The student X-factor

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Summary and discussion
ABSTRACT

The central goal of this dissertation was to clarify the relationships between personality, personal relations and social comparison, as well as the predictive value of these concepts for higher education students’ academic behavior and academic attainment. To this purpose, a number of studies have been carried out. In this chapter, the central concepts, the expected relations, the research questions, method and the main findings are summarized first, and some practical implications are described. Subsequently, the strengths and limitations of the research conducted for this dissertation are discussed and finally some suggestions for further research are given.
INTRODUCTION

The general purpose of education is to transfer knowledge and skills in order to prepare students for successful participation in our society. Students’ outcomes are the central and crucial criteria to evaluate whether this purpose is attained. Educational effectiveness studies try to discover factors that either facilitate or hamper students’ learning and thus educational outcomes. There are several levels at which these facilitative or hampering factors can be studied. Among these are, for instance, national-level factors such as curriculum guidelines, school-level factors such as the quality of the school organization, and class-level factors such as the quality of instruction or the learning content (Creemers & Kyriakides, 2006). However, the most important factors for explaining why some students do better in education than others are student-level factors like, for example, students’ study behavior. It is at the level of the students that this dissertation tried to find an answer to the question: ‘What works well and why in higher education?’.

CENTRAL CONCEPTS TO THIS DISSERTATION

There are three theoretical concepts that are central to this dissertation: personality, personal network, and social comparison. In past research, these variables all appeared to be related to academic outcomes. Personality can be defined as habitual patterns of behavior, thought, and emotion. Not surprisingly, these patterns of behavior, thought and emotion play an important role in the academic environment: students’ personality influences, among others, the way in which students study (see, for instance, Blickle, 1996), their persistence (see, for instance, Lay et al., 1998; Schouwenburg & Lay, 1995), and their focus and motivation (see, for instance, Busato et al., 1999; Busato et al., 2000). Of the five most described personality traits or factors, the most influential basic personality trait in the educational context has been found to be Conscientiousness (the other four are Agreeableness, Extraversion, Emotional Stability and Autonomy or Openness to Experience). Being conscientious, that is, being hard-working, disciplined and striving for achievement, is beneficial to educational outcomes at all levels of education (Poropat, 2009).

The second central concept in this dissertation concerns students’ personal network. From the moment they are born, people are surrounded by other people and learn and develop themselves in close interaction with others. It is inevitable that this is also relevant to the academic context. Especially peer groups appeared to influence students’ academic beliefs, motivation, self-esteem and study behavior as well as their educational outcomes, both directly and indirectly (Berndt et al., 1990; Davies & Kandel, 1981; Keefe & Berndt, 1996; Lubbers, 2004; Robbins et al., 2004; Ryan, 2001; Wentzel, 1998; Wentzel et
al., 2004). One of the means by which students’ personal network might affect educational outcomes is through social support. The support that is available or actually provided within students’ social environment can function as a safety net during education, and can enhance students’ self-esteem and feelings of well-being. Social support has indeed proven to be beneficial to educational outcomes (DeBerard et al., 2004; Dubow et al., 1991; Malecki & Demaray, 2005; Richman et al., 1998; Robbins et al., 2004).

Finally, since education takes place in close interaction with other students, it is inevitable that students are aware of other students’ study behavior and achievement. Often, students compare their results with those of others to get an impression of their standing, that is whether they performed better, worse or similar as others did. Empirical studies on academic comparison have revealed that some students generally tend to compare themselves with others who performed better, while other students are more inclined to compare themselves with students who performed worse or equally well (Dijkstra et al., 2008; Wehrens, 2008). Given available evidence (Dijkstra et al., 2008), it seems reasonable to assume that the direction of comparison depends on the reason why one compares. For instance, when a student wants to feel better about his or her own performance, it is likely that this is accomplished by comparing with others who performed worse. Knowing that one is not the worst performing student may lead to more positive thoughts or feelings on one’s own performance. In contrast, when a student is seeking for ways to improve his or her own performance, students who perform better may provide them with examples of best practice. It is especially this upward comparison, with others who performed better, that has been found to be beneficial to educational outcomes (Blanton et al., 1999; Huguet et al., 2001; Wehrens, 2008).

EXPECTED RELATIONS

Next to the fact that the above-mentioned constructs separately appear to influence academic attainment, they have appeared to be interrelated. Personality does not only play a role in academic behavior and educational outcomes, but also in interpersonal relationships. Personality affects the forming and maintenance of personal relations (Asendorpf, 2002; Bouchard et al., 1999; Jensen-Campbell et al., 2002; Ozer & Benet-Martinez, 2006). For instance, Extraversion, Agreeableness and Conscientiousness have been found to affect the number as well as the quality of peer relations among university students. Personality is also known to be associated with the amount and direction of social comparison. For instance, people low in Emotional Stability compare themselves more often with others than people high in Emotional Stability (Van der Zee et al., 1996) and people low in Agreeableness typically tend to compare downward (Olson & Evans, 1999).

As has been said, personality can be defined as habitual patterns of behavior, thought, and emotions. In other words, personality is inferred from behavior. This includes
academic behavior, such as achievement motivation, procrastination, or time-on-task, which have been found to be detrimental (procrastination) or beneficial (e.g., achievement motivation) to academic attainment. But, academic behavior and outcomes are also likely to be affected by the personal network that surround students. Parents, peers and co-students can function as role models during education, showing students for instance how to study and how to keep up motivation (Wentzel, 1998; Wentzel et al., 2004). Furthermore, the demands as well as the support provided by network members may influence, for instance, whether students tend to procrastinate or proceed in time, and whether they quit easily or persevere. Also, a supporting network might enhance students’ self-esteem or self-confidence as well as well-being, which can also be beneficial for their educational careers.

In summary, personality, personal network, and social comparison processes all have been found to be associated with academic attainment. However, these variables have also been found to be related to each other. So, the central question of this dissertation was whether the effects of personality, personal network, and social comparison on academic attainment work together, through specific, learning related variables such as achievement motivation, procrastination, and time-on-task, as well as other learning related variables like well-being and self-esteem. The expected relations, which were partly studied in this dissertation, are depicted in Figure 4.

Based on these expected relations, four separate studies were conducted. In the first study (see Chapter 3) it was investigated whether students’ personality is related to the composition of their personal network. Following, a study was conducted in which it was investigated whether students’ personality is related to the direction in which they compare themselves, and whether this is dependent on their motives for comparison (see Chapter 4). In Chapter 5, it was explored whether certain characteristics of students’ personal network – such as the number of network members, their age, educational level and the amount of social support – is related to students’ study behavior and thereby to their educational success. Finally, in Chapter 6 it was examined whether students’ personality is related to students’ educational outcomes via the effect of personality on achievement motivation, procrastination and time-on-task.
DATA AND PROCEDURE

This dissertation has been written within the context of three large-scale cohort studies in the Netherlands, called Voortgezet Onderwijs Cohort Leerlingen VOCL’89 (Hustinx et al., 2005a), VOCL’93 (Hustinx et al., 2005b) and VOCL’99 (Zijsling et al., 2005). All three cohort studies were carried out among approximately 20,000 students, who were at the moment of the start of the respective cohort (1989, 1993 and 1999) in their first year of secondary education. For this dissertation, a follow-up was performed on the cohorts VOCL’89 and VOCL’93, among those students who had successfully finished Senior General Secondary Education (SGSE, or HAVO in Dutch) or pre-university education (PUE, or VWO in Dutch). Within VOCL ‘99, students’ personality, personal network and social comparison were studied. By performing a follow-up among students in the preceding cohorts, VOCL ‘89 and VOCL ‘93, who at that time had already entered and/or finished higher education, the same concepts could be studied within higher education as well.

In this follow-up on VOCL’89 and VOCL’93, the students received a self report questionnaire that consisted of five parts: part 1 was titled ‘About your study’, part 2 was titled ‘About the way you study’, part 3 was titled ‘About comparison’, part 4 was titled ‘About your network’ and part 5 was titled ‘About your personality’. Approximately 3400 students out of an eligible 10,500 students filled in and returned the questionnaire. At the moment they received the questionnaire, on average the students from VOCL ‘89 were 27 years old and the students from VOCL ‘93 were 23 years old.

SUMMARY OF THE FINDINGS

Chapter 3 - Personality and personal network type

Even though the association between personality and (students’) personal network has been studied frequently, these studies mainly focused on dyadic – that is, one-on-one – relationships such as marital relations or friendships. So, little is known about how personality affects the composition of a personal network consisting of multiple relations surrounding an individual. Chapter 3, therefore, examined the association between personality and personal network type. Because men and women are known to differ in personality as well as their social relationships, sex was included as a covariate in the analyses.

Personality was assessed with the FiveFactor Personality Inventory (FFPI; (Hendriks et al., 1999a; Hendriks et al., 1999b). The FFPI provides scores on the Big Five dimensions Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Autonomy. Using data on the role relationship (for instance, parent or friend) with three focal figures within students’ personal network, a Latent Class Analysis revealed three personal
network types: (a) a primarily family oriented network, (b) a primarily peer oriented network, and (c) a mixed family/peer oriented network. The results showed that there are differences between these network types concerning sex and personality. Extraverted students are more likely to have a peer-oriented network than a family oriented network. In other words, extraverted students are more focused on peer relations than on family relations. Furthermore, autonomous students are more likely to have a family oriented network than a peer oriented network, and they are also more likely to have a mixed family/peer oriented network than a peer-oriented network. In other words, autonomous students also focus more on family relations than on peer relations. Finally, conscientious students are more likely to have a family oriented network than a family/peer-oriented network. In other words, conscientious students are also more family oriented.

In previous studies, Extraversion, Conscientiousness and Autonomy appeared to be related to social relations (Asendorpf & Wilpers, 1998; Jensen-Campbell et al., 2002; La Guardia et al., 2000). This study, presented in Chapter 3, showed that these personality traits are also related to the type of personal network students have. However, Agreeableness and Emotional Stability were found not to be related to personal network type, although in previous studies both have been found to be related to social relations (Carlo et al., 2005; Donnellan et al., 2004; Graziano et al., 1997). Possibly, the association between personality and dyadic relations is different from the association between personality and a personal network consisting of multiple relations; forming and maintaining dyadic relations may appeal to other personality characteristics than forming and maintaining a personal network. For instance, it is possible that certain personality characteristics can explain why some people feel more comfortable when they are surrounded by a large number of (more superficial) relationships, whereas others prefer a smaller number of closer ties surrounding them.

Hays and Oxley (1986) found that the number of co-students in a students’ network had a positive effect on students’ adaptation. Furthermore, they stated that a network consisting of primarily family members or other non-academic relations might cause tension between the expectations and demands within the network and the expectations and demands within the educational environment. This tension can have a hampering effect on students’ educational careers. More insight in the effect of the composition of students’ personal network on their educational careers therefore can be a highly relevant aim of future studies.

Chapter 4 – Personality and social comparison
Chapter 4 aimed to examine the relationship between personality and motives for and the direction of social comparison. Previous studies have shown that personality is related to the direction of comparison, that is, to upward, downward, or lateral comparison.
Extraverted individuals, for instance, have been found to prefer to compare themselves downward (Olson & Evans, 1999; Van der Zee et al., 1996). Furthermore, there are several motives for comparison that possibly underlie certain comparison choices. Students who want to improve their performance for instance can compare themselves with others who performed better in order to acquire information on how to improve their own performance. However, it is largely unknown how these motives fit in the relationship between personality and the direction of comparison. Which people compare for reasons of self-enhancement, which for reasons of self-evaluation, and which for reasons of self-improvement?

It was hypothesized that personality and motives for comparison might be associated. Moreover, it was hypothesized that motives for comparison may mediate the association between personality and the direction of comparison. For instance, extraverts may feel the need to keep up their high level of self-esteem, and this need for self-enhancement might motivate individuals to compare downwards.

First, by means of multinomial logistic regression analysis, the relationship between personality and direction of comparison was tested. Lateral comparison served as the reference category. The analyses showed that students high in Conscientiousness were less likely to compare upward than to compare lateral. No other significant associations were found. Lateral comparison is considered best for self-evaluation, whereas upward comparison is considered best for self-improvement (Dijkstra et al., 2008).

Second, by means of linear regression analysis, the relationship between personality and motives for comparison was tested. The results suggested that students low in Agreeableness, low in Emotional Stability, and low in Autonomy are more inclined than their opposites (high in Agreeableness, high in Emotional Stability, and high in Autonomy) to compare themselves to enhance their self-worth. Furthermore, it was found that students high in Conscientiousness were more inclined than those low in Conscientiousness to compare themselves for motives of self-evaluation or self-improvement.

Finally, by means of multinomial logistic regression analysis, the relationship between motives for comparison and direction of comparison was tested. The results showed that students who compare to evaluate their performances tend to compare lateral instead of downward, and that students who compare to improve their performance tend to compare upward instead of lateral. However, no evidence was found that the relationship between personality (in casu Conscientiousness) and the direction of comparison was mediated by motives for comparison.

A number of expected relations were not confirmed in this study. In contrast to previous studies (Olson & Evans, 1999; Van der Zee et al., 1996), no tendency to compare downward was found among students high in Extraversion and low in Agreeableness. However, Extraversion and Agreeableness play an important role in interpersonal relations, whereas in our study, the focus was on comparison of grades. Extraverted and
Agreeable students might be more interested in comparing more socially relevant subjects such as, for instance, comparing their popularity. This might also explain why no evidence was found for a relationship between Extraversion and any of the motives for comparison, since these motives—as formulated in the present study—were also related to academic subjects, namely grades. Furthermore, no significant relationship was found between self-enhancement as a motive for comparison and the direction of comparison, whereas it was expected that downward comparison would serve as a way towards self-enhancement.

The students were asked to indicate the extent to which they compared themselves for reasons of (a) self-enhancement, (b) self-evaluation, as well as (c) self-improvement. However, the students were not asked to indicate a single dominant motive for comparison with the individual they usually compared their grades with. Information concerning a dominant motive for comparison might have revealed other or stronger associations between personality and motives for comparison as well as the motives for comparison and the direction of comparison. On the other hand, asking for a dominant motive might have missed the more nuanced premise that students may have more than one motive to compare their grades with others. This is especially the case when the time frame is longer (‘last year’) and motives for comparison as well as directions of comparison may alternate.

A suggestion for further research might be to explore whether personality is indeed related to which subjects of comparison someone is interested in, and whether specific subjects of social comparison evoke certain motives to compare. So, for instance, are extraverted people indeed more interested in comparison of more socially relevant subjects such as popularity among peers instead of academic grades, and does comparing popularity evoke a specific motive for comparison, for instance self-enhancement rather than self-improvement.

Chapter 5 - Personal relationships and academic attainment

Certain characteristics of the personal network that surround students have been found to affect academic attainment - both directly and indirectly (Berndt et al., 1990; Davies & Kandel, 1981; Keefe & Berndt, 1996; Lubbers, 2004; Robbins et al., 2004; Ryan, 2001; Wentzel, 1998; Wentzel et al., 2004). For instance, a study performed by Lubbers (2004) showed that the number of friends as well as peer acceptance was directly related with students’ academic progress. Generally, however, the association of students’ personal network with academic attainment is thought to be mediated by other variables (Lubbers, 2004). For instance, being integrated in a supportive network can enhance feelings of personal well-being and self-esteem, which in turn benefits educational attainment (Keefe & Berndt, 1996). Also, the social support that is provided by a students’ personal
network might function as a buffer against the influence of stress on students’ motivation (Kennedy et al., 1988; Wentzel, 1998; Wentzel, 1999). On the other hand, conflicting expectations between the demands of the academic environment and the social environment can cause students to postpone studying, for instance because they prefer to go out and have fun with friends rather than spending time at the library.

To shed more light on the role personal relationships play with respect to academic attainment, the effects of a number of network characteristics on the educational attainment of students was investigated. Variables included in this study were the age and educational level of the network members, the number of men and women within the network and the amount of contact students have with their network members, as well as the amount and type of support that is provided by the network members. Since existing studies on the effect of personal relations on academic outcomes have mainly been aimed at peer groups or friends groups, other role relations were included as well, for instance family or neighbors.

Furthermore, in previous studies, the studied mediators through which the influence of personal network characteristics and social support on academic attainment is likely channeled were mainly achievement motivation, well-being and self-esteem. Therefore, other interesting variables as (a) time spent studying and working and (b) procrastination were examined as well in the current study. Direct relationships were expected between personal network characteristics and social support on the one hand and diploma attainment and study progress on the other hand. In addition to these direct relationships, indirect relationships were expected through achievement motivation, well-being, time-on-task as well as time spent working, procrastination, and self-esteem.

First, the relationship of personal network characteristics and social support with diploma attainment and study progress was explored by means of a multinomial logistic regression analysis. No relationships were found between personal network characteristics and diploma attainment, nor between social support and diploma attainment. However, a relationship was found between personal network characteristics and social support on the one hand and study progress on the other hand. Even though none of the individual social support variables showed a significant relationship with study progress, the social support variables together significantly improved the model fit for study progress. So, there appears to be a relationship between social support and study progress, even though it is not yet clear which type(s) of support is most important.

Furthermore, students with a larger network appeared less likely to finish their study with delay, whereas students with older network members appeared more likely to finish their study with delay. In other words, having a larger network is beneficial when it comes to study progress, whereas having an network with older network members plays a hampering role. Finally, the results only provided evidence for a negative relation-
ship between time spent working and diploma attainment, and a negative relationship between procrastination and accelerated diploma attainment.

So, having a larger network is beneficial to study progress, even though one might assume that forming and maintaining a large network takes a lot of time and effort that cannot be spent at studying. A large network may indeed provide a safety net during setbacks and may function as a buffer against the influence of stress. Furthermore, having an older network appears to be a hampering factor when it comes to study progress, possibly because of the before mentioned friction between the demands and expectations of the network and demands and expectations of the academic environment.

Surprisingly, no significant relationship was found between the learning related variables included in this study and students’ educational outcomes. This is rather surprising, since the included variables in this study all have been proven to be highly relevant when it comes to predicting educational outcomes, for instance achievement motivation and time-on-task. This may be due to the fact that a number of control variables were included measuring students’ previous performance during education. These measures of previous attainment are very likely to be at least partially caused by students’ study behavior and achievement motivation at that time. Therefore, the effect of these variables might be included in measures of previous attainment, leaving no variation to be explained by current measures of study behavior. This is especially the case when students’ study behavior, achievement motivation and self-esteem are highly consistent over time.

Due to the fact that a relationship between students’ study behavior and their educational success was hardly found, no mediating role of learning related variables such as achievement motivation and procrastination in the relationship between personal relations and academic attainment could be determined, even though it is generally thought that students’ personal network is mostly related to academic outcomes by means of the effect on other variables such as student’s academic behavior or self-esteem. A more in-depth study exploring pathways through which learning related behavior is affected by students’ personal network and whether this mediates the association of students’ personal network with academic outcomes might be a valuable suggestion for further study.

Chapter 6 - Personality, procrastination, achievement motivation, and academic attainment

From previous studies it has become clear that personality is related to study behaviors like procrastination and achievement motivation. For instance, students low in Conscientiousness tend to procrastinate more often than students high in Conscientiousness (e.g., Johnson & Bloom, 1995; Lay et al., 1998; Watson, 2001). Furthermore, previous studies have also shown that both personality and study behaviors are related to academic
attainment. Conscientiousness, for instance, has been found to be one of the most consistent predictors of educational outcomes as compared to the other personality factors (Poropat, 2009). Also, it is not surprising that procrastination has been found to have a detrimental effect on academic attainment (Beck et al., 2001; Ferrari, 2004; Owens & Newbegin, 1997; Steel et al., 2001).

This chapter aimed at exploring the pathways between personality and academic outcomes through procrastination and achievement motivation. For instance, previous studies have shown that conscientious students are more motivated to be successful during education (Hart, Atkins, & Fegley, 2003; Judge & Ilies, 2002; Komarraju & Karau, 2005; Komarraju et al., 2009), and it might well be this achievement motivation that (partly) accounts for the relationship between Conscientiousness and academic attainment (Paunonen & Ashton, 2001). In addition to achievement motivation, two measures of procrastination were included: trait procrastination, or the general tendency to procrastinate, and actual study-related procrastinatory behavior. Furthermore, time-on-task was included in the analyses as well. It has been found that time-on-task is related to both achievement motivation and procrastination; more motivated students spend more time studying and procrastinating students spend less time studying (Pychyl et al., 2000). Furthermore, a study performed by Biderman et al. (2008) showed that the relationship between Conscientiousness and academic attainment is mediated by time-on-task.

Two dependent variables were used: Grade Point Average (GPA) and Study delay. Since a number of recent studies had shown that there are significant sex differences in the relationship between personality and academic attainment (De Fruyt et al., 2008; Freudenthaler et al., 2008; Hicks et al., 2008; Nguyen et al., 2005; Steinmayr & Spinath, 2008), it was also examined whether there are differences between men and women in the expected relations between the variables included in this study.

A path analysis with Mplus (Muthén & Muthén, 1998) showed no direct association between personality and educational attainment. Of all variables included in this study, achievement motivation was the only direct predictor of GPA (positively) and Study delay (negatively). Being more motivated appears to result in higher grades and less delay, as was expected, based on the literature. Extraversion, Agreeableness, Conscientiousness and Autonomy were positively related with achievement motivation, whereas Emotional Stability was negatively related with achievement motivation. So, the results suggest that if extraverted, agreeable, conscientious, emotionally unstable, and autonomous students are achieving better than their counterparts, an important difference appears to be that they are more motivated. No differences were found between men and women concerning these associations.

Furthermore, Conscientiousness, Emotional Stability, Extraversion, Autonomy and achievement motivation were negatively related with trait procrastination, as was expected. Also, in line with expectations, actual procrastinatory behavior was positively
related to tendency to procrastinate as well as Extraversion. Furthermore, actual procrastinatory behavior was negatively related with Emotional Stability and achievement motivation. Finally, achievement motivation was positively associated with time-on-task.

Surprisingly, the results showed that emotionally unstable students are more motivated towards achievement than emotionally stable students. Possibly, emotionally unstable students are uncertain and anxious about their performance, and therefore they may try to compensate for this by working hard and making extra effort to perform well.

It is also rather surprising that even though extraverted individuals are less inclined to procrastinate, they still show more actual procrastinatory behavior. Maybe extraverted individuals get distracted more easily or overestimate themselves, and therefore indeed procrastinate even though they are not inclined to. Furthermore, it is also possible that extraverted individuals are less inclined to procrastinate in general, but they do procrastinate when it comes to academic subjects.

Finally, no relationship was found between either procrastination as a trait and procrastinatory behavior and GPA or Study delay. This is rather surprising, because procrastination earlier has been found to have a detrimental effect on academic attainment (Beck et al., 2001; Chu & Choi, 2005; Ferrari, 2004; Fritzsche et al., 2003; Jackson et al., 2003; Owens & Newbegin, 2000; Pychyl et al., 2000; Rothblum et al., 1986; Steel et al., 2001). Possibly, since the tendency to procrastinate is negatively related to achievement motivation, the effect of achievement motivation on educational outcomes overlaps the effect that procrastination may have.

**OVERALL CONCLUSIONS AND DISCUSSION**

‘What role do personality, personal network, and social comparison play in the academic life and achievement of higher education students?’ This is the central issue that was addressed in this dissertation. Two main questions were leading in formulating the specific research questions: (a) how is personality related to the students’ personal network and aspects of social comparison, and (b) what are the specific paths through which students’ personality and personal network predict educational outcomes, looking at learning related variables such as achievement motivation, procrastination and time-on-task?

**Personality, personal network types, and social comparison**

Chapter 3 showed that differences in the type of students’ personal network (peer oriented, family oriented or mixed peer/family oriented network) are related to the personality of students. Extraverted students appeared to have a network that consists of primarily peer relations rather than primarily family relations. Furthermore, autonomous students and
Conscientious students appeared to have a network that consists of primarily family relations rather than primarily peer relations. In addition, Chapter 4 showed that personality affects the kind of social comparison information that is preferred (information to be used for self-evaluation, self-enhancement, or self-improvement), as well as preferences for the direction in which students compare themselves (whether the comparison other is doing worse, equal, or better). Conscientious students appeared to compare themselves lateral rather than upward, and they compare themselves particularly in order to evaluate or improve their performance. Furthermore, agreeable, emotionally stable and autonomous students tend to compare themselves to enhance their self-worth or self-esteem.

Even though these two chapters were not directly aimed at predicting educational outcomes, they are still highly relevant in an educational context. It is known from existing studies that personality, social comparison as well as students’ personal network are all related to educational outcomes as well as successful professional careers (Dijkstra et al., 2008; Poropat, 2009; Robbins et al., 2004). Therefore, gaining more insight in how personality affects both social comparison and students’ personal network also adds to our knowledge concerning various educational outcomes.

During higher education, most students face a shift in their social environment; they will generally go from a rather secluded and small network towards a larger and more diverse network. This shift is likely to appear in both their personal as well as their academic life. They meet new people, make new friends and loosen contacts with former friends and possibly also with their family. Furthermore, they meet new teachers and co-students, and have to adapt to another academic environment than they were used to in secondary education.

The first two chapters of this dissertation showed that students’ personality is related to the way they behave in this social as well as academic environment. Some students come in contact with new people more easily than others, and this may well help them to participate in academic and student life more easily than others. Furthermore, some students tend to ‘stick to their family’ more than others, and this might cause internal conflicts between the demands of their educational environment and their personal network. Since personal relations have been found to affect not only educational outcomes but also success in professional careers (Greller & Richtermeyer, 2006; Vos, Clippeleer, & Dewilde, 2009), it might be very helpful for students to be or become aware of their own strengths and weaknesses when it comes to forming and maintaining personal relations and how these strengths and weaknesses are related to their personality. For instance, an introverted student might focus on learning how to have ‘networking conversations’ more easily. Someone who is rather disagreeable might notice at a certain point that he or she tends to end up in conflicts quite often and wants to change that by learning how to cope with conflicts or even avoid them. Finally, a last example is that very autonomous students might aim at further developing their teamwork skills.
Also, this dissertation showed that the comparisons that take place within the academic environment are related to students’ personality as well, especially when it comes to the reason why students compare themselves. It might be very helpful to students, teachers as well as educational counselors or mentors to know that there are certain strategies that underlie the comparisons that take place, for instance a self-enhancing strategy or a strategy aimed at self-improvement. Depending on the desired outcome, not all these strategies are equally efficient. For instance, a student who performed quite badly during an exam or internship might tend to focus on self-enhancement in order to cope with the disappointment and frustration of this experience, especially when this student has a low emotional stability. However, should this student focus on self-improvement, the chance that he or she will succeed the next time might well be much higher, and this in turn might also help to gain more confidence. Knowing why someone is focusing on self-enhancement, for instance because someone is emotionally unstable, is the first step towards possible change of this strategy and adapting other, more efficient strategies. Furthermore, being able to choose which strategy is most effective given the situation might even be more helpful.

**Personality, personal network, and academic attainment**

In the study reported in Chapter 5, it was explored how students’ personal network affect their academic success. Findings to be highlighted are the beneficial effect of a larger network, and the hampering effect of having an older network, that is having a network with individuals older than oneself. Chapter 6 showed that the effect personality has on students’ attainment is through differences in motivation, rather than procrastination.

Students’ academic life takes place in a social environment, in which students interact with other students and faculty, and also with friends and family and many other people. The results from Chapter 5 indicate that the effect of this social environment on students’ educational success is quite small. Furthermore the relationship between personal relations and academic outcomes was expected to be largely mediated by other, more specific behavioral aspects such as achievement motivation, procrastination or time-on-task. By means of role modeling, socialization and providing explicit guidelines and examples of desired behavior, co-students, peers, family, friends and teachers are thought to affect students’ behavior and it is this behavior that can have an impact not only on their educational careers, but also long after. However, this study provided no evidence for such a relationship.

However, the finding that having a smaller network and/or a relatively older network hampers educational outcomes still has some implications for both students and faculty. They should at least be aware of the importance of having a network to rely on and to turn to when not everything is going very well during education. Though the beneficial
Effect of having a larger and younger network is not very large, students with a small network consisting of merely older network members should at least be aware of the possible hampering effect of these network characteristics and maybe need to put some effort into finding other people to turn to when the safety net provided by their current network turns out to be insufficient.

In both Chapters 5 and 6, achievement motivation was one of the variables used to predict students’ academic outcomes. Surprisingly, whereas in Chapter 5 no significant association was found of achievement motivation with diploma attainment nor study progress, Chapter 6 showed that achievement motivation is significantly related to both study delay and GPA. This may be due to the fact that in Chapter 5 a number of control variables was included that were not included in Chapter 6, and these control variables consisted of, amongst others, measures considering previous academic results. These results that were previously attained by students are very likely to be at least partly determined by students’ achievement motivation at that time. Indeed, it has been found that also within secondary education achievement motivation is a consistent predictor of educational outcomes (Archer et al., 1999; Busato et al., 1999; Busato et al., 2000; Robbins et al., 2004; Zeegers, 2004). Because achievement motivation has been shown to be rather stable over time (Gottfried, Fleming, & Gottfried, 2001; Hustinx, Kuyper, Van der Werf, & Dijkstra, 2009), these control variables might account for the effect of achievement motivation on educational outcomes. This makes the results from Chapter 6 even more relevant, since that chapter shows the exact pathways through which personality affects achievement motivation and thereby academic attainment.

Chapter 6 also shows that, when planning interventions in order to prevent students from drop-out or delay, it is more effective to focus on students’ motivation towards their study rather than their tendency to postpone things or actual dilatory behavior. Achievement motivation appears to be a better predictor of academic outcomes than procrastination, and furthermore achievement motivation is related to both the tendency to procrastinate as well as actual procrastinatory behavior.

**Strengths and limitations**

A strength of this dissertation is, that a broad range of variables is studied. These variables consisted of factors related to students’ personality, their personal network as well as their academic behavior, including social comparison concerning academic subjects. Even though the expected relations were not fully or completely examined in this dissertation, it still can be considered a valuable clarification of the interrelatedness of the before mentioned factors, and the way they jointly influence students’ academic careers.

A second strength is that this dissertation was not restricted to a single outcome measure of academic attainment. Rather, different measures were used; diploma attainment,
study progress and GPA. This is important, since it can be expected that students’ personality, academic behavior and social behavior are likely to affect the grades they attain, as well as whether they attain a diploma and the amount of time they need to attain a diploma. Chapter 5, for instance, showed that certain personal network characteristics are not related to diploma attainment, but do affect study progress. Furthermore, Chapter 6 showed that the paths from personality through achievement motivation to GPA and progress may be the same, but the path coefficients appeared different. Apparently, GPA can be explained by other factors or can be differently explained by the same factors as for instance study progress and/or diploma attainment.

In two chapters of this dissertation, mediational analyses were applied to examine whether certain academic behaviors – for instance procrastination and achievement motivation – mediate the relationship of students’ personality and social environment with their study results. When studying personality and personal relations in an educational context, mediational analyses might be a valuable approach. Both personality and personal relations can be expected to affect students’ behavior during as well as outside college, and it is this actual behavior that possible plays a much more important role in predicting educational outcomes.

Another strength of this dissertation is that in all analyses, the number of respondents was large. For most statistical analyses, the number of observations is highly important: the larger the number of observations, the more accurate the estimates. This is particularly important with respect to the mediation models in this dissertation, investigating indirect effects (Little, Card, Bovaird, Preacher, & Crandall, 2007).

However, there are also a number of limitations to the study. A first limitation is that this study relied solely on self reports. Moreover, the questionnaire sent to the students was largely retrospective in nature, as it mostly concerned students who had already finished their study. Self-reported retrospective questionnaires can yield unreliable and biased information. It is likely that the respondents were not able to exactly report, for instance, the time they spent studying during the last year of their study, or the number of occasions they met or spoke to their friends or family. This inherent amount of unreliability, in turn, can have influenced the results. Bias and unreliability can lead to an overestimation (in case of bias) or an underestimation (in case of unreliability) of the strength of relationships. If anything, most likely, the associations between the variables have been attenuated, due to unreliability. This might explain why, in some chapters, fewer relationships were found than expected.

Furthermore, all variables used in this dissertation concerning personal relations and network characteristics, as well as social comparison were based on information from one source: the students themselves. In other words, information was available from one single network member about other network members, but not vice versa. Including
information from other network members as well might reveal other results or more strongly confirm the findings from this dissertation.

The questionnaire was sent to students from various universities in the Netherlands, attending various studies in various disciplines. Even though this adds to the variability within the sample, it still is a sample restricted to (former) students in higher education. Therefore, the results from this dissertation cannot be generalized to other groups of individuals and further study is required to assess whether the patterns and relationships found in this dissertation can be identified in other samples as well.

There are also limitations concerning some of the analyses. There appears to be growing consensus that investigating mediation effects require longitudinal data (e.g. (MacKinnon, 2010; MacKinnon et al., 2007). Cross-sectional data do not make it possible to provide evidence for the causality of the hypothesized relationships, since all measures take place at once. The studies reported on in this dissertation concern cross-sectional data. Therefore, longitudinal replication studies are needed.

**Recommendations for future research**

Not all relations between the variables depicted in Figure 1 have been investigated. Within the scope of this dissertation, choices had to be made. One part that had to be skipped is the relationship between social comparison and students’ personal network. It is likely that the comparisons students make are influenced by the individuals surrounding them, and evidence for this influence has indeed been found. Mussweiler and Rüter (2003), for instance, found that close friends are a likely source of routine comparisons. Once comparisons have taken place, the source of comparison is easier accessible and therefore more likely to be used again. Furthermore, according to Wheeler and Miyake (1992), upwards comparison with close friends can have negative effects, and are therefore not likely to occur. However, Huguet and others (2001) found that individuals tend to compare upward with close others. An exploration of the association between characteristics of students’ personal network and social comparison might be a valuable extension of the research performed for this dissertation.

In this dissertation, no study was performed on the relationship between social comparison and academic attainment. From recent studies it is known that in an educational setting, students prefer to compare upward, and that upward comparison is beneficial to educational outcomes (Dijkstra et al., 2008; Wehrens, 2008, Wehrens et al., 2009). Furthermore, the results from Chapter 6 indicated that personality affects educational outcomes through its effect on achievement motivation. Possibly, the direction of comparison and/or motives for comparison might function as a mediator between personality and academic attainment as well. Therefore, a future study might focus on how personality might be related to educational outcomes through its effect on the direction of and motives for
social comparison. This is especially relevant since Agreeableness, Conscientiousness
and Autonomy appeared to play an important role in the direction of and motives for
social comparison, and these personality variables are known to be highly relevant in an
educational context as well (Poropat, 2009).

Since it is known from Chapter 3 that the composition of the network students
participate in is related to their personality, and that this network influences the way in
which students study and the result they attain, as shown in Chapter 5, future research
might also be aimed at exploring how personality affects educational outcomes by means
of its relationship with students’ personal network. In other words, how do students’
personalities affect the social relations they have and do these relations in turn at least
partly determine their success or failure during education? It is known for instance that
extraverted individuals come in contact with new people more easily than introverted
students, and that the size of the network that surrounds students is beneficial to their
educational attainment, possibly because they provide a safety net that proves to be help-
ful when students face setbacks. Do extraverts have a larger network than introverted
students? And does being extraverted thereby affect educational attainment through its
effect on network size? And are the other personality factors possibly related to educa-
tional attainment through their effect on the personal network students have as well?
These might be possible questions to answer in further research.

When studying the suggestions being made in this paragraph, a very useful approach
might be to collect longitudinal data. This approach will make it possible to not only
explore the hypothesized relationship discussed here, but also to determine whether
there is a causal relation between these concepts. Furthermore, structural equation mod-
eling makes it possible to test the relationship between all variables within one single
model, and there are more sophisticated procedures for determining the significance of
the indirect effect, such as bootstrapping methods.