The effects of Dutch student debt on health and study performance

THE IMPACT OF THE RECENT DUTCH STUDY FUNDING SYSTEM FROM 2015

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Bachelor Thesis Economics and Business Economics
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Date final version: 09-01-2022

Abstract

This research aims to estimate the impact of the introduction of the new study funding system in 2015 on students' health, study load, and study performance. The annual survey of De Studentenmonitor was used as a cross-sectional dataset. In this dataset, study performance is measured as the average study grade. Health is measured as self-reported health issues. Multiple regressions were calculated with several control variables, such as the income of parents and high school grades. Results reveal no relationship between studying in the new study funding system and having health problems. The same result was found for the effects on study load. A negative relationship was found between study performance and studying in the new study funding system. However, it is unclear whether this relationship is causal. Research with panel data of students would be a more reliable way to say more about the relationship between student debt and health, study load, and study performance.

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1. Introduction

On 1st of February 2021, the Dutch House of Representatives voted for a motion about a national prevention agreement for mental health. The members of parliament noted that 780,000 young adults suffer from a form of mental illness (Tweede Kamer der Staten-Generaal, 2021) The number of youth with ages between 12-25 who are mentally unhealthy increased from seven to eight percent over the past ten years (RIVM et al., 2019).

A possible part of the cause of the increase in this number is that Dutch young adults have more debts. Fitch et al. (2011) concluded the existence of a positive relationship between debt and mental illness. The reason why young adults have more debt may be found from the recent development of abolition of basic student grants and the introduction of the new student loan system in 2012. Students that started their first study before September in 2015 receive monthly basic student grants during their study time. This student grant becomes a gift for students that finish their studies within ten years after the start of their study (DUO, z.d.-a). Students starting their first study from September 2015 are not receiving any basic grants, but have the opportunity to borrow money to pay their tuition (DUO, z.d.-b). This development begs the question whether the reform in the funding system triggered the increase in mental health issues, and if so, to which extent. Hence, the main question I am trying to answer is the following:

What are the effects of the introduction of the new study funding system on (mental) health, experienced study load, and performance of students during their student time?

It is important to answer this question because mental health plays an important role in the well-being of people in general. A questionnaire from Bowling (1996) among British people revealed that for example, most people with mental illness experience changes in the ability to work, followed by social leisure activities. They reported these changes as the most important determinants of well-being.

First, student debt could play a direct role in mental health due to stress (Tran et al., 2018). Furthermore, the effects of the introduction of the student loan system could also influence the experienced study load. Maybe students have to work more or feel more pressure to perform due to less income from student grants. Then, loans also can have indirect health effects via more workload and the feeling of higher pressure of performance. This could lead

to more levels of stress which also could negatively influence health in the long term (Salleh, 2008).

It is also important to research the effects of studying in the new system on the actual performance of students. The performance of students is a proxy for the degree of education and the quality of the labor force. Education has an enormous impact on future prosperity. Therefore, it is important to learn about the effect of debt on students' achievements (Van Praag and Kapteyn, 1973).

Lastly, the new system is recently again part of the discussion, as many political parties in the Dutch House of Representatives are in favor of abolishing the system that was introduced in 2015 (Meijer, 2021). One reason political parties give is that the new funding system increases stress among students because of their soaring student debt. Moreover, the parties argue that students have a lack of time to do other things besides their studies due to the student loan system (NOS, 2020). Conclusions of this research are relevant to this for this debate and allow for assessing whether these arguments are correct.

A cross sectional dataset from De Studentenmonitor from the years 2011 until 2019 is used to research the impact of study funding system on health, study load and study performance. The dataset included only students from 2011-2019 who are enrolled with DUO and study at a higher educational institution. Several multiple regressions with ordinary least squares are estimated to investigate the relationships between studying in the new study funding system, and health and study performance.

The research proceeds as follows: section 2 contains some background information about the study funding systems before and after 2015. The hypothesis and theoretical framework are outlined in section 3. Section 4 describes the data and the method of research. Section 5 will present the results and section 6 tries to make these results more robust. Section 7 discusses the limitations and section 8 concludes.

2. The Dutch Funding System and Hypotheses Development

2.1. The Dutch study system before 2015

The funding system of studying has been changing for years and has been an important topic of political discussions for quite some time. Before 2015, there was a system in place that was established in 1991 (NOS, 2018). The funds students received consisted of five parts, namely the basic grant, the supplementary grant, the student travel product, a loan and a tuition fee loan. The basic grant was available for four years when students started with studying. It was a so-called performance grant which becomes a gift when a student graduates within ten years. The amount of the basic grant differed in whether students were living at home with their parents or away. Students living away from their parent's home received approximately 300 euros per month. Students living at their parent's received about 100 euros. It is important to mention that these amounts of basic grants changed over the years. The supplementary grant, was available for four years and income-based. Students received a specific amount of this grant according to the income of their parents. The student travel product gave students the opportunity to choose to travel by public transport on weekdays or weekend for free for a maximum of five years (DUO, z.d.-a). Students were also given the possibility to take out an interest-bearing loan in the nominal duration of the study plus three years. After graduation, students had 15 years to pay off their loans with an interest payment at a slightly lower rate than the market. Apart from this general loan, students also could receive a interest-bearing tuition fee loan, which was intended as an extra to pay the tuition fee (LSVB, z.d.).

2.2. The Dutch study system after 2015

In 2012, the coalition parties presented their coalition agreement with some changes in the study funding system. It included the abolition of the basic grant. The supplementary grant and student travel product remained (Rijksoverheid, 2012). An argument for this policy change was that the money saved from the basic grant could be invested directly in education to maintain the quality of education. The Labor Party, PvdA, also reasoned that the issued basic grants led to a widening gap between rich and poor because the basic grants in the old system was not income based. According to the PvdA, a social loan system was the solution in which the basic grant disappeared and students could borrow more (PVDA, 2010). After three years of negotiations with other political parties, the new law was passed by parliament. The

main changes were that the basic grant was abolished, the supplementary grant was increased and that students now have to pay off their student debt in 35 years instead of 15 years. The new system entered into force since September 2015. It is important to note that students that started their first study before the academic year 2015-2016 are still falling under the old study funding system in the years after their first study year (Rijksoverheid, 2015).

Since the introduction of this new study funding system, the student debt increased from nearly 12 billion in 2014 to over 19 billion in 2019. The number of borrowing students increased also with 40 percent in 2019 in comparison with 2014 (CBS, 2019). These findings raise questions about the impact of this upward trends on health, study load and study performance.
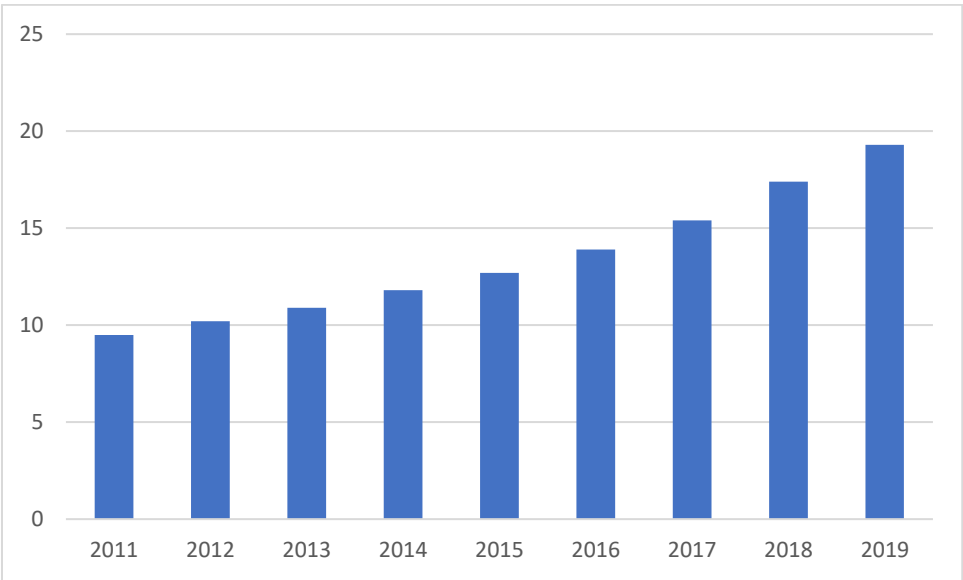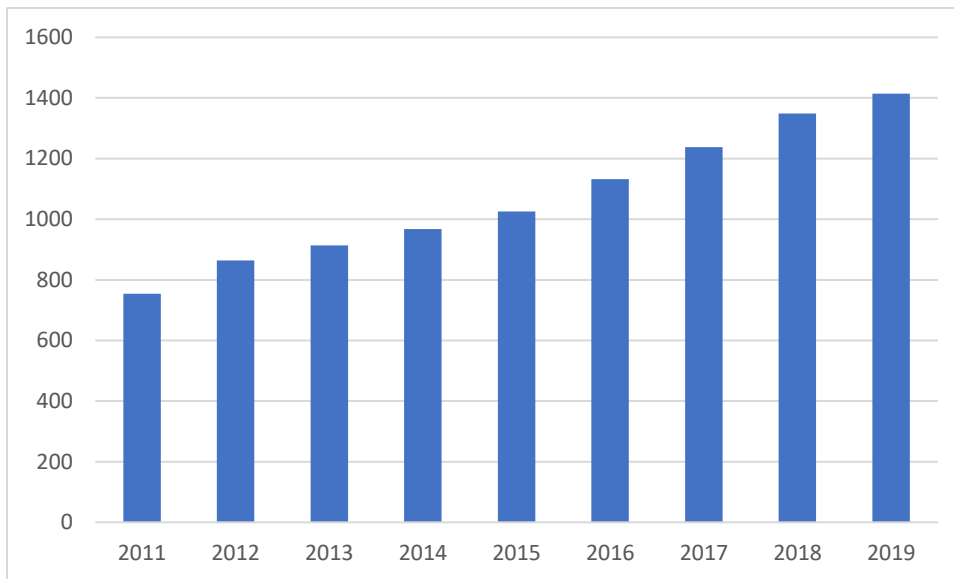

Figure 2.1. Total student debt in billion euros over the years, 2011 – 2019

Source: CBS, 2019

Figure 2.2: Total number of students x 1000 with student debt

Source: CBS, 2019

3. Literature review and Hypotheses Development

3.1. Student debt, stress and (mental) health

Much research is done into the causality between indebtedness and health among students. Most of this research show positive correlations, but could not present causalities. Nelson et al. (2008) looked at credit card debt of (under)graduates of the University of Minnesota and their data was collected by the Boynton Health Service in 2004. The authors analysed the potential causal relationship between health risk indicators and having a credit card debt of at least 1000 dollars. They also examine several students' stress experiences as the outcome variable. The authors use several health risk indicators such as obesity, binge drinking and insufficient eating. The relative risk indicators are computed as the Poisson probability of someone for whom the health indicator applies divided by someone whom the health indicator does not apply.

Poisson regressions showed that the relative risk in having credit card debt of at least 1000 dollars increase with some risk health indicators, such as overweight. Positive correlations were also found in feeling stressed and in having poor stress management. However, only age, race and number of hours worked were used as control variables in the Poisson regressions. Therefore, the conclusions of this study should be treated with caution due to potential selection bias.

Reading and Reynolds (2001) found a positive significant association between debt and depression. In their analysis, 209 families in the UK were investigated into debt worries and depression in July 1997 and six months later. Including a control variable having a depression at the baseline estimation did give significant results for depressions six months later. Other control variables include socioeconomic variables, such as income and general health. Multiple regression with these control variables showed a positive relationship between debt and depression. Moreover, research from Tran et al. (2018) showed negative indirect effects of student loan debts on general health and positive effects on depression symptomatology. The sample included freshmen at 28 participating schools in the US. The authors use the stress appraisal from respondents as mechanism between student loan debts and general health. Income was used as control variable in the multiple regression.

Having debt and worrying about debt is also associated with physical impairment (Drentea and Lavrakas, 2000). Physical impairment was defined as experiencing difficulties in performing daily tasks. According to several multiple regression models, a higher debt to income ratio leads to an increase of more than 20 percent in physical impairment. This research also controls for socioeconomic factors, sociodemographic factors, health risks and behaviour. Also the felt stress of respondents were measured by the debt stress index. A higher debt stress index was associated with a greater impairment.

Research from Cooke et al. (2004) showed that in multiple years students with high financial concerns felt more tense and anxious than students with lower worries about their financial situation. Second- and third-year students scored higher mental health scores (worse mental health) than first year students. Importantly, these English students have to deal with a loan system that is very similar to the Dutch one since 2015 (Government Digital Service, 2014).[1]

3.2. Student debt and academic performance

Ross et al. (2006) showed that there was no significant relationship between total debt and class ranking. In their estimations, they adjusted for gender and whether respondents live at their parental home. Another survey by Zhang and Kemps (2009) showed no evidence for a

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[1] No research was found about the effects of the introduction of the English system, probably due to its long existence. The same holds for Australia that introduced a student loan system in 1989 (Parliament of Australia, 2013).

correlation between Grade Point Averages (GPA) and levels of debt. However, these studies are limited in that they do not include some control variables, such as the income of students or parents. Adding additional variables could eliminate a potential selection bias.

Stoddard et al. (2018) focussed on the effects of having debt on multiple academic performance measures. Using student fixed effects, these authors find significantly positive effects of having a student loan on the GPA. However, there is a negative relationship between the ratio of debt to tuition and GPA. The same negative relation is found between the ratio of debt to tuition and the number of obtained semester credits. Furthermore, a positive relationship was found between having a loan and the obtained semester credits. The retention rates of students also decrease in having a loan and in the loan to tuition ratio.

The conflicting results of Stoddard et al. (2018) show that study performance may be correlated with each other in several ways. One possible channel for the relationship between indebtedness and performance could be that students are highly motivated due to stress about their future earnings. In this case, more stress leads to higher study performances. Another mechanism could be that students appreciate leisure time more when the stress of students increases. The increased willingness to escape from their financial problems could be the reason for this. According to Nibud (2017), students with student debt spend more money on leisure activities than students without student debt. Students in the new study funding system also spend less time on a side job. The additional leisure expenditure suggests that more time is spent on leisure or that more is spent in the same leisure time. It could also be that the extra money saved by the government has caused the quality of education to rise. One of the reasons to introduce the new study funding system was to make extra money available to invest in education. In this way, the grades could decrease with a more complicated curriculum due to extra funding by the government.

Stinebrickner and Stinebrickner (2003) underlined that there is no unambiguous evidence for one theory. They showed a negative relationship between an additional work/study hour and grade performance. According to them, students could increase their GPA by decreasing hours worked and increasing study hours. However, they do make a side note that this can also work the other way around. Working can also provide more income in the future according to Ruhm (1997). According to Stinebrickner and Stinebrickner (2003), more research is required to identify which effect is larger. This research tries to find answers to this question.

3.3. The impact of the recent Dutch study funding system

Motivaction (2019) did already research on the well-being of borrowing students in comparison to non-borrowing students in the new study funding system in the Netherlands. One finding is that non-borrowers experience fewer concerns about their financial situation than borrowers. They also report fewer possible burnout complaints than borrowers. Borrowers also feel more urge to graduate as fast as possible than non-borrowers. However, this study is limited to statistically comparing two groups. The study does not take into account other characteristics of students. As a result, there may be selection bias. Therefore, it is necessary to investigate the effects of the study funding system further to conclude anything representative and valid.

Other research on the effects of this policy change only focuses on the accessibility of education and borrowing behavior (CPB, 2020; Oosterbeek and van den Broek, 2009). Considering this, it is still interesting to analyze the effects of this policy change on (mental) health, experienced study load and study performance.

3.4. Hypotheses

Although some research did not find significant results, most studies found a negative relationship between indebtedness and (mental) health with feeling stressed as a mechanism. Earlier research showed a positive correlation between debt and the risk of unhealthy behavior and physical impairment. Furthermore, credit card debt was also positively associated with harmful health factors. Mental health problems, such as depression symptoms, are also positively correlated with indebtedness.

Dutch students starting their study in 2015 or later borrow more due to the abolition of basic student grants than students beginning their first study before 2015 (CBS, 2019). A study funding system with more students creating more debt could lead to more stress and (mental) health problems. This requires more empirical evidence, so the first hypothesis in this research is:

H1: There is a positive relationship between studying in the new study funding system starting from 2015 and (mental) health problems.

Previous research had not specifically studied students' experience of study load. However, as mentioned before, Dutch students in the new study funding system are more motivated to complete their studies as fast as possible than students who started their first study before 2015. This could result in a higher experience in study load, as they might feel a certain pressure to graduate quickly. Therefore, the second hypothesis is the following:

H2: There is a positive relationship between studying in the new study funding system starting from 2015 and the experienced study load.

Stoddard et al. (2018) showed that having student loans could lead to higher GPAs and higher numbers of obtained semester credits. Students could be highly motivated for their studies to ensure their future earnings. In this way, they might be able to pay off their debt. This means that more debt could lead to higher study performances. Although Stinebrickner and Stinebricker (2003) have reservations about this theory, they also suggest a potential positive relationship between debt and study performance. Therefore, the third hypothesis is:

H3: There is a positive relationship between studying in the new study funding system starting from 2015 and the average exam grade.

4. Methodology

4.1. Data

To estimate the effects on health, experienced study load, and students' study performance, a cross-sectional dataset from De Studentenmonitor is used (van den Broek and ResearchNed, 2019; ResearchNed, 2017, 2019a, 2019b, 2021). This organization owns self-reported surveys in the years 2011 until 2019 from students that enrolled for higher education. Only Dutch students with a valid enrolment for a Dutch university or college when completing the survey are in the dataset. The data contains only Dutch students who study or studied in college or university in the Netherlands. The data comprises background characteristics before studying, such as labor, disabilities, study progress, and more. An email was sent to all students that were registered at the Dutch department of education (DUO) to fill out the survey.

In this research, a combined dataset is used from multiple years. A handful of respondents participated in multiple years. In this case, the most recent observation of respondents were kept in the dataset. Only data after 2011 is used due to the unavailability of observations of some survey questions before 2011. Missing answers or questions where respondents did not know the answer were reported as missing values.

It is important to clarify some important variables of these datasets. First, the variable that reflects health is whether a person experiences physical or mental health problems. Physical or mental health problems are defined as being hindered by a concentration disorder, mental illness, or physical disability. Due to data unavailability, there is only one variable that captures mental and physical problems together. However, mental illness and physical illness are strongly correlated with each other (Perlmutter and Nyquist, 1990). For this reason, these two categories are combined into one variable. Second, the experienced study load and satisfaction of study are valued with a range from dissatisfied to very satisfied. The income group of parents also has a range from far below modal income to far above modal income.

Descriptive statistics of the data are presented in Table 1. First of all, there are more women in this dataset. Moreover, more than ten percent are hindered by a physical or mental problem, and most students in the dataset study in the old system. It is important to mention that the scale of the income groups of parents, the satisfaction of the study, and satisfaction of the study load is from one to five. When looking at satisfaction rates, students are more

satisfied with their study in general than about the study load. For almost 20 percent of the student, there was a minimal gap of one year between finishing their high school and enrolling for their first study in higher education. The average high school grade is based on the average grade of the final exams in the Netherlands.

Table 1: Descriptive Statistics

	Observations	Mean	Std. Dev.	Min	Max
Gender (male=1)	123908	.374	.484	0	1
Age	123877	18.954	3.92	9	95
First year enrollment	123908	2010.67	5.318	1979	2019
Monthly health expenses	126436	56.396	186.395	0	30000
Physical/mental health problems	122545	.101	.302	0	1
Study load (very dissatisfied=1)	120323	3.474	.908	1	5
Satisfaction study (very dissatisfied=1)	122576	3.899	.828	1	5
Average exam grade study	117406	7.168	.662	.65	9.8
Studying in the new study funding system	126436	.218	.413	0	1
Income group parents (far below modal income=1)	19976	3.44	.934	1	5
Average high school grade	81067	7.069	.701	.95	10
Student: falling behind	92626	.360	.480	0	1
At least one gap year	52472	.195	.396	0	1

Notes: this table shows the number of observations, means and standard deviations of the variables in the years 2011-2019.

This study looks at the differences between students in the old system and the new system. Table 2 presents the descriptive statistics for these groups. Physical and or mental health problems are more an issue for a student in the new study funding system with a difference of almost seven percentage points. Students in the old system are slightly more satisfied with the course load than students in the new system. Although, this latter group is slightly more satisfied with their study in general. Furthermore, a student in the old system perform better

at their study in terms of grades, and they often have minimal one year between finishing high school and enrolling for the first time for a higher education study.

It is also interesting to see differences between males and females. Table 3 shows the descriptive statistics among men and women. In general, female students are slightly younger and are more hindered by physical and or mental problems. Males are more satisfied with the study load and their study in general. Females perform better at their studies in terms of grades, and more female students enroll for a higher education study in the same years as they finish their high school.

Table 2: Descriptive statistics by study funding system

	Studying in the old study funding system			Studying in the new study funding system		
	Observations	Mean	Std. Dev.	Observations	Mean	Std. Dev.
Gender (male=1)	96312	.384	.486	27596	.341	.474
Age	96282	18.942	4.014	27595	18.997	3.57
First year enrollment	96312	2009.113	5.02	27596	2016.104	1.022
Monthly health expenses	98840	53.958	130.809	27596	65.125	312.731
Physical/mental health problems	95662	.087	.282	26883	.153	.360
Study load (very dissatisfied=1)	93828	3.475	.906	26495	3.469	.915
Satisfaction study (very dissatisfied=1)	95428	3.897	.835	27148	3.906	.800
Average exam grade study	91044	7.172	.657	26362	7.152	.678
Income group parents (far below modal income=1)	17047	3.436	.933	2929	3.460	.941
Average high school grade	55572	7.080	.699	25495	7.046	.706
Student: falling behind	66030	.412	.492	26596	.233	.423
At least one gap year	26057	.207	.405	26415	.183	.387

Notes: this table shows the number of observations, means and standard deviations of the variables in the years 2011-2019: divided into studying in the old study funding system and studying in the new study funding system.

Table 3: Descriptive statistics by gender

	Male			**Female**		
	Observations	Mean	Std. Dev.	Observations	Mean	Std. Dev.
Age	46356	19.172	4.146	77521	18.824	3.772
First year enrollment	46375	2010.289	5.526	77532	2010.898	5.176
Monthly health expenses	46375	54.092	227.497	77533	59.611	159.949
Physical/mental health problems	45737	.085	.279	76808	.111	.314
Study load (very dissatisfied=1)	45167	3.506	.92	75156	3.455	.901
Satisfaction study (very dissatisfied=1)	45930	3.903	.875	76646	3.897	.798
Average exam grade study	44270	7.146	.685	73135	7.181	.647
Studying in the new study funding system.	46375	.203	.402	77533	.235	.424
Income group parents (far below modal income=1).	7718	3.479	.974	12258	3.415	.907
Average high school grade	29417	7.09	.705	51650	7.057	.699
Student: falling behind	34230	.427	.495	58396	.321	.467
At least one gap year	18979	.206	.405	33493	.188	.391

Notes: this table shows the number of observations, means and standard deviations of the variables in the years 2011-2019 among male and female.

4.2. Empirical strategy

Multiple linear OLS regression

The specifications for this research are based on multiple linear regressions with ordinary least squares (OLS). The following regression equation is estimated:

$$y = \beta_0 + \beta_1 * new\ system_i + \beta_2 * gender_i + \beta_3 * average\ high\ school\ grade_i + \beta_4 * income\ group\ parents_i + \beta_5 * age_i + \beta_6 * gap\ year_i + \beta_7 * gender_i * new\ system_i + \beta_8 * gap\ year_i * new\ system_i + \beta_9 * average\ high\ school\ grade_i * new\ system_i + \beta_{10} * income\ group\ parents_i * new\ system_i + \mu_t + \pi_i + \varepsilon_i$$

In this equation, the primary variable of interest is studying in the new study funding system. For the students that started their study in September 2015 or later this value is one. For the other students, this value is zero.

y measures the independent variables: having health problems, the satisfaction of study load and the study performance. Health problems have a scale of zero to one. In this case, β_1 measures the difference in the percentage of students that experience health problems in comparison with students that do not experience health problems, while studying in the new study funding system on the one hand, and students who study in the old study funding system on the other hand. The satisfaction of study load is measured from one to five, so β_1 measures the average difference in the degree of satisfaction of the study load between students that study in the new study funding system, and students in the old study funding system. The average exam grade is measured in absolute numbers with one decimal. The β_1 measures the average difference in the average exam grade between students that study in the new study funding system, and students in the old study funding system. Gender takes the value one when someone is a male and zero otherwise. The term μ_t describes year-fixed effects and π_i represents study phase fixed effects.

Year-fixed effects

Some major incidental events at some point in time may have an impact on both the control and treatment groups. For instance, certain macroeconomic shifts could lead to less employment and income. Less income may cause more students that go to college or university sooner than originally planned. In this case, students that start studying before 2015 rather than in 2015 or later could compensate for the impacts of negative macroeconomic shifts by receiving grants. An example of such a negative macroeconomic shift could be a economic recession.

The Worldbank (2020) claimed that the human capital indices of the Netherlands have been declining over the last ten years. As mentioned before, the same holds for mental health: students experience worse mental health over the years (RIVM et al., 2019). Also, more university students have been satisfied with their studies over the years (Ministerie van Onderwijs, Cultuur and Wetenschap, 2019). This main specification tries to control for these

trends. Accounting for year-fixed effects will assure that these socioeconomic and cultural trends at $t_{year} = x$ have the same effect on y as every level of t_{year}. In other words, year fixed effects allow for factors that are constant across all students, but that vary over time. In this way, for example, other important study laws that apply to all students are included in the model.

Study phase fixed effects

Moreover, students could also differ from each other in phases of the study. Bachelor students could differ from master students in performance or mental resilience. For example, master students might differ because they might be more used to studying and the student life. Thus, master students may be able to take better care of themselves because they know better what is needed for them to stay healthy in student life. The same may be true for performance in college and university, as a master student may have better control of the new way of teaching in comparison with a bachelor student. On top of that, bachelor students are less likely to have to get used to this new way of teaching. Moreover, their bachelor may feel heavier than it is for master students. Therefore, their experience of study load could differ from master students. To account for all of these potential unobserved differences between the control and treatment group, study phase fixed effects are included in the specification. In other words, study phase fixed effects allow for factors that are constant across students in a study phase, but that vary over study phases. The study phase is here divided into bachelor's and master and year phase of the study degree.

Other control variables

A possible control variable that could influence whether someone is studying in the new system and one of the outcome variables is gender. According to the data, males and females differ in the amount of physical or mental health problems. Rieker and Bird (2005) confirmed these differences in (mental) health in gender. According to them, women have a higher morbidity rate but a higher life expectancy than males. Furthermore, differences are also present in study performance across gender (Dayioğlu and Türüt-Aşik, 2007). They showed that Turkish female students performed better on average in terms of grades. This is in line

with the descriptive statistics of the dataset. Evidence of the difference in the satisfaction of study in general and study load has not been found yet. However, the data suggest that female students are more satisfied with their study (load) than males. Gender could also influence the timing of studying. Women might more willing to study in 2014 or earlier, because they need more study grants than men do. Women would be less able to repay any debt because women's future income might be lower than men. In the Netherlands, women earn eight percent less than men (CBS, 2018). The proportion of female first-year students is also higher after the announcement of the new study funding system than after the implementation.

Secondly, the age of students may affect the timing of starting with a higher education study since older students might feel more rushed to start earlier because of their age. Moreover, older students may be sooner ready to make a choice about which study they would like to start. Therefore, older students could start earlier with studying than others. Age could also influence the study performance of students (Hoskins et al., 1997). More life experience and possible greater brain development may play a role here. Age could also influence (mental) health of students. After all, the age of students partly determines the motivation for physical exercise (Egli et al., 2011). Naturally, physical exercise influences physical health, but it could also affect mental health (Paluska and Schwenk, 2000). The age of students could also influence the experience of study load. It could be that older students have experienced more setbacks in their lives, making them more resilient now. In this way, they could rate the study load lower than younger students.

Furthermore, having a gap year could influence whether students study in the new study funding system and the outcome variables. For example, a gap year could influence study performance. Birch and Miller (2007) estimated multiple regressions which showed strong positive associations between having a gap year and grades. Having a gap year could also influence (mental) health. Multivariate analysis showed negative associations between having a gap year and levels of burnout (Guang et al., 2020). The likelihood of burnout also decreased with the number of gap years of students. Taking a gap year could also play a role in the satisfaction of study (load) of students. O'Shea (2011) described the benefits of gap years: students with a gap year could have more time for personal identification and to discover their preferences. Maybe this could play a role in their study choice and so on their opinion about

their study. Whether students take gap years could influence the timing of starting with a study.

The income of a student's parents could also play a role in the timing of starting with studying. Students from wealthier families may feel less inclined to study as soon as possible because they consider basic grants (studying before 2015) less necessary. According to Nibud (2021), 68% of Dutch students receive monthly money from their parents, so this may play a role in a student's total disposable income. However, it is unclear whether the received amount of money of parents differ by income group. Intuitively, the income of students' parents could influence the debt levels of students. As mentioned before, these debt levels could influence (mental) health, study load, and study performance.

High school grades could also have an impact on the timing in which students start going to college or university. Higher high school grades could suggest higher degrees of motivation to start a study as soon as possible. Perhaps students may find studying more interesting when they graduated with higher grades. As a result, students with higher grades may want to study sooner than students with lower grades. In addition, students in 2014 may also realize that they need to pass their high school exams as soon as possible. Otherwise, they will not be able to start their studies in 2014 miss out the grants from the old funding system. In this way, the announcement of the new study funding system can influence the grades of students.

High school grades could also be a proper predictor for future performance at college or university (Eskew and Faley, 1988). The same holds for the experienced study load of students: higher high school grades could in some way be linked with the intelligence of students. A greater intellect of a student may allow for less time to study to pass a course of study. Spending less time on studying can lead to lower values of study pressure and study load. Higher high school grades could also influence (mental) health in this way. Namely, study time could be a substitute for times when students exercise or rest. This, of course, could also affect the degree of (mental) health.

Heterogeneity analysis

It can also be helpful to analyze effects within the treatment and control groups to check whether the results are robust. The effects of the new study funding system may be skewed

by one or more subgroups. The addition of interaction terms can thus show more information about what drives the results. Therefore, four interaction terms are included in the main specification.

First, women could be more affected by the earlier mentioned stress mechanism than men do. For example, women are two times more likely than men to experience high levels of stress (Remes et al., 2016). The effect of losing basic grants and accumulating student debt could therefore be greater for women.

Secondly, students with a higher income of parents might accumulate less debt than students with a lower parental income. According to Nibud (2021), Dutch students became more dependent on their parents over the last few years. The study shows that parental support increased out of fear of high student debt. The question is whether this is more the case for students with a higher parental income.

Furthermore, students within a study funding system may respond differently to their debt and their stress. This could be the case because students with higher high school grades could feel less stress during their study time than students with lower grades. Students' high school grades could reflect one's intelligence and future income. According to Roth et al. (2015), intelligence is the strongest predictor of high school grades. In addition, Ceci & Williams (1997) conducted evidence for the relationship between intelligence and future income. Thus, students' high school grades could explain differences in stress levels within groups due to less financial stress. As mentioned before, stress levels could explain levels of study performance, experienced study load, and (mental) health.

Lastly, students with a gap year or more could reflect one's perceived stress via the emotional intelligence mechanism. Emotional intelligence is defined as the ability to recognize and understand your emotions to manage your behavior and relationships (Salovey & Mayer, 1990). Shahid & Adams (2020) argue that taking a gap year could influence one's stress tolerance. Their analysis showed differences in levels of stress tolerance across students with and without a gap year. This suggests that a gap year could reduce the effects of (financial) stress. For example, a student might have a lot of debt but that doesn't say anything about how much stress that creates. And again, stress levels could explain levels of study performance, experienced study load, and (mental) health.

5. Results

The results of the multiple regressions with the three outcome variables are presented in this section. To make the results more plausible, multiple regressions were done with different control variables. Year-fixed effects and study phase-fixed effects are included in all regressions with OLS. The number of observations in these regressions decreases in the number of control variables due to data unavailability in some years.

5.1. Student debt and physical/mental health problems

The results of the multiple regressions with physical and or mental health problems as outcome variables are presented in Table 4. The first linear probability model contains only gender and age as control variables. Studying in the new study funding system leads to a decrease of 1.9 percent points in the probability of having (mental) health problems. This result is statistically significant, with a significance level of five percent. Adding whether someone took a gap year between high school and higher education does not change the results. Besides, the treatment variable is still statistically significant with a five percent significance level. The treatment value changes slightly to 2.2 percent when including the high school grade in the third regression. This coefficient is still statistically significant ($p<0.05$). The value of the treatment variable changes when attaching the income group of the student's parents. Gender is in every specification statistically significant. This could mean that gender plays an important role in the timing of study and health. However, age is not statistically significant with a value near zero. This suggests that the age of students might not influence both the timing of studying and health.

The preferred specification is the most extensive one containing the four interaction terms. This regression contains the most control variables and that makes the probability of omitted variable bias the lowest. It is assumed that the variables in this regression are actually control variables. Only the interaction between studying in the new study funding system and gender is significant. As mentioned before, this could be due to differences in the effects of the stress mechanism between men and women. However, the treatment variable is not statistically significant. Average high school grades and the income group of parents are both statistically significant with a five percent significance level.

5.2. Student debt and study performance

The results of multiple regressions with study performance as a dependent variable are converted into Table 5. Studying in the new study funding system leads to an increase in 0.86 points in the average study grade according to the first regression. This result is statistically significant, with a significance level of one percent. Including having a gap year changes the magnitude of this effect, but there remains a positive relationship between study performance and studying in the new study funding system. Controlling for high school grades and the income group of the parents does not much change the results. Studying in the new study funding system leads to an increase in 0.82 points in the average study grade and is statistically significant ($p<0.05$).

Including four interaction terms give the most reliable results of these regressions. Studying in the new study funding system suggest that the average study grade is 1.472 points lower than the grade of nearly the exact person that is studying in the old study funding system. The grades for students with a gap year are slightly higher than students without a gap year in the new study funding system. These results are statistically significant with a significance level of five percent. The average high school grade is also significant at a one percent level.

5.3. Student debt and the experienced study load

The results of the multiple regressions with the experienced study load as outcome variable are presented in Table 6. In all four regressions, the main variable of interest is not statistically significant. The variables gender and the income group of parents are statistically significant with a one percent significance level.

Table 4: multiple regression with physical/mental health problems as outcome variable

Variables	(1) Physical/mental health problems	(2) Physical/mental health problems	(3) Physical/mental health problems	(4) Physical/mental health problems	(5) Physical/mental health problems	(6) Physical/mental health problems
Studying in the new study funding system	-0.019** (0.007)	-0.019** (0.009)	-0.022** (0.009)	-0.041** (0.018)	-0.053*** (0.021)	0.188 (0.157)
Gender (male=1)	-0.021*** (0.002)	-0.038*** (0.006)	-0.039*** (0.006)	-0.022* (0.012)	-0.039*** (0.013)	-0.039*** (0.013)
Age	0.001*** (0.000)	0.001 (0.001)	0.001 (0.001)	0.004 (0.002)	0.002 (0.002)	0.002 (0.002)
At least one gap year		0.014 (0.008)	0.015* (0.009)	0.018 (0.019)	0.016 (0.019)	0.017 (0.019)
Average high school grade			0.016*** (0.004)	0.028*** (0.009)	0.017* (0.009)	0.025** (0.010)
Income group parents				0.011* (0.006)	0.011* (0.006)	0.014** (0.007)
Studying in the new study funding system * Gender					0.059** (0.027)	0.060** (0.027)
Studying in the new study funding system * Gap year					0.012 (0.043)	0.006 (0.043)
Studying in the new study funding system * High school grades						-0.028 (0.021)
Studying in the new study funding system * Income group parents						-0.013 (0.014)
Constant	0.080*** (0.012)	0.293*** (0.075)	0.176** (0.081)	0.005 (0.146)	0.048 (0.127)	-0.013 (0.132)
Year-fixed effects	YES	YES	YES	YES	YES	YES
Study phase fixed effects	YES	YES	YES	YES	YES	YES
Observations	83,388	15,936	15,646	3,740	3,778	3,778
R-squared	0.024	0.004	0.005	0.010	0.008	0.009

Notes: Multiple regression estimations of studying in the new study funding system on physical/mental health problems. The income group of the parents is measured in a range from 1 (far below modal income) to 5. A gap year means a between finishing high school and enrolling for a study in a higher educational institute for the first time. The standard error is given within parentheses, and the '' provide the significance level as follows: * p<0.10 ** p<0.05 *** p<0.01.*

Table 5: multiple regression with average exam grade study as outcome variable

Variables	(1) Average exam grade study	(2) Average exam grade study	(3) Average exam grade study	(4) Average exam grade study	(5) Average exam grade study	(6) Average exam grade study
Studying in the new study funding system	0.086*** (0.015)	0.056*** (0.018)	0.023 (0.017)	0.082** (0.035)	0.071* (0.039)	-1.472*** (0.349)
Gender (male=1)	-0.037*** (0.005)	-0.023** (0.011)	-0.033*** (0.010)	-0.040* (0.021)	-0.030 (0.023)	-0.030 (0.023)
Age	0.001 (0.001)	-0.010*** (0.002)	-0.009*** (0.002)	0.001 (0.004)	-0.002 (0.004)	-0.002 (0.004)
At least one gap year		-0.020 (0.015)	0.007 (0.015)	0.010 (0.032)	-0.026 (0.033)	-0.031 (0.032)
Average high school grade			0.322*** (0.012)	0.383*** (0.024)	0.385*** (0.024)	0.328*** (0.027)
Income group parents				0.036*** (0.012)	0.035*** (0.000)	0.035** (0.000)
Studying in the new study funding system * Gender					0.006 (0.055)	-0.007 (0.054)
Studying in the new study funding system * Gap year					0.204** (0.091)	0.227** (0.093)
Studying in the new study funding system * High school grades						0.219*** (0.048)
Studying in the new study funding system * Income group parents						-0.003 (0.029)
Constant	7.190*** (0.027)	7.360*** (0.097)	5.111*** (0.135)	4.299*** (0.236)	4.368*** (0.236)	4.767*** (0.256)
Year-fixed effects	YES	YES	YES	YES	YES	YES
Study phase fixed effects	YES	YES	YES	YES	YES	YES
Observations	79,076	15,262	14,993	3,567	3,595	3,595
R-squared	0.067	0.059	0.164	0.183	0.177	0.185

Notes: Multiple regression estimations of studying in the new study funding system on the average exam grade. The income group of the parents is measured in a range from 1 (far below modal income) to 5. A gap year means a year between finishing high school and enrolling for a study in a higher educational institute for the first time. The standard error is given within parentheses, and the '' provides the significance level as follows * p<0.10 ** p<0.05 *** p<0.01.*

Table 6: multiple regression with study load as outcome variable

Variables	(1) Study load	(2) Study load	(3) Study load	(4) Study load	(5) Study load	(6) Study load
Studying in the new study funding system	0.007 (0.019)	-0.021 (0.024)	-0.018 (0.024)	-0.031 (0.043)	0.019 (0.049)	0.247 (0.366)
Gender (male=1)	0.033*** (0.007)	0.100*** (0.015)	0.095*** (0.015)	0.055* (0.029)	0.097*** (0.034)	0.097*** (0.034)
Age	-0.008*** (0.001)	-0.010*** (0.003)	-0.010*** (0.003)	-0.006 (0.006)	-0.008 (0.006)	-0.009 (0.006)
At least one gap year		-0.050** (0.022)	-0.042* (0.022)	-0.074 (0.046)	-0.057 (0.049)	-0.056 (0.049)
Average high school grade			0.026** (0.011)	0.025 (0.024)	0.029 (0.023)	0.041 (0.028)
Income group parents				0.056*** (0.016)	0.064*** (0.016)	0.056*** (0.019)
Studying in the new study funding system * Gender					-0.156** (0.065)	-0.154** (0.019)
Studying in the new study funding system * Gap year					-0.018 (0.100)	-0.017 (0.100)
Studying in the new study funding system * High school grades						-0.047 (0.048)
Studying in the new study funding system * Income group parents						0.031 (0.035)
Constant	3.604*** (0.041)	3.540*** (0.175)	3.368*** (0.196)	2.823*** (0.381)	3.058*** (0.332)	2.996*** (0.351)
Year-fixed effects	YES	YES	YES	YES	YES	YES
Study phase fixed effects	YES	YES	YES	YES	YES	YES
Observations	81,605	15,738	15,460	3,662	3,695	3,695
R-squared	0.003	0.008	0.008	0.012	0.015	0.015

Notes: Multiple regression estimates of studying in the new study funding system on the experienced study load. The income group of the parents is measured in a range from 1 (far below modal income) to 5. A gap year means a year between finishing high school and entering a higher educational educational institute for the first time. The standard error is given within parentheses, and the '' provide the significance level as follows: * p<0.10 ** p<0.05 *** p<0.01.*

6. Robustness

This robustness section contains several tests to support the baseline results in the previous section. First, other variables are used as a proxy for every outcome variable. Secondly, placebo tests were implemented in which the effective year of the new policy is changed.

As discussed in the previous section, a change in physical or mental health problems is not recognizable as the new study funding system took into effect. The reliability of this outcome can be increased by replacing this outcome variable with monthly health expenses. This is because poorer health or more health problems can also lead to higher health costs. The results of this robustness test are presented in Table 7. The results are consistent with earlier results: there is not a relationship between studying in the new study funding system and monthly health expenses, measured in euros. The preferred specification does not give a significant result.

Another proxy is used to test the estimations of the performance of students. The results are reported in Table 8. The proxy, in this case, is whether a student is falling behind on his/her curriculum. This could also be a correct indicator of the performance of students. Results of the multiple regressions with this proxy are not in line with the previous results. The preferred specification does not give a significant result. A possible reason for this insignificance might be a too-small sample size relative to the variability of the data. However, that does not seem to be the case here, because other coefficients are significant in regressions with a similar number of observations. Non-linearity is also not the case here due to a binary treatment variable. The most plausible reason is that there is no relationship between studying in the new study funding system and falling behind the curriculum.

As mentioned before, the results of the regressions with the experienced study load of students were statistically not significant. Therefore, the robustness test with the degree of satisfaction of their study is implemented in Table A.1. In this way, it is still possible to do more research on students' study load. The satisfaction of the study serves as a proxy for the experienced study load. These regressions suggest a positive relationship between studying in the new study funding system and the degree of satisfaction about the study in general. Estimations are statistically significant in the first five estimations. However, the results of the most extensive regression are not significant.

In the second robustness test, the year is changed in which the new study funding system took effect. Table 9 shows no statistically significant estimations when assuming that the policy took effect in the academic year 2014-2015 instead of 2015-2016. These robustness tests imply no relationships between a fictional policy change and the outcome variables in other years than 2015. Table A.2 and Table A.3 show results roughly similar to Table 9 when assuming that the policy took effect in the academic year 2016-2017 and in 2012-2013, respectively.

Table 7: multiple regression with monthly health expenses as outcome variable

Variables	(1) Monthly health expenses	(2) Monthly health expenses	(3) Monthly health expenses	(4) Monthly health expenses	(5) Monthly health expenses	(6) Monthly health expenses
Studying in the new study funding system	-5.358*** (1.526)	-2.434 (6.517)	-2.791 (6.459)	-9.001** (3.542)	-9.668** (4.075)	28.820 (26.836)
Gender (male=1)	-8.220*** (0.730)	-9.319*** (3.189)	-9.366*** (3.250)	-4.842** (2.185)	-5.139** (2.581)	-5.167** (2.581)
Age	-0.018 (0.064)	2.011*** (0.288)	2.041*** (0.297)	1.519** (0.607)	1.359** (0.603)	1.342** (0.603)
At least one gap year		0.015 (3.129)	-0.895 (3.121)	5.734* (3.302)	7.624** (3.526)	7.774** (3.526)
Average high school grade			0.568 (1.339)	3.875** (1.570)	4.203*** (1.564)	5.282*** (1.798)
Income group parents				-5.680*** (1.162)	-5.273*** (1.161)	-4.560*** (1.340)
Studying in the new study funding system * Gender					1.528 (4.947)	1.779 (4.960)
Studying in the new study funding system * Gap year					-5.574 (8.568)	-6.584 (8.516)
Studying in the new study funding system * High school grades						-4.023 (3.663)
Studying in the new study funding system * Income group parents						-2.897 (2.655)
Constant	61.105*** (2.661)	43.322*** (11.870)	38.090*** (13.175)	45.613* (24.141)	51.605** (23.121)	42.047* (23.880)
Year-fixed effects	YES	YES	YES	YES	YES	YES
Study phase fixed effects	YES	YES	YES	YES	YES	YES
Observations	83,676	16,137	15,846	3,740	3,778	3,778
R-squared	0.013	0.004	0.004	0.033	0.032	0.032

Notes: Multiple regression estimations of studying in the new study funding system on the monthly health expenses. The income group of the parents is measured in a range from 1 (far below modal income) to 5. A gap year means a year between finishing high school and enrolling for a study in a higher educational institute for the first time. The standard error is given within parentheses, and the '' provide the significance level as follows: * p<0.10 ** p<0.05 *** p<0.01.*

Table 8: multiple regression with falling behind at study schedule as outcome variable

Variables	(1) Student: falling behind	(2) Student: falling behind	(3) Student: falling behind	(4) Student: falling behind	(5) Student: falling behind	(6) Student: falling behind
Studying in the new study funding system	-0.104*** (0.009)	-0.120*** (0.011)	-0.114*** (0.011)	-0.102*** (0.020)	-0.076*** (0.022)	0.028 (0.161)
Gender (male=1)	0.088*** (0.004)	0.086*** (0.008)	0.086*** (0.008)	0.096*** (0.015)	0.101*** (0.019)	0.101*** (0.019)
Age	-0.001** (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.000 (0.003)	-0.000 (0.002)	-0.000 (0.002)
At least one gap year		-0.010 (0.011)	-0.014 (0.011)	0.005 (0.024)	0.036 (0.026)	0.037 (0.026)
Average high school grade			-0.041*** (0.006)	-0.052*** (0.011)	-0.052*** (0.011)	-0.053*** (0.014)
Income group parents				-0.006 (0.008)	0.001 (0.008)	0.010 (0.010)
Studying in the new study funding system * Gender					-0.039 (0.030)	-0.039 (0.030)
Studying in the new study funding system * Gap year					-0.050 (0.045)	-0.056 (0.044)
Studying in the new study funding system * High school grades						0.004 (0.021)
Studying in the new study funding system * Income group parents						-0.038** (0.016)
Constant	0.668*** (0.027)	0.644*** (0.077)	0.935*** (0.089)	1.029*** (0.147)	0.975*** (0.144)	0.952*** (0.157)
Time fixed effects	YES	YES	YES	YES	YES	YES
Study phase fixed effects	YES	YES	YES	YES	YES	YES
Observations	54,570	15,819	15,538	3,678	3,711	3,711
R-squared	0.121	0.143	0.146	0.187	0.189	0.190

Notes: Multiple regression estimations of studying in the new study funding system on students who fall behind at the study schedule. The income group of the parents is measured in a range from 1 (far below modal income) to 5. A gap year means a year between finishing high school and enrolling for a study in a higher educational institute for the first time. The standard error is given within parentheses, and the '' provide the significance level a follows: * p<0.10 ** p<0.05 *** p<0.01.*

Table 9: Placebo tests implying the policy change was in 2014

Variables	(1) Physical/mental health problems	(2) Study load	(3) Average exam grade study
Started studying in 2014 or later	-0.014 (0.021)	-0.046 (0.052)	-0.026 (0.038)
Gender (male=1)	-0.040*** (0.013)	0.095*** (0.034)	-0.027 (0.023)
Age	0.002 (0.002)	-0.008 (0.006)	-0.002 (0.004)
At least one gap year	0.015 (0.019)	-0.059 (0.049)	-0.024 (0.033)
Average high school grade	0.018** (0.009)	0.032 (0.024)	0.377*** (0.024)
Income group parents	0.013* (0.007)	0.055*** (0.019)	0.044*** (0.014)
Studying in the new study funding system * Gender	0.061** (0.027)	-0.152** (0.065)	-0.011 (0.055)
Studying in the new study funding system * Gap year	0.012 (0.044)	-0.009 (0.100)	0.189** (0.091)
Studying in the new study funding system * High school grades	-0.003 (0.007)	-0.013 (0.017)	0.034** (0.015)
Studying in the new study funding system * Income group parents	-0.008 (0.013)	0.037 (0.033)	-0.038 (0.029)
Constant	0.035 (0.127)	3.059*** (0.333)	4.400*** (0.236)
Time fixed effects	YES	YES	YES
Study phase fixed effects	YES	YES	YES
Observations	3,778	3,695	3,595
R-squared	0.009	0.015	0.179

Notes: Placebo tests estimations of starting with studying in 2014 on several outcome variables. The income group of the parents is measured in a range from 1 (far below modal income) to 5. A gap year means a year between finishing high school and enrolling for a study in a higher educational institute for the first time. The standard error is given within parentheses, and the '*' provide the significance level a follows: * $p<0.10$ ** $p<0.05$ *** $p<0.01$.

7. Discussion and limitations

7.1. Results

The results of the regressions are not in line with all three hypotheses. First, there was not a significant result found in the preferred regression with health as the outcome variable. This suggests that there might not be a relationship between studying in the new study funding system and mental health problems. A non-linear relationship is can not be the case here, since the main independent variable is binary. The last possible reason for the insignificance is a too-small sample size relative to the variability of the data. That does not seem to be the case here either, because other regressions find significant results with the same number of observations.

Moreover, all estimations of the multiple regressions on study load were not significant. This suggests that there is no relationship between studying in the new study funding system and the experienced study load. Also here, a non-linear relationship can not explain the insignificant results, since the main independent variable is binary. Too few variations between subjects are also not likely, since OLS estimations with more than 80 thousand observations are not significant.

Lastly, the results regarding the study performance are not in line with the hypothesis. There was a strong negative association between studying in the new study funding system and the grade point average of students. As earlier mentioned, one possible reason for this is that financial stress motivates students to spend less time studying. Instead, they might relax more to escape temporally from their financial problems.

7.2. Limitations of the data and empirical strategy

Some of the conflicting results can be explained by limitations in data. First of all, data about physical and mental health are combined into one variable due to data unavailability. The problem is that in some years, no distinction has been made between these types of health in the surveys. Despite there might be a possible connection between physical and mental health, probably mental health issues arise more due to having monetary debt in comparison with physical health problems. Furthermore, some health problems, such as dyslexia and sensory limitations, can be completely unrelated to a wealth situation or this policy change. A

correct data collection could have provided a more reliable result. In the perfect situation, students should be asked exactly what problems they have and whether they know where their problems are coming from. For example, they may be asked whether their symptoms are stress-related. In this way, it may be possible to be more certain whether certain outcomes are through the aforementioned stress mechanism. Data about emotional intelligence could provide more reliable results.

Another limitation is that the data of some socio-economic variables do not exist in some years. For example, survey data from students with a gap year are only available starting from the year 2016. Moreover, data of the income group of parents is only available until the year 2017. The computations might be less accurate because fewer observations are available. Consistent data availability in all years could provide a solution to this problem. On top of that, the year-fixed effects can no longer be added accurately because data is constantly missing for some variables in certain years. The year-fixed effects may not be calculated accurately.

The last limitation of this data is that it is coming from self-reported surveys. Students may have given socially desirable responses or could have made mistakes. For example, students could have made mistakes in reporting the income group of their parents. This data is also divided into five income groups which only says something about the relative income of parents. This is because it only asks how the parents' income relates to the modal income. Students may also not even know what their parents earn, or they may not know what the modal income is. Moreover, students may report their parents' income not quite honestly because they might feel ashamed. Students who study in the new study funding system could lie more about this because they have more debts. They may be ashamed of this, so they fill in their parents' income higher than it is in reality. In the example of study performance, current results would be underestimated. This is true because a positive relationship between family income and academic performance is likely (Ali et al., 2013). Moreover, students might want to trivialize their (mental) health, or they feel ashamed by their study performance. On the other hand, students may exaggerate their health problems because they suffer from self-pity. Thus, it can work both ways, and it is unclear which group is more affected by these potential measurement errors. In the ideal situation, databases can be checked at educational institutions, health institutions, and tax authorities. In this way, the answers of students can be verified to ensure that the data reflects reality.

One possible problem with the empirical strategy is that the conditional independence assumption does not hold. This assumption does not hold when the control variables are not measured correctly. As mentioned in the previous subsection, this might be the case as this data was coming from self-reported surveys.

Second, this assumption does not hold when the treatment group differs from the control group in unobserved ways. In other words: students covered by the study funding system differ in unobservable characteristics from students covered by the old system. In the case of randomization, this might not be a problem. In that case, out of nowhere, the new study funding system should have gotten into effect so that students could not have anticipated the policy change. The only problem is that the assignment of treatment was not random. Years before the new system went into effect, it was announced. Therefore, students may have anticipated this policy change by studying earlier than planned. Proper randomization did not happen in this case. Thus, there may still be unobservable differences between the treatment and control groups.

An example of a potential unobservable characteristic is the genes of students. This is impossible to cover in a multiple linear regression with OLS, but it could be that students differ in genes across study funding systems. For instance, genes might play a role in how people experience their stress. As mentioned earlier, this could affect the performance, health, and feelings of satisfaction with the study load through this stress mechanism. Moreover, genes could predict financial choices patterns (Carpenter et al., 2011). For example, someone may tend to take on more debt due to their genes because they derive relatively little stress from debt. This could also be the case, for example, that genes influence whether someone takes a gap year. Genes could thus determine in which year a student starts studying and thus which system students study in. It is uncertain in what way this would affect the results, as it may be a factor in both groups. The question is in which group genes have the most effects.

Another important example of an unobserved characteristic is the way of parenting. The way of parenting could influence the timing of starting with studying. For example, after high school, kids may have to work for family businesses first. The extent to which parents are involved in the choice of study may also influence the timing of starting with studying. Moreover, childhood parenting can play a role in how children perform in their studies and

perhaps in terms of stress management. In addition, parenting may also influence the health management of students. Unfortunately, no research has ever been done on this.

The way of parenting is a broad and subjective concept. Therefore, it is unclear how the results are influenced by the omission of this variable. Data about the extent to which parents were involved in the study choice and what parents think of gap years could be the solution. These potential unobservable characteristics of students can be added to the specification.

The preferred solution to eliminate all these unobserved characteristics of students is to estimate a difference-in-difference model. In this case, the conditional independence assumption holds. Difference-in-difference models can only be estimated with multiple observations per student over time. The problem with the dataset from De Studentmonitor is that it does not contain proper panel data.

8. Conclusions

This study searched for answers to the question: 'What are the effects of the introduction of the new study funding system on (mental) health, experienced study load, and performance of students during their student time?' For this purpose, quantitative research was conducted on the characteristics of students in higher education. Data from de Studentenmonitor is used for this (van den Broek and ResearchNed, 2019; ResearchNed, 2017, 2019a, 2019b, 2021).

Results from multiple regressions on students' (mental) health have not shown that students in the new study funding system experience more health problems. The results are statistically not significant, which implies that there is no relationship between de new study funding system and health problems. Furthermore, the effects of studying in the new study funding system on health costs were not significant. This strengthened the finding that there is not a relationship between studying in the new study funding system and (mental) health. However, the null hypothesis stated a positive relationship between the introduction of the new study funding system and (mental) health. Therefore, the null hypothesis can be rejected.

The results from the regressions on study performance have shown a negative relationship between studying in the new study funding system and the average exam grade. Robustness tests showed no relationship between studying in the new funding system and falling behind on the study curriculum. These two findings are not in line with the null hypothesis, so the null hypothesis can be rejected. A possible explanation for this contradicting result was that financial stress motivates students to relax more. As a result, they could spend less time studying to escape from their financial problems.

Results from multiple regressions on the experienced study load have not shown any statically significant results. However, some multiple OLS regressions on the satisfaction of the study, in general, did give statistically significant results. The preferred specification did not give statistically significant results. This suggested that there is not a relationship between studying in the new study funding system and the experienced study load. Therefore, the null hypothesis should be rejected.

Further research could focus on the effects of Dutch student debt on stress levels. In this way, it can be better said whether the results can be explained through the stress mechanism. This study can also be done again with an extended and more consistent dataset. First, the dataset

can be extended by improving surveys that include more in-depth questions about students' backgrounds. Most importantly, panel data is required to estimate a difference-in-difference model. In this way, it can be possible to eliminate all unobserved characteristics of students.

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Table A.1: multiple regression with the satisfaction of the study as outcome variable

Variables	(1) Satisfaction study	(2) Satisfaction study	(3) Satisfaction study	(4) Satisfaction study	(5) Satisfaction study	(6) Satisfaction study
Studying in the new study funding system	0.089*** (0.016)	0.144*** (0.019)	0.145*** (0.020)	0.089** (0.037)	0.096** (0.042)	-0.083 (0.298)
Gender (male=1)	0.014** (0.006)	0.034*** (0.013)	0.030** (0.013)	0.004 (0.026)	0.021 (0.030)	0.021 (0.030)
Age	0.001 (0.001)	-0.001 (0.002)	-0.000 (0.003)	-0.002 (0.006)	0.002 (0.006)	0.002 (0.006)
At least one gap year		-0.050*** (0.019)	-0.046** (0.019)	-0.012 (0.039)	-0.035 (0.041)	-0.036 (0.041)
Average high school grade			0.032*** (0.010)	0.029 (0.019)	0.027 (0.019)	0.021 (0.022)
Income group parents				0.040*** (0.015)	0.044*** (0.015)	0.042** (0.017)
Studying in the new study funding system * Gender					-0.064 (0.058)	-0.066 (0.058)
Studying in the new study funding system * Gap year					-0.030 (0.098)	-0.027 (0.098)
Studying in the new study funding system * High school grades						0.022 (0.040)
Studying in the new study funding system * Income group parents						0.007 (0.033)
Constant	3.835*** (0.038)	3.964*** (0.124)	3.730*** (0.146)	3.444*** (0.325)	3.351*** (0.302)	3.397*** (0.315)
Time fixed effects	YES	YES	YES	YES	YES	YES
Study phase fixed effects	YES	YES	YES	YES	YES	YES
Observations	82,950	16,012	15,727	3,710	3,748	3,748
R-squared	0.018	0.021	0.021	0.029	0.028	0.029

Notes: Multiple regression estimations of studying in the new study funding system on the experienced satisfaction of the study. The income group of the parents is measured in a range from 1 (far below modal income) to 5. A gap year means a year between finishing high school and enrolling for a study in a higher educational institute for the first time. The standard error is given within parentheses, and the '' provide the significance level as follows: * p<0.10 ** p<0.05 *** p<0.01.*

Table A.2: Placebo tests implying the policy change was in 2016

Variables	(1) Physical/mental health problems	(2) Study load	(3) Average exam grade study
Started studying in 2017 or later	0.005 (0.115)	-0.048 (0.248)	-0.712*** (0.217)
Gender (male=1)	-0.039*** (0.013)	0.096*** (0.034)	-0.027 (0.023)
Age	0.002 (0.002)	-0.008 0.006	-0.003 (0.004)
At least one gap year	0.016 (0.019)	-0.057 (0.049)	-0.023 (0.032)
Average high school grade	0.019** (0.009)	0.032 (0.024)	0.375*** (0.024)
Income group parents	0.013* (0.007)	0.055*** (0.019)	0.044*** (0.014)
Studying in the new study funding system * Gender	0.061** (0.027)	-0.153** (0.065)	-0.013 (0.055)
Studying in the new study funding system * Gap year	0.011 (0.043)	-0.010 (0.100)	0.203** (0.091)
Studying in the new study funding system * High school grades	-0.004 (0.007)	-0.016 (0.017)	0.034** (0.015)
Studying in the new study funding system * Income group parents	-0.008 (0.013)	0.037 (0.033)	-0.040 (0.029)
Constant	0.034 (0.127)	3.059*** (0.333)	4.419*** (0.236)
Time fixed effects	YES	YES	YES
Study phase fixed effects	YES	YES	YES
Observations	3,778	3,695	3,595
R-squared	0.006	0.013	0.175

Notes: Placebo tests estimations of starting with studying in 2016 on several outcome variables. The income group of the parents is measured in a range from 1 (far below modal income) to 5. A gap year means a year between finishing high school and enrolling for a study in a higher educational institute for the first time. The standard error is given within parentheses, and the '*' provide the significance level as follows: * p<0.10 ** p<0.05 *** p<0.01.

Table A.3: Placebo tests implying the policy change was in 2013

Variables	(1) Physical/mental health problems	(2) Study load	(3) Average exam grade study
Started studying in 2013 or later	-0.011 (0.017)	0.043 (0.044)	-0.033 (0.032)
Gender (male=1)	-0.040*** (0.013)	0.099*** (0.034)	-0.028 (0.023)
Age	0.002 (0.002)	-0.008 (0.006)	-0.002 (0.004)
At least one gap year	0.015 (0.019)	-0.056 (0.049)	-0.024 (0.033)
Average high school grade	0.019** (0.009)	0.032 (0.024)	0.378*** (0.024)
Income group parents	0.013* (0.007)	0.055*** (0.019)	0.044*** (0.014)
Studying in the new study funding system * Gender	0.062** (0.027)	-0.156** (0.065)	-0.009 (0.055)
Studying in the new study funding system * Gap year	0.012 (0.044)	-0.015 (0.100)	0.190** (0.092)
Studying in the new study funding system * High school grades	-0.004 (0.007)	-0.016 (0.017)	0.033** (0.015)
Studying in the new study funding system * Income group parents	-0.008 (0.013)	0.036 (0.033)	-0.038 (0.029)
Constant	0.033 (0.127)	3.061*** (0.333)	4.397*** (0.236)
Time fixed effects	YES	YES	YES
Study phase fixed effects	YES	YES	YES
Observations	3,778	3,695	3,595
R-squared	0.009	0.015	0.179

Notes: Placebo tests estimations of starting with studying in 2013 on several outcome variables. The income group of the parents is measured in a range from 1 (far below modal income) to 5. A gap year means a year between finishing high school and enrolling for a study in a higher educational institute for the first time. The standard error is given within parentheses, and the '' provide the significance level as follows: * $p<0.10$ ** $p<0.05$ *** $p<0.01$.*