implementation. We therefore hypothesize:

Hypothesis 4: Conscientiousness positively predicts proactive idea implementation.

Openness is associated with curiosity, flexibility of thought and openness for new ideas (Mccrae & Costa, 1987). It is used almost interchangeably with creativity as it so closely resembles it (Dollinger, Urban, & James, 2004; George & Zhou, 2001). Openness is likely to relate to both creative idea generation and idea implementation because it involves tendencies to seek out diverse experiences involving a variety of thoughts, ideas, and perspectives (Costa & Mccrae, 1992b; Mccrae, 1987; Mccrae & Costa, 1997). This allows the open individuals to engage in the cognitive process of generating new ideas. But, also in intrapersonal terms, people with this trait are described as broad-minded, imaginative, curious, and responsive to unconventional perspectives. Openness was found to relate to both proactive behavior (Jong & Hartog, 2007) and creative behavior (Amabile, 1996) as it entails curiosity and willingness to try new things.

Therefore openness might also enable proactive idea implementation through the facilitation of positive attitudes and social behavior (Mccrae, 1996). Open individuals are less prone to prejudice and authoritarian submission, as it is easier for them to understand and adapt perspectives from others while having a strong sense of self-confidence in their own ideas. We expect openness to positively influence both creative idea generation and proactive idea implementation. In our description of professional excellence we explained how being interested in other disciplines while still being an expert in your own is crucial. Openness means that individuals are interested in different perspectives and disciplines (Madrid, Patterson, & Birdi, 2014). Our next hypotheses therefore read:

Hypothesis 5: Openness positively predicts creative idea generation

Hypothesis 6: Openness positively predicts proactive idea implementation

Because proactive personality is a compound variable that encompasses the traits extraversion, conscientiousness and openness, and because it is strongly tailored to our definition of innovative behavior, we expect is to be a stronger predictor than either one of the three traits alone or combined . Since personality includes the willingness to question the status quo, make us of chances and bring about change, we expect a stronger association between a high proactive personality and proactive behavior, compared to the other personality traits. We hypothesize, therefore, that:

Hypothesis 7: Proactive Personality predicts variance in creative idea generation over and above openness

Hypothesis 8: Proactive Personality predicts variance in proactive idea implementation over and above conscientiousness, extraversion and openness

To sum up, we argue that the antecedents of innovative behavior are proactive personality, extraversion, conscientiousness and openness. Proactive personality was added to the more traditional antecedents to provide a better theory explaining the variance in both creative idea generation and proactive idea implementation (innovative behavior). Because the innovative behaviors in turn lead to excellent accomplishments and hence professional excellence, we posit proactive personality as the main predictor for professional excellence. As outlined in chapter 1, we also argue that innovative behavior is crucial for an excellent professional and that the 4 indicators together encompass all the qualities that we used to describe excellent performances. Individuals that score high on these variables are more curious, motivated, ambitious, and aware of the world around them, change-driven, future focused and cooperative.

We expect conscientiousness to relate to proactive idea implementation because conscientious people are action oriented and persistent, which helps them bring about change and take charge of a good idea. Extraverted individuals easily approach others and feel comfortable to push forward their ideas because of the social and assertive qualities in their personalities and therefore are more likely to proactively implement ideas. Open individuals are, because of their curiosity, both more inclined to come up with creative ideas and implement them. Proactive personality encompasses all three of these traits (Hough & Schneider, 1996) and is well tailored to both creative idea generation and proactive idea implementation because of their willingness to question the status quo and to deviate from formal expectation. We therefore expect this trait to provide added predictive validity over the other personality traits.

2.6 Cognitive-motivational mediators between personality and behavior

Apart from describing which personality traits predict innovative behavior, we also want to understand how they contribute to behavior. It seems insufficient to solely focus on distant influences like personality as an antecedent for behavior (Parker et al., 2010). We therefore seek to understand the more proximal motivational states of an individual (Parker et al., 2010) as well. After all, motivational concepts are seen as important causes of behavior and have received much research attention in organizational psychology even since human needs theories were posited by e.g. McDougal (1932) Murray (1938) and Maslow (1954). These early theories on motivation claim that human behavior is driven by unfulfilled individual needs. Since the early 1930's motivational theory literature has seen many developments, such as the introduction of process theories like equity theory (Adams, 1963), expectancy theory (Vroom, 1964), social cognitive theory (Albert Bandura, 1986) and goal setting theory (Locke, 1991). Discussing the details of these theories and their contribution to predicting behavior is beyond the scope of this study. However, various reviews are available that explain the development of the field thoroughly (Locke, 1977; Pritchard & Campbell, 1976; Staw, 1977). See Locke and Latham (Locke & Latham, 2004) for a contemporary review of the motivation literature and future directions.

Two major contributions to the field of motivational theory are worth mentioning more explicitly in light of the current study, namely expectancy theory (Vroom, 1964) and social cognitive theory (Bandura, 1986). First, Vroom (1964) posited the first overarching theory of motivation that claims behavior results from a conscious evaluation of the desirability of the expected outcome of that behavior. In other words, one makes choices based on the expected effect of those choices. Vroom (1964) includes three components of his theory: 1. expectancy (the expectation that effort leads to performance), 2. instrumentality (the expectation that performance leads to outcome), and 3. valence (the expectation that the outcome leads to a desirable reward). Second, Bandura's (1986) concept of self-efficacy, as part of social cognitive theory, appears to have a very powerful motivational effect on behavior. Self-efficacy describes ones expectancies to successfully execute desired behavior (Bandura, 1977) and therefore relates to the expectancy component in Vroom's theory (1964). An individual is only willing to work very hard at implementing creative ideas (choice), with much intensity (effort) for a long period (persistence) when he or she expects to be capable of doing so.

In line with research by Parker et al. (2006) we describe self-efficacy variable as an action oriented, internal state that, unlike traits, is assumed to be malleable. People with high self-efficacy feel in control of their behavior and are therefore more likely to persevere in the face of challenges. It enhances the persistence level and the coping efforts (Bandura, 1986). Since accomplishments are largely the result of hard work, perseverance is crucial for both proactive idea implementation and creative idea generation. Especially considering coming up with new ideas and implementing them entails challenging the status quo, which is a risky endeavor. Engaging in change related behavior is difficult since ideas might fail or be resisted by others. Bandura and Locke (Bandura & Locke, 2003, p. 97) noted that "a resilient sense of efficacy provides the necessary staying power in the arduous pursuit of innovation and excellence".
Drawing on both expectancy theory (Vroom, 1964) and social cognitive theory (Bandura, 1986) we expect that engaging in innovative behavior involves a conscious calculation of the likelihood that exerting effort will lead to a successful output. We therefore expect the self-efficacy variables to positively predict the innovative behaviors. Our hypotheses are then:

Hypothesis 9: Self-efficacy mediates the relationship between personality traits and creative idea generation

Hypothesis 10: Self-efficacy mediates the relationship between personality traits and proactive idea implementation

Figure 3. Model with personality antecedents and cognitive-motivational states as antecedents of innovative behavior

2.7 Honors educational context as a moderator of the personality – innovative behavior relationship

Up to this point we described the personality antecedents of innovative behavior and the cognitive-motivational processes underlying the influence of personality on innovative behavior. We will now include the context of our study as a moderator effect on this relationship. Distal personality traits and context factors interact in their influence on motivational processes (Parker et al., 2010). As explained above, engaging in innovative behavior involves a conscious calculation of the likelihood that exerting effort will lead to a successful output. Whether one is likely to be successful in exerting certain behaviors depends on the type of person, but is also related to the context in which this person operates. This interaction between personality and context is explained by trait activation theory (Tett & Burnett, 2003). This theory argues that personality influences behavior in a response to situational cues. Proactive individuals are more likely to behave in ways that are consistent to their proactive nature when the context stimulates their disposition (Parker et al., 2010). The interaction effect of personality and context was found in several studies (Fuller & Marler, 2009; Kim, Hon, & Lee, 2010; LePine & Van Dyne, 2001; Parker & Sprigg, 1999). Parker and Sprigg (1999) for example found that only individuals with a proactive personality responded positively (low strain) to jobs with high demands and high control. Kim, Hon and Lee (2010) found that especially proactive individuals engaged in creative behaviors in the presence of situational cues such as job creativity requirement and supervisor support.

Tett and Burnett (2003) propose three sources of trait-relevant cues – task, social and organizational – of the personality trait relationship with job performance. In our study we take honors context as one large organizational level factor and argue that this context requires students to be creative and proactive much more than the regular educational context. We argue that within the honors context, students' personalities have a stronger influence on their motivational states and innovative behavior then in the non-honors context (see figure 4). Honors education is described as substantially different from regular education and not as more of the same (Van Eijl, Wientjes, Wolfensberger, & Pilot, 2005). Honors programs are characterized by small scale education, active participants and much peer interaction (Van Eijl et al., 2005). Although they are diverse in content, style and selection procedure, they all claim to select and foster a type of student that has more potential for excellence in their life (Scager et al., 2012). Because honors programs foster potential for excellence in students we expect the effect of personality on cognitive-motivational states to be

higher in the honors context than in the non-honors context. Our final hypothesis therefore reads:

Hypothesis 11: Honors context moderates the relationship between personality and cognitive-motivational states

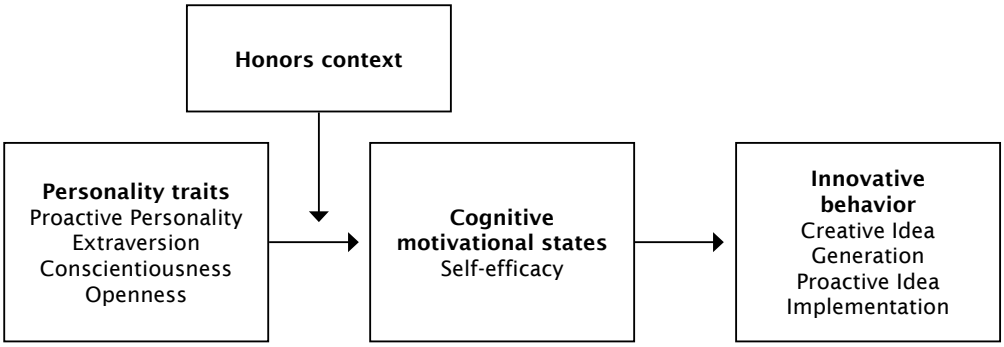


Figure 4. Model with honors context as a moderator of the relationship between personality antecedents and cognitive-motivational states as antecedents of innovative behavior

2.8 Full theoretical model

In this final section we posit our full theoretical model including all mediators and moderators (see figure 5 for the full theoretical model) and we summarize the hypotheses we described above.

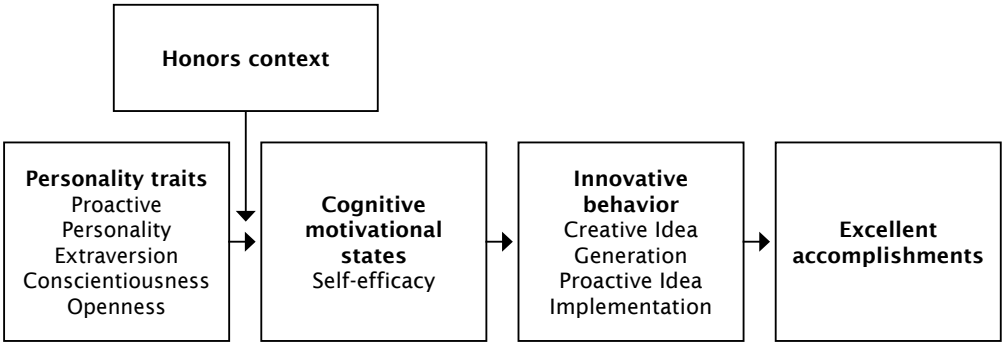


Figure 5. Full theoretical model with personality antecedents of innovative behavior, which in turn leads to excellent accomplishments, plus moderators and mediators

Firstly, as portrayed in figure 5 we hypothesize four personality traits to predict innovative behavior via cognitive-motivational states. Of the four personality traits we expect proactive personality to be the strongest predictor of both creative idea generation and proactive idea implementation over more traditional personality traits. This means that we expect individuals that actively seek change, have a future focus, are aware of changes in the world and take advantage of unexpected opportunities, are particularly feel a responsibility than curious, diligent an extraverted individuals.

Secondly, we expect the mechanism through which the personality traits predict creative behavior, to be self-efficacy, a malleable cognitive-motivational state. This means that having an open, conscientious, extraverted and proactive personality leads people to feel more motivated and confident to come up with new ideas, change the status quo and take more initiative and that this in turn leads people to come up with more creative ideas and implement those more often.

Finally, because of trait activation theory (Tett & Burnett, 2003) we expect a moderating effect of honors context on the relationship between personality and self-efficacy. In other words we expect traits to be a stronger predictors for self-efficacy in the honors group than in the non-honors group. The effect personality already has on self-efficacy is enhanced by being in an context that provides more room to express the personality. To test our hypotheses and study the role of antecedents of both idea creation and implementation, longitudinal designs with multiple measure points are required (Rank et al., 2004) which our study provides (see chapter 4 for a thorough description of our study quasi-experimental and longitudinal research design). In chapter 3 we describe how we created the measurement tool that measures the antecedents that

relate to professional excellence via creativity and proactivity. We describe both the development of the measurement tool and test its reliability and validity.

Moreover, our study design includes both a group of honors students and a control group which allows us to measure interaction between context and personality. Honors programs do not only foster potential for excellence in students, they select students on their potential as well. Because of this selection (or sometimes self-selection) we expect the honors sample to differ from regular student on all the antecedents in our model, not only on the moderator. Therefore we need to control for those variables and variables such as age, gender, ethnicity and previous level of education. The details of our study design and the operationalization of all variables apart from the antecedents of our model are thoroughly explained in chapter 4. In the next chapter, we first explain how we have operationalized the antecedents in our model, the personality traits and cognitive-motivational states, in a concise, understandable and valid measurement tool.

3

Methodology I: Construct operationalization of antecedents of innovative behavior

Chapter 3

Methodology I: construct operationalization of antecedents of innovative behavior

3.1 Introduction

The aim of this chapter is to describe how we developed a tool that is short, understandable and applicable for a population of students in higher professional education and capable of reliably measuring innovative potential. As described in chapter 2 we include personality traits and cognitive-motivational states as antecedents of innovative behavior. Our main focus is on proactive personality - "a dispositional construct that identifies differences among people in the extent to which they take action and influence their environment" (Bateman & Crant, 1993, p. 103). As this trait is especially highly related to extraversion, openness and conscientiousness (Major, Turner, & Fletcher, 2006), we want to control for their influence on innovative behavior. The cognitive-motivational states are included as they are the (more proximal) antecedents of innovative behavior. We chose to measure two types of self-efficacy. In this chapter we explain how we operationalized proactive personality, extraversion, conscientiousness, openness, creative self-efficacy and academic self-efficacy into valid and reliable scales.

3.2 Item and scale development process

To develop a measurement instrument we relied on existing scales where possible, but we needed to adapt scales and rewrite them in order to fit the population of our research and to create a tool that was both concise and adequate for our context. In our scale development process we followed the guidelines provided by Hinkin (1995) and Babbie (1990). We divided the process into two stages. Stage 1 refers to construct operationalization and item development (paragraph 3.3) and stage 2 refers to scale development and evaluation (paragraph 3.4).
All measures should meet the criteria of content validity, criterion-related validity, construct validity, and internal consistency, according to The American Psychological Association

(Standards for educational and psychological testing, 1985). We therefore discuss the content validity in stage 1 and criterion-related validity and internal consistency in stage 2. Construct validity refers to the overarching category of validity testing. It roughly refers to the degree to which an operationalization measures the variable it is supposed to measure (Bagozzi, Yi, & Phillips, 1991) and therefore plays a role in both stages.

3.3 Construct operationalization and item development

Content validity refers to the degree to which the items together represent all the aspects of the psychological construct (Creswell, 2003). It is most crucial in the stage of item development, "in item generation, the primary concern is content validity, which may be viewed as the minimum psychometric requirements for measurement adequacy" (Hinkin, 1995, p. 969). We met this criterion by making use of existing scales as much as possible and adjusting items in a way that they still capture the essence of the original scale.

The steps we took in this stage are 1. selecting the items that capture the underlying psychological construct to ensure content validity (Hinkin, 1995). 2. Using a professional translator to translate our selected items from English into Dutch and then back to English again to ensure accuracy of the translation. 3. Forming scales with non-reverse-scoring items to increase validity of responses (Schriesheim & Hill, 1981). 4. Evaluating the ease and understandability of both the English and the Dutch scales by letting both researchers and students read and discuss the items. And finally, 5. Pilot testing the scales with 75 students to check for face validity and reliability.

All the scales in our research are 5-point Likert scales and the item selection and scale development process is described below per antecedent.

Proactive personality

We used the shortened 10 item version of Bateman and Crant's (1993) original Proactive Personality scale (Seibert, Crant, & Kraimer, 1999). We simplified the language where needed to fit the educational setting of students. From our first evaluation we found that, for example, the item 'wherever I have been, I have been a powerful force for constructive change' was difficult to understand for our population. We changed this in 'I like to make change happen'. Next we tested the 10 item proactive personality scale in our pilot with 75 students. Based on the outcomes, our 10 item scale was reduced to 8 items. Two items were deleted, namely 'I love being a champion for my ideas'

and ‘nothing is more exciting for me than seeing my ideas turn into reality’. The pilot test showed that these two items did not work reliably in this population. And since a shorter measure helps reduce response biases (Schmitt & Stults, 1985; Schriesheim & Hill, 1981), reducing the number of items is beneficial for our scale development. With the 8 items we selected we still meet the criterion of adequate domain sampling to obtain content and construct validity (Cronbach & Meehl, 1955). Moreover all items were non-reverse-scoring items, which increases the validity of the responses (Schriesheim & Hill, 1981). The 8 items we selected are listed in paragraph 3.3. In this section (scale evaluation) we thoroughly checked whether our scale measuring proactive personality meets the criteria of criterion-related validity and internal consistency.

Conscientiousness, extraversion and openness

Our scales for conscientiousness, extraversion and openness are based on the original NEO-FFI scale (Costa & Mccrae, 1992b) as much as possible to ensure content and construct validity (Cronbach & Meehl, 1955). The NEO-FFI consists of 60 self-descriptive statements, 12 for each of the five factors and is often used in similar research (e.g. Kappe, 2011). However, the NEO-FFI stems from 1992 and is quite long for our purpose. Scales with too many items can lead to fatigue in respondents and response bias (Anastasi, 1976). Moreover, the NEO-FFI contains many denials and words that do not seem to resonate in a context of students. Negatively worded items may reduce the validity of the questionnaire (Schriesheim & Hill, 1981). We therefore chose to create simpler, neutrally phrased questions that were easy to use and applicable for our population. We will now discuss our item and scale development process for conscientiousness, extraversion and openness. More extensive validity testing is also described in the scale evaluation stage later in this chapter (paragraph 3.4).

For conscientiousness we chose the items that fitted with our research and were neutrally formulated. For example, the item ‘I am not a methodical person’ was changed into ‘I approach work systematically’. ‘Methodical’ is not a word that all students recognize or interpret correctly as the English version was administered to non-native English speakers. Moreover, the ‘not’ would often be overlooked by students, possibly resulting in low reliability too. The essence of this aspect of conscientiousness however is still captured with our new item. We created 9 items that capture conscientiousness adequately (see paragraph 3.3 for the full scale).

For extraversion we created a scale of 6 items using the same criteria and logic described above. Our scale contains no negatively worded items or confusing words. For example the item ‘I am a cheerful, high-spirited person’ would be confusing

because high-spirited is not clear to all students. We therefore chose to formulate 'I enjoy my life' as it is easy to understand and interpret. This item still captures the 'high energy' component of extraversion. For the full scale containing all our items please see the next section of scale construction (paragraph 3.3).

The original Openness scale the NEO-FFI (Costa & Mccrae, 1992b) was especially confusing for our population. The item 'Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement' is perceived as comical and hard to relate to by our population. Likewise, the item 'I have little interest in speculating on the nature of the universe or the human condition' is too far-fetched for our population. We therefore chose to choose simpler wording like 'I enjoy philosophizing' and 'I enjoy discovering new things'. These items still measure intellectual curiosity and openness to new things.

The items of the three scales were mixed in our questionnaire to reduce response bias, like in the original questionnaire (Costa & Mccrae, 1992b). The pilot test showed adequate internal consistency and factor structure which is a further indication of adequate validity and reliability (see paragraph 3.4 for a more rigorous tests of both).

Creative self-efficacy

Creative self-efficacy is defined as the self-view "that one has the ability to produce creative outcomes" (Tierney & Farmer, 2002, p. 1138) and it has been shown in empirical research to mediate between individual factors and creative performance (Gong, Cheung, Wang, & Huang, 2010; Shin & Zhou, 2003). Our scale was constructed of three items based on previous research done in creative self-efficacy (as presented by Tierney & Farmer, 2002)), definitions of creativity (Plucker, Beghetto, & Dow, 2004) and the concept of self-efficacy (Bandura & Bandura, 1997). We measured creative self-efficacy by asking students how secure (ranging from not at all secure to very secure) they would feel about carrying out certain creative tasks: "Inventing a new solution to an existing problem', 'coming up with new ideas' and 'inventing a useful solution to a new problem'. The scale consists of three neutrally worded items that in the pilot reliably measured the essence of creative self-efficacy. The full scale and rigorous testing is provided in paragraph 3.4.

Academic self-efficacy

For academic self-efficacy we were not able to rely on existing scales, because we are not interested in academic performance in the classical sense of feeling e.g. confident to pass a class or an exam. Existing academic self-efficacy measures therefore did not

suffice. Specificity of a self-efficacy measurement is important to adequately measure the construct (Pajares, 1996). We want to measure whether students feel confident of going beyond the predefined academic setting to increase their knowledge and to take on extra work. This type of self-efficacy resembles role breadth self-efficacy (Axtell & Parker, 2003) but then fitted to the student context. Empirical research shows that academic self-efficacy is influenced by individual factors (Lin, Lu, Chen, & Chen, 2014) which in turn will influence performance. We define academic self-efficacy as the self-view that one has the ability to take on a broader role than demanded by formal academic expectations, like taking on extra courses or broadening their knowledge.
Critical evaluation of students and researchers ensured face validity. The pilot test moreover showed that the scale was reliable. The scale consists of 6 neutrally worded items. We ask students how they would feel about carrying out the following tasks: 'Engaging in additional activities besides your degree program', 'Dealing with freedom of choice in the course of your studies', 'Improving your knowledge', 'Performing a practice-orientated research assignment', 'Attending additional classes on top of the regular classes', 'Broadening your knowledge'. The full scale is provided in the next section together with more extensive validity and reliability testing.

3.4 Scale construction and evaluation

After the items were finalized we entered the phase of scale construction and evaluation. The first goal of this phase is to reduce the number of items while maintaining construct validity. The second goal is to thoroughly check the internal consistency of the scales and the criterion-related validity of the scales. Reliability is the extent to which the items are consistent (Creswell, 2003). The criterion validity in this study was assessed with convergent and discriminant validity. Convergent validity is the degree to which attempts to measure the same concepts are in agreement and divergent validity is the extent to which concepts that are not related and indeed do not correlate too highly (Bagozzi et al., 1991).

We measured 594 students and split our sample in half to avoid double dipping in our sample pool. We first administered an exploratory factor analysis using Principal Components Analysis (PCA)[2] on one sample and next a confirmatory factor analysis on the second sample. The aim of doing both factor analyses is to reduce the number of items while maintaining construct validity and to check for internal consistency and criterion validity.

First, a sample of 297 students (half our sample) was used for the exploratory factor analysis. This sample size is widely sufficient for adequately conducting an exploratory factor analysis (Hinkin, 1995). We used PCA with Varimax rotation[3]. We explored the personality factors separate from the self-efficacy factors.

We administered PCA to proactive personality, openness, extraversion and conscientiousness. Five factors were extracted using this analysis with eigenvalues higher than 1. These five factors together explained 56.7% of the variance. Clearly this factor structure deviates from our theoretical model in that our 4 scales were expected to measure just four distinct factors. This result is explained however by the fact that proactive personality, as stated before, overlaps with the big five factors (Tornau & Frese, 2013). Additional analyses show that conscientiousness loads .35 on Proactive Personality; extraversion .10; and openness .37. This is an indication of convergent validity. Measures that theoretically overlap, do in fact overlap in our data.

Therefore, we explored proactive personality next; separate from openness, extraversion and conscientiousness. This analysis showed 1 factor with eigenvalue over 1 (3.641) explaining 45.52% of the variance. Retaining factors with eigenvalues higher than 1 is a widely applied criterion in scale construction (Hinkin, 1995). This is exactly in line with what we would expect theoretically. All items loaded over .6 on the factor (see table 1). Cronbach's alpha with these 8 items is .83. From the PCA and the Cronbach's alpha analysis we can conclude that this factor is reliably measured.

[2] *Since we used PCA, our analysis technically yields components and not factors. Factor analysis is used here however to refer to the entire family of data reducing techniques (Pallant, 2002). In our exploratory PCA our aim is to provide a summary of our data set before moving to the more restricted technique of confirmatory factor analysis to validate our theoretical factor structure. According to Tabachnick and Fidell (2001, p. 611) PCA is preferred over Factor Analysis (FA) when providing an summary of the data set. See Tabachnick and Fidell (2001, pp. 610–611) for a review of PCA and FA.*

[3] *We also performed the PCA's with oblique rotation (Direct Oblimin) to see if that would result in different results from orthogonal rotation (Varimax). We however found similar results with both types of rotation and therefore only report the Varimax rotation because these results are easier to interpret and report (Tabachnick, et al., 2001).*

Table 1. Component Matrix with factor loadings for Proactive Personality based on PCA

Component	Factor 1
I like to make change happen	.714
When I dislike something, I do something about it	.703
When I want something, I make sure that it happens	.703
I solve problems immediately	.692
No matter what the odds, if I believe in something I will make it happen	.655
When others are in doubt, I take action	.645
I recognize possibilities	.642
I am always looking for better ways to do things	.637

The three other personality factors, openness, conscientiousness and extraversion were administered to PCA next. The results show (table 2) a 3 factor structure as theoretically expected. Three factors with eigenvalues higher than 1 were extracted. Together they explained 53.71% of the variance. One item loaded higher than .4 on a different factor than theoretically expected. 'I achieve my goals' theoretically belongs to conscientiousness but loads almost equally high on 'extraversion'. We therefore decided to delete this item to improve construct validity (Schriesheim & Hill, 1981). Conscientiousness had a reliability of .86 with 8 items which indicates adequate internal consistency.

Table 2. Component Matrix with factor loadings for Conscientiousness, Extraversion and Openness based on PCA[4]

Component	Factor 1	Factor 2	Factor 3
I approach work systematically	.801		
I look after my things very carefully	.778		
I perform assignments with care	.707		
I work hard	.663		
I find it easy to get organized	.660		
I always do the best I can	.655	.316	
I meet deadlines	.630		
I know what I want to achieve	.518	.386	
I achieve my goals	.495	.493	
I am often surrounded by a group of people		.786	
I enjoy my life		.771	
I laugh often		.740	
I engage in a wide range of activities		.631	
I have a busy life	.337	.578	
I like to exercise leadership over others		.414	
I enjoy philosophizing			.785
I like playing around with theories and abstract ideas			.770
I am curious about ideas that are critical of the social structure			.743
It is important to see things from different perspectives			.700
I am open to new ideas			.662
I enjoy discovering new things		.325	.653

[4] *To increase readability of the table we suppressed coefficients below .3 in the component matrix with. The rotated component matrix with all coefficients are available in appendix nr. 1*

Openness has a Cronbach's alpha score with 6 items of .83. All items correlate substantially with the total scale. From both the PCA (table 2) and the Cronbach's alpha analysis we can conclude that this scale needs to remain intact. Extraversion is measured with 6 items and has a reliability score of .79. This score is satisfactory, but in the PCA (table 2) we see that one item - 'I like to exercise leadership over others'- loads relatively low on the factor. The item is supposed to measure feeling comfortable in operating with and in groups of people. However, this item focusses too much on 'leadership' and therefore is probably less suitable for measuring extraversion. We decided to delete this item for theoretical reasons supported by the Cronbach's alpha analysis and the PCA to increase construct validity (Hinkin, 1995). With deleting this item, we still maintain enough items the measure the latent constructs as intended. Moreover, the new alpha is still .79 which indicates adequate internal consistency.

The self-efficacy scales, **creative self-efficacy and academic self-efficacy**, were explored together with PCA. The results show (see table 3) an expected two factor structure with the two factors explaining 57.18% of the variance. Only item 'dealing with freedom of choice in the course of your studies' loads somewhat on creative self-efficacy, but not to an alarming extent. Cronbach's alpha indicates a reliable scale for creative self-efficacy, .79, especially considering the fact that this scale consists of only 3 items. The Cronbach's alpha for academic self-efficacy is .78 with all items correlating sufficiently with the total scale. The alpha level would not improve by deleting any of the items.

Table 3. Component Matrix Creative self-efficacy and Academic self-efficacy based on PCA[5]

Component	1	2
(How very insecure-very secure do you feel about…?)	.801	
Inventing a new solution for an existing problem	.862	
Coming up with new ideas	.798	
Inventing a useful solution for a new problem	.779	
(How very insecure-very secure do you feel about…?) Attending additional classes on top of the regular classes		.786
Improving your knowledge		.761
Broadening your knowledge		.736
Engaging in additional activities besides your degree programme		.704
Performing a practice-orientated research assignment		.577
Dealing with freedom of choice in the course of your studies	.311	.475

The exploratory principal component analysis further confirmed the validity and reliability of our scales. We only deleted 1 item from the extraversion scale and 1 items on the conscientiousness scale to improve the validity of both scales. To err on side of caution we also performed a confirmatory factor analysis to once more test whether our data sufficiently fit our theoretical models. For this analysis we use a separate (other half) sample of 297 students. Because these analyses yielded similar results we will not discuss those analyses in detail. We have attached a full description in appendix nr. 2. Worth mentioning is the fact that a common-method variance check (Podsakoff & Organ, 1986) revealed that our data does not appear to suffer from common-method bias, which is a further indication of discriminant validity.

[5] *To increase readability of the table we suppressed coefficients below .3 in the component matrix with. The rotated component matrix with all coefficients are available in appendix nr. 1*

3.5 Descriptive statistics

Because the confirmatory factor analysis shows adequate fit (see appendix nr. 2), we constructed mean constructs for our 6 antecedents. Below we describe the descriptive statistics and the Pearson correlation coefficient of our final measurement scales. We used all the participants N=594 to describe the descriptive statistics of our 6 antecedents as presented in table 4.

Table 4. Correlation matrix and descriptive statistics

Scale	Mean (1-5)	SD	1	2	3	4	5	6
Personality								
1. Proactive Personality	3.78	.52	1.00					
2. Conscientiousness	3.79	.64	.532**	1.00				
3. Extraversion	4.04	.67	.448**	.371**	1.00			
4. Openness	3.77	.69	.488**	.212**	.256**	1.00		
Personality								
5. Creative self-efficacy	3.67	.63	.495**	.78	.166**	.383**	1.00	
6. Academic self-efficacy	3.79	.61	.468**	.379**	.277**	.463**	.382**	1.00

$*p < 0.05$, $**p < 0.01$

In table 4 we see how the antecedents correlate. Interestingly proactive personality correlates relatively highly with openness, conscientiousness and extraversion as we would theoretically expect (Tornau & Frese, 2013). These correlations are higher than the correlations between the three big five variables on their own. Conscientiousness, extraversion and openness do correlate with each other, but these correlations are relatively small. These descriptive statistics indicate convergent and discriminant validity (Hinkin, 1995).

Finally the histograms of the constructs below show that our variables are relatively normally distributed (see appendix nr. 3). Only extraversion is rather left-skewed indicating that our sample scores high on extraversion. Also the kurtosis is high (2.15). Kurtosis may result in an underestimation of the variance, however this risk is reduced with large samples (Tabachnick, FIdell, & Osterlind, 2001). The sample in our

study exceeds 200 widely and we therefore do not expect a large effect of kurtosis in our analyses. All in all, the validity and reliability of our measurement is sufficient and the measurement is adequate for our target group and concise. It can be used for further study to test our theoretical model.

4

Methodology I I: Quasi-experimental and longitudinal research design

Chapter 4

Methodology I I: Quasi-experimental and longitudinal research design

4.1 Introduction

In this chapter we explain the quasi-experimental and longitudinal research design and methodology we used to test the hypotheses of this study, as formulated in chapter 2. While chapter 3 focused on some of the quantitative measurements in this study, this chapter also includes some qualitative measurements. Because our design includes both quantitative and qualitative data, our research design is considered a mixed methods approach (Creswell, 2003). We first discuss how this study was set-up (in paragraph 4.2 design) and we then (in paragraph 4.3 participants) elaborate on how the type of students in the experimental group (honors) compares to the type of students in the control group (non-honors). Next we summarize the measures of the antecedents in our model (in paragraph 4.4 measures) based on the construct development and testing described in chapter 2 and the measures of our dependent variables. Finally, we describe the analyses performed on our data (in paragraph 4.5 analyses).

4.2 Design

In this next section we describe the research design we chose to test the hypotheses we formulated in chapter 2. For this study we used a quasi-experimental and longitudinal research design, with one experimental (honors students) and one control group (non-honors students). We chose this design because an experimental design is regarded as "the only means for settling disputes regarding educational practice" (Campbell & Stanley, 1966, p. 2). Our design most closely resembles a pretest-posttest control group design (Campbell & Stanley, 1966) with multiple posttest observations.

However, because we had no influence on the selection on the honors group and had no means of predicting who would become an honors student, we could only commence

our measurements after both groups had been established. Therefore one could argue that our design is a combination of a posttest-only control group design and a pretest-posttest control group design. Both designs are considered true experimental designs (Campbell & Stanley, 1966). However, as the students were not randomly assigned to either group our design is labeled quasi-experimental (Campbell & Stanley, 1966). Because of that we need to check whether our experimental group does not differ from the control group on control variables (see paragraph 4.3 participants).

Our study took place between 2011 and 2015. During these years we monitored the two groups of students. The total sample consists of 594 students from various degree programs. The first group consisted of students that were recruited and selected for one of several honors programs (N=249). The second group consisted of 'regular' bachelor students that did not participate in an honors program (N=345). The data of both the experimental and the control groups were gathered at four points in time (see table 5 for an overview) by means of a survey (T1-T3) and transcripts from the student administration office (T4). T1 measurement took place within a half year of the start of the honors program (year 2 of the regular bachelor program). T2 measurement took place one year later (half way through year 3 of the regular program). T3 measurement took place a year after that (half way through year 4 of the regular program). T4 measurement took place about 8 months after T3 (a couple of months after the graduation date).

Table 5 shows which variables were measured at various points time. The personality variables were only measured at measurement 1, the self-efficacy variables and proactive and creative behavior were measured at measurement 1, measurement 2 and measurement 3. Academic and professional achievement information was only obtained on one point in time, namely three years after the first student data was gathered. Academic and professional achievement was gathered from all 594 participants of the study that were graduated at that point in time and from whom record were available. This resulted in 302 valid results.

Table 5. Overview of data gathering at 4 points in time

Measurement	Measurement T1 (N=594)	Measurement T2 (N=162)	Measurement T3 (N=80)	Measurement T4 (N=302)
Personality traits	X			
Cognitive-motivational states	X	X	X	
Creative Behavior	X	X	X	
Proactive Behavior	X	X	X	
Academic Achievement				X
Professional Achievement				X

Mortality is a possible threat to the internal validity of our research design (Campbell & Stanley, 1966). The drop out in our study was 73.7% after one year and 86.5% after two years (see table 5). We therefore tested whether the students that dropped out of our study differed significantly from those that did not drop out based on control variables (age, gender ethnicity, previous level of education) and all antecedents. We found no significant differences between the drop-out group and the participants that remained in the study in age, level of previous education and ethnicity. We did however find that the drop out group consisted of relatively more male students (47.9%) than the remaining group (31.3%) and that this difference was statistically significant ($Chi^2 = 7.698$; $df = 1$; $p = .006$). Fortunately we found no statistically significant differences between the drop out group and the remaining group on all the personality traits and the cognitive-motivational states. These finding suggest that is unlikely that mortality poses a major problem in our study.

4.3 Participants and procedure

In this section we describe the participants in our study and how we both selected and approached them. For our study we first wanted to select all the honors students as participants. We measured honors students from several Honors programs (HP ABO: Excelleren is ondernemen, HP TFNL: Talent for Natural Leadership, HP ABR: Sapere Aude, HP MIM: Marketing & International Management, HP EPM: Excellent People Management, HP APO: Academische Pabo, HP EOTF: Energy of the Future, HP LAS: Liberal Arts & Science, HP HCSS: Health Care & Social Work, HP CC: Changing Cities,

HP EFM: Excellence in Finance & Management, HP LED: Life Science & Engineering). We also measured non-honors students with comparable degree programs. The response rate was 63% which is a good response rate.

Of the sample 45.6 % was male and 54.4% was female. The mean age of the sample was 20.58 years with a standard deviation of 2.40. Although over 25 different ethnic backgrounds were present in the sample, the vast majority was Dutch 84.8%. About 7.2% was German and 2.4% had a Turkish background. All the other ethnicities were represented by 4 students or less. As for educational level, the vast majority had a higher general secondary education (HAVO) degree 52.4%. Another 21.3% had a lower general secondary education degree (MBO). A pre-university education degree (VWO) was obtained by 22.6% of our population.

We developed an online-survey to which students were invited via email. The survey was predominantly filled out in a class-room setting scheduled at the beginning or end of a class. A researcher was present to explain the purpose of the research and invite students to fill in the survey candidly. Only in cases when students were not able to come to class, or scheduling a meeting was not possible, the surveys were filled out at home. We measured students within a half year after starting their programs. For most programs this means students in the second year of their degree program. We used data from 4 different cohorts. Eleven programs were indicated as 'honors programs' at some point within those years. However, some programs were eliminated during those years (Excellent People Management; Life Science and Engineering and Sapere Aude!) or were no longer considered and honors program (Academische Pabo; Energy of the Future). Table 6 gives an overview of the number of respondents per cohort and per honors program. The 4 programs that were either eliminated or otherwise removed from the list of honors programs are placed at the bottom.

Table 6. Response Honors students per Honors program per cohort (N=249)

Honors Program (HP)	Life Span of the program	Response % cohort 2011-2012
HP ABO – Innovation and Business Creation	Still running	66.7% [6/9]
HP ABO - Talent for natural leadership	Still running	50% [5/10]
HP MIM – Marketing & International Management	Still running	7,7% [1/13]
HP LAS - Liberal Arts & Science	Still running	36,4% [8/22]
HP HSSW – Health care & Social Work	Still running	-
HP CC – Changing Cities – People, Places and Choices	Still running	-
HP CFM – Creativity in Finance & Management	Still running	-
HP LED - Life Science & Engineering	Eliminated per 2012-2013	0% [0]
HP EPM – Excellence in People Management	Eliminated per 2012-2013	63,6% [7/11]
HP ABR – Sapere Aude – Dare to Think	Eliminated per 2013-2014	77,8% [7/9]
HP APO – Academic Teacher Training College	Eliminated per 2012-2013	46,7% [7/15]
HP EOTF – Energy of the Future/Factory of the Future	Eliminated per 2012-2013	10,7 % [3/28]

Not all programs were approached each year to participate in this study. Some programs either did not yet or no longer existed at the time of measurement. From other programs we had sufficient data at one point and therefore ceased to collect data. As shown in table 6, students from 1 program did not respond (HP LED). This program was therefore excluded from further research.

The control group consisted of 2 cohorts of students. Their data was gathered between November 2011 and November 2015. Students from 24 distinct degree programs were approached. The degree programs were matched to the degree programs the honors students took part in. Per degree program, at least 1 group of students was randomly selected. The response of these students is depicted in table 7.

Response % cohort 2012-2013	Response % cohort 2013-2014	Response % cohort 2014-2015	Total
88,9% [8/9]	71,4% [5/7]	-	19
91,7% [11/12]	33.3% [3/9]	-	19
57,1% [8/14]	53,8% [7/13]	-	16
90% [9/10]	73,7% [14/19]	-	31
56,7% [17/30]	43,8% [14/32]	-	31
100% [4]	65% [13/20]	-	17
87,5% [7/8]	60% [15/25]	73% [27/37]	49
-	-	-	0
-	-	-	7
100% [19/19]	-	-	26
100% [12/12]	-	-	19
57.1% [12/21]	-	-	15

Table 7. Response students per degree program (N=345)

School
School of Business, Building & Technology (ABO)
School of Governance, Law & Urban Development (ABR)
School of Creative Technology (ACT)
School of Health (AGZ)
School of Applied Psychology and Human Resource Management
School of Social Work (AMM)
School of Education (APO)
School of Finance & Accounting (FEM)
Hospitality Business School (HBS)
School of Marketing & International Management (MIM)
School of Life Science Engineering and Design (LED)

Degree program	Number of cohorts	Response %
Business Engineering	2	63% [36/57]
Small Business & Retail Management	1	Extra person[6]
Applied Safety and Security Studies	2	67,3% [37/55]
Management, Economics and Law	2	52% [26/50]
Social Legal Services	1	74% [20/27]
HJO	1	58,8 % [20/34]
Media Information and Communication	1	11,8% [2/17]
Textile Engineering and Management	2	35,7% [15/42]
Physiotherapy	1	18,5% [5/27]
Podiatry	1	16,7% [2/12]
Nursing	1	50% [6/12]
Human Resource Management	2	70% [35/50]
Applied Psychology	2	62,5% [20/32]
Social Work and Social Services	1	58,3% [7/12]
Social Educational Care	1	53,8% [7/13]
Teacher Training College (Primary School)	2	58,3% [24/41]
Accountancy	1	14,4% [4/26]
Accounting and Finance	1	88,5% [23/26]
Facility Management	2	39,5% [15/38]
Tourism & Leisure Management	1	6,7% [1/15]
International Business Languages	1	37,5% [6/16]
International Business Management Studies	1	92,9% [13/14]
Architecture and Construction Engineering	1	71,4% [5/7]
Civil Engineering	1	55,6% [15/27]

[6] *This person was present during one of the measurements sessions of business engineering because her or she took an extra course. This person was added to the sample.*

The response in the honors group (82%) was higher than the response in the control group (54%) This difference is probably due to the fact that Honors students are required to participate in research as it is a prerequisite for honors programs to receive funding. Also, honors meetings are visited more frequently than regular classes.

Table 8. Comparing the Honors group to the control group on program, age, gender, ethnicity and previous level of education

School	Degree program	HP (N=249)	Control (N=345)
ABO	Business Engineering	14	36
	Small Business & Retail Management	4	1
	Construction Management	3	-
ABR	Social Legal Services	6	20
	Applied Safety and Security Studies	2	27
	Laws	8	20
	Public Administration	4	-
	Management, Economics and Law	18	26
ACT	Business Information Technology	1	-
	Human Information Design & Strategy	3	-
	Information Technology	2	-
	Art and Technology	2	-
	Media, Information and Communication	6	2
	Textile Engineering and Management	10	15
AGZ	Physiotherapy	13	5
	Podiatry	3	2
	Nursing	5	6
AMA	Human Resource Management	16	35
	Applied Psychology	6	20
M&M	Social Work and Social Services	10	7
	Social Educational Care	8	7
APO	Teacher Training College (Primary School)	1	24
	Academische Teacher Training College	19	-

School	Degree program	HP (N=249)	Control (N=345)
FEM	Accountancy	8	4
	Accounting and Finance	20	23
HBS	Facility Management	2	15
	Tourism & Leisure Management	3	1
	MBA	3	-
LED	Mechanical Engineering	1	1
	Industrial Design Engineering	1	1
MIM	Commercial Economics	2	-
	International Business Languages	3	6
	International Business Management Studies	14	13
ROB	Architecture and Construction Engineering	3	5
	Civil Engineering	1	15
	Environmental Science	4	-
	Urban and Regional Planning	2	-
	Total number of students	**249**	**345**
	Age (Mean in years)	20.96 (SD 2.6)	20.51 (SD 2.2)
	Ethnicity (% Dutch)	82.3%	86.7%
	Gender (% male)	43.4%	47.2%
	Level of previous education (% pre-university level)	43.1%	13.9%

As shown in table 8, students from both groups are comparable. For all degree programs of honors students a comparable degree program from the same school is available for the students in the control group. The two groups match based on age and gender. Table 8 shows that the mean ages of the honors group (M=20.96) is close to that of the control group (M=20.51). Independent t-test shows that there is no statistical difference between them (t = .88; df = 483; p = 0,380), although Levene's test shows a statistically significant difference in standard deviations (F = 4,77; p = 0,029). The percentage of females in the honors group is somewhat higher (43.4%) than in the control group (47.2%). A Chi2-test however, indicates that this difference in not statistically significant (Chi^2 = .874; df = 1; p = .350).

The percentage of Dutch students is a little lower in the honors groups (82.3%) than in the non-honors group (86.7%). This is mainly because of the relatively larger population of German students in honors, in this sample 9.2% in honors versus 5.8% in non-honors. A Chi2-test with Dutch ethnicity as Dummy variable showed no statistical difference between the two samples ($Chi^2 = 2.116$; $df = 1$; $p = .146$). The difference in previous level of education was measured with a Mann Whitney U-test. Honors students score higher (Mean rank= 341.00) on previous level of education than non-honors students (Mean rank= 266.10) ($U=32.121$, $p<.001$). The percentage of pre-university education degree was higher in honors students (34,1%) than in non-honors students (13.9%).

4.4 Measures

This study has a mixed-methods research design which means we gathered both quantitative and qualitative research data with our measures. In this next section we first describe the reliability of the quantitative measures (antecedents) and then describe the more qualitative measures of this study.

Antecedents of proactive and creative behavior

The development and testing of the quantitative measurement tool we created to measure personality traits and cognitive-motivational states, is extensively described in chapter 3. See table 9 for an overview of the final scales. The Cronbach's alpha levels are sufficient for our measurement purposes.

Table 9. Final scales in the measurement instrument with sample items and reliability scales

Scales	Sample item	α
Proactive personality (8 items)	I am always looking for better ways to do things	.81
Openness to experience (6 items)	I am curious about ideas that are critical of the social structure	.81
Conscientiousness (8 items)	I perform assignments with care	.84
Extraversion (5 items)	I am often surrounded by a group of people	.79
Creative self-efficacy (3 items)	(Very insecure-very secure about) coming up with new ideas	.77
Academic self-efficacy (6 items)	(Very insecure-very secure about) attending additional classes on top of the regular classes	.79

Proactive and creative behavior

Creative and proactive behavior is measured with semi-open questions as part of the questionnaire and have a more qualitative nature. The answers to the questions were coded for both the level of proactivity and creativity. The development and the coding of this measurement are extensively described in chapter 5.

Academic achievement

We chose not to use overall Grade Point Average (GPA) – the arithmetic mean of grades across the curriculum- for two reasons. Although often used as a measure for academic success (Kappe, 2011) it is criticized for being potentially biased. For example it doesn't distinguish between difficulty of the courses, the type of courses, skills needed for the courses or the number of courses taken (Vickers, 2000). We chose to include the grade for the thesis, generally the final product of the degree program, mostly consisting of 25 or 30 credits. Not all programs used a thesis, some just a final assessment. Grade for thesis generally appears to not be normally distributed (Kappe, 2011). In our sample that is the case as well (M=7.4, SD=.91).

We only include the data of students that actually graduated in order to be able to judge how long it took for them to graduate, which grade they received for their final project and to determine what they did straight out of university. We split the students into those that 'graduated with honors' (N=62) and non-honors graduates (N=218). Academic achievements data (grades) were obtained via the student administration office. We looked which grade students received for their final project. Because all students graduated the grades ranged from 6 to 10 (6 is the minimal grade to pass), the range of grades is limited. The average for honors was 7.73 (SD .83) and for non-

honors graduates 7.32 (SD .92). We chose to dummy code grades into 0 (grade of 6 or 7) and 1 (grade of 8 or higher).

From the students administration office we were also able to see how long it took for students to graduate in months. For honors graduates the average was 45.51 months (SD 8.26) and for non-honors graduates the average was 48.69 (SD 4.32). Because some programs are shorter the time in months does not fairly represent academic achievement. We therefore dummy coded this variable into 0 for longer than official time for the program and 1 within the official time for the program.

Professional achievement

Finally we searched for LinkedIn profiles of students. We only included students that graduated in our search to see whether they find a job or continued studying at a research university. We coded the profiles and found 12 different codes applied; 1. holding a job right after school, 2. not having a job and looking for a job, 3. having an impressive CV (e.g. both a job, and a master program and an award for best thesis), 4. doing a master at a research university, 5. having started their own company, 6. having no (updated) profile on Linkedin, 7. not graduated yet, 8. being a management trainee at a company, 9. doing a double degree abroad, 10. doing a double bachelor at a different university, 11. doing a unpaid internship after graduation and 12. having switched universities. Because the options were so numerous and it is hard to judge which option is better, we decided to simplify the codes into a dummy 0 for not having a direct follow-up after graduation and 1 having a direct follow-up in terms of education, job, own business or traineeship.

To get an overall picture of performance we averaged the three dummy coded variables.

Measure for drop-out

Of the 249 honors students we have in our study, 115 students dropped out their honors program. 124 students stayed in the program and of 10 students no data were available, and these data were therefore considered missing. As most programs last 3 years most students stayed in the program 3 years. Of all the students that dropped out, the average time spend in the program was 1.11 years (SD .62 years). The reason for drop-out ranged from being too busy, to not showing enough effort or switching studies or becoming an entrepreneur instead. So both positive and negative reasons were given for not continuing with the program. When we compare honors students to non-honors students in the study, we refer to the students that at time of measurement 1 (T1) were registered as honors students or non-honors students. The

drop-out group did not differ from the remaining group on any of the antecedents other than extraversion. The group of students that quit their honors program at some point were a little less extraverted (M=3.94), SD=.73)), than the group that stayed in their honors program (M=4.12, SD=.58) (t=-2.203, df=237, p=.03). We found no significant differences between the drop-out group and the remaining group on either the achievement measure or on the creative and proactive behavior measures.

4.5 Analyses

Because we rely on a proper research design we are able to use descriptive statistics as valid means to describe the differences over time between the experimental and the control group (Campbell & Stanley, 1966) and to make inferences about the effect of educational context on our dependent variables. However, as our participants were not randomly assigned to either group, we need statistical analyses to control for mean differences in scores on antecedents in our model.

First, to test our basic model we performed a hierarchal multiple regression analysis with the personality antecedents as predictors for creative self-efficacy and proactive self-efficacy. Age, gender, ethnicity, previous level of education and school were all included in the analyses as control variables. Except for age they were all dummy coded and added in the first block of the regression analysis (e.g. 0= male, 1=female). In the second block we placed the traditional personality traits and in the third block we added proactive personality to the regression analysis.

Next we performed mediation analyses using a Sobel test (Baron & Kenny, 1986). We tested the mediating role of both creative and academic self-efficacy in the relationship between personality and innovative behavior.

Then we tested the moderating effect of honors context on the relationship between personality and cognitive-motivational states. To do that we took 3 separate steps. Firstly, we compared the group of honors students to the group of non-honors students based on all personality antecedents in our model using interdependent samples t-tests in order to adequately interpret differences between the two groups on the dependent variables. Secondly, we tested whether being in honors has a significant main effect on the cognitive-motivational processes (self-efficacy) by using hierarchical linear regression analysis. Thirdly, we tested for an interaction effect between personality

traits and being in an honors program, by using moderation analysis in our linear regression test.

Next, we used repeated measures analyses to test the development of creative and proactive behavior over time for both the honors and the non-honors students. We tested the moderating effect of educational context in this analysis by looking at the interaction effect of time and context (honors or non-honors) on creative and proactive behavior.

Finally, we describe the differences in achievement between the honors and the non-honors group using descriptive statistics, independent samples t-test and qualitative descriptions.

5

Methodology I I I: Measure for creative and proactive behavior

Chapter 5

Methodology I I I: Measure for creative and proactive behavior

5.1 Introduction

In this chapter we explain and argue our operationalization of proactive and creative behavior. Creative idea generation and proactive idea implementation are crucial variables in this study and we therefore describe their reliability and validity extensively in this chapter. We chose a measurement instrument that unlike the antecedents in our model does not rely on a Likert scale self-report instrument, in order to prevent common method bias (Podsakoff & Organ, 1986) and to limit social desirability. We first explain how we developed this measurement instrument based on an existing measure (Parker et al., 2006) and then explain how we coded proactive idea implementation and creative idea generation. Because the coding of the latter is more complicated we discuss proactive idea implementation first. We end our chapter with descriptive statistics mainly based on the first of the three measurements (because of the large N see chapter 4) and differences in scores between the honors students and non-honors students over time as well.

5.2 Measurement instrument

We adapted the measurement instrument as developed by Parker, Williams and Tuner (2006) to capture 'proactive idea implementation' of students. Moreover we elaborated on it by adding a measure for the creativity of their ideas by coding both the novelty and the utility of the ideas. This allows us to not only measure the proactivity of the actual behavior but also the creativity thereof.

We chose to measure a specific dimension of proactive behavior as introduced by Parker, Williams and Turner (2006), namely proactive idea implementation. This dimension was developed to measure an individual taking charge of an idea for improving the workplace. This could be done by either voicing the ideas to others or by

implementing the idea themselves. This dimension is an adequate operationalization of what is expected of excellent professionals; coming up with new ideas to improve the workplace, sharing them with others or taking charge of them on their own.

Although this measurement is an effective operationalization of proactive behavior it unfortunately fails to measure innovative behavior. In line with other research (Janssen, 2000) we define innovation in behavioral terms: "Innovation is the successful implementation of creative ideas within an organization" (Amabile, 1996, p. 1). Innovative behavior therefore must consist of two behaviors: idea generation and idea implementation. Creating ideas is fundamental for innovative behavior and referred to as creativity (Amabile, 1996; Hennessey & Amabile, 2010). Creativity is described as "the production of novel and useful ideas in any domain" (Amabile, 1996, p. 1). 'Novel' and 'appropriate' are important components if ideas are to be creative (Hennessey & Amabile, 2010).

So creativity entails the generation of novel and useful ideas and innovation has been argued to be both the production of creative ideas as the first stage and their implementation as the second stage (Amabile, 1996; Oldham, Cummings, Academy, & Jun, 2007; Shalley et al., 2004; West & Farr, 1989). We therefore add a creativity component to the measurement of proactive idea implementation. As previously suggested (Bindl & Parker, 2010; Frese & Fay, 2001; Rank et al., 2004), the distinct fields of innovation and proactive behavior would benefit from better integration. By measuring both creative idea generation and proactive idea implementation we assure we cover both phases on the innovation process.

5.3 Measuring proactive idea implementation in a population of students

To measure proactive idea implementation we elaborated on a measurement instrument created by Parker et al. (2006). According to them: "Proactive idea implementation, involves an individual taking charge of an idea for improving the workplace, either by voicing the idea to others or by self-implementing the idea" (Parker et al., 2006, no. 637). The measurement instrument of proactive idea implementation developed was part of a larger survey. They used a context-specific approach in their measurement. This means that they tailored their instrument to the work context of the respondents. After all, in order for a behavior to be proactive it has to deviate from what is normal

or expected and what is normal or expected depends on the context. Five goals were chosen for which individuals were asked 1. how many new ideas they had had in the last 12 months, 2. whether they had put those ideas forward and 3. whether they were implemented. The five goals were 1. saving money or cuttings costs; 2. improving quality; 3. improving customer delivery times; 4. making a better product; and 5. working together effectively.

To adapt their instrument to our population of students we first needed to come up with areas of improvement that fit the context of a student. We came up with three themes that would relate to students. We pilot tested these theme with 75 students and these proved to cover the range of important areas in which student come up with ideas to change things. Previous studies showed that proactive behavior can be applied in various domains. It can be used to be more effective in a job, to manage a career better (Seibert, Kraimer, & Crant, 2001), to shape the work environment (Wrzesniewski & Dutton, 2001), and to cope with stress (Aspinwall & Taylor, 1997). We tried to cover all these areas in the themes we chose. The first theme was home/private life, the second theme was hobby/work and the third was school/studies. We asked students whether they had had new and useful ideas in each respective theme.

Moreover, because we wanted to make sure we did not limit students in their creativity we started with an even more open question in the beginning. We asked them whether they had had any new and useful idea lately. They were encouraged to write down their original and useful idea and stipulated that their idea could entail anything. This very open question made sure we did not miss innovative ideas that would just fall outside of the three themes we distinguished earlier. Moreover, it allowed us to see who was able to describe their own great ideas without being forced into a specific format or context.

In our survey students were asked how many ‘new ideas’ they had in the last half year. The original scale of Parker et al. (2006) states ‘the last 12 months’, but our pilot study indicated that it was easier for participants to recollect memories of the last six months. Moreover, we wanted to prevent overlap in ideas recollected between the moments of measurement, since our research design is longitudinal and we want to measure progress.

The scale ranged from no new ideas, one or two new ideas, 3–10 new ideas, to more than 10 new ideas. The instruction students received was that the ideas needed to be new and useful. They were asked to try to remember which original ideas they had

come up with and were told that these ideas might entail anything. For the first few questions students received no further instructions about the content of the idea. For the last three sets of questions students were given a theme (home and private life/ work and hobby/ school and studies). They were asked whether they had had an idea (in the past six months) to change and improve anything (in their private life, their job or their school respectively). Students were also instructed that if they had already described their best idea for a specific theme, they were allowed to skip that theme.
Next, for every theme, if students indicated that they had had at least one new idea, they were asked whether they had (a) suggested the idea/s to anyone and, if so, to whom (no; yes —to my parents; yes- to my teacher; yes- to my fellow students; yes – to my friends; yes- to other); and (b) whether the idea/s was generally implemented and by whom (no; yes—by myself; yes—by others). Like in research by Parker et al. (2006), for each theme, there were two possible proactive responses: suggesting ideas to someone and self-implementing the idea. For each theme, a student scored 1 if they indicated they had engaged in at least one of these proactive actions and 2 if they had engaged in both. A score of 0 indicates either that the individual had no ideas (an individual cannot proactively implement ideas if they do not have any ideas in the first place) or that they had come up with new ideas but did not suggest them to anyone nor self-implement them. Responses were averaged across the 3 themes and the open question. Scores ranged from 0 to 2.00, with a mean of 0.82 (SD 0.61) for the first measurement; with a mean of 0.87 (SD 0.58) for the second measurement; and with a mean of 0.94 (SD 0.64) for the third measurement. The majority of the students was not proactive at measurement 1.

5.4 Measuring creative idea generation

Parker et al. (2006) did not ask for the content of the idea. We elaborated on this measurement tool by adding a measurement for creativity. Coming up with new ideas is crucial for proactive idea implementation, but also for creativity. We included a measurement for creativity for two reasons. 1. By asking about the content of the idea we were able to check whether students actually had an idea in mind or were just trying to fill in the questionnaire for social desirability reasons, this would allow us to discard their response or alternatively take the rest of the data more seriously. 2. By coding the ideas in terms or originality and utility we were also to say something about the level of creativity.

For ideas to be considered creative they have to be both novel or original and useful. There are however few creativity theorists that argue that the idea needs to be completely unique (Amabile, 1996). The idea needs to be both different and valuable, correct, appropriate or expressive of meaning (Amabile, 1996). It is possible to rate ideas based on these qualifications. We asked students to describe their best idea. We created a coding scheme to assess how creative those ideas were by looking at both usefulness and originality. Ideas were assessed on both indicators by scores ranging from 0 (not useful/original) to 2 (very useful/ original). Score 1 corresponded with somewhat useful/original.

Examples for improving school/studies from not original to very original

Studying harder, using more structure in studying or making summaries may be considered very useful (2) but not at all original (0). Students are expected to study hard and in an efficient and an effective way.

Organizing specific study groups with friends or, taking an extra course (for example time management) is considered somewhat creative (1) and very useful (2). Not every student comes up with this idea and it definitely deviates from what is normally expected from students.

Creating an app that summarizes homework for you is considered both very useful (2) and very original (2).

The choice of whether something was creative also depended on the ideas expressed by other students. When 80% of the students mentioned that exact same idea, it was considered less original than when only 1 or 2 students shared that idea. The coding scheme was developed with 3 independent researchers. In a session with 3 coders (2 students and the researcher) on October 9th 2014 the data of the open questions were first analyzed. The coders were instructed to rate the ideas of the open questions first on a scale from 0-2 for both originality and usefulness. After discussing the difference between originality and usefulness and explaining the connotations of 0, 1 and 2 the coders each rated 3 pages (25 ideas) on their own. Then the ratings were discussed and

consensus was reached. The coders then rated 3 more pages (32 ideas) and discussed the coding again. Consensus was found for all the differences. From these discussions a coding schedule was made. With the coding schedule all three coders individually rated the rest of the ideas. Based on these three independent raters an idea received a final rating based on the majority of the codes.

Finally, to calculate the level of creativity we gave 0 points when either of the two criteria was appointed 0 points, because both the originality and the usefulness criteria need to be met in order for an idea to be considered creative. 1 point was assigned when both criteria were rated with a 1 or a combination of 1 and 2. Because the difference between a 1 and a 2 is somewhat arbitrary we chose not to differentiate between a little creativity and a little more creativity. The three coders decided that the data did not allow for such detailed distinction in the level of creativity. Unanimously they decided that it was however possible to indicate genuine 'hits'. This means that some ideas truly stood out and it was easy to indicate they were both very original (2 points) and very useful (2 points). For the rare occasions that happened, 2 point were assigned to that idea. For students that decided to skip the theme 9999 was entered to indicate missing data.

Examples of 'hits' very creative ideas

(because of confidentiality some details are omitted or changed). One student took the initiative to do a research into the effects of working in multidisciplinary teams on the recovery of patients with Cerebro Vasculair Accident. He or she then pitched the results of that research to a local rehabilitation center on one of their open days. They then talked about starting to do research together.
This idea was awarded the full points because in many ways this behavior goes beyond normal expectations, is original and useful.

Another student described how he or she read in the newspaper that testing your knowledge is a better way to memorize study material. He came up with an idea to create a game that tests knowledge as a way of preparing for exams.
This idea was awarded the full points because in many ways this behavior goes beyond normal expectations, is original and useful.

Finally one student came up with the idea to write a children's book and doing the animation as well, he or she explained some of the plot and the characters in the book.
This idea was awarded the full points because in many ways this behavior goes beyond normal expectations, is original and useful.

The level of creativity for all four questions was averaged, so including the open ended question in the beginning and the three themes. Scores ranged from 0 to 2 for the first 2 measurements but from 0 to 1 for the third measurement. The mean creativity for the first measurement was 0.53 (SD 0.43); for the second measurement it was 0.41 (SD 0.41); and for the third measurement a mean of 0.42 (SD 0.38). The measure of creativity showed high kurtosis. We observe two strong peaks at 0 (no creativity) and at 1 (creativity). This was as expected since we basically dichotomized the measurement.

5.4 Description of proactive idea implementation

The coding of proactive behavior went relatively smoothly. On a few occasions students claimed that their idea was both not implemented and yet implemented by themselves. When this discrepancy occurred, the description of the idea often explained why this was the case and we were able to choose the correct code. Because the themes were rather general, and the explanation for students was limited to prevent steering, the reactions of students were rather mixed. Some found it very difficult to answer the questions whereas others immediately starting writing and thinking. Yet other students clearly needed more instructions, which is an interesting result in itself. Students are not often challenged to share their personal creative thoughts without knowing what is expected exactly.

From the number of extensive answers we can conclude however that most students, some after a little hesitation, were able to think back of some of the ideas for improvement they had had. For our description of the proactive behavior of students we focus on the first measurement moment because this groups is the largest (N=594). All the students in our measurement answered the first question how many 'new ideas' they had had in the last half year. Of all the students 37,9 percent was unable to recollect original and useful ideas of their own. Some 23.2 percent however indicated that they had had at least 1 or 2 new ideas in the past half year. Another 31% claimed they had had 3-10 ideas and a small percentage of 7.9% even had over 10 ideas. When students indicated they had ideas for a certain theme, but failed to provide the best idea, their results were excluded from analysis because they were not considered reliable.

For the other questions in which themes were introduced to help students in answering the questions, we see more modest estimations of the number of ideas. The number of students that claimed to have more than three ideas remained under 17% for the three themes (home/private, work/hobby or school/studies). For the first question this percentage was 39%. When it comes to whether students actually did something with their ideas (voicing it to others and/or self-implementing their ideas) we see that many students showed no proactive behavior. Most students did voice their idea (90.6%), but in only in 33% of the cases students executed their idea themselves.

5.5 Description of creative idea generation

Coding the creativity of the ideas students wrote down proved to be complicated. When coding the data we faced two important challenges. The first challenge was that several students indicated that they had several ideas but were not willing to share them for privacy reasons. These students wrote down 'private' or as one student wrote down 'I have several business ideas but I would rather keep them to myself'. Still another student explained he was in the middle of patenting his idea and was therefore not able to share his idea just yet. These students received a separate code because although we have no way of coding the creativity of their idea, we have every reason to assume they genuinely had ideas. We could therefore still code their proactivity. For the first question 3.8% of the students were not willing to share their idea. For the theme home/ private the percentage was 2.6 and for the final two themes only .2 percent.

The second obstacle was that some descriptions were so vague or more of a description about the topic and theme of their idea instead of a description of the content of their idea. The questionnaire did invite students to write down the actual content of their idea, but clearly this instruction was not followed up on by every student. Because we were unable to code the creativity of these ideas neither, these ideas received a special code as well. An example is 'I pitched multiple ideas at the McDonalds where I work; these ideas refer to the kitchen personnel and the fact that they are being replaced by machines more and more'. Although this is an excellent example of proactive behavior, we don't know whether this idea was creative or not because we miss pertinent information about the details of the idea. For the first question we were unable to code 9.5 percent of the data, for the other three ideas fortunately only 1.1%, 4.9%, and 2.5%.

Example of proactivity versus creativity

An example of the above is a beautiful description of a student who suggested all kinds of improvements to their manager but nothing was done with it. Because this person did not describe the content of the idea we could not code it for creativity, but we can however code it for proactivity. Although this idea was never implemented, this is definitely a proactive person.

In the next section we explain how we coded the creativity of the ideas per theme. We first explain how students answered the first open question and then describe how the answered the subsequent themes of Home/Private life, Work/Hobby and School/ Studies.

General ideas

The first question was an open ended question for which students received no further instructions than writing down the content of the best idea they had had in the past half year. They were instructed that the idea needed to be their own, and that it needed to be original and useful. Other than that anything was possible.

Understandably, because of that instruction the range of themes of ideas was very wide. Some students describe more philosophical ideas of how they believe power of the rich could be redistributed to the poor. Others have very concrete ideas for product design. Still others describe how they would distinguish themselves from other professionals by choosing a specific specialization in their physiotherapy practice. The ideas are very diverse, but in itself often valuable and creative. Although these very broad themes make it very hard to reliably assess creativity in this manner, it is also an indication of how diverse students are in their thinking. This reassures us that the open ended questions, however hard to code, did lead to rich data.

Some ideas related to creating apps that would make everyday life easier, for example creating an app to find your bike, meeting new people etc. For privacy reasons I cannot share all the details of students' ideas. Depending on the originality of the app idea students received a 1 or a 2 for originality. Coming up with creating an app in the first place was generally seen at least a somewhat creative idea because definitely not all students would come up with this idea. Another idea that was often mentioned was deciding to enter an honors program. This idea was considered very useful (2) because it is a good investment in your career and development and a great challenge. It was considered also somewhat original (1), because not everybody comes up with this idea, and it is definitely not generally expected of students as it is an extracurricular program. Of course there were many other ideas that students mentioned that were equally useful and just as, or even more original. For example doing an internship abroad, taking on extra classes on your own initiative or choosing to do a (pre)master's program.

Of the ideas we were able to code (N=294) for the first question of the first measurement, 22.4% percent were not considered creative. This means that those ideas were either

not at all original or not at all useful. Generally the ideas students wrote down were useful to even very useful, in only 2% of the cases was an idea considered inadequate by the coders. So although the students came up with generally good ideas, their ideas were not at all creative in 22.4% of the cases. 72.8% of the ideas were however considered at least somewhat creative. And only 4.8% of the students had ideas that really stood out and were rated both very original and very useful (the so-called 'hits'). We consider the first open ended question to be the best indicator of true creativity because this question did not limit students to the themes we chose for them.

Ideas for home/private life

As it turns out, the first theme (home/private life) was probably the most unsuitable theme of the three to measure true creativity. When it comes to ideas about personal life, students have a lot of important ideas but they are a lot less creative. Most ideas concern being more effective, working out more, spending more time with loved ones and being more satisfied with life overall. Although these ideas are in itself very good, they are hardly original. All these ideas fall within the expectations of a normal person engaging in everyday life.

A striking fact was that many students mentioned moving out of their parental house as one of their most important ideas. The goal of these actions was often to become more independent and developing themselves. In this same goal other ideas were mentioned like ending my relationship, hanging out with (different) friends more often, taking more 'me-time' and focusing on what is really important for me. All these ideas are potentially really useful, but not particularly original. Only when there were very concrete and somewhat original ideas we marked them as such, like deciding to walk half a marathon or traveling to London for vacation with friends to work on the English language.

Other ideas like refurbishing the house or better planning were not considered creative. However when specific and original time management tools were administered like taking 1 hour a day to rest or no longer watching television before sleeping, this was considered somewhat original. Even more original was refurbishing old cars or houses as a way of making money.

Of the ideas we were able to code at measurement 1 (N=286) for home/private life, 67.8% percent were not considered creative. Again this was mostly because the ideas were not very original, not because they were not useful. 30.8% of the ideas were however considered at least somewhat creative. And only 1.4% of the students had ideas that really stood out and were rated both very original and very useful.

Ideas for work/hobby

When it comes to ideas for work and hobby, students seemed to be primed to be more original. Still many students mention changing sports or jobs as great original ideas, but some students are more creative. They come up with very concrete examples of how they made processes at work more efficient or effective. They also share their ideas to work abroad, start their own businesses or to work on very challenging projects.

Spending time with colleagues or friends was mentioned often and was not considered original and therefore not creative. Organizing a network event however was considered somewhat more creative. Also finding a part-time job is in itself is not original, this is a very natural thing to do for a student, yet it is very useful. Suggesting ideas at your part-time job to improve the workplace to make it more efficient or attractive, changing procedures of products to increase customer satisfaction or improve sales is much more creative. When it comes to part time jobs we also see quite a few students who implemented a more automated or digital way of doing to job more efficiently. Like starting to use the cloud for storage or work together on a digital platform instead of having meetings and making minutes. Although these changes are not revolutionary they are somewhat creative because they are new for the context of the company are and changing these work processes is not naturally expected from students working on a part time job.

When it comes to hobby, starting to do fitness, changing sports or changing an instrument is not considered original. Changing a specific position in a team sport because that position fits your personality better is considered somewhat original. Also, pitching ideas to improve the structure of the sports training to make it more effective is somewhat original. One student described for example that he or she wanted to use a different leadership style, being more facilitating than demanding. Another came up with a new cocktail in their job as a bartender or started sewing clothes from waste materials.

Of the ideas we were able to code (N=236) for work/hobby, 48.7% percent were not considered creative. Again this was mostly because the ideas were not very original, not because they were not useful. 50% of the ideas were however considered at least somewhat creative. And only 1.3% of the students had ideas that really stood out and were rated both very original and very useful. An example of that is a student that came up with the idea to apply gamification techniques like competition in the workplace to improve sales and make work more fun in the process.

Ideas for school/studies

When it comes to the final theme, most ideas concern working harder, starting in time, showing more discipline, making summaries of classes and books, being more motivated and taking study related affairs more seriously. These ideas, although useful, were not considered original because they are directly in line with what is expected of every student. Some other ideas however, taking on extra courses, doing a final year in English etc. were considered more original because they go beyond what is generally expected of students.

Many students also uttered ideas about what could be more efficient or student focused in their study programs. These ideas were all very proactive. Some students even described that on their own initiative they started giving their teachers pointers on how they could make the classes more interactive or how they could incorporate certain trends in their lectures. Not all of these ideas were very original, but they can all be considered very proactive.

Ideas that were considered somewhat original were taking on extra courses, choosing to participate in a political party and changing schools. A great original example came from a student who had read in the newspaper that testing your own knowledge works very well for memorizing the study material. This student created a game in which he or she can earn points when testing his or her own knowledge.

Of the ideas we were able to code (N=242) for school/studies, 56.2% percent were not considered creative. Again this was mostly because the ideas were not very original, not because they were not useful. 42.1% of the ideas were however considered at least somewhat creative. And only 1.7% of the students had ideas that really stood out and were rated both very original and very useful.

5.6 Overall findings

Overall we found that students are not used to being asked for their own individual ideas. They seek more structure and explanation and seem somewhat shy and reluctant to share their ideas. When they do share their innovative ideas they often refer to a course, assignment or situation in which they were required to come up with a good solution for a problem.

From the ideas students did share we could tell that they are in a phase in which choosing the degree program and deciding on a career path demands much from them. The ideas they mention often refer to making responsible choices to enhance their employability. Only few students are really capable of coming up with very original ideas to create new products, start new blogs or websites or start their own venture. Maybe asking new and original ideas from students still in university is a little early in their creative development.

Another striking point was that many students talk about balancing their work-life, private-life and school-life. This appears to be a high priority in their life and proves to be very challenging for them. This constant battle could possibly inhibit creative thought and self-initiative.

Some strikingly original, fun and creative ideas were shared by students. Although these ideas are more exception than rule, they suggest that some students are capable of coming up with great and original ideas and all we need to do is ask for them.

5.7 Evaluations of the measures

The correlation-matrix below (table 10) is based on the data from our first measurement. Proactive behavior and creative behavior do not seem to correlate to each other, which reconfirms a clear distinction between the two concepts. One can be very proactive with a rather standard idea, or have a revolutionary idea but not act on it. In fact, the table shows that the two concepts can even be negatively correlated, although these correlation coefficients are rather small.

Table 10. Correlation matrix proactivity and creativity at first measurement across the open question and the questions related to the three themes

		Mean (SD)	1	2
1	**Creativity** General Ideas	.82 (.49)	1.00	
2	**Creativity** Home/private life	.34 (.50)	.157*	1.00
3	**Creativity** Work/Hobby	.53 (.53)	.005	.262**
4	**Creativity** School/Studies	.45 (.53)	.210*	.144
5	**Proactivity** General Ideas	.86 (.84)	-.154**	.027
6	**Proactivity** Home/private life	.93 (.90)	-.013	-.159**
7	**Proactivity** Work/Hobby	.72 (.89)	.042	-.055
8	**Proactivity** School/Studies	.70 (.84)	-.045	-.026

For creativity we see that the themes do not all correlate with each other whereas that is the case for proactivity. Moreover we see that on all the proactivity measurements students score relatively highly. A comparable score for creativity however is only found for the first question in which students were not forced into a theme. We think this score is possibly the best indicator of the level of creativity. Nevertheless for both proactivity and creativity the scores were averaged across the 4 questions to increase reliability . This was done for all three measurements in time. The scores range from 0 to 2. A correlation matrix of the scores on creativity and proactivity over time is provided in table 11.

3	4	5	6	7	8
1.00					
.094	1.00				
.124	.066	1.00			
.036	.039	.299**	1.00		
-.120	.110	.275**	.341**	1.00	
-.061	.036	.305**	.337**	.309**	1.00

Table 11. Average level of creativity and proactivity over time

		Mean (SD)	1	2	3	4	5	6
1	**Creativity T1 (N=459)**	.53 (.43)	1.00					
2	**Creativity T2 (N=128)**	.41 (.41)	.241*	1.00				
3	**Creativity T3 (N=62)**	.43 (.39)	.173	.279*	1.00			
4	**Proactivity T1 (N=594)**	.82 (.61)	.014	.051	-.175	1.00		
5	**Proactivity T2 (N=166)**	.84 (.59)	.147	-.125	-.056	.458**	1.00	
6	**Proactivity T3 (N=88)**	.89 (.64)	.053	-.206	-.034	.230*	.380**	1.00

Table 11 shows that the creativity measure does not correlate with the proactivity measure. We do see statistically significant correlations between the level of creativity at measurement 1 and measurement 2 ($R = .241$, $p = .013$) and between measurement 2 and 3 ($R = .279$, $p = .043$). For proactivity we found a significant correlation between all three times of measurement. When we look at the mean scores on both creativity and proactivity we see that the level of creativity appears to be declining over the years, whereas the level of proactivity appears to be climbing. Overall the level of creativity of students throughout the years is lower than their level of proactivity.

Finally when we look at the distributions of all the measurements of both creativity and proactivity we see a relatively good distribution considering the fact that the data was coded with scores of 0-2. We do see that kurtosis plays a role in the sense that the distribution is too flat because of large peaks at 0 and 1 for creativity and proactivity. However, considering the large sample size (especially for measurement 1), the fact that there are no issues with singularity and multicollinearity (see table 11), the fact that outliers do not seem to affect the mean scores (only marginal differences between the trimmed mean and the normal mean) and finally the fact that the data were transparently coded by three independent coders, we expect our measures of proactivity and creativity to be adequate measures to test our model in the next chapter.

6

Results: Hypotheses testing

Chapter 6

Results: hypotheses testing

6.1 Introduction

In this chapter we address the hypotheses we formulated in chapter 2. We first discuss the relative value of the personality traits in predicting proactive and creative behavior. We expect proactive personality to be a crucial predictor for innovative behavior and we added more traditional traits to our model to determine the added value of proactive personality over traditional traits. Next, we discuss the mediating role of creative and academic self-efficacy. After that we describe the moderating effect of participating in an honors program on the relationship between personality and self-efficacy. For that purpose we first compare honors students and non-honors students on all antecedents and describe the interaction effect between personality and context. We also report the development of creative and proactive behavior over time for both the honors and non-honors group. Finally we describe the differences between the two groups in achievement during and after their studies.

6.2 The relationship between personality and innovative behavior

As outlined in chapter 2 we expect four personality traits to positively predict either creative or proactive behavior or both. Proactive personality, extraversion, conscientiousness and openness are all distal antecedents in our model. Of the four, we expect proactive personality to be the strongest predictor in our model because it is strongly tailored to both creative and proactive behavior (Bateman & Crant, 1993) and because it is a compound variable that encompasses the more traditional traits like extraversion, conscientiousness and openness (Tornau & Frese, 2013).

All the personality traits were measured with self-rated 5-point Likert scales as outlined in chapter 3. Proactive behavior and creative behavior were measured with our instrument as described in chapter 5. We tested to what extent these personality

traits predicted proactive behavior and creative behavior, using a hierarchal multiple regression analysis. The first analyses were performed including the total group (N=594) at measurement T1. The regression analyses were performed with the level of proactive behavior and creative behavior as the dependent variables and the personality traits we hypothesized as antecedents as the independent variables - controlled for gender, age, level of education, ethnicity and school. The latter three variables were Dummy coded. Behind each of these variables we reported (between brackets) to which dummy variable the beta-value relates. When more dummies for that specific variable reached statistical significance, we chose to display the highest beta-value and list the other dummies in the text. The control variables were entered in the hierarchal regression analysis first (model 1), the traditional personality traits were entered second (model 2) and proactive personality was entered last (model 3).

We split our testing into two parts. We will first test the relationship between the personality traits and proactive behavior in paragraph 6.3 and then test the relationship between personality and creative behavior in paragraph 6.4.

6.3 The relationship between personality and proactive behavior

In this first section we analyze the influence of the personality antecedents on innovative behavior by focusing on proactive behavior as an outcome. We first and foremost expect proactive personality to predict proactive idea implementation **(hypothesis 2)**. The fact that proactive individuals are willing to question the status quo, show initiative and persevere (Bateman & Crant, 1993) will help them implement their ideas or voice them.

However, other - more traditional - personality traits are also expected to positively predict proactive idea implementation. First, extraversion is expected to positively affect proactive idea implementation **(hypothesis 3)**, because extraverted individuals are outgoing, easily approach others and feel comfortable to push forward their ideas (Caniëls et al., 2014). Second, conscientiousness is expected to positively affect proactive idea implementation **(hypothesis 4)** because this trait includes action orientation and persistence (Mccrae & Costa, 1987) which are important aspects in bringing about change. Third, openness is expected to positively predict proactive idea implementation **(hypothesis 6)** because it is associated with curiosity, flexibility

of thought and openness for new ideas (Mccrae & Costa, 1987). Finally we expect proactive personality to predict variance in proactive idea implementation over and above conscientiousness, extraversion and openness **(hypothesis 8)**.

Table 12 shows that all the control variables together explain 4% of the total variance in proactive idea implementation. Of the control variables, only previous level of education and school had a significant influence on proactive behavior. A few students in our sample are master students and this has a statistically significant positive influence on the level of proactive behavior (b=0,10, p=0.025). Also, the school students are in, influences their level of proactivity. Students from AGZ (b=0,11, p=0.011), AMA (b=0,17, p=0.000), APO (b=0,13, p=0.007) and MIM (b=0,16, p=0.003) are more proactive than students from other schools. Gender, age and ethnicity have no influence on the level of proactive behavior.

Table 12. Hierarchal Regression Analysis for Personality predicting Proactive idea implementation (N=594)

Models and predictors	Model 1	Model 2	Model 3
1 Control variables			
Gender	.03	.04	.05
Age	.05	.04	.03
Level of education (master)	.10*	.10*	.10*
Ethnicity (NL)	.09	.10	.10
School (AMA)	.17***	.16***	.17***
2 Traditional personality traits			
Conscientiousness		.04	-.01
Extraversion		.05	.02
Openness		.15**	.11*
3 Proactive personality			.13*
R^2	.08**	.11***	.12*
Adjusted R^2	.04**	.07***	.08*
ΔR^2		.03***	.01*

Note. The displayed coefficients are standardized beta weights.
**p < .05. ** p < .01. *** p < .001*

When we add the three traditional personality traits to the regression analysis the percentage of variance increases significantly to 7%. However, of the personality traits we selected for our model, only openness turned out to be a statistically significant predictor (b=0,15, p=0.001) for proactive behavior over and above the other control

variables. In contrast to what we expected, extraversion and conscientiousness were non-significant predictors in the model.

In the next step we added proactive personality to see whether this trait would predict proactive behavior and whether it would account for additional variance in proactive behavior over and above control variables and openness. Table 12 shows that adding proactive personality to the traditional model does in fact explain extra variance, but only 1 percent (b=0,13, p=0.025). Moreover the standardized beta coefficient of proactive personality is higher than that of openness in model 3, while both traits still remain statistically significant predictors. This indicates that proactive personality, as hypothesized, is a stronger predictor for proactive behavior than any of the traditional traits alone or combined, but the added effect is only 1%

Therefore hypothesis 2 **(Proactive personality positively predicts proactive idea implementation)** is confirmed. This is a confirmation of our proposition that the willingness to question the status quo and to deviate from formal expectation, makes individuals more readily implement their proactive ideas. However, in contrast, our third **(Extraversion positively predicts proactive idea implementation)** and fourth hypothesis **(Conscientiousness positively predicts proactive idea implementation)** were rejected. Of the more traditional personality traits we measured, only one turned out to be a significant predictor of proactive idea implementation. We therefore did find confirmation for hypothesis 6 **(Openness positively predicts proactive idea implementation)**. And finally we were able to confirm hypothesis 8 **(Proactive Personality predicts variance in proactive idea implementation over and above conscientiousness, extraversion and openness)** since proactive personality turned out to be a stronger predictor that any of the other traits alone or combined.

6.4 The relationship between personality and creative behavior

In this next section we continue to analyze the influence of the personality antecedents on innovative behavior by now focusing on creative behavior as an outcome. As outlined in chapter 2 we expected proactive personality to predict creative idea generation **(hypothesis 1)** because the willingness of the proactive personality to question the status quo and to deviate from formal expectation makes proactive individuals more

likely to develop new ideas to improve the work situation. Of the more traditional traits we only expected openness to predict creative behavior **(hypothesis 5)** because it is so closely related to creativity (Dollinger et al., 2004; George & Zhou, 2001). Finally, of the two traits we expected proactive personality to predict variance in creative idea generation over and above openness **(hypothesis 7)**.

Table 13 shows that the control variables explained 12% of the variance in creative idea generation. Of these variables only gender and school had a significant influence on creative idea generation. This means that men were more likely to come up with creative ideas. Seven schools proved to be particularly creative, namely ACT (b=0,21, p=0.000), AGZ (b=0,22, p=0.000), AMA (b=0,15, p=0.004), AMM (b=0,22, p=0.000), FEM (b=0,16, p=0.002), HBS (b=0,1-, p=0.045) and MIM (b=0,19, p=0.001). Table 13 only displays the beta-values for AGZ because these beta-values were highest.

In the next step we added openness to the regression model and this resulted in an additional explained percentage of the variance of only 2 percent. That openness proved to be a significant predictor is in line with our expectations. In the third step we added proactive personality to see whether this trait would predict proactive behavior and whether it would account for additional variance in proactive behavior over and above control variables and openness. Table 13 shows in contrast to our expectation, that adding proactive personality to the traditional model does not explain any additional variance in creative idea generation.

However, when we run a regression analysis without controlling for openness, we see that proactive personality does explain an extra 1% of variance in creative idea generation (Δ R2 = .01), with a standardized beta coefficient of .10. This is in line with our expectation. This effect however turns out to be fully explained by the overlap proactive personality and openness show.

Table 13. Hierarchal Regression Analysis for Personality predicting Creative Idea Generation (N=459)

Models and predictors	Model 1	Model 2	Model 3
1 Control variables			
Gender	-.14**	-.12*	-.12*
Age	-.04	-.06	-.06
Level of education (MBO)	-.21	-.17	-.18
Ethnicity (NL)	.01	.02	.02
School (AGZ)	.22***	.22***	.22***
2 Personality			
Openness		.16***	14**
3 Proactive personality			.04
R^2	.16***	.18***	18
Adjusted R^2	.12***	.14***	14
ΔR^2		.02***	.00

Note. The displayed coefficients are standardized beta weights.

**p < .05. ** p < .01. *** P < .001*

Therefore we can confirm the first hypothesis (Proactive personality positively predicts creative idea generation). Proactive personality proved to be a significant predictor of creative idea generation. However, after controlling for openness this effect disappears. This leads to a rejection of hypothesis 7 (Proactive Personality predicts variance in creative idea generation over and above openness). Our results show that when openness and proactive personality are both placed in the model only openness remained as a significant predictor in our model in addition to our control variables. In fact, openness predicts variance in creative idea generation over and above proactive personality instead of the other way around. Hypothesis 5 (Openness positively predicts creative idea generation) therefore is clearly confirmed. Openness is the only and strongest personality related antecedent of creative idea generation in our model.

6.5 The mediating role of creative self-efficacy in predicting proactive behavior

In this next section we want to describe the motivational process underpinning innovative behavior. We start by describing the process for proactive behavior. We

expect that engaging in proactive behavior involves a conscious calculation of the likelihood that exerting effort will lead to a successful output. In chapter 2 we therefore hypothesized that self-efficacy mediates the relationship between personality traits and proactive idea implementation (hypothesis 10). We chose creative self-efficacy and academic self-efficacy. The first is defined as the level of confidence that one can produce creative outcomes. The later refers to the level of confidence that one can take on a broader role than their formal academic expectations (e.g. taking on extra courses or broadening their knowledge). Both self-efficacy variables are measured with self-rated scales as described in chapter 3.

To test the mediation of creative self-efficacy we performed a second regression analysis with the mediator (creative self-efficacy) as the dependent variable and personality traits (only proactive personality and openness) as the predictor (again controlled for control variables). Results showed that both proactive personality (b=0,27, p = 0.000) and openness (b=0,21, p = 0.000) are statistically significantly associated with creative self-efficacy

Subsequently, following the procedure of Baron and Kenny (1986), a regression analysis with personality traits and the mediator as predictors and proactive behavior as the dependent variable revealed that the previously found relationship between proactive personality and proactive behavior became non-significant (b = 0.08, p= .076). The previously found relationship between openness and proactive behavior became non-significant as well (b = 0.08, p = .108.). The mediator creative self-efficacy however did show a significant relation with proactive behavior (b = 0.16, p = .000). This suggests full mediation of creative self-efficacy (figure 1.). A Sobel test (Baron & Kenny, 1986) confirmed that creative self-efficacy fully mediates the relation between proactive personality and proactive behavior (Z = 3.12, p = .000) and between openness and proactive behavior (Z = 2.85, p = .002).

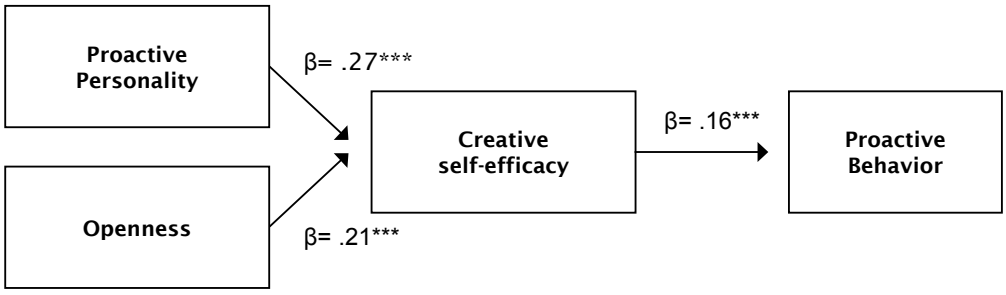


Figure 1 Mediation model creative self-efficacy for proactive behavior (N=594)
*Note. *p < .05. ** p < .01. *** p < .001*

In line with our expectation as outlined in chapter 2 we found that creative self-efficacy fully mediates the relationship between personality and proactive behavior. This means that a proactive personality and an open personality lead to a certain level of confidence one can produce creative outcomes. This confidence in turn leads students to voice their creative ideas and or self-implement their ideas.

6.6 The mediating role of academic self-efficacy in predicting proactive behavior

The next motivational process underpinning the relationship between personality and proactive behavior we want to study, is the role of academic self-efficacy. We expected that a level of confidence that one can take on a broader role than their formal academic expectations leads to voicing ideas for improvement or self-implementing those ideas more often.

We therefore did another regression analysis with the mediator (academic creative self-efficacy) as the dependent variable and openness and proactive personality as the predictors (again controlling for control variables). This analysis showed that proactive personality significantly influences academic self-efficacy (b=0,32, p = 0.000), as does openness (b=0,29, p = 0.000).

Following the procedure of Baron and Kenny (1986), a regression analysis with personality traits and the mediator as predictors and proactive behavior as the dependent variable revealed that the previously found relationship between proactive personality and proactive behavior became non-significant (b = 0.09, p = .064). The previously found relationship between openness and proactive behavior became non-significant as well (b = 0.07, p = .13). The mediator academic self-efficacy however did show a significant relation with proactive behavior (b = 0.12, p = .011). This suggests that academic self-efficacy fully mediates the effect of proactive personality and openness on proactive behavior. A Sobel test (Baron & Kenny, 1986) confirmed that academic self-efficacy fully mediates the relation between proactive personality and proactive behavior (Z = 2.44, p = .007) and between openness and proactive behavior (Z = 2.42, p = .007).

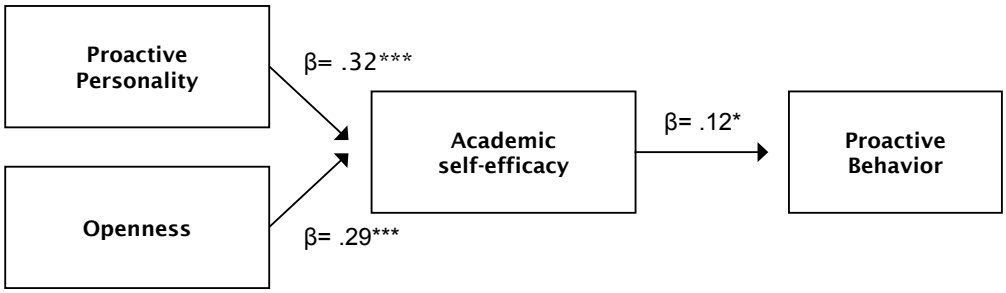


Figure 2 Mediation model academic self-efficacy for proactive behavior (N=594).

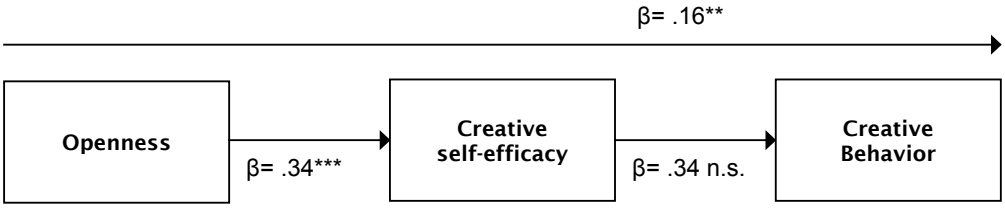
In line with our expectation as outlined in chapter 2 we found that academic self-efficacy fully mediates the relationship between personality and proactive behavior. This means that a proactive personality and an open personality lead to a certain level of confidence that one can take on a broader role than their formal academic expectations and that this in turn leads students to voicing and implementing their ideas.

Hypothesis 10: Self-efficacy mediates the relationship between personality traits and proactive idea implementation, is therefore confirmed. Both creative self-efficacy and academic self-efficacy mediate the relationship between openness and proactive personality on the one hand and proactive behavior on the other hand. This means that certain personality traits lead to a certain level of confidence in both taking on extra academic challenges and achieving creative outcomes. This confidence then leads to students voicing and implementing their ideas.

6.7 The mediating role of creative self-efficacy in predicting creative behavior

Next we are interested in the underlying process relating openness to creative behavior. In line with the reasoning of section 6.6 we hypothesized that self-efficacy mediates the relationship between personality traits and creative idea generation **(hypothesis 9)**. The test this hypothesis, the next mediation regression analysis was done for the dependent variable level of creative behavior and the personality variables as the independent variables. We first tested the role of creative self-efficacy as mediator. The regression analysis yielded a significant effect of openness on creative behavior (b=0,16, p = 0.000). The second regression analysis with the mediator (creative self-efficacy) as the dependent

variable and personality as the predictor, showed that openness influences creative self-efficacy significantly (b=0,34, p = 0.000). Subsequently, following the procedure of Baron and Kenny (1986), a regression analysis with personality and the mediator as predictors and creative behavior as the dependent variable revealed that the previously found relationship between openness and creative behavior remained more or less the same (b = .16, p = .001). Creative self-efficacy as a predictor was not significant however (b = .01, p = .839), which indicated only a direct effect of openness on creative behavior (figure 3.).



**p < .05. ** p < .01. *** P < .001*

Figure 3. Mediation model creative self-efficacy for creative behavior (N=459).

6.8 The mediating role of academic self-efficacy in predicting creative behavior

The final mediation regression analysis was done with academic self-efficacy as the mediator to see what role this variable plays in mediating the effect of openness on creative behavior. The analysis with the mediator (academic self-efficacy) as the dependent variable and openness as the predictor (again controlled for control variables), showed that and openness (b=0,45, p = 0.000) positively predicts academic self-efficacy. Subsequently, following the procedure of Baron and Kenny (1986), a regression analysis with openness and the mediator as predictors and creative behavior as the dependent variable revealed that the previously found relationship between openness and creative behavior disappeared (b = 0.07, p = .177). The mediator academic self-efficacy however showed a significant relation (b = 0.21, p = 0.000), which indicated full mediation of academic self-efficacy on creative behavior (figure 4.). A Sobel test (Baron & Kenny, 1986) confirmed that academic self-efficacy fully mediates the relation between openness and creative behavior (Z =3.99, p = 0.000), supporting our hypothesis.

**p < .05. ** p < .01. *** P < .001*

Figure 4 Mediation model academic self-efficacy for creative behavior (N=459).

These findings suggest that openness raises the level of confidence that they can take on extra academic challenges which in turn raises their creative behavior. Based on these results hypothesis 9 is confirmed. Self-efficacy does mediate the relationship between openness and creative behavior, but only via academic self-efficacy.

6.9 Honors educational context as a moderator of the personality - innovative behavior relationship

Up to this point we have tested the influence of personality antecedents on innovative behavior and the cognitive-motivational processes underlying the influence of personality on innovative behavior. We will now test the moderating effect of the honors context on this relationship. As described in chapter 2, based on trait activation theory (Tett & Burnett, 2003) we expect an interaction effect-between context and personality in their effect on innovative behavior. Hypothesis 11 reads Honors context moderates the relationship between personality and cognitive-motivational states.

To test this hypothesis we take 3 separate steps. We first compare the group of honors students to the group of non-honors students based on all personality antecedents in our model in order to later be able to adequately interpret differences between the two groups on the dependent variables. Next we test whether being in honors has a significant main effect on the cognitive-motivational processes (self-efficacy) by using hierarchical linear regression analysis. Finally, we test whether we find an interaction effect between personality traits and being in an honors program, by using moderation analysis in our linear regression test.

In the first step we want to describe whether honors students are significantly different from non-honors students on the personality antecedents in our model. We already established in chapter 4 that honors students and non-honor students are

rather similar to each other on our control variables. However, as honors students are selected for honors programs based on their motivation, their belief they can take on extra activities besides their degree program and their curiosity towards new topics, new disciplines and new students, we expect these students to score high on all the personality antecedents of our model. We tested this expectation with independent-samples t-test. The results are depicted in table 14.

Table 14. Descriptive statistics means (M) and standard deviations (SD) of the personality antecedents for honors (N=249) and non-honors (N=345) students

	Honors Mean (SD)	N	Non-Honors Mean (SD)	N	t	Sig.
Proactive personality	3.88 (.49)	249	3.71 (.53)	345	4.08	.000***
Openness	4.01 (.65)	249	3.59 (.66)	345	7.67	.000***
Conscientiousness	3.90 (.64)	249	3.70 (.62)	345	3.85	.000***
Extraversion	4.05 (.65)	249	4.04 (.67)	345	0.09	.927

*Note. *p < .05. ** p < .01. *** P < .001*

In table 14 we see that honors students score significantly higher on almost all personality antecedents than students in the control group. Honors students score higher on proactive personality, conscientiousness and openness. The Cohen's d effect size for these differences are respectively .33 (proactive personality), .64 (openness), and .31, (conscientiousness). To interpret these scores we use the general guidelines of .2 = small, .5 = moderate, and ≥.8 = large (Cohen, 1988). The effect size for openness is moderate. The other effect sizes are small to moderate. This means that the two groups are dissimilar on three of the four personality traits. Although this is a further indication of criterion-related validity of our measurement instrument (see chapter 3), we need to carefully consider these results in the next step of our analysis.

In the second step we want to analyze the main effect of the honors context on the cognitive-motivational states, creative self-efficacy and academic self-efficacy. Using independent t-tests we first tested whether the honors score higher on the malleable states creative self-efficacy and academic self-efficacy as we would expect. As depicted in table 15 we see that honors students do indeed score significantly higher of both types of self-efficacy. We however do not know whether this difference can be attributed to the different levels of personality (see table 3) or the context of the honors program.

Table 15. Descriptive statistics means (M) and standard deviations (SD) honors (N=249) versus non-Honors (N=345) in creative and proactive behavior at measurement 1

	Honors Mean (SD)	N	Non-Honors Mean (SD)	N	t	Sig.
Creative self-efficacy	3.74 (.65)	249	3.62 (.62)	345	2.29	.009**
Academic self-efficacy	4.11 (.56)	249	3.56 (.55)	345	12.03	.000***

*Note. *p < .05. ** p < .01. *** P < .001*

We therefore calculated the effect of being in an honors program on self-efficacy using hierarchical linear regression analysis, while including the personality traits as predictors at the same time. We first report the results for creative self-efficacy and then for academic self-efficacy.

So now we test the main effect of honors context of creative self-efficacy. Because proactive personality, openness and conscientiousness all have a statistically significant effect on creative self-efficacy, we included these three traits in the regression model. Table 16 shows that proactive personality and openness have a positive effect on creative self-efficacy and that conscientiousness has a negative effect on creative self-efficacy. Next we added honors context in the next step to the regression model. We see that the honors context does not have a main effect over and above the effect of the personality traits on creative self-efficacy.

Table 16. Hierarchal Regression Analysis for Personality and honors context predicting creative self-efficacy (N=594)

Models and predictors	Model 1	Model 2
1 Personality		
Proactive personality	.37***	.37***
Openness	.24***	.24***
Conscientiousness	-.17***	-.17***
2 Honors context		-.01
R^2	.22***	.22
Adjusted R^2	.22***	.22
ΔR^2		.00

Note. The displayed coefficients are standardized beta weights.
**p < .05. ** p < .01. *** P < .001*

Next we want to test the main effect of honors context on academic self-efficacy. Again only proactive personality, openness and conscientiousness have a statistically significant effect on academic self-efficacy and therefore we only included those personality traits in our analysis. We entered honors context in the second model of our analysis. In table 17 we see that in model 1 the personality traits predict 32% of the variance in academic self-efficacy. Next in model 2 we observe that adding the honors context to this model adds an additional 9% of explained variance over and above the effect of personality.

Table 17. Hierarchal Regression Analysis for Personality and honors context predicting academic self-efficacy (N=594)

Models and predictors	Model 1	Model 2
1 Personality		
Proactive personality	.20***	.22***
Openness	.32***	.17***
Conscientiousness	.20***	.23***
2 Honors context		.31***
R^2	.32***	.41***
Adjusted R^2	.32***	.41***
ΔR^2		.09***

Note. The displayed coefficients are standardized beta weights.
**p < .05. ** p < .01. *** P < .001*

In the third step we calculate the interaction-effect between personality and honors context on creative self-efficacy and academic self-efficacy. Personality traits and honors context were entered in the first model of the regression analysis and the moderator (personality trait*honors context) was entered in the second model. We repeated this analysis for all the moderators, we calculated the interaction effect between proactive personality and HP, between openness and HP and between conscientiousness and HP and measured their combined effect on creative self-efficacy and on academic-self-efficacy.

For creative self-efficacy we did not find a statistically significant interaction effects between context and proactive personality ($\Delta R2 = .22$, $F(1, 588) = .80$, $p = .371$), between context and openness ($\Delta R2 = .22$, $F(1, 588) = 1.69$, $p = .194$) or between context and conscientiousness ($\Delta R2 = .22$, $F(1, 588) = .06$, $p = .811$). For academic self-efficacy however, we did find a statistically significant interaction-effect between proactive personality and context on academic self-efficacy ($\Delta R2 = .41$, $F(1, 588) =$

5.16 , p = .32). But not for conscientiousness and context (ΔR2 = .41, F(1, 588) = .273 , p = .099) or openness and context (ΔR2 = .41, F(1, 588) = 1.13 , p = .288). Interestingly the plots in appendix 4 do appear to suggest interaction-effects between personality and context, especially for creative self-efficacy. But we only found a statistically significant interaction effect of proactive personality times honors context for academic self-efficacy. Therefore hypothesis 11 (Honors context moderates the relationship between personality and cognitive-motivational states) is confirmed but only for proactive personality and only for academic self-efficacy. This means that being in an honors program enhances the effect that having this type of personality has on students level of confidence they can take on a broader role and take extra courses and develop themselves. In the next step we want to take a closer look at the development of creative and proactive behavior of both honors students and non-honors students over time.

6.10 Developments in proactive and creative behavior over time with longitudinal data

For the analyses with our longitudinal data, we only had a limited sample available. As explained in chapter 4 only 74 students filled in the questionnaire 3 years in a row. Of those 74, 30 students were honors students and 46 were non-honors students. Of those 74 students we were able to code 44 ideas on creativity, 22 in the honors group and 24 in the non-honors group. This remaining group however does differ significantly from the group that dropped out of this study (see chapter 4) on either the control variables or the antecedents in our model.

In table 18 we can read that honors students (N=30) grow in their proactivity level throughout the years, much more than non-honors students (N=44). This interaction-effect between time and condition is statistically significant (F= 5.56, p = .028).

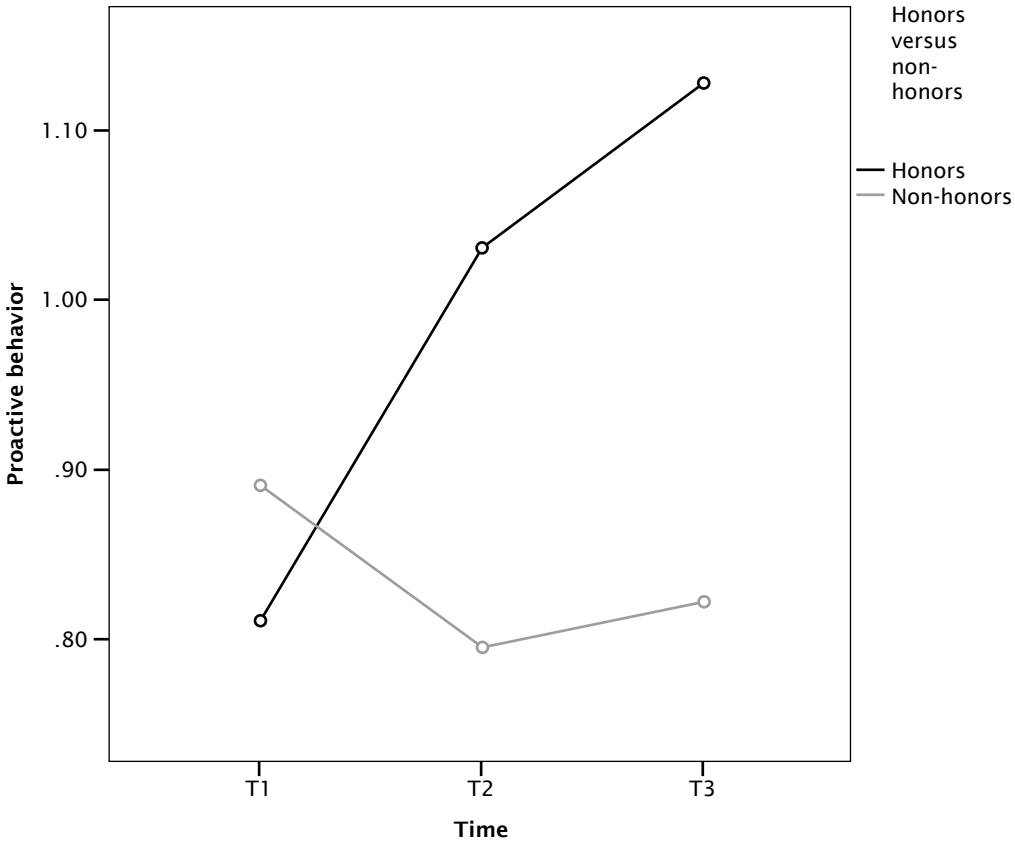


Figure 5 Development of proactive behavior for honors and non-honors students

Figure 5 shows that honor students grow in their proactive behavior mainly between t1 and t2 whereas non-honors students' level of proactive behavior drops in that time period. Note that the y-axis in figure 5 depicts a scale from .80 to 1.10., while in reality our scale of proactive behavior ranges from 0-2. Regardless, we clearly see an interaction-effect between being in the honors program and the development over time. This is in line with what we expected. It further confirms that honors education does have an effect on the development of innovative behavior.

Table 18 Mean creativity (N=46) and proactivity (N=74) scores at measurement 1, measurement 2 and measurement 3

Table 18 Mean creativity (N=46) and proactivity (N=74) scores at measurement 1, measurement 2 and measurement 3

	Creativity t1	Creativity t2	Creativity t3	Proactivity t1	Proactivity t2	Proactivity t3
Honors	.65 (.39)	.45 (.39)	.47 (.34)	.81 (.60)	1.03 (.53)	1.13 (.65)
Non-honors	.50 (.41)	.30 (.35)	.27 (.37)	.89 (.61)	.80 (.55)	.82 (.61)

From table 18 we can also deduct that both honors students (N=22) and non-honors students (N=24) level of creative behavior drops mainly between t1 and t2 (F= 5.35 p = .008). And therefore for creative behavior, other than for proactive behavior, we find no interaction-effect between being in an honors program and time (F= .05 p = .951). We do however see that honors students start with a significantly higher levels of creative behavior and maintain a higher level of creative behavior than non-honors students throughout the years.

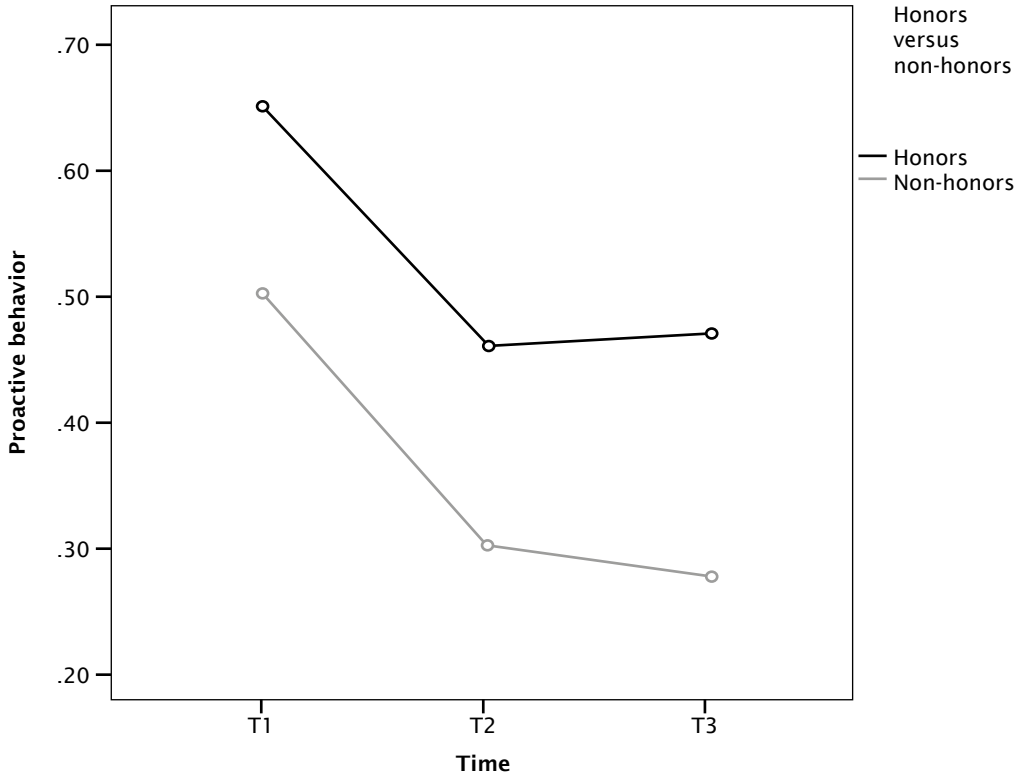


Figure 6 Development of creative behavior for honors and non-honors students

What we have found so far is that honors students differ significantly on proactive personality and openness, both of which proved to be significant predictors for innovative behavior. They therefore from the start of the program have more potential to show innovative behavior. In fact, we found that honors students show significantly more creative behavior than non-honors students. As this difference is already there in the early stages of the honors program and does not seem to be enhanced because of the program, honors students creative behavior is most likely explained by their personality.

On the other hand we found that honors students do grow more in their proactive behavior than non-honors students because of the honors program. This development is due to their proactive personality, but also the interaction effect between proactive personality and being in an honors context. Being a proactive person in an honors context leads to higher levels of academic self-efficacy which in turn leads to higher levels of proactive behavior.

6.11 Achievement of honors students versus non-honors students

We now want to describe whether honors students actually show higher levels of achievement than non-honors students, by comparing the level of academic and professional achievement of honors students to that of non-honors students. To assess achievement level we made an average score of two academic achievement measures and one professional achievement measure as described in chapter 4. This measure is an average of three dummy coded variables: 1. grade for final thesis project is 8 or higher, 2. time of graduation within the scheduled time frame of the bachelor program, 3. having a direct follow-up in terms of education, job, own business or traineeship after graduation. We conducted an independent samples t-test to compare the level of achievement of the two groups (N honors group =112, N non-honors group= 190).

The results of the t-test show that honors students indeed score higher on achievement (M=.81, SD=.26) than non-honors students (M=.62, SD=.28). This difference is statistically significant (t=5.664, df=300, p=.000). This indicates that honors students have more success during and after their studies than non-honors students.

However, as explained in chapter 4, of the honors students that started an honors program, a significant portion dropped out of the program for a variety of reasons. We therefore also calculated differences between honors graduates (those honors students that stayed with their honors program for three years and met all the criteria to 'graduate with honors') and non-honors graduates (including students that were neither in an honors program or dropped out of one at some point). These analyses showed similar results that were equally significant (t=4.31, df=278, p=.000). Honors graduates score higher on excellent performance (M=.82, SD=.21) than non-honors graduates (M=.66, SD=.27).

Table 19 gives an overview in descriptive statistics that we will clarify with some concrete examples. We see that the vast majority (54.8%) of honors graduates both graduated with an 8 or higher, finished their studies within the set timeframe and had a direct follow up after their studies. Compared to only one third (30.3%) of the non-honors graduates, the achievements of honors graduates are consistently and significantly higher. More specifically, honors graduates more often choose to do a master (21% versus 9.5%) after their bachelor or start-up their own business (3.2% versus .05%), whereas non-honors graduates choose to work in regular employment more often (36.3% versus 29%).

Table 19 Achievement of honors graduates versus non-honors graduates in percentages

	Honors graduates (N=62)	Non-honors graduates (N=218)
Highest score on achievement	54.8%	30.3%
Master right after bachelor	21%	9.5%
Start-up own business	3.2%	.05%
Work for a boss	29%	36.2%
Extra-ordinary achievements	22.6%	5.0%

The most striking results are related to what we labeled 'extra-ordinary achievements' (see table 19). Some graduates simply had such an complete and impressive CV that we labeled them as extra-ordinary. Extra-ordinary achievement for example meant that the young professionals both started their own business and started a master's program at a research university at the same time. Or that they started a management traineeship and also worked abroad on challenging projects and graduated cum laude. We will provide several examples of these young professionals to paint a clearer picture

of what their achievements entail. We will first describe to non-honors graduates and then describe three honors graduates.

Non Honors: One young professional that was labeled an extra-ordinary achiever was a non-honors student that graduated within the set time frame with an 8. During his studies he was actively involved in volunteer work for years in a row, for which he at one point worked as a team leader on a project in the outskirts of London. He obtained several certificates in leadership on a voluntary basis next to his degree program and was selected for a management traineeship for talented students right after his graduation. In this traineeship he coordinated several challenging projects. He is described by teachers and co-workers as hard-working, proactive and driven.

Another example of a non-honors student with an impressive track record is a young woman that graduated with an 8 within the set time frame. While finishing her degree program in the Netherlands she was a marketing & sales administration manager in England and became a district manager a half year after graduation in Vienna. Her CV with much travel experience and work experience in international organizations, shows a high dose of ambition and a global attitude.

Honors: We now turn to the honors graduates to share some examples of extra-ordinary achievers. Our first example is a male young professional that graduated in time with an 8 for his thesis, and took part in an honors program on top of his bachelor degree program for the full three years. During his studies he took part in the pre-master program and entered a master program right after graduation. While successfully completing his master's program he also holds an important job at a large governmental organization that he had already obtained while he was still a bachelor student.

Another great success story comes from a female young professional that again graduated in time with an 8 and successfully completed her three year honors program. During her studies she was a Top Talent ambassador, a freelance photographer and an active blogger for a monthly magazine. She took part in an Arts and Design minor in a different part of the country and followed a 10-week creative entrepreneurship program. After graduating with honors she continued as a business owner of the company she already started during her degree program.

The final success story we will share here is from a male young professional that apart from graduating in time with an 8 for his bachelor thesis, managed to obtain a job at one of the big four accountancy corporations of the country. He successfully completed

his honors program and engaged in a variety of other extra-curricular activities as well. He for example co-founded a students' union that he personally chaired for over a year and he organized and joined a study-trip abroad. Alongside his job he is also obtaining his master's degree at a top business school.

Although we see that both honors students and non-honors students have possibilities to accomplish major achievements, our data suggest that honors students do in fact score higher on our achievement measure and have extra-ordinary CV's more often. To control for the effect of personality in predicting these results we conducted a linear regression analysis with all the personality antecedents as control variables. After controlling for personality, being an honors students still predicted 10% of the variance in achievement. The standardized beta coefficient is .32. This clearly suggests that entering an honors program does effect achievement positively. In the next chapter we interpret what all these results mean for answering our research questions and identifying which individual antecedents predict professional excellence.

7

Conclusions and discussion

Chapter 7

Conclusions and discussion

7.1 Introduction

In this chapter we answer our main question: Which individual antecedents predict professional excellence? First however, we recapitulate the goal of this study as extensively described and argued in chapter 1. We then summarize the arguments for this research goal and look back on the context of our study. Next, based on the results provided in the previous chapter, we answer our research questions. We do that by placing our results in a theoretical context and by thoroughly discussing the limitations of our research design and our data. Finally we give several recommendations for both practice and future research based on the findings of this study.

7.2 Research goal and research questions

The goal of this study was to identify potentially excellent professionals. The relevance for this study was that excellence figures prominently on the agenda in politics, education and industry and that excellent professionals are in high demand. Industry seeks potentially excellent employees, because selectively investing in them yields a high return on investment (Boudreau & Ramstad, 2005). But to date, we have very little scientific insight into the identification of these professionals.

We chose a specific context to execute our study, namely Saxion University, a medium-large University of Applied Sciences (UAS) in the East of The Netherlands. A University that aims to develop students into "professionals of the future" (Boomkamp & Van Oldeniel, 2016, p. 3). Since identification of talent preferably takes place at an early stage - so the talent is able to develop their potential (Guldemond et al., 2007) - studying a population of students seemed fitting. Moreover, Saxion offers excellence programs aimed at the identification and development of (future) excellent professionals, which made the context even more ideal to study potentially excellent professionals. We chose to include this context, referred to as 'honors programs' into our research design as explained in chapter 4.

From a practical perspective we set out to develop a measurement tool that is able to measure potential for excellence in young (future) professionals. From a theoretical perspective we set out to create a new model for which we identified relevant individual antecedents as independent variables. As a dependent variable we chose a clear and updated operationalization of excellence, specifically tailored to our context.

Our main question therefore reads: Which individual antecedents predict professional excellence? By answering this theoretical question we take an important step towards selecting (future) excellent professionals on the proper antecedents. In chapter 1 we then argued that innovative behaviors precede excellent accomplishments and that to identify antecedents for excellence, we need to focus on antecedents for innovative behavior. We also argued that personality is a crucial antecedent for innovative behavior and that especially proactive personality needs to be incorporated in our model. We split this main question up in four research questions that we will now introduce and argue.

1. **How well do personality traits predict innovative behavior?**
   We chose to focus on personality traits as antecedents because traits generalize across cultures and remain fairly stable over time.

2. **Which personality trait is the strongest predictor for innovative behavior?**
   We expected that proactive personality is a strong predictor for innovative behavior. The entrepreneurial disposition – Proactive Personality – matches our description of the attitude of an excellent professional (see chapter 1). An excellent professional, has a future focus, a change-orientation and a willingness to challenge the status-quo.

3. **To what extent do the cognitive-motivational states mediate the relationship between personality and innovative behavior?**
   Because we wanted to gain a better understanding of the mechanisms through which personality causes innovative behavior, we included more proximal antecedents of innovative behavior, namely cognitive-motivational states, in our model (see chapter 2).

4. **To what extent does being in honors education moderate the relationship between personality and innovative behavior?**
   We expected honors students to be particularly proactive people and to show

innovative behavior. We expected their personality to predict innovative behavior, but we expected that the honors context enhances the influence of personality on innovative behavior. We therefore studied the interaction between personality and honors context in predicting innovative behavior.

In chapter 2 we operationalized our research questions into more specific hypotheses that we then tested in chapter 6. We explained the exact research methodology that formed the basis of our hypotheses testing in chapter 3 and 4. In chapter 5 we described our operationalization of innovative behavior. We now in this chapter use the results of chapter 6 to answer the research questions stated above and combine the answers to these question to finally explain what predicts professional excellence.

7.3 Conclusion 1: how well do personality traits predict innovative behavior?

We first want to discuss the extent to which personality traits affect innovative behavior. We chose 4 personality traits as antecedents for innovative behavior as explained and argued in chapter 2. Proactive personality, extraversion, conscientiousness and openness were included as distal antecedents in our model. Of the four we expected proactive personality to be the strongest predictor in our model because it is well tailored to both creative and proactive behavior (Bateman & Crant, 1993) and because it is a compound variable that encompasses the more traditional traits like extraversion, conscientiousness and openness (Tornau & Frese, 2013).

Our results showed, in line with our expectations, that the personality antecedents predicted variance in innovative behavior over and above control variables such as age, gender ethnicity, previous level of education and school. Note however that interestingly, only openness and proactive personality were significant main predictors. We can therefore conclude that in a model of innovative behavior, personality is a relevant –statistically significant- predictor. Yet the predictive value of personality in this study is limited, for proactive behavior personality explained an extra 4% of variance over and above control variables (entire model explains 8% of variance) and for creative behavior an extra 2% (entire model explains 14% of variance).

Previous meta-analyses linking personality to performance measures have reported correlations of around .26. Thomas et al. (2010) for example reported in their meta-analysis significant correlations between proactive personality and performance (p = .26) and Barrick and Mount (1991) reported similar findings for the relationship between conscientiousness and subjective performance ratings (p = .26). More specifically tailored to innovative behavior, Hammond at al. (2011) reported correlation coefficients of .25 for the relationship between personality and individual-level innovation. Hammond et al. (2011) concluded, in line with our findings, that personality plays a small role in predicting innovation. They suggested that innovation is not solely trait-driven, in contrast to what some early researchers suggested (Barron & Harrington, 1981), but that it interacts with environmental factors (Shalley et al., 2004).

The conclusion that personality plays only a modest role in predicting innovative behavior, means that other factors accounted for most of the variance. We want to theorize about which factors might be responsible and we therefore address this later in this chapter. First we want to acknowledge that we knew beforehand that creative and proactive behavior are complex, multifaceted and multi-level phenomena. Previous research suggested that apart from biography and personality, other factors play and important role in influencing creative behavior like cognitive style and ability, knowledge, motivation, social influences and of contextual influences (see for example meta-analysis by Anderson, Poto nik, & Zhou, 2014). Similarly for proactive behavior various personal and contextual antecedents have been identified at multiple levels (see for example meta-analysis by Thomas, Whitman, & Viswesvaran, 2010). A meta-analysis by Hammond et al. (2011) shows that motivational factors are particularly strongly related to innovation. We therefore address motivational factors in paragraph 7.5 more extensively. The contextual factors that might have accounted for the variance in innovative behavior are discussed in detail in paragraph 7.6.

7.4 Conclusion 2: which personality trait is the strongest predictor for innovative behavior?

After having discussed the role of personality in general in predicting innovative behavior, we now discuss which of the traits is the strongest predictor. As explained in chapter 2 we expected proactive personality to be the strongest predictor for

innovative behavior. Because it is a compound variable (Tornau & Frese, 2013) that holds much information in a relatively short scale. Unfortunately this trait has received little attention, whereas the traditional 'Big-Five' have received much research attention (Axtell et al., 2006; Conti et al., 1996; Gatignon et al., 2002; Unsworth & Parker, 2003; West & Farr, 1989; Woodman et al., 1993).

Our results first indicated that in contrast to our expectations of the traditional model, only openness proved to be a strong predictor for both innovative behaviors. Our findings are in line with our hypothesis and other research relating openness to creative behavior (George & Zhou, 2001). They are however not in line with our hypothesis that conscientiousness, extraversion and openness are all three predictors for proactive behavior. According to our findings, it only takes openness to come up with new ideas and implement those ideas proactively. Extraversion and conscientiousness did not explain any additional variance in proactive idea implementation. A possible explanation for this outcome can be found in a conclusion drawn by Wang et al. (2012), in their research into the interaction between context and conscientiousness, that conscientiousness in itself is not enough to predict innovative performance, but that contextual cues need to be present to facilitate innovation. In a similar vein, we might suggest that in order for extraversion to effect innovative performance, social cues need to be present to facilitate innovation. The educational context of this study, might simply not provide students enough contextual and social cues to become innovative. It probably takes very open students to become innovative regardless of the lack of cues communicating to them that it is acceptable for them to do so.

Next, our results indicated that proactive personality too was a significant predictor for innovative behavior, which was in line with our expectations. Proactive personality statistically significantly predicted variance in both creative behavior and proactive behavior over and above the control variables. This indicates that proactive personality is indeed a relevant personality trait when it comes to predicting innovative behavior.
However, for creative behavior, the effect of proactive personality on this behavior disappeared after adding openness to the model. Openness proved to be a better predictor for creative behavior and proactive personality did not seem to predict any additional variance in creativity over openness. So although proactive personality is relevant for predicting creative behavior, it does not improve on the more traditional trait of openness. In fact openness remains a sufficient and even stronger predictor for creativity. For proactive behavior on the other hand proactive personality does explain extra variance (1%) over and above the traditional traits. This is evidence of the significant and unique relationship between proactive personality and innovative behavior.

Therefore we conclude that openness is the strongest predictor for innovative behavior as it predicted creative and proactive behavior equally well. The traditional model is apparently still valuable in predicting innovative behavior and does need to be replaced by the more modern compound variable proactive personality. At the same time, proactive personality does make a unique contribution to our model too and therefore should be considered a relevant unique predictor for proactive behavior. Based on this study we argue that this personality trait deserves more research attention, which is in line with recent meta-analyses linking proactive personality to contemporary outcomes (Fuller & Marler, 2009; Thomas et al., 2010).

7.5 Conclusion 3: to what extent do the cognitive-motivational states mediate the relationship between personality and innovative behavior?

After having established the effect of personality on innovative behavior we want to gain a better understanding of the mechanism through which proactive personality and openness predict proactive behavior and creative behavior. Therefore in this next section we describe the motivational process underpinning innovative behavior. As explained in chapter 2 we expected that engaging in innovative behavior involves a conscious calculation of the likelihood that exerting effort will lead to a successful output. In chapter 2 we therefore hypothesized that self-efficacy mediates the relationship between personality traits and innovative behavior.

Our results show that self-efficacy variables do in fact mediate the relationship between personality and innovative behavior. For proactive behavior we found that both proactive personality and openness lead to a higher level of creative and academic self-efficacy and that those states in turn lead to a higher level of proactive behavior. For creative behavior we found that self-efficacy mediates the relationship between openness and creative behavior too, but only through academic self-efficacy.
This means that proactive personality and openness leads people to have a certain level of confidence in both taking on extra academic challenges and achieving creative outcomes. This confidence then leads students to come up with more creative ideas and to voice and implement their ideas more often. These finding concerning the role of self-efficacy are crucial. They support the notion that engaging in innovative behavior

involves a rational decision making process in which students assess their capacity to step outside their regular student role, to take on extra activities and to create creative outcomes. The results of this study are in line with other studies on proactive behavior (Axtell, Holman, Unsworth, Wall, & Waterson, 2000; Morrison & Phelps, 1999; Parker et al., 2010) and creative behavior (Tierney & Farmer, 2002, 2011) in an organizational setting. Our results underline the value of motivational factors in predicting innovative behavior and have many practical implications as they are a plea for building students' confidence levels to achieve more innovative behavior. We therefore address this issue further in paragraph 7.9 'practical implications'.

7.6 Conclusion 4: to what extent does being in honors education moderate the relationship between personality and innovative behavior?

We have established that both creative behavior and proactive behavior are influenced by personality and that this influence takes place via motivational states, namely self-efficacy. We now dive into the complex interaction between personality and context and their combined effect on innovative behavior. As described in chapter 2, based on trait activation theory (Tett & Burnett, 2003) we expected an interaction effect-between context and personality in their effect on innovative behavior.

Our research design that is both quasi-experimental, longitudinal and mixed methods (see chapter 4 for an extensive description) allowed us to test for moderation effects of the context of honors education. Quasi-experimental and longitudinal research is described as "the only means for settling disputes regarding educational practice" (Campbell & Stanley, 1966, p. 2). In our analyses we compared honors students (experimental group) to non-honors students (control group) and were therefore able to answer the final research question: To what extent does being in honors education moderate the relationship between personality and innovative behavior?

Firstly we found that, in line with our expectations, honors students score statistically significantly higher on three of the four personality traits we measured. Honors students are more proactive, more open and more conscientious than non-honors students. Moreover, honors students scored significantly higher on creative and academic self-efficacy. Since honors students are selected for honors programs based on their

motivation, their belief they can take on extra activities besides their regular degree program and their curiosity towards new topics, new disciplines and new students, we find in these results a confirmation that honors programs are selecting a 'different' type of student. And since our research showed that openness and proactivity are predictors for innovative behavior, honors students seem to have more potential for innovation than non-honors students.

Additionally, honors students had more success during and after their studies. Our results showed that the vast majority (54.8%) of honors graduates both graduated with an 8 or higher, finished their studies within the set timeframe and had a direct follow up after their studies. Compared to only one third (30.3%) of the non-honors graduates, the achievements of honors graduates are consistently and significantly higher. Also, honors graduates more often chose to do a master after their bachelor or start-up their own business, whereas non-honors graduates chose to work in regular employment more often. Our qualitative descriptions of excellent accomplishments of students showed that honors students more often than non-honors students chose to actively engage in a variety of curricular and extra-curricular activities, develop their potential in non-traditional ways and land a high end job.

Secondly, we found that both personality and participation in an honors program had a statistically significant main effect on academic self-efficacy. This is an interesting finding because, as discussed before, academic self-efficacy mediates the relationship between personality and both creative and proactive behavior. We now know that not only personality has an influence on academic self-efficacy, but participation in an honors program has too. While personality explains 32% of the variance In academic self-efficacy, participation in honors explains another 9% over and above personality. Moreover, we found an interaction effect between personality and context on academic self-efficacy. This means that being in an honors program enhances the effect that having this type of personality has on students' level of confidence that they can take on a broader role and take extra courses and develop themselves. This cognitive-motivational state in turn leads students to come up with more creative ideas and implement those ideas proactively. We now know that it is a combination of personality and context and the interaction between those two, that best explains innovative behavior.

Thirdly, we also observed an interaction-effect between honors context and the development of proactive behavior over time. While honors students become more and more proactive over the years, non-honors students' level op proactivity drops. This is very much a confirmation that participating in an honors program has a positive

effect on the development of innovative behavior. However, we did not find the same interaction effect for creative behavior. The level of creativity of all students drops over the years and this pattern is no different in the honors context than it is in the non-honors context.

We conclude that the honors context enhances the effect of personality on innovative behavior through the mechanism of academic self-efficacy. This means that students with a proactive and open personality tend to have higher levels of confidence in their ability to take on a broader role, to engage in other activities and to develop themselves further and that this effect is even stronger for the honors group than for the non-honors group. These finding are line with trait activation theory (Tett & Burnett, 2003) and show that in the honors context students are more motivated to express their personality in terms of innovative behavior than the same type of students in a non-honors context.

The honors programs in this study are, as explained in chapter 1, very diverse and unfortunately this study does not differentiate between these programs. This precludes us from specifying which factors exactly in this 'honors context' influence innovative behavior. Yet in these next sections we will try to hypothesize possible contextual factors crucial for innovative behavior. Some of the most important factors we imagine to have influenced the innovative behavior of students, are related to the level of challenge, complexity and autonomy students experience in their studies, work or private life. Previous studies performed in a work-context, have found that job characteristics accounted for a large portion of the variance in individual level innovation (Hammond et al., 2011). Autonomy for example correlated .45 with innovation. In an educational context we image similar effects. Classes in which students are provided with freedom to be creative, in which they get to share and implement their ideas and are faced with challenging and complex assignments, most likely have higher levels of innovative behavior.

Other factors we imagine to have accounted for the variance in innovative behavior have to do with the climate of support for innovative behavior. Classes in which students are supported by teachers and peers to come up with new ideas and implement those ideas, most likely have higher levels of innovation. In a work setting support for creativity, general support, and positive climate were found to positively relate to innovation (Hammond et al., 2011). A positive climate within the classroom setting is probably, apart from involved and supporting teachers, also influenced by smaller group sizes and a high level of interaction in the group.

To test the relationship between educational factors and innovative behavior more research from an educational science perspective is needed. We therefore address this topic further under 'practical implications' in paragraph 7.9.

7.7 Conclusion 5: which individual antecedents predict professional excellence?

In conclusion we found that both proactive personality and openness are relevant distal antecedents of innovative behavior. We also found that creative self-efficacy and academic self-efficacy are important proximal antecedents of innovative behavior. Finally, we found that participation in an honors program also influences innovative behavior although only for proactive behavior, and achievement. So in conclusion, in this study we identified several personality traits and cognitive-motivational states and a contextual variable that together predict some of the level innovative behavior of students.

7.8 Discussion of the research design and the research context

This research contributes to our understanding of antecedents of (future) professional excellence. We have identified crucial personality traits for innovative behavior and we have concluded that the honors context positively influences innovative behavior, the development of innovative behavior and the level of achievement of students. We also now have a better understanding of the mechanisms through which context and personality influence a level of self-efficacy that in turn leads individuals to identify and grasp opportunities and change the status quo. Our longitudinal and quasi-experimental, mixed methods study allowed us to draw these conclusion and to gain insight into the complex interaction between individual and context.

However, in interpreting our findings, we recognize some limitations of our study. Our first limitation is that the drop-out rate in our study was substantial. After two years we lost 86.5% of our participants. Mortality is one of the biggest threats for the internal

validity (Campbell & Stanley, 1966) of our research design. Although the differences between the drop out group and the remaining group were minimal (see chapter 4) we were still forced to base most of our findings on the first measurement moment (T1), because that measurement contained the most participants (N=594). Because of that, some of our analyses were based on cross-sectional data, despite our efforts to use a longitudinal research design. This technically precludes drawing causal inferences.

However, since our predictor variables were relatively stable personality traits and we did establish how our dependent variables developed over time, we are confident that reverse causation did not influence our findings. We do however run the risk of underestimating the effect sizes of personality on behavior. The effect might have been stronger if we could have used data from later points in time as our dependent variable, so that the context of the program would have had more time to influence individuals. Therefore, although we partly used cross-sectional data we are confident that our conclusions hold and might even be a modest estimation. Testing our hypotheses with more data later in time would allow for more definitive causal conclusions.

The second limitation of our study was our relatively new operationalization of innovative behavior. Although we grounded the development of our measurement tool in theory and relied on existing work in the field of proactivity and creativity (Hennessey & Amabile, 2010; Parker et al., 2006) we needed to create a new tool for this specific context. As explained in chapter 5 we were able to create a robust measurement instrument by averaging scores in proactivity and creativity over several themes and coding them conscientiously with multiple independent coders. And although this resulted is very rich data that captured the variety and complexity of students' proactive and creative ideas in a way that no Likert scale could, we acknowledge the limitations of this measurement tool. ¬We for example found that some students chose not to share their ideas for privacy reasons because they were in the middle of patenting their idea. Because of that fact alone we missed quite a lot of data (3.8%) whereas those exact data would have been especially interesting to include in our analyses. Moreover, we missed another 9.5% of our data because participants failed to provide enough details about the content of their idea(s) for us to assess the level of creativity. This would certainly not have improved had we used Likert scales we think, using this method we were at least able to judge the quality and reality of students' ideas.

Our findings indicate that asking open questions about new and original ideas, and actions towards implementing those ideas, leads to very rich data. However, we

conclude that gathering those data in the form of semi-structured interviews would prevent some of the limitations we have encountered in our study. In an interview-setting researchers can encourage participants to share their ideas and can stress confidentiality. Moreover, researchers could ask follow-up questions to ensure that enough details about the ideas are shared to be able to properly assess the level of creativity of those ideas afterwards. Although this type of research would be rather time-consuming, our experiences seem to suggest that students have many great ideas and that they do want to share them, but unfortunately are rarely asked about them (see chapter 5). Highly involved and qualitative research is probably more appropriate to dig deeper into the complex areas or creative and proactive behavior.

Our third limitation relates to the issue of generalizability of this model beyond the educational context. Although our theory derives from the organizational context and our model therefore should apply to industry, we have not yet tested our model in that context. Testing our hypotheses in an organizational context will further strengthen the application of these findings to understanding and predicting workplace innovative behavior.

Our fourth and final limitation refers to our operationalization of achievement. We have built a compound measure of achievement, consisting of both academic achievement indicators and a professional achievement indicator (see chapter 5). For assessing professional achievement we qualitatively analyzed CV's using readily available data from LinkedIn. The choice for this measure was somewhat pragmatic, these data were available and hold much information about students educational and extra-curricular activities. However, not all graduates had an updated LinkedIn profile and we were unable to pinpoint reasons for having a LinkedIn profile. We found our compound measure valuable as an indication for achievement but acknowledge that more research is needed to further improve the reliability and validity of an achievement measure. More insight into what is considered a high achievement might help build a summation score for professional excellence in the future.

7.9 Practical implications

The practical aim of our study was to identify (future) excellent professionals so we would be able to select them for, for example, honors programs. Our findings suggest that honors programs seem already rather successful in filtering out a specific type of

individual and preparing them properly for an excellent future. There are three reasons why our results seem to suggest this. 1. Our results show that honors students are different from non-honors students in the sense that they have more potential to innovate. Whether this is a matter of self-selection or whether these results are due to a proper selection procedure is impossible to tell from our study. Nonetheless, these finding are a confirmation that honors programs attract and recruit a specific type of student. 2. Our findings show that the context of an honors program has a positive influence on the development of proactive behavior of these students. It seems that in the honors context students get more opportunity to express their proactive personality and that because of that, their level of proactivity increases throughout the years. Students that enter an honors program seem to be more actively involved with their own development and or voice more ideas about making things around them more efficient or successful. Also, the content of their ideas seems to be more original and useful than the ideas of non-honors students. 3. Honors students seem to achieve better during their studies and after their studies than non-honors students. They obtain a job faster, choose to do a master program after their bachelor more often and start-up their own business more often.

On a critical note, it appears that although students in the honors programs do get a boost in their level of proactivity and level of achievement during and after their studies, they do not get a boost in their level of creativity. This means that they are nurtured to take more charge, to voice their ideas more often and initiate change, but that this hardly leads to a 'revolution' in their thinking or actions. Over time the level of creativity of students drops and honors programs fail to prevent that from happening, let alone achieve the reverse.

From the ideas students shared with us (see chapter 5), we could tell that towards the later phases of their studies, students were highly focused on making sensible choices to enhance their employability. They seemed to struggle juggling all their responsibilities in their private life (friends, family etc.), their working life and their school life. According to them, some of their best ideas involved ending a time-consuming relationship, choosing to stop doing sports to save time and choosing an internship or graduation project in line with their ambitions and qualities. Although these ideas may be very useful, we do not consider them original. Only few students are really capable of coming up with very original ideas to create new products, starts new blogs or websites or start their own venture. So a possible explanation for the decline in creativity is that towards the end of their studies students are drawn into (proactively) planning the next logical steps in their career without feeling the space or time to do that in an original or unconventional manner.

Our results seem to confirm a much heard complaint that our highly standardized education does not promote creativity (Zhao, 2014). Creativity courses in education seem to not be taken seriously while they have great potential to increase creative levels and academic and nonacademic achievement (Fasco, 2001). We therefore suggest that investing in more creativity courses, but also providing a safe environment for students to be creative throughout their entire program is needed to develop students' full potential. Some important tips to increase creativity involve: modeling creativity, building self-efficacy, encouraging idea generation, tolerating ambiguity and allowing mistakes (Fasco, 2001). The factors we discussed under paragraph 7.6 such as increasing complexity, autonomy, supporting and creating a positive climate, are in line with these suggestions.

At the same time we realize that encouraging creativity often requires a drastic change which involves great risks (Amabile, 1998). Considering the high costs involved with exceeding graduation deadlines, the current educational system leaves little room for encouraging students to take risks, to deviate from expectation, to challenge the status quo and develop and pursue their own original ideas. This fact has been one of the main reasons why government funding was made available to higher education in The Netherlands, including Saxion University, to develop excellence programs to challenge the high potentials (Sirius programma, 2014) in the first place.

Our first practical implication therefore is directed at 2 things: 1. Identifying which educational factors account for the success in enhancing proactivity in students and 2. identifying which factors might possibly enhance the creativity of students. Within Saxion, using Sirius funding, the honors programs were developed very diversely. Some programs focus mainly on science and philosophy, others focus on business creation and still others focus heavily on self-development and reflection (Saxion, n.d.). In some programs creativity is most likely highly encouraged, whereas in other programs less so or less successfully. All-in-all our findings support the claims of honors programs within this University of Applied Sciences, that they do indeed select and educate a special breed of student in their honors programs, and justifies their existence. Honors education provides a stimulating and challenging context allowing us to focus on the individual characteristics that predict innovative behavior. This education aims to develop excellent, innovative professionals. Although our current educational system is criticized for failing to resemble an innovative organizational context, the context of honors education does provide a more challenging environment. We now need to identify specific success factors for educating innovative professionals.

Our second practical implication concerns an advice to use caution when using our measurement instrument to select innovative high potentials. Although we were able to develop a reliable and valid measurement tool that measures some relevant personality traits for innovation (see chapter 3), we know that personality is only part of a complex puzzle. The effect-sizes are marginal and therefore using our measurement tool to decide whether an individual is a 'high potential' or not, would be a gross simplification of reality and, one might even argue, unethical. From our study we do however advice to select highly open and proactive personalities if innovative behavior is what you seek to encourage.

Our final implication is that our research is a plea to fostering students' academic self-efficacy specifically. This means that we, as educators, need to make students feel capable of challenging the status-quo, to take on new challenges and make use of new opportunities. Building their self-esteem will lead them to come up with original ideas more often and suggest or implement them. Students need to feel confident they can take on a broader role than being a rule abiding passive consumer of education. Fostering students motivation and giving room to their personalities should be an integral part of education as also recently stated by the report 'persoonlijkheid voorspelt succes' (personality predicts success) from the Bureau of Economic Policy Analysis (Borghans, Diris, & Ter Weel, 2015).

7.10 Theoretical implications

Our theoretical implications are twofold. 1. We have shed new light on the importance of proactive personality as a personality trait in relation to innovative behavior. 2. We have explained the mechanisms through which personality traits influence innovative behavior.

Firstly, we have established the relevance of proactive personality in predicting innovative behavior, but also established it is not necessarily a better predictor than the traditional model. Therefore we suggest that this trait does deserve more research attention, but that it should be researched alongside openness. The two traits somewhat overlap, but are both unique and relevant factors for innovation and excellence. Secondly, consistent with previous research showing significant links between proactive personality and proactive outcomes (Crant, 1995; Fuller & Marler,

2009), our study adds to this literature because it suggests that proactive personality has its effect via self-efficacy mechanisms. Understanding how personality and context influences self-efficacy adds to our understanding of motivational mechanism involved in predicting innovative behavior.

Finally, in a very practical way our research adds to the on the field of Talent Management because it pleas for using true experimental design in this field (Campbell & Stanley, 1966). The discussion about what makes a talent should be extended by adding context to the discussion. Whether or not someone is likely to do very well in a context results from the right match between this persona and the context. Our design shows that we are able to calculate interactions between the person and the context. We therefore plea for similar research designs with various operationalization of professional excellence. This would shed new light on 'who' talent is and close some gaps in the field of Talent Management (Gallardo-gallardo et al., 2013; Lewis & Heckman, 2006; Vaiman & Collings, 2013).

8

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Chapter 8

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9

Summary (English)

Chapter 9

Summary (English)

Excellence figures prominently on the agenda in politics, education and industry and excellent professionals are in high demand. Industry seeks potentially excellent employees, because selectively investing in them yields a high return on investment (Boudreau & Ramstad, 2005). Talent Management is a rapidly growing field (Festing et al., 2013) because it is expected to help organizations achieve durable advantage over the competition (Collings & Mellahi, 2009; Lewis & Heckman, 2006). But to date, the field provides too little scientific insight into the identification of potentially excellent professionals.

Therefore in this study we wanted to identify which type of individual is capable of achieving professional excellence. Our main question therefore read: *which individual antecedents predict professional excellence?* We chose to focus on personality traits as individual antecedents because the value of personality for individual, team and organizational functioning has been well established (Judge & LePine, 2007). Personality is used to describe the uniqueness of the individual and has been proven to generalize across cultures (Mccrae & Costa, 1997; Pulver et al., 1995), remain fairly stable over time (Costa & Mccrae, 1988, 1992a) and have a genetic basis (Digman, 1989).

More specifically we chose to focus on proactive personality - the entrepreneurial disposition –because it matches our description of the attitude of an excellent professional. Bateman and Crant (1993) launched proactive personality as a dispositional construct that entails actively influencing the environment. Proactive individuals are likely to suggest new ways of doing things to improve performance (Seibert, Kraimer, & Crant, 2001). *"Proactive people scan for opportunities, show initiative, take action, and persevere until they reach closure by bringing about change."* (Bateman & Crant, 1993, p. 105).

Our study took place at Saxion University, a medium-large University of Applied Sciences (UAS) in the East of The Netherlands, because the identification of talent preferably takes place at an early stage - so the talent is able to develop their potential (Guldemond et al., 2007). This university provides us with the ideal context to study potentially excellent professionals. Saxion UAS aims to develop students into

"professionals of the future" (Boomkamp & Van Oldeniel, 2016, p. 3). In recent years Saxion, with government funding meant for innovating education, developed excellence programs specifically aimed at the identification and development of (future) excellent professionals. We included this excellence context, referred to as the 'honors context,' in the design of our study.

Theoretical model and research questions

The first step in our study was creating a theoretical model with individual antecedents as independent and a clear and updated operationalization of excellence for our context, as a dependent variable. When it comes to adequately defining our dependent variable, we argued for a focus on active, innovative and entrepreneurial behaviors as they are essential for long term success of the organization (Shalley et al., 2004; Wales et al., 2011; Zhang & Bartol, 2010). After describing and analyzing current excellent professionals we identified crucial general behavior underlying excellent accomplishments that we included in our model as well, namely innovative behavior. We defined innovative behavior as both generating creative ideas and proactively implementing those ideas.

The next step was to indicate which type of individual is capable of creativity and proactivity, because we argue that these innovative behaviors precede excellent accomplishments. Our first research question read: *how well do personality traits predict innovative behavior?* Proactive personality is posited as the main predictor, but more traditional traits were added to our model as well to determine the added value of proactive personality over these traits. The traditional traits we selected were openness, conscientiousness and extraversion. Our second research question read: *which personality trait is the strongest predictor for innovative behavior?* Of the four personality traits (antecedents) we expected proactive personality to be the strongest predictor of both creative idea generation and proactive idea implementation. This means that we expected individuals that actively seek change, have a future focus, are aware of changes in the world and take advantage of unexpected opportunities, are particularly innovative, even more so than curious, diligent an extraverted individuals.

To understand the mechanism through which traits influence innovative behavior and to answer our third research question, we also added underlying cognitive-motivational states to our model. We expected the mechanism to be self-efficacy, a malleable cognitive-motivational state. This would mean that having an open, conscientious, extraverted and proactive personality leads people to feel more motivated and confident to come up with new ideas, change the status quo and take more initiative

and that this in turn leads people to come up with more creative ideas and implement those more often. The third research question read: *to what extent do the cognitive-motivational states mediate the relationship between personality and innovative behavior?*

Our final research question read: *to what extent does being in honors education moderate the relationship between personality and innovative behavior?* Honors programs are designed for talented students that are willing and able to take on more than their regular program (Van Eijl et al., 2010). Honors programs are intended to better bridge the gap between higher education and professional life and supposedly foster innovative behavior. We wanted to study the interaction between personality and honors context in predicting innovative behavior. Because of trait activation theory (Tett & Burnett, 2003) we expected a moderating effect of honors context on the relationship between personality and self-efficacy. In other words, we expected traits to be a stronger predictors for self-efficacy in the honors group than in the non-honors group. The effect personality already has on self-efficacy is likely enhanced by being in a context that provides more room to express the personality. We operationalized the four research questions described above into more specific hypotheses, but for the purpose of this summary we will only focus on answering these four more general questions.

Design of our study

For this study we used a quasi-experimental and longitudinal research design, with one experimental and one control group. We chose this design because an experimental design is regarded as "the only means for settling disputes regarding educational practice" (Campbell & Stanley, 1966, p. 2). Our study took place between 2011 and 2015. During these years we monitored the two groups of students. The experimental group consisted of students that were recruited and selected for one of several honors programs (N=249). The control group consisted of 'regular' bachelor students that did not participate in an honors program (N=345). Our analyses show that these two groups were comparable on our control variables age, gender, degree program and ethnicity. The only difference we did find between the groups was that honors students have a higher previous level of education.

We first created the measurement tool that measures the antecedents that relate to professional excellence via creativity and proactivity. Our aim was to develop a tool that is short, understandable and applicable for a population of students in higher professional education and capable of reliably measuring innovative potential. We

operationalized proactive personality, extraversion, conscientiousness, openness, creative self-efficacy and academic self-efficacy into valid and reliable scales. We relied on existing scales where possible, but we needed to adapt scales and rewrite them in order to fit the population of our research and to create a tool that was both concise and adequate for our context. In our scale development process we followed the guidelines provided by Hinkin (1995) and Babbie (1990). After developing the 5-point Likert scales we thoroughly checked the internal consistency the criterion-related validity of the scales.

We split our sample of 594 students in half to avoid double dipping in our sample pool. We first administered an exploratory factor analysis using Principal Components Analysis (PCA) on one sample and next a confirmatory factor analysis on the second sample. The aim of doing both factor analyses was to reduce the number of items while maintaining construct validity and to check for internal consistency and criterion validity. Our two tests showed adequate internal consistency and adequate model fit for our tool and the descriptive statistics indicated convergent and discriminant validity (Hinkin, 1995). Proactive personality had a reliability score (Cronbach's alpha) of .81 (8 items), Conscientiousness .84 (8 items), Openness .81 (6 items), Extraversion .79 (5 items), Creative self-efficacy .77 (3 items) and finally academic self-efficacy .79 (6 items).

Next we operationalized proactive and creative behavior and described their reliability and validity extensively. To prevent common method bias (Podsakoff & Organ, 1986) and to limit social desirability we chose a more qualitative approach to measure creative idea generation and proactive idea implementation instead of a Like-scale we used to measure the behaviors in our model. We adapted the measurement instrument as developed by Parker, Williams and Tuner (2006) to capture 'proactive idea implementation' of students. Moreover we elaborated on it by adding a measure for the creativity of their ideas by coding both the novelty and the utility of the ideas. This allows us to not only measure the proactivity of the actual behavior but also the creativity thereof.

In the form of a survey we asked students to share their most creative idea to change or improve something relating to 3 themes, 1. Home/private life, 2. hobby/work and 3. school/studies. We also added an even more open question in the very beginning, in which we did not provide a specific theme (rather a general theme), in order to prevent limiting the creativity of students. In all four themes we asked how many new and useful ideas students have had in each theme and whether they implemented or

voiced their idea. Students received points for proactivity when they had ideas and actually implemented their idea or voiced it and no points when they either had no useful ideas or did not do anything with their idea (in line with research by Parker et al. (2006)). These points were averaged across the diverse themes. For creativity we coded the originality and usefulness of the ideas students shared by using a coding scheme and three independent coders. An idea had to be both (at least somewhat) useful and original to be considered creative (in line with research by Amabile (1996)). The scores students received for usefulness and originality were also averaged across the four themes.

We approached students for measurements at three point in time, beginning at the start of the honors program and ending roughly three years later. The personality variables were only measured at measurement 1, the self-efficacy variables and proactive and creative behavior were measured once a year at measurement 1, measurement 2 and measurement 3. Achievement information was only obtained on one point in time, namely three years after the first student data were gathered. This variable was a summation score of time to graduation, final thesis grade and follow-up after graduation (job, master, start-up company etc.). For our analyses we used both descriptive statistics and inferential statistics in the form of hierarchal multiple regression analyses, with control variables.

Results

Our results showed, in line with our expectations, that the personality antecedents predicted variance in innovative behavior over and above control variables. However, only openness and proactive personality proved to be significant main predictors. The predictive power of personality in this study is little, for proactive behavior personality explained an extra 4% of variance over and above control variables (entire model explains 8% of variance) and for creative behavior an extra 2% (entire model explains 14% of variance). Proactive personality proved to be strongest predictor for proactive behavior and openness the strongest predictor for creative behavior. For creative behavior adding proactive personality to the model, did not explain additional variance.

Our results further showed that self-efficacy mediated the relationship between personality and innovative behavior. Also, we found that honors students score statistically significantly higher on proactive personality, openness, conscientiousness and creative and academic self-efficacy than non-honors students. Moreover, honors students score higher on innovative behavior and achievement than non-honors

students. Finally we found that honors context moderates the relationship between proactive personality and academic self-efficacy and that honors students, in contrast to the non-honors students, develop higher levels of proactive behavior over time.

Conclusion

In conclusion we found that both proactive personality and openness are relevant distal antecedents of innovative behavior. We also found that creative self-efficacy and academic self-efficacy are important proximal antecedents of innovative behavior. Finally, we found that participation in an honors program also influences innovative behavior (although only for proactive behavior) and achievement. Therefore in this study we identified several personality traits and cognitive-motivational states and a contextual variable that together predict some of the level innovative behavior of students.

This research contributes to our understanding of antecedents of (future) professional excellence. We have identified crucial personality traits for innovative behavior and we have concluded that the honors context positively influences innovative behavior, the development of innovative behavior and the level of achievement of students. We also now have a better understanding of the mechanisms through which context and personality influence a level of self-efficacy that in turn leads individuals to identify and grasp opportunities and change the status quo. Our longitudinal and quasi-experimental, mixed methods study allowed us to draw these conclusion and to gain insight into the complex interaction between individual and context.

Limitations

In our study we also address the limitations of our research. For the purpose of this summary we will simply lists them here. 1.The drop-out rate in our study was substantial. This forced us to use cross-sectional analyses more often than planned. 2. Our study contained a relatively new operationalization of innovative behavior and therefore further research to evaluate the reliability of this measurement is appropriate. 3. We hesitate to generalize our model beyond the educational context. Further research in an industry setting is called for. 4. We are divided about our compound measure for achievement as it consists of relatively few indicators of academic and professional achievement.

Practical implications

Our findings suggest that honors programs seem rather successful in filtering out a specific type of individual and preparing them properly for an excellent future. Honors

students seem to achieve better during their studies and after their studies than non-honors students. They obtain a job faster, choose to do a master program after their bachelor more often and start-up their own business more often. This means that they are nurtured to take more charge, to voice their ideas more often and initiate change, but that this hardly leads to a 'revolution' in their thinking or actions. Over time the level of creativity of students drops and honors programs fail to prevent that from happening, let alone achieve the reverse. Our first practical implication therefore is directed at 2 things: 1. Identifying which educational factors account for the success in enhancing proactivity in students and 2. identifying which factors might possibly enhance the creativity of students.

Our second practical implication concerns an advice to use caution when using our measurement instrument to select innovative high potentials. The effect-sizes of personality on innovative behavior are marginal and therefore using our measurement tool to decide whether an individual is a 'high potential' or not, would be a gross simplification of reality and, one might even argue, unethical.

Our final implication is that our research is a plea to fostering students' academic self-efficacy specifically. This means that educators need to make students feel capable of challenging the status-quo, to take on new challenges and make use of new opportunities. Building their self-esteem will lead them to come up with original ideas more often and suggest or implement them.

10

Samenvatting (Nederlands)

Chapter 10

Samenvatting (Nederlands)

Excellentie staat hoog op de agenda van de politiek, het onderwijs en het bedrijfsleven; excellente professionals zijn erg gewild. Het bedrijfsleven zoekt potentieel excellente medewerkers omdat selectief in hen investeren een hoge 'return on investment' oplevert (Boudreau & Ramstad, 2005). Talentmanagement is zich als wetenschapsgebied snel aan het ontwikkelen (Festing et al., 2013), omdat ervan verwacht wordt dat het organisaties gaat helpen duurzaam concurrentievoordeel te behalen (Collings & Mellahi, 2009; Lewis & Heckman, 2006). Tot nu toe levert dit gebied echter weinig concreet inzicht in het identificeren van potentieel excellente professionals.

Daarom willen we in deze studie identificeren welk type professional in staat is te excelleren. Onze hoofdvraag luidt: welke individuele antecedenten voorspellen professionele excellentie? We kozen ervoor om ons onderzoek op persoonlijkheidstrekken als individuele antecedenten te richten, omdat de waarde van persoonlijkheid voor het functioneren van het individu, het team en de organisatie reeds duidelijk is vastgesteld (Judge & LePine, 2007). Persoonlijkheid wordt gebruikt om de unieke kenmerken van een individu te beschrijven en blijkt generaliseerbaar naar verschillende culturen (Mccrae & Costa, 1997; Pulver et al., 1995), redelijk stabiel te blijven door de tijd (Costa & Mccrae, 1988, 1992a) en een genetische basis te hebben (Digman, 1989).

We hebben ervoor gekozen om het onderzoek specifiek op proactieve persoonlijkheid te richten – het ondernemende type – omdat dit kenmerk correspondeert met de houding van een excellente professional. Bateman and Crant (1993) introduceerden proactieve persoonlijkheid als een construct dat inhoudt dat iemand actief zijn of haar omgeving beïnvloedt. Binnen een organisatie betekent dit onder andere dat proactieve personen vaak met suggesties komen om prestaties te verbeteren (Seibert, Kraimer, & Crant, 2001). "Proactive people scan for opportunities, show initiative, take action, and persevere until they reach closure by bringing about change." (Bateman & Crant, 1993, p. 105).

Dit onderzoek vond plaats op Saxion University of Applied Sciences (UAS), een gemiddeld tot grote UAS in het oosten van Nederland, omdat de identificatie van talent bij voorkeur in een vroeg stadium plaatsvindt - zodat dit verder ontwikkeld kan worden

(Guldemond et al., 2007). Deze UAS biedt de ideale context voor het onderzoeken van potentieel excellente professionals: Saxion legt zich toe op de ontwikkeling van 'Professionals van de toekomst' (Boomkamp & Van Oldeniel, 2016, p. 3). De afgelopen jaren, gesteund door overheidssubsidies gericht op onderwijsinnovatie, heeft Saxion programma's samengesteld die zich specifiek richten op het identificeren en ontwikkelen van (toekomstige) excellente professionals. We betrekken deze excellentiecontext, genaamd 'honorscontext', in het ontwerp van ons onderzoek.

Theoretisch model en onderzoeksvragen

De eerste stap in ons onderzoek was het creëren van een theoretisch model met individuele antecedenten als onafhankelijke variabelen, en een duidelijke en geüpdatete operationalisatie van excellentie voor onze context als afhankelijke variabele. Voor het adequaat definiëren van onze afhankelijke variabele, pleitten we voor een focus op actief, innovatief en ondernemend gedrag aangezien dit essentieel is voor het langetermijnsucces van de organisatie (Shalley et al., 2004; Wales et al., 2011; Zhang & Bartol, 2010). Door het beschrijven en analyseren van huidige excellente professionals hebben we cruciale maar algemene gedragingen geïdentificeerd die voorafgaan aan excellente prestaties. Deze gedragingen vormen samen 'innovatief gedrag' en zijn als zodanig in het model meegenomen. Innovatief gedrag is geoperationaliseerd in het genereren van creatieve ideeën en het proactief implementeren hiervan.

Innovatief gedrag van professionals blijkt cruciaal voor het succes van organisaties (Axtell, Holman, Unsworth, Wall, & Waterson, 2000; Conti, Coon, & Amabile, 1996; Gatignon, Tushman, Smith, & Anderson, 2002; Unsworth & Parker, 2003; West & Farr, 1989; Woodman, Sawyer, & Griffin, 1993) en de professionals zelf (Unsworth & Parker, 2003). Individuen die in staat zijn nieuwe ideeën te genereren zijn gewild, aangezien dat een van de weinige dingen is waar mensen nog steeds beter in zijn dan computers (Autor et al., 2003; Brynjolfsson & McAfee, 2014; Davenport & Kirby, 2015; Levy & Murnane, 2007). We hebben innovatief gedrag geoperationaliseerd in twee verschillende soorten gedrag; creatieve-ideegeneratie (creativiteit) en proactieve-ideeimplementatie (proactiviteit).

De volgende stap was de identificatie van het type professional dat in staat is creatief en proactief gedrag te vertonen, aangezien wij veronderstellen dat deze gedragingen voorafgaan aan excellente prestaties. Onze eerste onderzoeksvraag luidt: hoe goed voorspellen persoonlijkheidstrekken innovatief gedrag? Proactieve persoonlijkheid is opgenomen als de belangrijkste voorspeller in dit onderzoek, maar klassieke kenmerken werden ook toegevoegd aan dit model om de meerwaarde van proactieve

persoonlijkheid ten opzichte van de klassieke kenmerken te kunnen vaststellen. De klassieke kenmerken die we hebben opgenomen zijn openheid, consciëntieusheid en extraversie. De tweede onderzoeksvraag luidt: welk persoonlijkheidskenmerk is de sterkste voorspeller innovatief gedrag? Van de vier persoonlijkheidskenmerken (antecedenten), verwachtten we dat proactieve persoonlijkheid de sterkste voorspeller zou zijn voor zowel creatieve-ideegeneratie en proactieve-ideeimplementatie. Dit betekent dat we verwachtten dat individuen die actief zoeken naar verandering, een toekomstfocus hebben, zich bewust zijn van ontwikkelingen in de wereld en gebruik maken van onverwachte gebeurtenissen en met name innovatief zijn; meer nog dan nieuwsgierige, ijverige en extraverte individuen.

Om het mechanisme te begrijpen waardoor persoonlijkheidskenmerken innovatief gedrag beïnvloeden en om onze derde onderzoeksvraag te kunnen beantwoorden, hebben we onderliggende 'cognitive-motivational states' aan ons model toegevoegd. We verwachtten dat het onderliggende mechanisme self-efficacy is, een veranderbaar motivatie construct. Dit houdt in dat het hebben van een open, consciëntieuze, extraverte en proactieve persoonlijkheid ertoe leidt dat men zich meer gemotiveerd en zeker voelt om met nieuwe ideeën te komen, de status quo te veranderen en initiatief te nemen. Dit zorgt vervolgens voor het hebbben van meer creatieve ideeën en het vaker implementeren ervan. De derde onderzoekvraag luidt: in hoeverre mediëren de 'cognitive-motivational states' de relaties tussen persoonlijkheid en innovatief gedrag?

Onze laatste onderzoeksvraag luidt: in hoeverre modereert deelname aan honorsonderwijs de relatie tussen persoonlijkheid en innovatief gedrag? Honorsonderwijs is ontwikkeld voor talentvolle studenten die bereid en in staat zijn om meer te doen dan het reguliere programma (Van Eijl et al., 2010). Honorsonderwijs is bedoeld om het gat tussen hoger onderwijs en het professionele leven beter te overbruggen en zou innovatief gedrag moeten bevorderen. Wij wilden de interactie tussen persoonlijkheid en honorscontext in het voorspellen van innovatief gedrag onderzoeken. Op basis van 'trait activation theory' (Tett & Burnett, 2003) verwachtten we een modererend effect van honorscontext op de relatie tussen persoonlijkheid en self-efficacy. In andere woorden, we verwachtten dat persoonlijkheidskenmerken een sterkere voorspellende waarde hebben in de honorsgroep dan in de niethonorsgroep. Het effect dat persoonlijkheid al heeft op self-efficacy wordt waarschijnlijk vergroot in een context die meer ruimte biedt aan het uiten van persoonlijkheid. We hebben de vier onderzoeksvragen zoals hierboven beschreven geoperationaliseerd in meer specifieke hypothesen, maar in deze samenvatting beperken we ons tot het beantwoorden van deze meer algemene vragen.

Onderzoeksontwerp

Voor dit onderzoek hebben we een quasi-experimenteel en longitudinaal onderzoeksontwerp gebruikt, met een experimentele- en een controlegroep. We kozen voor dit ontwerp omdat een experimenteel ontwerp wordt gezien als 'the only means for settling disputes regarding educational practice' (Campbell & Stanley, 1966, p. 2). Ons onderzoek vond plaats tussen 2011 en 2015. Gedurende deze jaren hebben we twee groepen studenten gevolgd. De experimentele groep bestond uit studenten die waren gerekruteerd en geselecteerd voor een van de verschillende honorsprogramma's (N=249). De controlegroep bestond uit reguliere bachelor studenten die niet deelnamen aan een honorsprogramma (N=345). Onze analyses toonden aan dat beide groepen vergelijkbaar waren op de controlevariabelen: leeftijd, geslacht, opleiding en etniciteit. We vonden wel een significant verschil tussen beide groepen in vooropleidingsniveau.

We hebben eerst een meetinstrument ontwikkeld dat de antecedenten meet die leiden tot professionele excellentie, via creativiteit en proactiviteit. Ons doel was om voor onze hogeschoolstudenten een kort, begrijpelijk en toepasbaar instrument te ontwikkelen, dat in staat was om op een betrouwbare manier innovatiepotentieel te meten. We operationaliseerden proactieve persoonlijkheid, extraversie, consciëntieusheid, openheid, creatieve self-efficacy en academische self-efficacy in betrouwbare en valide schalen. We maakten zo veel mogelijk gebruik van gevalideerde schalen, maar moesten enkele schalen aanpassen en herformuleren om deze 1). te laten aansluiten bij de onderzoekspopulatie en 2). kort en adequaat toe te kunnen passen in deze context. In het schaalconstructieproces hebben we de richtlijnen gevolgd van Hinkin (1995) and Babbie (1990). Na het ontwikkelen van de 5-punts Likertschaal hebben we de interne consistentie en de criteriumvaliditeit uitgebreid getest.

We hebben de steekproef van 594 studenten willekeurig in tweeën gesplitst om per analyse een unieke steekproef te kunnen gebruiken. Met de Principal Components Analysis (PCA) voerden we eerst een exploratieve factoranalyse uit op de eerste steekproef, en we voerden een confirmatieve factoranalyse op de tweede steekproef. Ons doel voor beide analyses was het reduceren van het aantal items; tegelijkertijd wilden we de constructvaliditeit borgen en de interne consistentie en criteriumvaliditeit testen. Onze twee testen lieten adequate interne consistentie en adequate modelfit zien voor ons instrument en de beschrijvende statistieken wezen op convergente en discriminante validiteit (Hinkin, 1995). Proactieve persoonlijkheid had een betrouwbaarheidssore (Cronbach's alpha) van .81 (8 items), consciëntieusheid .84 (8 items), openheid .81 (6 items), extraversie .79 (5 items), creatieve self-efficacy .77 (3 items) en ten slotte academische self-efficacy .79 (6 items).

Vervolgens hebben we proactief en creatief gedrag geoperationaliseerd en hun betrouwbaarheid en validiteit uitgebreid beschreven. Om 'common method bias' te voorkomen, (Podsakoff & Organ, 1986) en sociaal wenselijk gedrag te beperken, hebben we gekozen voor een meer kwalitatieve meting van creatieve-ideegeneratie en proactieve-ideeimplementatie in plaats van een likert-schaal, om de gedragsconstructen uit ons model te meten. We hebben een bestaand instrument dat is ontwikkeld door Parker, Williams en Tuner (2006) aangepast om proactief gedrag van studenten te kunnen meten. Vervolgens hebben we dit instrument uitgebreid met een meting van creatief gedrag door de ideeën van studenten te coderen op originaliteit en bruikbaarheid. Dit stelde ons in staat om zowel proactief gedrag als creatief gedrag te meten.

Met een vragenlijst vroegen we studenten naar hun meest creatieve idee om iets te veranderen of te verbeteren gerelateerd aan 3 thema's: 1. Thuis/privé, 2. Hobby/werk, 3. School/studie. Het toevoegen van een open vraag met een algemeen thema aan het begin had als doel te voorkomen dat we studenten zouden beperken in hun creativiteit. In alle vier de thema's vroegen we studenten hoeveel nieuwe en bruikbare ideeën ze hadden gehad, per thema, en of ze hun idee ook hebben gesuggereerd aan een ander of zelf geïmplementeerd. Studenten kregen punten voor proactiviteit wanneer ze ideeën hadden en deze implementeerden of voorstelden aan een ander; ze kregen geen punten als ze geen idee hadden gehad of daar niets mee hadden gedaan (zoals in onderzoek van Parker et al. (2006)). Deze punten hebben we vervolgens gemiddeld over de vier thema's. Voor creativiteit hebben we de originaliteit en de bruikbaarheid van de ideeën gecodeerd met een codeerschema en drie onafhankelijke codeurs. Als een idee zowel (minstens een beetje) bruikbaar en origineel was, werd het beschouwd als creatief (zoals in onderzoek van Amabile (1996)). De punten die studenten kregen voor originaliteit en bruikbaarheid werden gemiddeld over de vier thema's.

Studenten zijn op drie verschillende momenten benaderd voor een meting, waarvan de eerste keer aan de start van het honorsprogramma en de laatste keer ongeveer drie jaar later. De persoonlijkheidsvariabelen werden alleen gemeten op meetmoment 1, de self-efficacy variabelen en proactief en creatief gedrag werden gemeten op meetmoment 1, meetmoment 2 en meetmoment 3. De prestatie-indicator werd alleen in kaart gebracht op één meetmoment, namelijk drie jaar nadat de eerste meting was gedaan. Deze variabele betrof een samengestelde score van tijd tot afstuderen, cijfer voor eindproduct en vervolg na het afstuderen (baan, master, ondernemer etc.). Voor onze analyses hebben we gebruik gemaakt van zowel beschrijvende statistiek en inferentiële statistiek in de vorm van meervoudige regressieanalyses met controlevariabelen.

Resultaten

Onze resultaten wezen uit, in lijn met onze verwachtingen, dat de persoonlijkheid antecedenten variantie in innovatief gedrag voorspelden bovenop de controlevariabelen. Echter, slechts openheid en proactieve persoonlijkheid bleken significante hoofdvoorspellers. De voorspellende waarde van persoonlijkheid in deze studie is zeer beperkt, voor proactief gedrag verklaarde persoonlijkheid slechts 4% extra variante bovenop de controle variabelen (het volledige model verklaarde 8% van de variantie) en voor creatief gedrag slechts 2% (het volledige model verklaarde 14% van de variantie). Proactieve persoonlijkheid bleek de sterkste voorspeller te zijn voor proactief gedrag en openheid de sterkste voorspeller voor creatief gedrag. Voor creatief gedrag bleek het toevoegen van proactieve persoonlijkheid aan het model geen extra verklaarde variantie op te leveren.

Onze resultaten wezen verder uit dat self-efficacy de relatie tussen persoonlijkheid en innovatief gedrag medieert. Ook lieten de resultaten zien dat honorsstudenten significant hoger scoorden op proactieve persoonlijkheid, openheid, consciëntieusheid, creatieve- en academische self-efficacy, dan niet honorsstudenten. Bovendien scoorden honorsstudenten hoger op innovatief gedrag en op de prestatie-indicator. Ten slotte vonden we dat de honorscontext de relatie modereerde tussen proactieve persoonlijkheid en academische self-efficacy en dat honorsstudenten, in tegenstelling tot niet-honorsstudenten, groeien in proactief gedrag.

Conclusie

We concludeerden dat zowel proactieve persoonlijkheid als openheid relevante persoonlijkheidantecedenten zijn voor innovatief gedrag. We zagen bovendien dat creatieve self-efficacy en academische self-efficacy belangrijke 'cognitive-motivational' antecedenten zijn voor innovatief gedrag. Ten slotte hebben we gevonden dat deelname aan een honorsprogramma ook invloed heeft op innovatief gedrag (althans voor het onderdeel proactief gedrag) en prestatie. In dit onderzoek hebben we dus verschillende persoonlijkheidskenmerken, motivationele kenmerken en een contextvariabele geïdentificeerd die samen een deel van het innovatieve gedrag van studenten voorspellen.

Dit onderzoek draagt bij aan onze kennis van antecedenten voor (toekomstige) professionele excellentie. We hebben cruciale persoonlijkheidskenmerken geïdentificeerd voor innovatief gedrag en geconcludeerd dat de honorscontext een positieve invloed heeft op innovatief gedrag, de ontwikkeling van innovatief gedrag en het prestatieniveau van studenten. We hebben ook beter inzicht gekregen in het

mechanisme waardoor context en persoonlijkheid invloed hebben op self-efficacy, wat er vervolgens weer toe leidt dat individuen kansen herkennen en grijpen en de status quo veranderen. Ons longitudinaal en quasi-experimenteel onderzoek, met 'mixed-methods', stelde ons in staat deze conclusies te trekken en beter inzicht te krijgen in de complexe interactie tussen individu en context.

Beperkingen

In dit proefschrift adresseren we ook de beperkingen van ons onderzoek. We hebben ervoor gekozen om in deze samenvatting beperkingen slechts op te noemen. 1. De uitval in de studie was groot. Hierdoor moesten we vaker gebruik maken van cross-sectionele analyses dan we hadden gepland. 2. Ons onderzoek maakt gebruik van een relatief nieuwe operationalisatie van innovatief gedrag en daarom is meer onderzoek nodig om de betrouwbaarheid van ons meetinstrument vast te stellen. 3. We aarzelen om ons model te generaliseren naar contexten buiten de onderwijscontext. Meer onderzoek in een bedrijfscontext is hiervoor noodzakelijk. 4. We zijn kritisch op onze samengestelde prestatie-indicator omdat het uit relatief weinig indicatoren voor academische en professionele prestatie bestaat.

Praktische aanbevelingen

Onze resultaten lijken erop te wijzen dat honorsprogramma's redelijk succesvol zijn in het filteren van een specifiek type persoon en deze goed voor te bereiden op een excellente toekomst. Honors studenten lijken beter te presteren tijdens hun studie en na hun studie dan niet-honorsstudenten. Zij krijgen sneller een baan, kiezen vaker voor een master na hun bachelor en starten vaker hun eigen bedrijf. Dit betekent dat zij gestimuleerd worden in initiatief nemen, het ideeën delen en verandering teweeg brengen. Toch lijken de initiatieven en de veranderingen zelden revolutionair. Door de jaren neemt de creativiteit van studenten af en het honorsprogramma lijkt daar geen verandering in te brengen. Onze eerste aanbeveling is daarom op twee zaken gericht: 1). Het identificeren van de onderwijsfactoren die proactief gedrag kunnen ontwikkelen en 2). het identificeren van de onderwijsfactoren die creatief gedrag kunnen ontwikkelen.

Onze tweede praktische aanbeveling betreft het advies voorzichtig om te gaan met ons meetinstrument als selectieinstrument voor potentieel innovatietalent. De effectgroottes van persoonlijkheid op innovatief gedrag zijn marginaal en daarom zou het gebruik van dit instrument voor het beoordelen van iemands potentie een grote simplificatie van de werkelijkheid zijn, en wellicht zelfs onethisch.

Onze laatste aanbeveling betreft het feit dat ons onderzoek pleit voor het aanwakkeren van studenten hun academische self-efficacy. Dit betekent dat docenten studenten het gevoel moeten geven in staat te zijn om de status quo aan de kaak te stellen, nieuwe uitdagingen aan te gaan en gebruik te maken van nieuwe kansen. Het bouwen aan dit zelfvertrouwen zal leiden tot meer creatieve ideeën en meer implementatie van deze ideeën.

11

Appendices

Chapter 11

Appendices

Appendix 1 rotated components matrices with all factor loadings

Table 1 Rotated component matrix conscientiousness, extraversion and openness

Component	Factor 1	Factor 2	Factor3
I approach work systematically	.801	.081	-.107
I look after my things very carefully	.778	-.089	.069
I perform assignments with care	.707	.065	.158
I work hard	.663	.283	.094
I find it easy to get organized	.660	.097	.125
I always do the best I can	.655	.316	.079
I meet deadlines	.630	.258	.071
I know what I want to achieve	.518	.386	.188
I achieve my goals	.495	.493	.171
I am often surrounded by a group of people	.025	.786	-.105
I enjoy my life	.060	.771	.129
I laugh often	.073	.740	.033
I engage in a wide range of activities	.252	.631	.116
I have a busy life	.337	.578	.115
I like to exercise leadership over others	.203	.414	.263

Component	Factor 1	Factor 2	Factor3
I enjoy philosophizing	-.068	-.011	.785
I like playing around with theories and abstract ideas	.149	.019	.770
I am curious about ideas that are critical of the social structure	-.026	-.081	.743
It is important to see things from different perspectives	.103	.149	.700
I am open to new ideas	.250	.298	.662
I enjoy discovering new things	.237	.325	.653

Table 2 Rotated component matrix conscientiousness, extraversion and openness

Component	1	2
(How very insecure-very secure do you feel about…?) Attending additional classes on top of the regular classes	.786	.020
Improving your knowledge	.761	.162
Broadening your knowledge	.736	.239
Engaging in additional activities besides your degree programme	.704	.166
Performing a practice-orientated research assignment	.577	.198
Dealing with freedom of choice in the course of your studies	.475	.311
(How very insecure-very secure do you feel about…?) Inventing a new solution for an existing problem	.090	.862
Coming up with new ideas	.258	.798
Inventing a useful solution for a new problem	.212	.779

Appendix 2 confirmatory factor analysis measurement scales antecedents

To thoroughly check our data, we also performed a confirmatory factor analysis to once more test whether our data sufficiently fit our theoretical models. For this analysis we use a separate (other half) sample of 297 students. Because our data show multivariate kurtosis we decided to use MLM modeling in MPLUS. MLM provides more robust indictors of fit for non-normal data. Model fit was assessed with four fit indexes: chi-Square (X^2); comparative fit index (CFI); the Tucker Lewis Index (TLI); and the root-mean-square of approximation (RMSEA). The CFI has advantages over other statistics (e.g. chi-squared) due to its resistance to error related to sample size (Bentler, 1990). A CFI value greater than or equal to .90 indicates adequate model fit (Bollen, 1989). Browne and Cudeck (Browne & Cudeck, 1992) suggested that RMSEA values between .05 and .08 indicate reasonable model fit. First a one factor model with the 4 personality factors was tested to test for common method variance. This test shows that our data poorly fitted the one factor model, which eliminates possible concerns of common method bias (Podsakoff & Organ, 1986).

With the CFA (N=297) we first tested our model that Proactive Personality is 1 latent variable measured with 8 items (model 1 table 3). This first test did not immediately result in satisfactory model fit. Modification Indices suggest co-varying error terms. Indeed several items were relatively similar to each other which allow us to co-vary these error terms. We co-varied error terms of items twice, this resulted is satisfactory (model 2 table 3) model fit. The CFI is well over .90 and the RSMEA falls nicely within the .05 - .08 range.

Table 3 Model fit Indices for Proactive Personality

Model	Description	*X²*	*CFI*	*TLI*	*RSMEA*
1	Proactive Personality 1 factor	69.13	.888	.843	.091
2	Proactive Personality 1 factor co-varied error terms 2 times	39.80	.950	.923	.064

Next we tested whether our measurement scales for openness, conscientiousness and extraversion indeed show a 3 latent factor structure. Our first model is represented in Table 4. Even though RSMEA is acceptable, CFI and TLI are too low. MI's indicate co-varying several error terms. Indeed several items were relatively similar and co-varying their error terms resulted in a better model fit (see model 2 table 4). CFI is sufficiently high and RSMEA falls within the required range as well.

Table 4 Model fit Indices for Conscientiousness, Openness and Extraversion

Model	Description	X^2	*CFI*	*TLI*	*RSMEA*
1	Three factor model OCE	384.959	.840	.817	.073
2	Three factor model OCE co-varied 5 error terms	288.128	.902	.884	.058

Lastly we calculated the model fit for the two self-efficacy scales (see table 5, model 1). Both the CFI is and the RSMEA were satisfactory. MI's indicate co-varying two error terms would improve the fit indices even further. Co-varying error terms (model 2) resulted in a better RSMEA and a higher CFI. Our CFA for self-efficacy consisting of two factors indicated sufficient model fit.

Table 5 Model fit Indices for Self-efficacy

Model	Description	X^2	*CFI*	*TLI*	*RSMEA*
1	Self-efficacy 2 factors	72.222	.922	.892	.077
2	Self-efficacy co-varied 1 error term	60.235	.941	.915	.069

Appendix 3 histograms of measurement scales antecedents

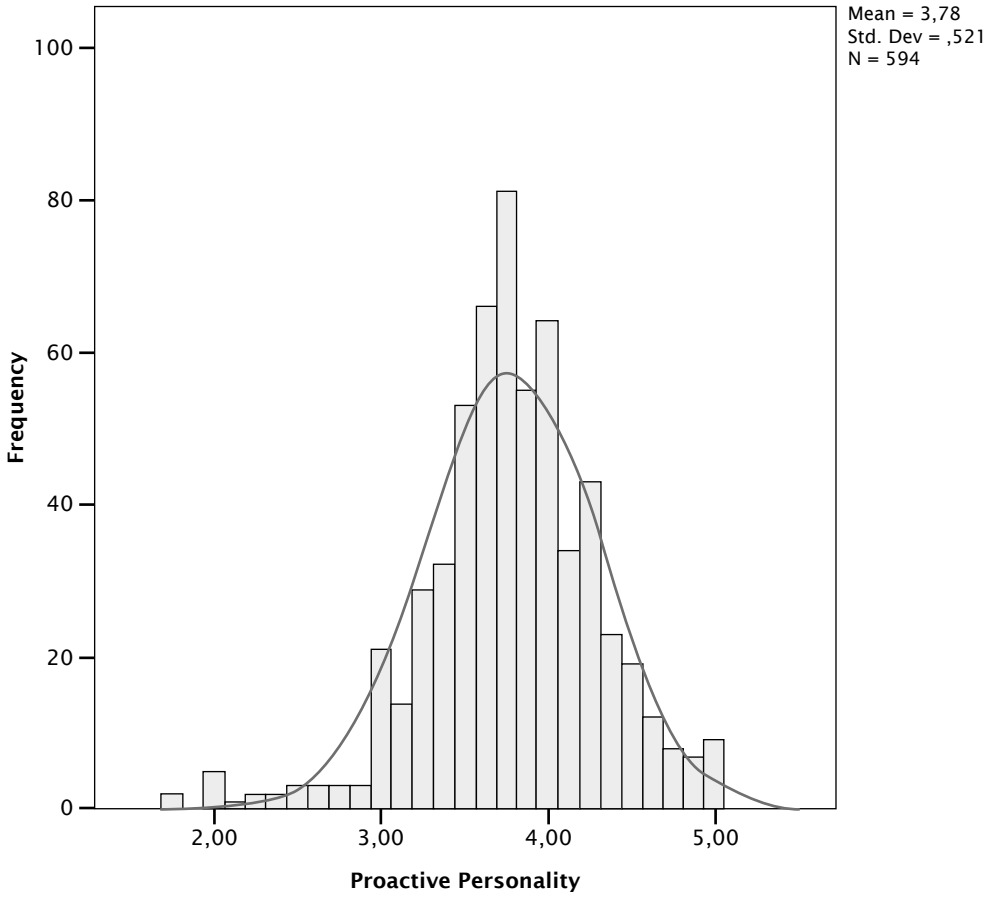

Figure 1. Histogram proactive personality scale

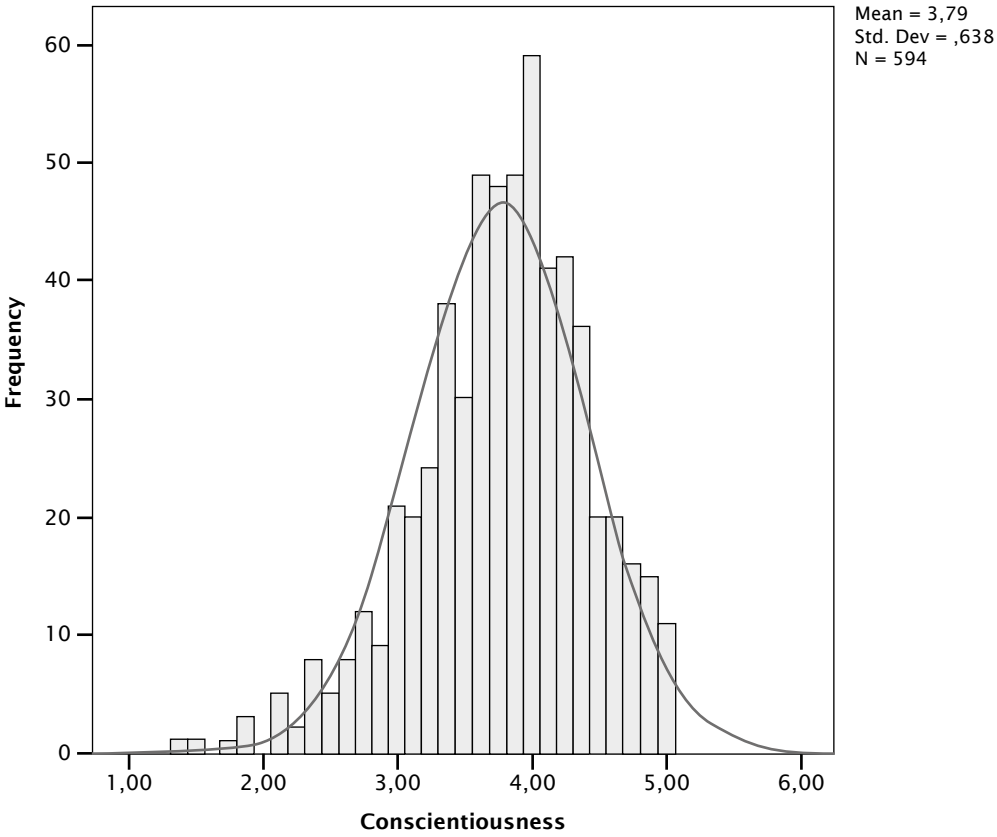

Figure 2. Histogram conscientiousness scale

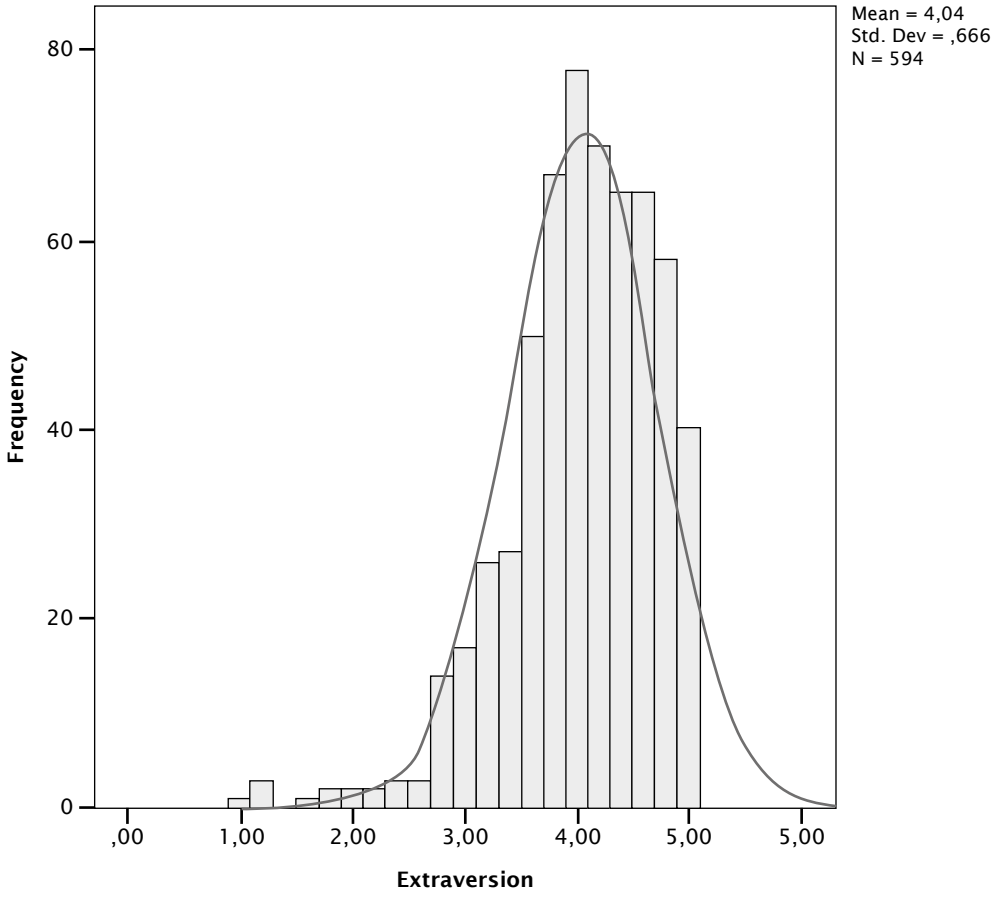

Figure 3. Histogram extraversion scale

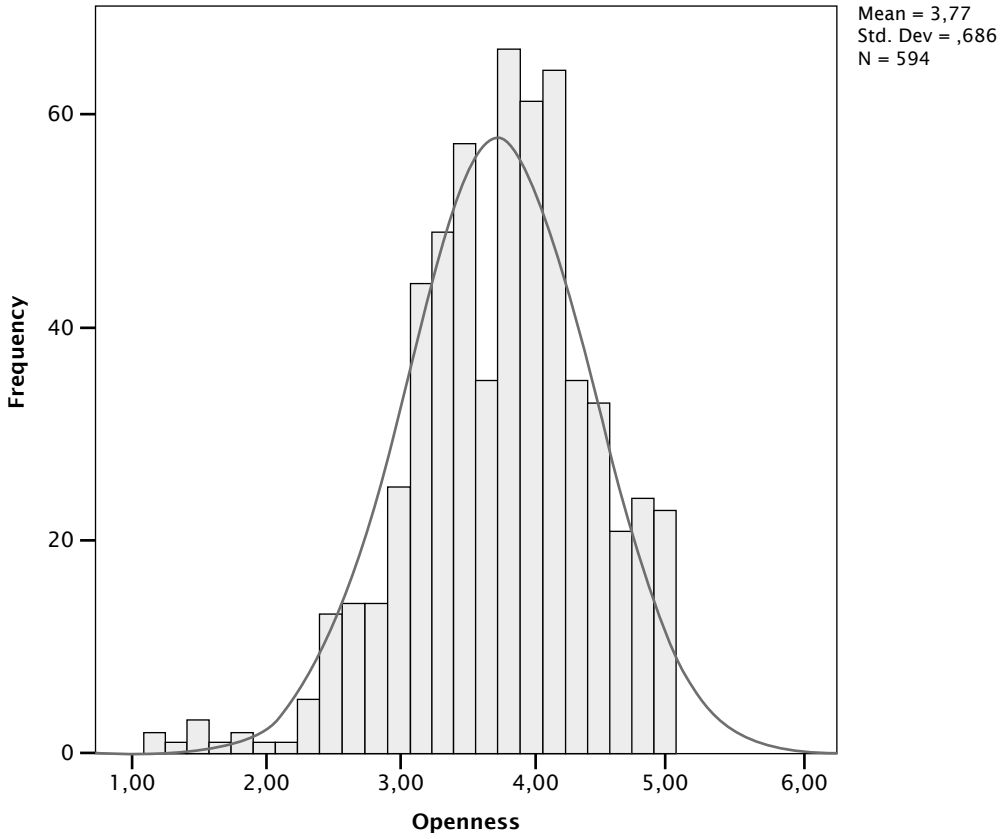

Figure 4. Histogram openness scale

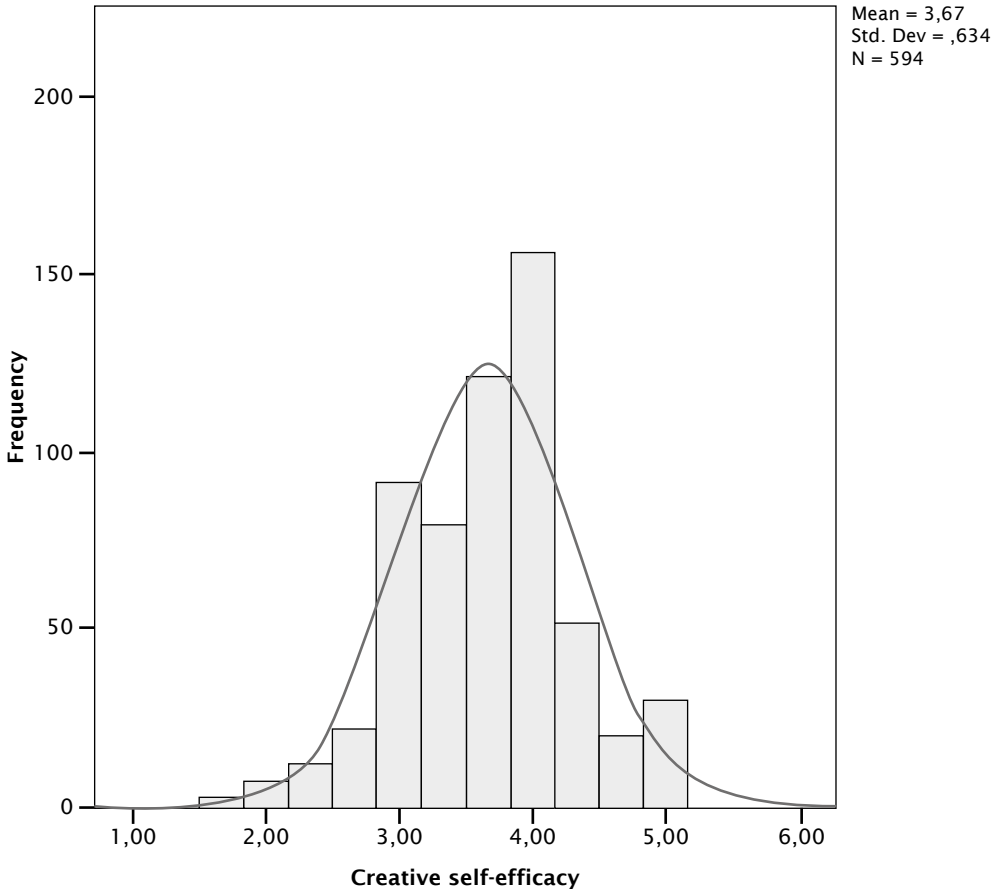

Figure 5. Histogram creative self-efficacy scale

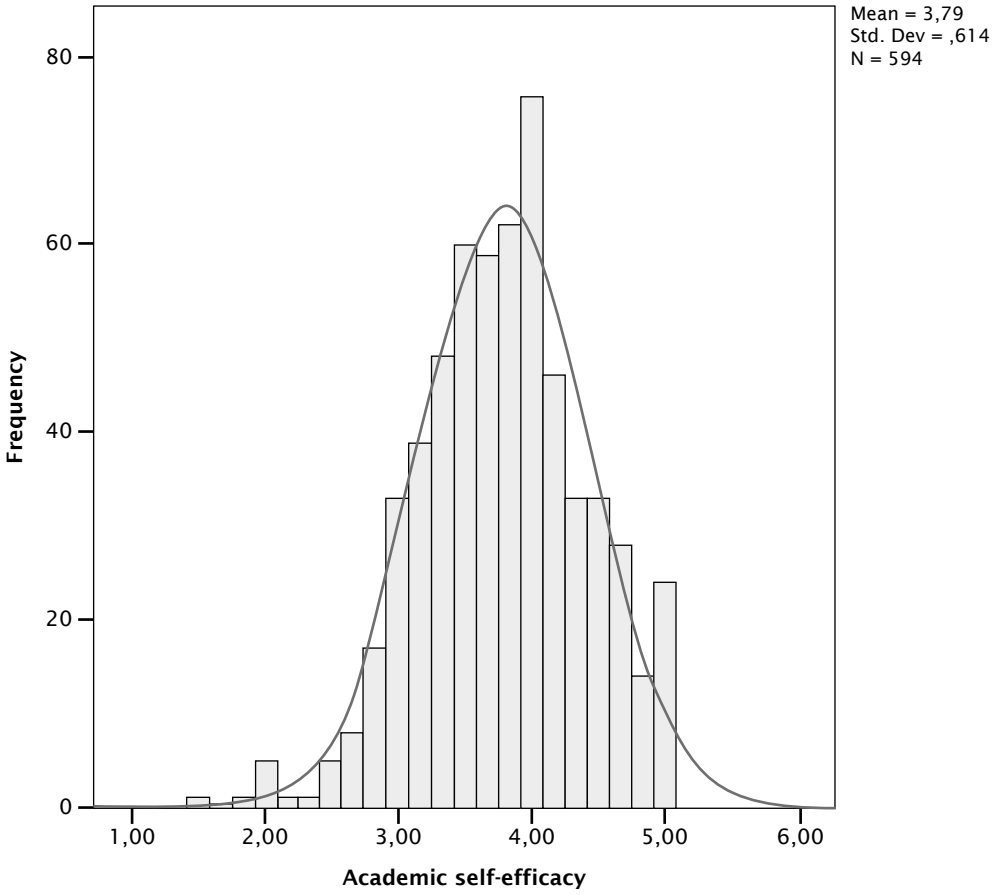

Figure 6. Histogram academic self-efficacy scale

Appendix 4 interaction-effect honors context and personality

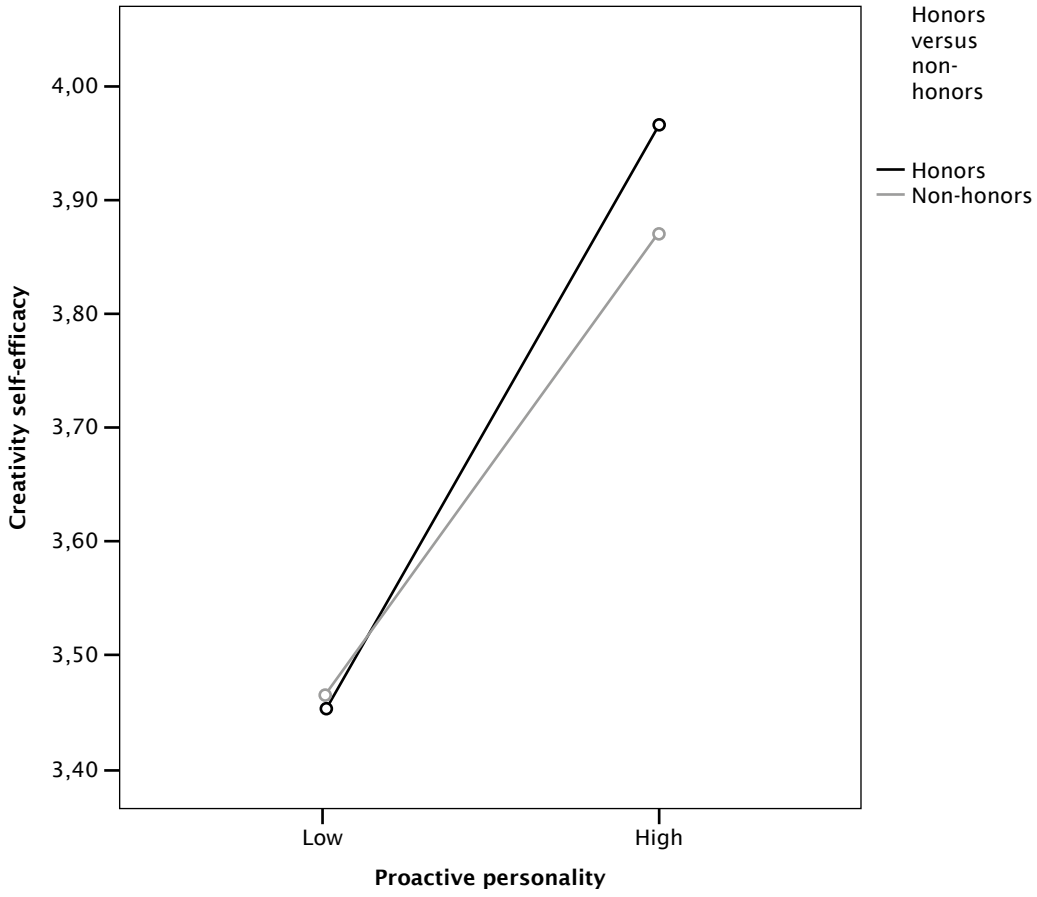

Figure 7. Interaction-effect of proactive personality and honors context on creative self-efficacy

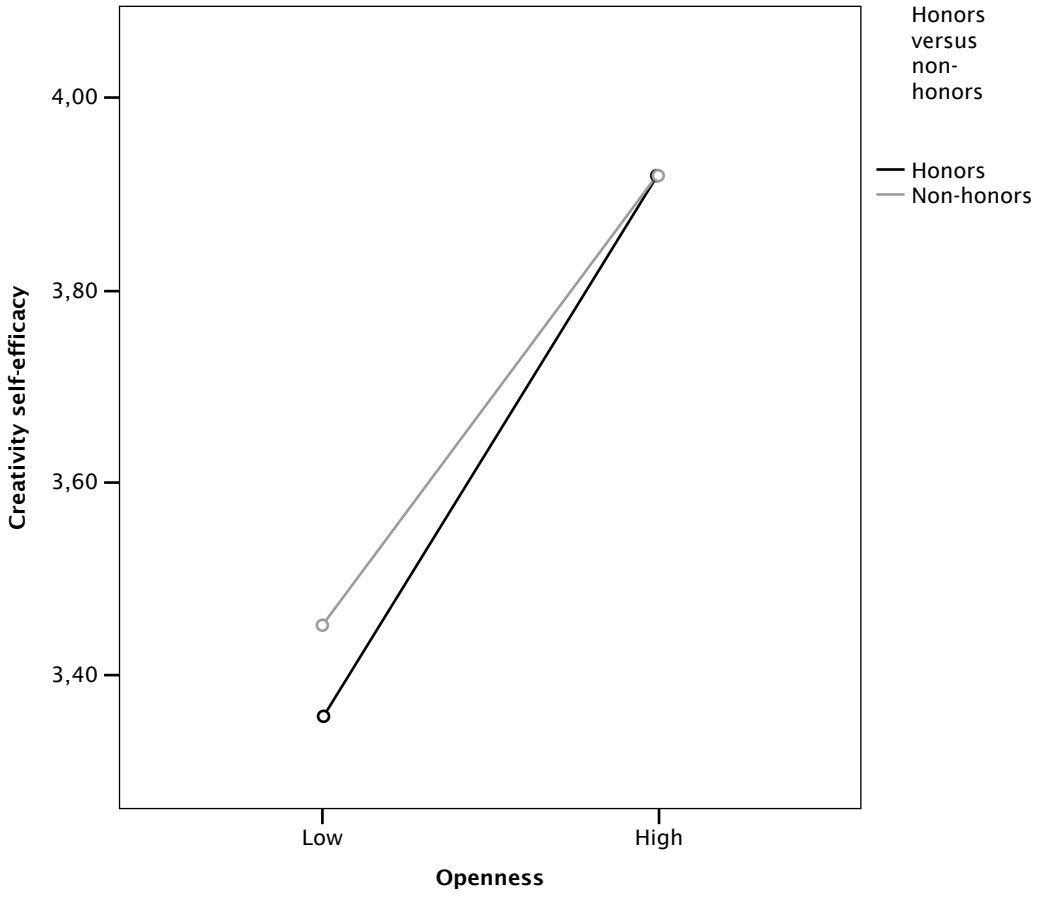

Figure 8. Interaction-effect of openness and honors context on creative self-efficacy

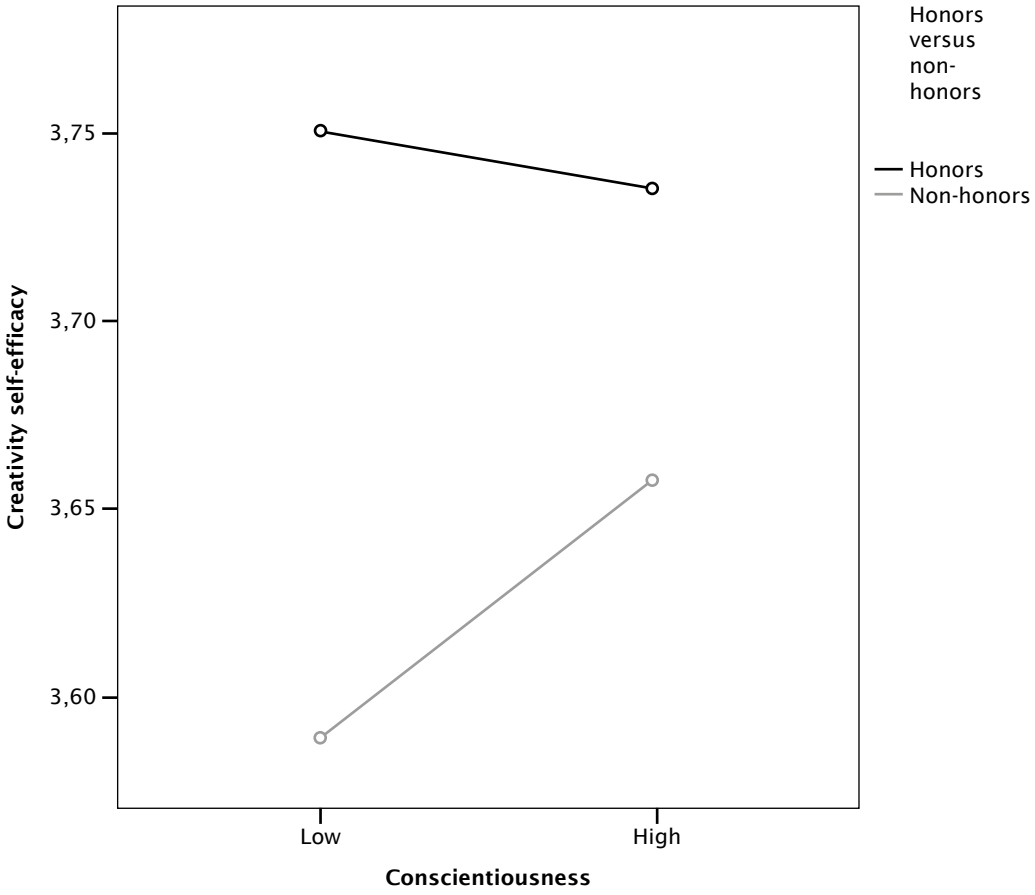

Figure 9. Interaction-effect of conscientiousness and honors context on creative self-efficacy

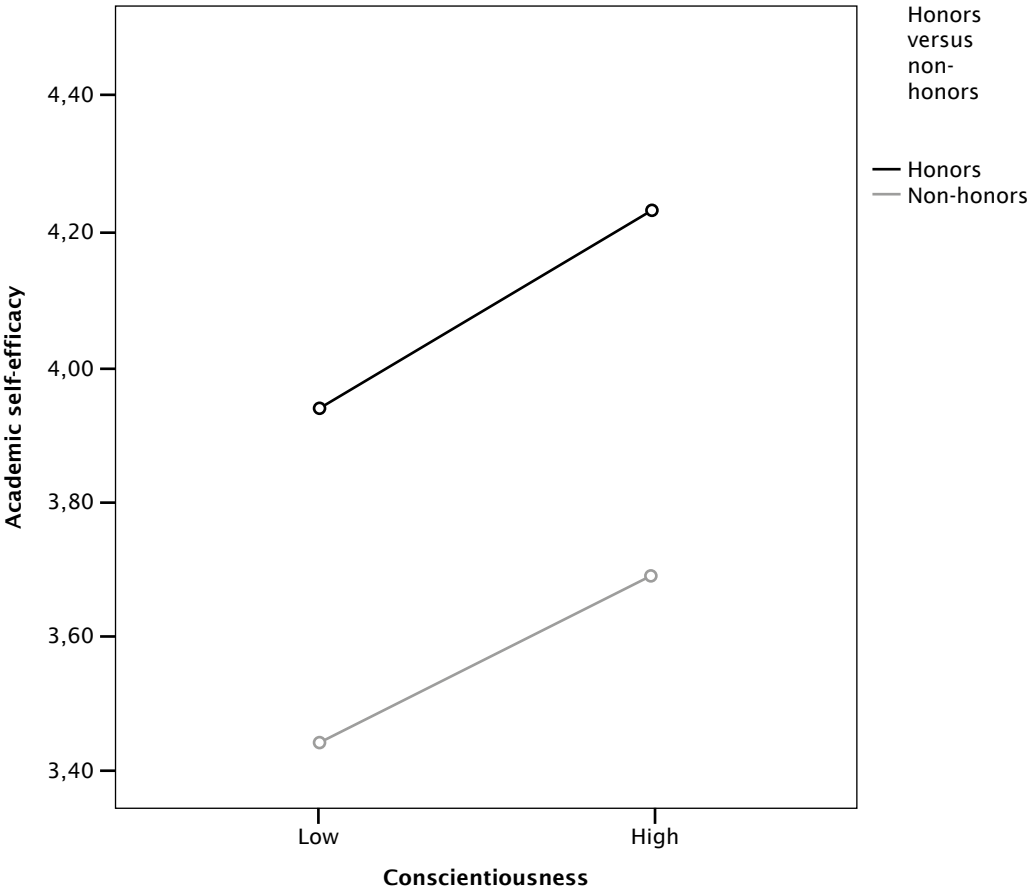

Figure 10. Interaction-effect of conscientiousness and honors context on academic self-efficacy

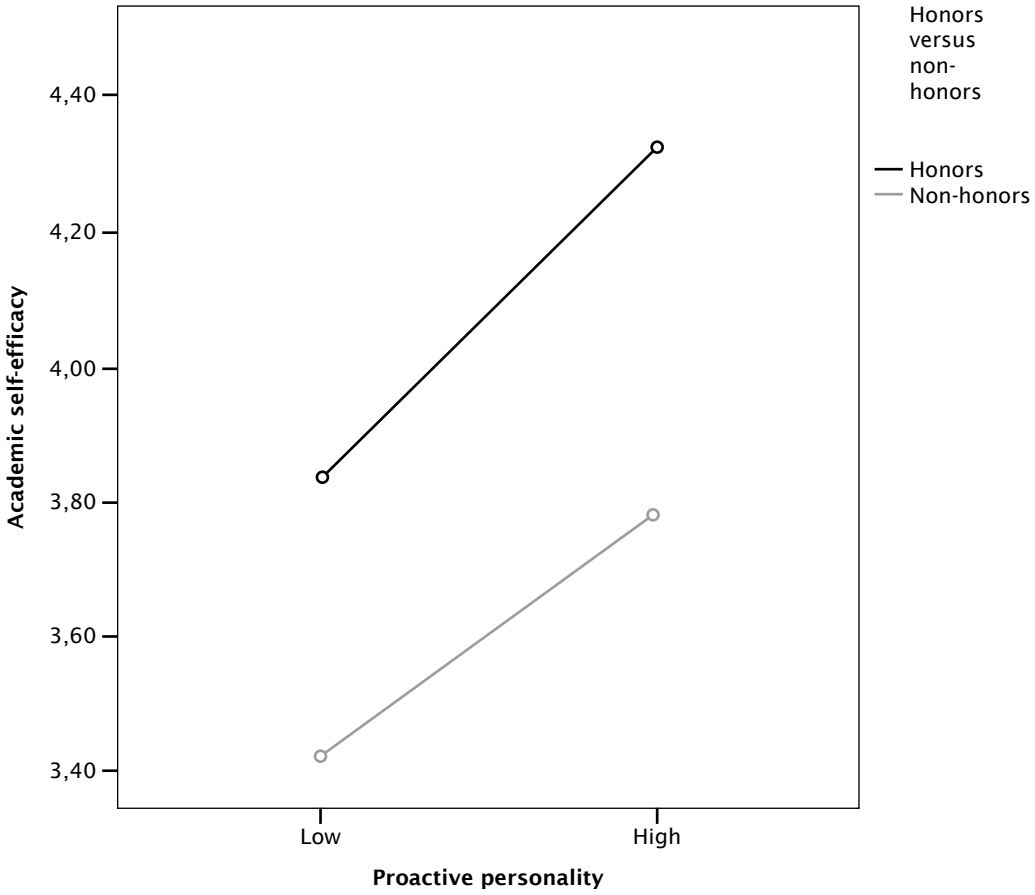

Figure 11. Interaction-effect of proactive personality and honors context on academic self-efficacy

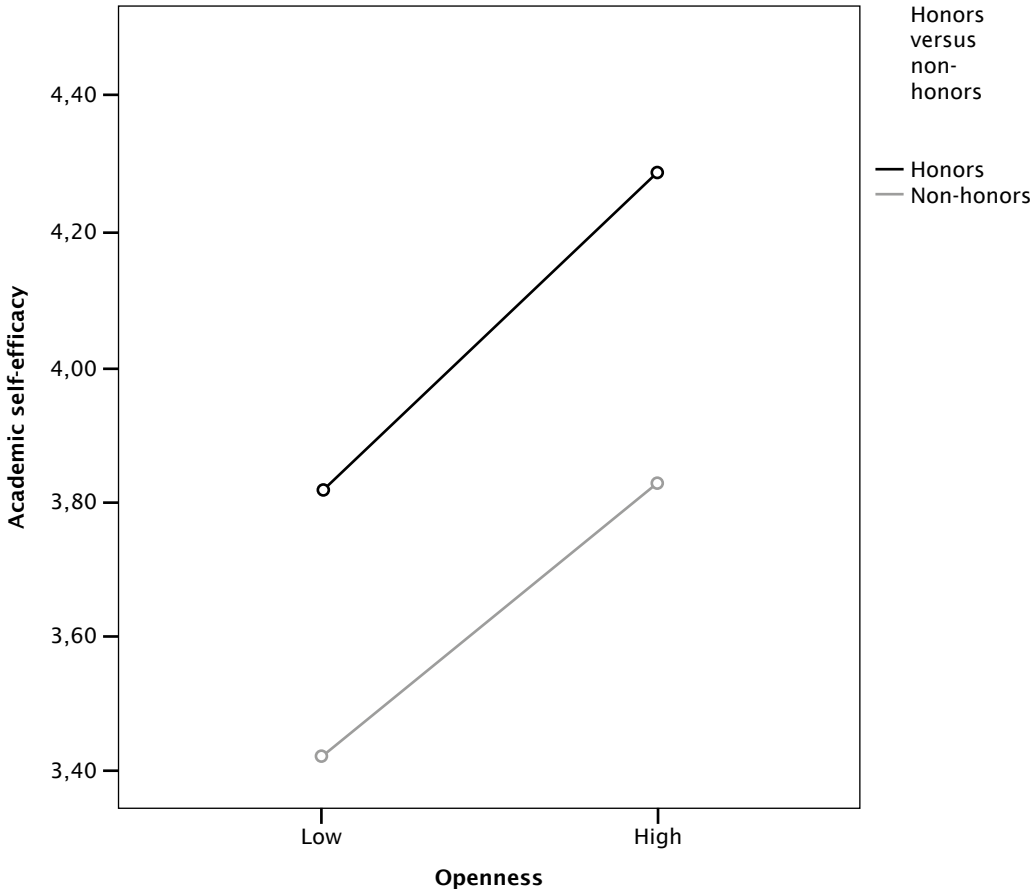

Figure 12. Interaction-effect of openness and honors context on academic self-efficacy

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