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

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ABSTRACT

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

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Honours programmes have become part of higher education systems around the globe, and an increasing number of students are enrolled in such programmes (Long & Mullins, 2012). These programmes aim at providing high-achieving and motivated students enriched experiences through, for example, small classroom teaching, a broader vision on study material, and a deeper elaboration of the subject matter (Byrne, 1998), thereby facilitating students to fully enhance the development of graduate attributes and to ultimately contribute to science and society (Jansen & Suhre, 2015). In the Netherlands, honours programmes are a relatively new phenomenon, and are mostly provided as an additional track beyond students' regular educational programme (Jansen & Suhre, 2015).

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Despite their rapid increase, the added value of honours programmes remains largely under-researched (Wolfensberger, 2012). Also in other parts of the world, such as the United States or Australia, there is a call for more empirical studies on the effects of such programmes (Achterberg, 2005; Allan, 2011). To justify the existence of honours programmes, questions have arisen as to whether, and how, honours students benefit from these programmes.

When reviewing the existing literature on effects of honours programmes, two gaps become apparent: (1) most studies lack a comparable control group of students not enrolled in honours programmes and (2) few studies have longitudinally investigated the effects of honours programmes on student characteristics other than academic achievement. The present study addresses these gaps by using propensity score matching (Rosenbaum & Rubin, 1983) to investigate the effects of honours programme participation in a sample of 94 students, half of them following a one-year honours track in addition to the regular programme. Propensity score matching is a statistical technique that controls for (self) selection bias, thereby allowing for the estimation of effects of programmes (i.e., interventions) in non-randomized or quasi-experimental studies (Rosenbaum & Rubin, 1983).

To move beyond academic achievement as an outcome measure of honours programmes, the current study focused, in accordance with a common goal of honours programmes in the Netherlands, on facilitating the development of students into successful professionals, on students' *ability*, *motivation* and *creativity*. These aspects are hypothesized to be required for highly productive and innovative professionals (Renzulli, 2002), and are also referred to as professional excellence (Scager et al., 2012)

Effects of honours education

Gaining insights into how honours programme participation benefits students is challenging. Previous studies have examined possible benefits in different ways. Allan (2011), for example, asked honours students in an interview to reflect on their past year in the programme. Jansen and Suhre (2015) applied a similar approach, using questionnaires to measure motivation and perceived graduate attributes of honours students retrospectively. Both studies concluded that students benefitted from the programmes. Although these studies provide valuable insights, a possible downside of this method may be that students are inclined to give socially desirable answers or the memory reconstruction process might suffer from memory failure and distortions (Veenman, 2011). Moreover, it remains uncertain whether these students would have developed similarly in the regular programme. Therefore, in order to draw causal conclusions, a comparable control group is required (Montgomery, 2005). A simple comparison between a group of honours and non-honours students is, however, likely to result in a biased estimate of effects of honours programmes due to (self) selection. Pflaum, Pascarella, and Duby (1985), for example, compared the Grade Point Average (GPA) of college freshmen participating in the university honours programme to that of peers who were invited for the programme but decided not to participate, and found that after one year in the programme, honours freshmen had higher GPAs. Shushok (2003) took another approach and matched honours students to non-honours students based on high school grades, SAT scores, gender, race and place of residency. Whereas honours students in the Mid-Atlantic States had a higher GPA compared to non-honours students after one year of study, after four years, the difference

in GPA between honours and non-honours students had levelled out. Although the study design of Shushok (2003) employed the most rigorous approach, it still remains unclear whether differences in GPA and self-reported differences between honours and non-honours students are simply the result of pre-enrolment characteristics or selection bias. Students who decide to apply for an honours programme may differ from students who do not apply in first place, for example, in self-efficacy.

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

A second challenge for studies examining effects of honours programmes is that the goals of honours programmes are often broad, including, for example, the fostering of intellectual diversity and creativity (Wolfensberger, 2012). This implies that when evaluating the programmes, a sole focus on academic achievement may provide an incomplete picture. Indeed, Jansen and Suhre (2015) showed that according to Dutch honours students, the honours programme contributed strongly to their skill development, especially to their research and communication skills. Additionally, Shushok (2003) reported larger self-perceived gains in liberal arts and sciences and technology in honours compared to non-honours students, but no difference in terms of self-reported gains in critical thinking and analytical skills. In contrast, Seifert, Pascarella, Colangelo, and Assouline (2007) did demonstrate a positive effect of honours programme participation on critical thinking as well as mathematics and cognitive development during the first year of college.

In sum, the present body of research on effects of honours programmes shows that the establishment of a comparable control group is a major challenge and outcomes beside GPA need further examination. In this study, we therefore add to the present literature by focusing on student qualities that are considered essential for successful professionals (Renzulli, 2002; Scager et al., 2012).

Ability, motivation and creativity

A common goal of honours programmes, at least in the Netherlands, is to facilitate the development of students into successful professionals (Scager et al., 2012). In the current study, we therefore focused on the development of three qualities that have been described as prerequisites for becoming a successful professional, that is, ability, motivation and creativity (Gagné, 1995; Heller, Perleth, & Lim, 2005; Renzulli, 2002). Honours programmes intend to achieve development of these three qualities by providing challenging courses in order to uphold (or even increase) motivation of high-achieving students over time and stimulate students' innovativeness by offering complex, often multidisciplinary, projects. Moreover, the complexity of the study material has been matched with honours students' abilities. Motivated and high-achieving students participating in honours programmes may therefore develop differently on these qualities as compared to similarly motivated and achieving students in a regular programme. In the present study, we used measures to tap ability, motivation and creativity in order to test effects

of honours programme participation on these intended learning outcomes. Comparable to Scager et al. (2012), we approached ability by measuring students' self-perceived intellectual ability, motivation by perseverance, mastery and performance orientation, and creativity by measuring students' intellectual curiosity.

Ability

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

Motivation

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

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

Creativity

Creativity includes the ability to come up with novel ideas and ways to solve problems. Research on successful professionals has shown that excellent performances and creativity

are related (Subotnik, Olszewski-Kubilius, & Worrell, 2011). Openness to experience, one of the Big-Five traits, is associated with creativity as measured by tests of divergent thinking (Feist, 1998; McCrae, 1987). Openness to experience includes several facets like fantasy or aesthetics but also intellectual curiosity and innovativeness (Costa & McCrae, 1992). In this study, we focus on intellectual curiosity, which we deemed most relevant for excellent professionals.

The current study

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

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

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

Method

Matching of participants before the start of the honours programme

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

Participants and procedure

The study was conducted at Utrecht University, the Netherlands. Ninety-four students participated, 47 honours and 47 non-honours students, of nine undergraduate programmes (44% psychology, 23% medical sciences, 10% biomedical sciences, 7% physics and astronomy, 7% pedagogical sciences, 3% chemistry, 3% geosciences, 2%

pharmaceutical sciences, and 1% information sciences). Females (overall 79%) were slightly overrepresented compared to the general gender distribution in the undergraduate programmes (67% female). Considering our sample size, power for a large effect (.80) was .84, for a medium effect (.5) .40 and for a small effect (.15) .07 (Cohen, 1992).

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

Like elsewhere in the world (Byrne, 1998; Kiley, Boud, Cantwell, & Manathunga, 2009), various types of honours programmes exist at Utrecht University. For this study, we only included one-year undergraduate honours programmes that were similar regarding starting time, type and selection criteria. All selected programmes were offered in addition to the regular programme and started simultaneously at semester 3. Before the start of the programme (at semester 2), students with a GPA of 7.5 and higher were invited to apply for the programmes by means of a motivation letter. Subsequently, selection interviews took place and the selection committee decided which students were accepted into the programme. Honours students followed at least 25% of the courses at honours level and had to obtain an additional 15 European Credit Transfer System (ECTS) on top of the 60 ECTS of the regular programme (1 ECTS equals 28 hours of study).

Measures

Besides the variables that measured ability, motivation and intellectual curiosity, the longitudinal data set used in the present study also included measures on self-efficacy (Adams & Wu, 2000), extraversion (Goldberg, 1992), and self-described mathematical and verbal ability (Marsh & O’Niell, 1984). For the calculation of the propensity scores, we included pre-enrolment characteristics (measured at semester 2, before the programme had started) that were statistically related (total sample of 12,094 students) to either self-perceived ability, perseverance, mastery and performance orientation, or intellectual curiosity at semester 4 (halfway into the programme).

Confirmatory factor analyses were conducted on the scales tapping ability, motivation and intellectual curiosity and the scales included in the propensity model. All models showed an adequate fit to the data.

Ability, motivation and intellectual curiosity variables

Ability. Students’ ability was measured by self-perceived ability by using the Smart Scale (Trapnell, 1994). The Smart Scale uses extreme qualifiers; an example is ‘I am considered exceptionally or unusually intelligent.’ Items were measured on a 9-point Likert scale, ranging from 1 (not at all true of me) to 9 (very true of me). After deleting one item

for scale reliability ('My grades have usually been near the top of every course'), the reliability of the three-item scale was $\alpha = .92$.

Motivation. Perseverance, mastery orientation and performance orientation were used to determine students' motivation. Mastery and performance orientation were assessed with the mastery approach and performance approach scales of Elliot and McGregor (2001). Both scales consisted of three items scored on a 7-point Likert scale, ranging from 1 (not at all true of me) to 7 (very true of me). An example item of mastery orientation ($\alpha = .76$) is 'I want to learn as much as possible in my study.' An example for performance orientation ($\alpha = .89$) is 'It is important for me to do better than other students.' The perseverance of effort subscale of the grit scale by Duckworth and Quinn (2009) was used to tap students' perseverance. Three items were assessed on a scale ranging from 1 (not at all true of me) to 7 (very true of me) ($\alpha = .77$). An example item is 'I finish whatever I begin.'

Intellectual curiosity. Intellectual curiosity was measured with the openness to experience scale (Goldberg, 1992). A 7-point Likert scale was used from 1 (low) to 7 (high) on which participants indicated the extent to which each item was an accurate self-description. Factor analyses showed that the six openness items were originally included in the openness scale divided into two subscales. One focused on artistic qualities and fantasy, and the other focused on innovativeness and intellectual curiosity. The finding that openness comprises at least two distinct lower order trait dispositions has been described in literature (see Von Stumm & Ackerman, 2013). We included the subscale focusing on innovativeness and intellectual curiosity, since we deemed this construct more relevant for the professional context. The subscale consisted of three items ($\alpha = .60$) and an example is 'I am innovative.'

Additional propensity model variables

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

Self-efficacy. Self-efficacy (scale unidimensionality; $\alpha = .69$) was measured with three items on a 7-point Likert scale using the Programme for International Student Assessment index of general academic self-efficacy (Adams & Wu, 2000). An example item is 'I am confident I can do an excellent job on assignments and tests.'

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

Propensity scores

Propensity scores were obtained with a logistic regression model using honours programme participation as the binary response. The initial step was to determine which pre-enrolment characteristics should be included in the logistic model used to calculate propensity scores. In general, three different options exist regarding the selection of pre-enrolment characteristics for the propensity model (Brookhart et al., 2006). A focus

on characteristics that affect (1) the probability of receiving a treatment (i.e., being selected for the honours programme), (2) the outcome variables or (3) both the probability of treatment and the outcome. Following Rubin and Thomas (1996), we applied option 2 and included all pre-enrolment characteristics in the propensity model that were significantly related to the outcome variables, that is, aspects related to ability, motivation and intellectual curiosity, measured halfway into the honours programme.

Regression analyses were conducted to determine which pre-enrolment variables measured *before* the start of the honours programme (semester 2) had a significant effect on one of the outcome variables. Self-perceived ability, perseverance, mastery orientation, performance orientation, intellectual curiosity, self-efficacy, GPA and gender measured at semester 2, were all significantly related to the ability, motivation and intellectual curiosity variables at semester 4, and were included in the model. Extraversion and self-perceived mathematical and verbal ability were not statistically related to one of the outcome variables and were excluded from the model.

The next step was to match honours students with non-honours peers based on the propensity score. We used Thoemmes' (2012) SPSS tool Propensity Score Matching to calculate propensity scores and to apply 1:1 matching with a caliper of 0.1 (the caliper width is the maximum allowed difference in the propensity score between the matches and was determined in several steps considering both the number of realized matches and the balance of the pre-enrolment variables between the two groups). To evaluate the matching, we used Rubin's (2001) criteria. Propensity score means were found to be 0.23 for honours (SD = 0.17) and 0.23 for non-honours (SD = 0.17). These similar means indicate that the difference of the mean propensity scores of the two groups is within the recommended limit of 0.5 standard deviation. The ratio of the propensity score variances in the two groups was 1, which is the optimal ratio as indicated by Rubin. The ratios of the residual error variances were calculated by linear regression for the continuous variables, and logistic regression for gender. All ratios were well within the acceptable range of 0.50–2.00 (see Table 1).

Overall, the three criteria outlined by Rubin (2001) were met, indicating adequate matching of the groups. Final examination of the matching using an independent sample *t*-test showed that there were no significant differences between the non-honours and honours group on any of the pre-enrolment characteristics included in the

Table 1. Descriptives, residual error variance ratios and *p*-values for differences between pre-enrolment characteristics of honours and matched non-honours students.

Pre-enrolment variables (semester 2)	Honours students (<i>n</i> = 47)		Non-honours students (<i>n</i> = 47)		Residual error variance ratio	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Perceived ability (1–9)	6.25	1.37	5.76	1.53	1.20	.11
Mastery orientation (1–7)	5.84	0.66	5.72	0.80	1.24	.40
Perf. orientation (1–7)	5.08	1.12	5.12	1.07	0.72	.90
Perseverance (1–7)	5.67	0.81	5.58	0.86	0.76	.59
Intellectual curiosity (1–7)	5.13	0.70	4.96	0.75	1.12	.26
Self-efficacy (1–7)	5.33	0.90	5.23	1.01	1.01	.77
GPA (5.5–10)	8.00	0.65	7.98	0.59	1.39	.83
Gender (ratio females)	0.81	0.40	0.77	0.43	0.87	.62

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

model. Table 1 shows the descriptives for the pre-enrolment characteristics included in the propensity model for honours and non-honours.

Results

Honours programme participation

Considering the focus of the previous studies on effects of honours programme participation on academic achievement (GPA), we first tested whether GPA of honours and non-honours in our study was significantly different at semester 4 (halfway into the honours programme). We found that GPA did not significantly differ between honours ($M=7.83$, $SD=0.70$) and non-honours students ($M=7.76$, $SD=0.58$); $t(91)=0.50$, $p=.62$.

Second, we used paired t -tests to examine whether scores on the ability, motivation and intellectual curiosity variables changed between semester 2 (before the start of the honours programme) and semester 4 (halfway into the honours programmes). Table 2 summarizes our findings. Overall, non-honours students increased in self-perceived ability between semester 2 and semester 4. Mastery orientation seemed to decrease for these students; this decrease was, however, not statistically significant. For honours students, on the other hand, mastery orientation was stable and intellectual curiosity increased between semester 2 and semester 4.

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

To answer the question whether honours programme participation had an effect on the aspects related to ability, motivation and intellectual curiosity, honours and non-honours students were compared halfway into the honours programmes (semester 4). Results of Hotelling's T^2 test showed no significant difference between honours and non-honours students on the combined dependent variables at semester 4 (Table 3). Note that given

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

	Honours ($n=47$)				Non-honours ($n=47$)			
	Semester 4		Difference with semester 2		Semester 4		Difference with semester 2	
	M	SD	t	p	M	SD	t	p
Perceived ability (1–9)	6.38	1.30	-.82	.42	6.11	1.38	-2.36	.02*
Mas. orientation (1–7)	5.86	0.75	-.15	.88	5.52	0.81	1.94	.06
Perf. orientation (1–7)	5.01	1.34	.45	.65	4.90	1.18	1.64	.11
Perseverance (1–7)	5.67	0.94	.07	.94	5.63	1.00	-0.55	.59
Intel. curiosity (1–7)	5.35	0.76	-2.10	.04*	4.94	0.77	0.21	.84

* $p < .05$.

** $p < .01$.

the power due to our sample size, we were only able to detect large effects. Thus, at least no *large* effect on students' ability, motivation and intellectual curiosity was found. For the sake of further exploration, we also checked the univariate tests and found significant differences between honours and non-honours students in mastery orientation ($F = 4.45, p = .04$) and intellectual curiosity ($F = 6.84, p = .01$). The difference in mastery orientation seemed to correspond with the small (but not significant) decrease in this type of motivation in non-honours students between semester 2 and semester 4. Intellectual curiosity increased between semester 2 and semester 4 for honours students. Following Tabachnick and Fidell (2007), the results of the univariate tests are presented as a guide for future research.

Discussion

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

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

Results of our study complement the findings of Scager et al. (2012) who showed that honours students at Utrecht University differed from non-honours students in ability, motivation and creativity. Scager concluded that (self-) selection processes play an important role in characteristics of the honours population. Our study confirmed that differences between honours and non-honours students in ability, motivation and creativity are indeed likely to result from such (self-) selection processes instead of developmental

Table 3. Multivariate and univariate results of Hotellings T^2 test between honours students ($n = 47$) and non-honours students ($n = 47$) halfway into the honours programme.

	<i>F</i>	<i>p</i>
<i>Multivariate effect</i>		
Ability, motivation and creativity	2.13	.07
<i>Univariate tests</i>		
Perceived ability (1–9)	0.90	.35
Mastery orientation (1–7)	4.45	.04
Performance orientation (1–7)	0.20	.65
Perseverance (1–7)	0.03	.86
Intellectual curiosity (1–7)	6.84	.01

differences due to honours programme participation. However, it should be noted that due to our sample size, chances of false negative findings are relatively large. Therefore, as the present study is one of the first to examine effects of honours programmes using propensity score matching, more research is needed before drawing firm conclusions on the effects of honours programmes.

In the present study, also no differences were found in GPA between honours and non-honours students. Our results are in contrast to some previous studies that did find differences in the development of honours and non-honours students in terms of GPA (Pflaum et al., 1985; but see Shushok, 2003). Our findings might indicate that these differences found were due to a selection bias and differences already existed before students entered university. It is likely that students who decided not to apply for an honours programme although invited (Pflaum et al., 1985) have different personal characteristics (e.g., self-perceived ability, perseverance) from students who apply for and complete an honours programme. These differences in personal characteristics may also affect GPAs. For example, perseverance has been found to predict grades (Duckworth & Seligman, 2005).

Although propensity score matching is an adequate approach to control for (self-) selection bias, it is challenging in itself. Students who participate in honours programmes are (in general) high-achieving and very motivated (Achterberg, 2005). Finding comparable matches is complicated, and therefore a large sample of non-honours students has to be obtained. In the present study, the sample of non-honours students participating in semesters 2, 3 and 4 was relatively large ($N = 594$); however, we were still unable to find an adequate match for all honours participants (47 out of 54 honours students).

If future studies would confirm our findings, the question may arise whether it is justifiable to provide rather costly and time-consuming educational programmes for high-achieving students when effects of these programmes are limited. We have to keep in mind, however, that honours programmes may have effect on aspects that cannot easily be measured (Wolfensberger, 2012). In the present study, univariate tests of mastery orientation and intellectual curiosity both showed a difference halfway into the honours programmes. Although these results should be interpreted with care, this may be a starting point for future research. Earlier research has shown that according to both Dutch and American teachers, offering freedom of choice regarding subject matter and assignments distinguishes their honours education from their regular education (Wolfensberger, 2012). Possibly, this difference in teaching approach, or the frequent interaction with equal peers may cause an increase in the level of intellectual curiosity in honours students. Moreover, honours programmes may help to prevent a decrease in mastery orientation over time for high-achieving students by offering challenging education that matches their abilities.

By using results of empirical studies, more evidence-based decisions about the role of honours programmes in the curriculum can be made.

Limitations and further recommendations

Given the power of the sample size in the present study to find differences between honours and non-honours on the combined aspects of ability, motivation and intellectual curiosity, it should be kept in mind that our sample size was adequate to find a *large* effect, but chances of finding a small effect were low (i.e., 7%; Cohen, 1992). It should be noted

that this could also apply to possible differences between the groups before the start of the programme, for example, differences in perceived ability were not that far from marginal significance. As described earlier, obtaining a larger sample with adequate non-honours matches is challenging given that honours students are a special group of students (Achterberg, 2005). However, we would like to encourage future studies to use our strategy with sample sizes that also allow the detection of medium and small effects of honours programmes.

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

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

Students who decided to complete at least three subsequent measurement occasions, and therefore were included in the current sample, may have different levels of the measured qualities (i.e., perseverance) than their peers who participated only once, or not at all. It should therefore be noted that our sample included students, both honours and non-honours, who may have higher levels of perseverance, intellectual curiosity, and/or self-perceived ability than the overall student population.

Finally, we used self-reports of variables related to ability, motivation and intellectual curiosity. The use of self-reports was most suitable for this study since a large sample of non-honours students was required in order to perform adequate matching. Using self-reports may result in socially desirable responses (Holden, 2007). We tried to diminish this by guaranteeing the participants that questionnaires would only be used for research purposes and that results would only be presented anonymously. Nevertheless, future studies using alternative ways to measure creativity, such as divergent thinking tests (Feist, 1998), would be a great addition to the present study.

Concluding remarks

The results provide reason for administrators to reflect upon the role of honours programmes in their curricula. If effects of honours programmes are limited with regard to measureable results, such as GPA or ability, motivation and intellectual curiosity, one can debate whether it is justifiable to invest in rather costly programmes for a small number of students. It may even generate unequal opportunities for non-honours graduates, since honours alumni might be more attractive for job recruiters. On the other hand, a cautious trend showed that honours programmes may be effective in sustaining levels of

mastery orientation and increasing intellectual curiosity, while this seemed less the case in regular programmes. Therefore, honours programmes may be essential for high-achieving and motivated students to maintain their desire to learn and at the same time provide opportunities to increase levels of intellectual curiosity. Consequently, it may be valuable to explore what elements in honours programmes can be implemented in the regular undergraduate programmes to help prevent a possible drop in mastery orientation over time and to stimulate intellectual curiosity in students.

Compliance with ethical standards

The institution where the study was conducted does not require ethical approval for this type of study, but we obtained written, informed consent, guaranteeing confidentiality. Participation was on voluntary basis and participants could withdraw from the study at any time without explanation.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

- Achterberg, C. (2005). What is an honors student? *Journal of the National Collegiate Honors Council*, 6(1), 75–81.
- Adams, R., & Wu, M. (2000). *Constructing and validating the questionnaire indices*. Organisation for Economic Co-operation and Development, PISA 2000 Technical Report.
- Allan, C. (2011). Exploring the experience of ten Australian honours students. *Higher Education Research & Development*, 30(4), 421–433. doi:10.1080/07294360.2010.524194
- Brookhart, M. A., Schneeweiss, S., Rothman, K. J., Glynn, R. J., Avorn, J., & Stürmer, T. (2006). Variable selection for propensity score models. *American Journal of Epidemiology*, 163(12), 1149–1156.
- Byrne, J. P. (1998). Honors programs in community colleges: A review of recent issues and literature. *Community College Review*, 26(2), 67–81.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155–159.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO personality inventory (NEO-PI-R) and NEO five-factor inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.
- Dai, D. Y., & Rinn, A. N. (2008). The big-fish-little-pond effect: What do we know and where do we go from here? *Educational Psychology Review*, 20(3), 283–317.
- Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the short Grit Scale (Grit-S). *Journal of Personality Assessment*, 91, 166–174. doi:10.1080/00223890802634290
- Duckworth, A. L., & Seligman, E. P. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science*, 16, 939–944. doi:10.1111/j.1467-9280.2005.01641.x
- Elliot, A. J., & McGregor, H. A. (2001). A 2 × 2 achievement goal framework. *Journal of Personality and Social Psychology*, 80(3), 501–519.
- Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100, 363–406.
- Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review*, 2, 290–309. doi:10.1207/s15327957pspr0204_5

- Gagné, F. (1995). From giftedness to talent: A developmental model and its impact on the language of the field. *Roepers Review*, 18, 103–111. doi:10.1080/02783199509553709
- Goldberg, L. R. (1992). The development of markers for the big-five factor structure. *Psychological Assessment*, 4(1), 26–42.
- Heller, K. A., Perleth, C., & Lim, T. K. (2005). The Munich model of giftedness designed to identify and promote gifted students. *Conceptions of Giftedness*, 2, 147–170.
- Holden, R. R. (2007). Socially desirable responding does moderate personality scale validity both in experimental and in nonexperimental contexts. *Canadian Journal of Behavioural Science*, 39, 184–201.
- Jansen, E. P. W. A., & Suhre, C. J. M. (2015). Factors influencing students' perceptions of graduate attribute acquisition in a multidisciplinary honours track in a Dutch university. *Higher Education Research & Development*, 34(6), 1138–1152. doi:10.1080/07294360.2015.1024626
- Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits – self-esteem, generalized self-efficacy, locus of control, and emotional stability – with job satisfaction and job performance: A meta-analysis. *Journal of Applied Psychology*, 86(1), 80–92.
- Kiley, M., Boud, D., Cantwell, R., & Manathinga, C. (2009). *The role of honours in contemporary Australian higher education*. Canberra: Australian Learning and Teaching Council.
- Kuncel, N. R., Hezlett, S. A., & Ones, D. S. (2004). Academic performance, career potential, creativity, and job performance: Can one construct predict them all? *Journal of Personality and Social Psychology*, 86(1), 148–161.
- Long, E. C. J., & Mullins, D. (2012). Honors around the globe. *Journal of the National Collegiate Honors Council*, 13(2), 1–6.
- Marsh, H. W., Kong, C. K., & Hau, K. T. (2000). Longitudinal multilevel models of the big-fish-little-pond effect on academic self-concept: Counterbalancing contrast and reflected-glorify effects in Hong Kong schools. *Journal of Personality and Social Psychology*, 78(2), 337–349.
- Marsh, H. W., & O'Niell, R. (1984). Self Description Questionnaire III: The construct validity of multidimensional self-concept ratings by late adolescents. *Journal of Educational Measurement*, 21(2), 153–174.
- McCrae, R. R. (1987). Creativity, divergent thinking, and openness to experience. *Journal of Personality and Social Psychology*, 52, 1258–1265.
- Montgomery, D. C. (2005). *Design and analysis of experiments*. Hoboken, NJ: Wiley.
- Pflaum, S., Pascarella, E., & Duby, P. (1985). The effects of honors college participation on academic performance during the freshman year. *Journal of College Student Personnel*, 26, 414–419.
- Pintrich, P. R. (2000). Multiple goals, multiple pathways: The role of goal orientation in learning and achievement. *Journal of Educational Psychology*, 92(3), 544–555.
- Renzulli, J. S. (2002). Emerging conceptions of giftedness: Building a bridge to the new century. *Exceptionality*, 10(2), 67–75.
- Rinn, A. N. (2007). Effects of programmatic selectivity on the academic achievement, academic self-concepts, and aspirations of gifted college students. *Gifted Child Quarterly*, 51(3), 232–245.
- Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika*, 70, 41–55.
- Rubin, D. B. (2001). Using propensity scores to help design observational studies: Application to the tobacco litigation. *Health Services and Outcomes Research Methodology*, 2, 169–188.
- Rubin, D. B., & Thomas, N. (1996). Matching using estimated propensity scores: Relating theory to practice. *Biometrics*, 52, 249–264.
- Scager, K., Akkerman, S. F., Keesen, F., Tim Mainhard, M., Pilot, A., & Wubbels, T. (2012). Do honors students have more potential for excellence in their professional lives? *Higher Education*, 64(1), 19–39.
- Seifert, T. A., Pascarella, E. T., Colangelo, N., & Assouline, S. G. (2007). The effects of honors program participation on experiences of good practices and learning outcomes. *Journal of College Student Development*, 48(1), 57–74.
- Senko, C., Hulleman, C. S., & Harackiewicz, J. M. (2011). Achievement goal theory at the crossroads: Old controversies, current challenges, and new directions. *Educational Psychologist*, 46, 26–47.

- Shushok, F. (2003). Educating the best and the brightest: Collegiate honors programs and the international, social, and psychological development of students. *Dissertation Abstracts International*, 63(11-A).
- Subotnik, R. F., Olszewski-Kubilius, P., & Worrell, F. C. (2011). Rethinking giftedness and gifted education: A proposed direction forward based on psychological science. *Psychological Science in the Public Interest*, 12(1), 3–54.
- Supovitz, J. A., & Turner, H. M. (2000). The effects of professional development on science teaching practices and classroom culture. *Journal of Research in Science Teaching*, 37(9), 963–980.
- Tabachnick, B. L., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Pearson Education.
- Thoemmes, F. (2012). Propensity score matching in SPSS. Retrieved from <http://arxiv.org/abs/1201.6385>
- Trapnell, P. D. (1994). Openness versus intellect: A lexical left turn. *European Journal of Personality*, 8, 273–290. doi:10.1002/per.2410080405
- Vaughan, A. L., Lalonde, T. L., & Jenkins-Guarnieri, M. A. (2014). Assessing student achievement in large-scale educational programs using hierarchical propensity scores. *Research in Higher Education*, 55, 564–580.
- Veenman, M. V. (2011). Alternative assessment of strategy use with self-report instruments: A discussion. *Metacognition and Learning*, 6(2), 205–211. doi:10.1007/s11409-011-9080-x
- Von Stumm, S., & Ackerman, P. L. (2013). Investment and intellect: A review and meta-analysis. *Psychological Bulletin*, 139, 841–869. doi:10.1037/a0030746
- Wolfensberger, M. V. (2012). *Teaching for excellence: Honours pedagogies revealed*. Münster: Waxmann.