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Time preference and academic procrastination: an empirical study

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Abstract

This research aims to explore the relation between time preference and academic procrastination. Academic procrastination is prevailing among students and is often viewed as related to self-control problems, which could be explained by people's inconstant time preference. This research applies quasi-hyperbolic formulation to measure time preference and uses the short form of Academic Procrastination Scale to indicate level of academic procrastination. Regression results suggest that students who discount leisure time more heavily and show more preference for immediate entertainment are more likely to procrastinate on their academic tasks when discount factor and present bias are regressed separately. When both discount factor and present bias are included in the regression, the effect of present bias becomes statistically insignificant. Besides, discount factor appears to have greater influence on academic procrastination than present bias especially in terms of affecting their academic task aversiveness and time management capability.

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1. Introduction

Similar phenomenon happens time and time again: Students 'cram' for their tests and wait until the last night or hours and sacrifice their sleep for studying. The libraries and classrooms are more crowded at the end of a semester, especially in a week before final exams. It seems that procrastination has become a prevailing problem among students. Even when I started writing this introduction, I found myself procrastinating on some parts that seemed to be difficult to organise and easily getting distracted by friends.

The word 'procrastination' comes from Latin word 'procrastinationem', which means 'a putting off from day to day'. This word consists of 'pro-' meaning 'forward' and 'crastinus' meaning 'belonging to tomorrow' (Online Etymology Dictionary). Records regarding procrastination can be dated back to thousands of years ago. For instance, Chinese poet Qian Fu wrote in his famous *Song of Tomorrow* as early as 15th century, which is still a must-read poet in primary education nowadays: '*Tomorrow comes and again comes tomorrow, Tomorrows are like rivers that endlessly flow. If all my things are put off till tomorrow, My time wasted to no purpose will brew woe.*' Ancient Greek poet Hesiod mentioned the risk of putting off today's work to tomorrow at around 800 B.C. :'*Do not put your work off till to-morrow and the day after; for a sluggish worker does not fill his barn, nor one who puts off his work: industry makes work go well, but a man who puts off work is always at hand-grips with ruin.*'(Evelyn-White, 2006).

Although people have been remained of the negative effects of procrastination for centuries, much has yet to be learned about procrastination itself using scientific methods. On the one hand, many researchers have viewed procrastination as a self-effacing and passive behaviour that would result in negative outcomes. Soloman and Rothblum (1984) define procrastination as

'the act of needlessly delaying tasks to the point of experiencing subjective discomfort'. They investigate 342 college students' procrastination on academic tasks and their reasons behind procrastination. They find that procrastination behaviours are positively related to depression symptoms, irrational cognitions and low self-esteem. Harriott and Ferrari (1996) explore different types of procrastination (Avoidant, Arousal and Decisional) in general population, and their results show that procrastination is common among both students and adults, and negatively affects their ability to complete required tasks on schedule. On the other hand, psychologists have found a different form of 'active procrastination' that could lead to desirable outcomes. Chu and Choi (2005) argue that active procrastinators prefer to work under pressure, and they are different from traditional procrastinators in terms of purposive use of time, control of time, self-efficacy and academic performance. In other words, while traditional procrastinators are passively pushed forward by time pressure, active procrastinators use procrastination to create favourable time pressure for their goals. Considering that some researchers argue that purposeful delay goes against traditional definition of procrastination and should not be studied as 'procrastination' (e.g. Pychyl, 2009), this research will focus on academic procrastination that associates with weak self-control and causes undesirable outcomes.

Economists have constructed many theories to explain the sources of procrastination. Fischer (2001) develops a time-consistent and fully-rational model, which suggests that the observed procrastination behaviour (more hours were spent working and fewer in leisure when the deadline came closer) could be rational when an individual has a positive rate of time preference and views the remaining time for leisure as an exhaustible resource. But this model could not explain undesirable procrastination as mentioned above. Hence, a time-inconsistent view should be introduced in order to further understand procrastination. Akerlof (1991) discusses procrastination as a decision-related

and time-inconsistent behaviour. As Akerlof argues, procrastination happens when present costs are unduly salient compared to future costs. The result is that people postpone tasks and decide to do it tomorrow without foreseeing that they will postpone the same tasks again to another day after 'tomorrow'. Such changing preferences and conflicts between 'selves' according to different time period indicate that discounting and time-inconsistent preference might explain procrastination behaviour. In order to explain undesired self-control problems, Fischer (1999) introduces two time-inconsistent models, hyperbolic discounting and differential discounting, to the existing time-consistent procrastination model. According to these models, both hyperbolic and differential discounters wish they would work more in the future, but their self-control problems are different. The results suggest that seemingly high rate of time preference implicit in procrastination.

Although there is relatively rich theoretical literature regarding the correlation between time preference and procrastination, few researchers have focused on empirically evaluate this correlation. Patiño and Gómez-García (2019) develop an empirical method to verify the main implications that quasi-hyperbolic model of time preference has in terms of procrastination behaviour among college students. Their sample includes students of the compulsory subject of Macroeconomics in the University of Seville, Spain. The data was obtained through two questionnaires. The first questionnaire was done in the middle of the course, which included a time discount task with monetary rewards to estimate students' quasi-hyperbolic parameters, a set of five questions to measure students' tendency to postpone their academic tasks, and collected information regarding the control variables. This questionnaire also asked students to estimate how much time they should ideally devote to the preparation for the subject, and what they thought they would actually do. The second questionnaire was handed out together with the final exam, which asked students to indicate the actual time that they had finally spent on

preparation before the final exam. Then, the time of ideal, planned and actual study were calculated to classify whether participants were consistent or inconsistent. The researchers use linear probability models and discrete-choice models to test if the discount rates and the present biases predict people's tendency to procrastinate and determine the typology of their time preferences. However, their results are ambiguous given that they support some of the model hypotheses but reject others. The likelihood of being consistent decreases as present bias increases, which is in line with the main hypothesis, but no significant relation with discount rate is found. Time-inconsistent people are classified as naïve or sophisticated. However no statistically significant relation between discount rates and present bias and the consideration of people as naïve or sophisticated are found. The tendency to procrastinate is also measured in the questionnaires, and the researchers also estimates the relation between this tendency and time preference. A statistically significant relation between the discount rates and the procrastination index has been found in some of the groups, where people with greater discount rates tend to postpone their academic activities more.

The main research question of this research is:

How does time preference associate with academic procrastination?

To answer this question and test the correlation between academic procrastination and time preference, this research will conduct a survey online and invite students worldwide to participate. All data collect from the survey will be stored anonymously and analysed using statistical software. Inspired by the results from Patiño and Gómez-García (2019), I seek to measure students' tendency to procrastinate in a more precise way and test whether quasi-hyperbolic formulation has relations with the procrastination index. Therefore, in this research academic procrastination will be measured using a psychological procrastination scale rather than simply comparing students'

behaviour before a final exam. Patiño and Gómez-García (2019) also mention in their paper that 'it is necessary to recognise that the mechanism that underlies financial behaviour is not, necessarily, the same as that of another type of decision'. Therefore, I also want to find an alternative indicator for time preference instead of monetary incentives.

2. Literature review

2.1 Main concepts

2.1.1 Self-control and academic procrastination

Behavioural biases that are found by psychology provide a solid foundation for behavioural economics to explain phenomena that conventional economics could not provide satisfactory explanations. Limited self-control is one of the psychological bias that have generated a wide range of discussions. For example, Congdon, Kling and Mullainathan (2011) define three main categories of behavioural biases that might cause market failures and inefficient instruments of economic policies: limited self-control, non-traditional preferences, and imperfect optimisation. Limited self-control is generally manifested as self-contradictory between people's intrinsic intentions and their actual behaviour. It is common that people plan to behave following a specific scheme but end up behave in another way, modifying their previous decisions and sometimes choosing to delay beginning or completing the planned behaviour.

According to a meta-analysis conducted by Steel (2007), procrastination might be a quintessential failure of self-control. Previous researchers regarding self-control/self-discipline suggest that self-control might be equivalent to trait procrastination, or that self-control is at least a proximal cause of procrastination. Steel (2007) also sites research findings from Tice and Baumeister (1997), arguing that procrastinators tend to prefer short-term benefits than long-term gains, and such tendency is a core component of poor self-control.

Considering the prevalence and convenience for conducting research, this

research aims to investigate academic procrastination to narrowing the behavioural causes and outcomes of procrastination. Frequently described as students' tendency to put off study-related actions, academic procrastination is a specific outlet of procrastination behaviours. Academic procrastination concerns students of all ages, however research has suggested that academic procrastination is extremely common among college students, in which over 70% of students report that they procrastinate regularly (Schraw, Wadkins and Olafson, 2007). Moreover, due to the widespread availability of students in the college environment, it is relevantly easy to recruit research subjects for academic procrastination research.

Previous researchers have revealed several negative effects resulting from academic procrastination. For instance, students' tendency to procrastinate is related to their academic performance. In a meta-analysis regarding outcomes of procrastination, Steel (2007) argues that there is a high and negative correlation between academic procrastination and academic performance, which is measured by students' Grade Point Average (GPA). Besides, procrastination also has negative influence on mental well-being. Stead, Shanahan and Neufeld (2010) find that procrastination among undergraduate students is associated with poorer mental health. Therefore, to further understand academic procrastination would not only add to existing literature but also help improving students' well-being.

2.1.2 Intertemporal preference and discounting

The theory of discounted utility is developed by Samuelson (1937), as an attempt to shed some light on the explanation of how intertemporal decisions are adopted. Discounted utility theory concludes people's motivations to evaluate the future relative to the present as a new parameter: discount rate,

which allows people to swap future utility with present utility in the same way as calculating the present value of future cash flows. The following formulation shows the standard model of intertemporal preference designed by Samuelson (1937):

$$U^t(u_t, u_{t+1}, \dots, u_T) = \sum_{\tau=t}^{T} \delta^\tau u_\tau \qquad (1)$$

Where $0<\delta\leq1$, δ is the exponential time discount rate that remains constant over time.

Some research suggests that individuals' preferences for discounting are influenced by a present bias, and thus hyperbolic discount functions are introduced. Fischer (1999) cites previous studies and explains the dynamic inconsistencies from hyperbolic discounting as the comparison between two selves: today's self discounts tomorrow's utility by βδ, but wants tomorrow's self to discount the utility of the day after tomorrow by δ, however the new self would not discount at δ when tomorrow becomes today. Laibson (1997) employs quasi-hyperbolic discount function, a simplified mimic of hyperbolic discounting model. This model also contains a present bias parameter β:

$$U^t(u_t, u_{t+1}, \dots, u_T) = \delta^t u_t + \beta \sum_{\tau=t+1}^{T} \delta^\tau u_\tau \qquad (2)$$

Where $0<\delta$, $\beta\leq1$, δ is the time discount rate and β is the present bias parameter. When β is close to 1, present bias barely exists. When β is closer to 0, the individual is more impatient and shows more preference for an immediate reward. Besides, the two parameters β and δ can be interpreted in another way. As written by Fischer (1999), '(Quasi-hyperbolic discounting function) has the advantages of tractability and the intuitive component of combining a short-run (βδ) and long-run (δ) discount factor.'

Empirical research has suggested that quasi-hyperbolic discounting

function can predict time preference well. Burks, Carpenter, Götte and Rustichini (2012) compared several measures of time preference and concluded that quasi-hyperbolic formulation gave the best prediction, especially when both present bias parameter (β) and exponential discounting parameter (δ) were used. To be specific, they focus on how well do different time preference measures indicate some important health outcomes including smoking habit and BMI, credit scores, and subsequent job-related outcomes. Burks et al. (2012) carry out the experiment on mid-aged workers rather than relying on college students who rarely face the important decisions as mentioned above, which is different from this research. Moreover, in their research, the quasi-hyperbolic parameters are calculated from several sets of choices regarding sums of momentary rewards guaranteed after waiting for different time periods.

2.2 Research hypotheses

2.2.1 Main hypothesis: quasi-hyperbolic discounting

Empirical studies have concentrated on the relationship between time preference and behaviours regarding limited self-control problems, and the findings are generally consistent. Using U.S. National Health and Nutrition Examination Study (NHANES) surveys data, Komlos, Smith and Bogin (2004) find evidence that trends in U.S. obesity are related to increasing marginal rate of discounting, which is referred to as the marginal rate of time preference and indicated by savings rate and consumer debt in the paper. Reynolds (2006) analyses the relationship between problematic behaviours, including drug abusing, and pathological gambling present bias, which referred to as the rate of delay discounting in the paper. The findings show a high degree of correspondence between those behaviours and present bias, suggesting a

possible causal relationship. Meier and Sprenger (2012) study the relationship between individual differences in defaulting behaviour and degree of time discounting. However, they report that the correlation between present bias and creditworthiness is not significant, while correlation between discounting rate is significant, showing that the correlation between time discounting and creditworthiness score is mainly driven by the long-run component of time discounting.

Theoretical research on the relationship between time preference and procrastination suggests that time-inconsistent preference would lead to more procrastination (Fischer, 1999). Inspired by Akerlof (1991) who uses a salience-cost model to explain why people procrastinate on one-time tasks, Fischer (1999) concentrates on tasks that require a fixed amount of work to be done in a time period before a deadline. When people evaluate today's costs as more salient than tomorrow's, they apply a short-term and present-biased discount factor to actions after tomorrow; after today, future costs are discounted with equal weight. Consequently, different discount factors affect people's evaluation of actions, and thus they decide to procrastinate or not.

However, empirical research has reached ambiguous results. Reuben, Sapienza and Zingales (2015) study the correlation between time preferences for immediacy and procrastination through series of laboratory experiments and field work on students. In their research, time preference is measured using choices between smaller-sooner and larger-later rewards, while procrastination is measured by recording time consumption of finishing three unrelated tasks. Their findings reveal that individuals with higher rate of time preference are more likely to procrastinate and make time-inconsistent choices. Another empirical research conducted by Patiño and Gómez-García (2019), however, suggest that present bias and discount rate could only predict the likelihood to procrastination for some of the categories of people.

This research assumed that more biased towards present rewards is associated with higher level of academic procrastination, and that discounting future rewards more heavily is associated with higher level of academic procrastination. Therefore the main research hypotheses in this research are formed as follows:

H1a: Present bias parameter β is negatively associated with academic procrastination.

H1b: Discount parameter δ is negatively associated with academic procrastination.

In addition to time preference, some demographic and psychological factors to be introduced as control variables in this research are highlighted in the following subsections.

2.2.2 Demographic factors: age, education level and gender

As Steel (2007) concludes, age could be a possible demographic moderator of procrastination, because people can learn to avoid procrastination by developing schemes as they grow up and learn. For example, people sometimes attempt to control their procrastination by precommitment. Ariely and Wertenbroch (2002) use two pilot studies among university students to investigate whether people are willing to self-impose deadlines to overcome procrastination. Their results show that although people are willing to use self-imposing deadlines and their task performance are improved, they are not rational enough to set their deadlines optimally for maximum improvement. By the same reasoning, school education might influence people's ability to restrain procrastination as well as age. Therefore, we have the following

hypotheses:

H2: Age is negatively associated with academic procrastination.

H3: The highest level of completed education is negatively associated with academic procrastination.

Previous research regarding the correlation between gender differences in the tendency procrastination have reached ambiguous conclusions, therefore it is somewhat complicated to predict the influence of gender on procrastination. Some studies do not find evidence of gender differences in procrastination (e.g., Hess, Sherman and Goodman, 2000). Some studies argue that females are more likely to procrastinate (e.g., Washington, 2004). Other studies find males at higher risk to procrastinate than females (e.g. Steel and Ferrari, 2013). However, there is evidence regarding gender differences in academic achievements among college students. For example, Voyer and Voyer (2014) find that female students on average receive higher school grades than male students. A recent study on gender differences in the relationship between academic procrastination and academic performance argue that gender moderates this relationship, and male students appear to have higher level of academic procrastination and lower level of academic performance (Balkis and Erdinç, 2017). Considering these research outcomes, in this research it is assumed that gender might have a weak correlation with academic performance, and the hypothesis is formed as follows:

H4: Male students tend to procrastinate more on academic tasks.

2.2.3 Psychological factors: Stress level and self-concept about abilities

Academic stress has been studied as an important factor that influence

students' procrastination. Steel (2007) sites previous research and points out that neuroticism is a source of procrastination, in which researchers argue that if people put off intended actions because the tasks are aversive or stressful, then those who are more likely to experience stress should procrastinate more. Empirical study has found that students tend to procrastinate when they perceived their tasks as important, stressful and difficult (Pychyl, Lee, Thibodeau and Blunt, 2000). Moreover, in terms of the negative consequences of academic procrastination on students, Stead et al. (2010) find that stress mediates the relation between procrastination and poor physical and mental health. In this research, the hypothesis regarding stress is formed as follows:

H5: The level of study-induced stress is positively associated with academic procrastination.

Besides stress level itself, other psychological research suggests that students' belief about their ability to work under stress is also corelated with academic procrastination. As suggested by Wohl, Pychyl and Bennett (2010), procrastinators are likely to rationalize their tendencies to delay intended actions and their ability to work under pressure. This could be explained by their academic self-concept according to Sokolowska (2009), meaning a self-reflective view that people hold about themselves. Some students might be over-confident and believe in their effectiveness, thus they are more likely to delay actions or even wait until the last night to begin studying for exams than those who are less confident about their ability to deal with pressure.

High level of self-assessed ability to work under stress might be correlated with a sense of challenge that lures students into procrastination. Lay, Edwards, Parker and Ender (1989) find that procrastinators who wait until the last minute to study would experience a greater sense of challenge and peak experience immediately prior to exams. Furthermore, Brinthaupt and Shin (2001) argue that cramming increases both the level of task challenge and the required level of

performance at the same time. Therefore, when crammers perform worse in study than they previously assumed, they get poor outcomes in school, which is in line with previous research that indicates that those who procrastinate often get poorer outcomes in school (e.g., Steel, 2007). In conclusion, the hypothesis is formed as follows:

H6: The level of self-assessed ability to work under stress is positively associated with academic procrastination.

3. Research design

3.1 Survey design

The data that will be analysed later in this research will be obtained by conducting online survey through Qualtrics (https://erasmusuniversity.eu.qualtrics.com/). After creating question sets on Qualtrics, this survey was distributed online and in-person through social media (e.g. WhatsApp, Discord and WeChat) and will be completed on a data carrying device that can visit the Qualtrics website (e.g. laptop or smartphone). As for participation, there will be no extra restrictions on participation except for one requirement that all participants should be students, since this research is aimed to study students' academic procrastination behaviour. The survey questionnaire consists of three parts: demographic questions, the academic procrastination scale, and utility measurement. Participants will begin with academic procrastination scale, and end with demographic questions.

3.1.1 Demographic characteristics and psychological stress

The demographic characteristics to be analysed in the research are:

1. Age. Continuous variable. On a ratio scale.

2. Gender. Categorical variable. On a nominal scale.

3. Highest completed level of education. Categorical variable. On an ordinal scale, where Lower than high school = 1, High school graduate = 2, Bachelor's degree = 3, Master's degree = 4, Doctorate or higher = 5.

To indicate the effect of psychological stress on academic procrastination,

two more variables are included:

4. Self-assessed study-induced stress level. Scored between 1 and 10, where 1 means not stressful at all, 10 means extremely stressful.

5. Self-assessed level of ability to work under stress. Scored between 1 and 10, where 1 means totally incapable of working under pressure, 10 means perfectly capable of working under pressure.

3.1.2 Independent and dependent variables

3.1.2.1 Academic procrastination

The level of academic procrastination will be measured based on the short form of Academic Procrastination Scale (McCloskey, 2011). The full-length form of Academic Procrastination Scale with 25 Likert-type items showed a good internal consistency reliability estimate and had good convergent validity. However, the full-length form is quite long compared to previous academic procrastination scales, e.g. the 12-item Procrastination Assessment Scale–Students (Solomon & Rothblum, 1984) and the 16-item Tuckman Procrastination Scale (Tuckman, 1991). McCloskey also created a shorter scale by selecting some items from the full-length scale that had some of the most promising psychometric properties. Yockey (2016) investigated the validation of the short form of Academic Procrastination Scale and concluded that this scale had good internal consistency reliability as well as good convergent validity. Considering that long questionnaire might help result in certain selection bias that participants who have lower procrastination level are more likely to complete the survey questions, the survey in this research will apply the short form of Academic Procrastination Scale.

This scale is a set of five questions to be answered on a 5-point Likert scale, where 1 = disagree and 5 = agree. These answers combined can show a participant's level of academic procrastination. The maximum value of the academic procrastination variable is (5*5=) 25, the minimum value is (5*1=) 5, and higher outcome indicates higher level of academic procrastination. For example, a participant who agrees with the statement 'I put off projects until the last minute' would procrastinate to a greater extent compared with another participant who disagrees with the same statement. Table 1 displays all items on the short form of academic procrastination scale.

Table 1: Measure academic procrastination

Academic Procrastination Scale - Short form	
1	I put off projects until the last minute.
2	I know I should work on school work, but I just don't do it.
3	I get distracted by other, more fun, things when I am supposed to work on school work.
4	When given an assignment, I usually put it away and forget about it until it is almost due.
5	I frequently find myself putting off important deadlines.

3.1.2.2 Quasi-hyperbolic time preference factors

Economists have developed numerous ways to measure time preference and predict human behaviour accordingly. Monetary rewards are commonly used in previous research on the correlation between time preference and individual behaviour (e.g., Burks et al., 2012), in which participants are asked to choose between receiving smaller amounts of money earlier or larger amounts of money later. However, in the time-inconsistent model of academic

procrastination developed by Fischer (1999), the leisure time of students is defined as an exhaustible resource before deadline, and their procrastination is explained by discounted utility of leisure time in the future. Hence, instead of amounts of money, this research uses amounts of leisure time to measure time preference. The main drawback of this approach is that we cannot design an experiment that directly offers leisure time to participants.

In the survey questionnaire, participants were asked to choose a larger amount of time spending on leisure later that will make them indifference between spending a smaller amount of time earlier. The smaller amount of time to spend earlier will be provided in the survey and will be fixed at 2 hours. Then, their time preference parameters will be calculated based on quasi-hyperbolic (β, δ) formulation:

$$D(t) = \begin{cases} 1, if\ t = 0 \\ \beta\delta^t, if\ t > 0 \end{cases} \qquad (3)$$

To distinguish between β and δ, the participants will be given four different choices. The design of four choices follows the procedure introduced by Burks et al. (2012). as follows:

(a) choose a number x that would make you indifferent between 2 hours spent on leisure today & x hours spent on leisure tomorrow

(b) choose a number x that would make you indifferent between 2 hours spent on leisure today & x hours spent on leisure five days from today,

(c) choose a number x that would make you indifferent between 2 hours spent on leisure two days from today & x hours spent on leisure nine days from today, and

(d) choose a number x that would make you indifferent between 2 hours spent on leisure two days from today & x hours spent on leisure thirty days from

today.

Therefore, if the participant is to choose between 2 hours of leisure now and x_i hours of leisure t days from now, as in choice (a) and (b), 'indifference' means:

$$u(2) = \beta \delta^t u(x_i) \tag{4}$$

If the participant is to choose between 2 hours of leisure k days from now and x_i hours of leisure k+t days from now, as in choice (c) and (d), 'indifference' then means:

$$u(2) = \delta^t u(x_i) \tag{5}$$

Take logs of Equation (2). For choice (a) and (b), we have the following equation:

$$\log u(2) - \log u(x_i) = \log \beta + t \log \delta \tag{6}$$

Similarly, take logs of Equation (3). And for choice (c) and (d), we have:

$$\log u(2) - \log u(x_i) = t \log \delta \tag{7}$$

The utility u is assumed to be approximately linear over the relevant range. Then β_i and δ_i can be estimated using ordinary least squares and Equation (6) (for choice (a) and (b)) and (7) (for choice (c) and (d)). To simplify the calculation procedure, we use the arithmetic mean of the observed β and δ as the estimated parameter.

$$\log 2 - \log x_i = \log \beta_i + t \log \delta_i \tag{8}$$

$$\log 2 - \log x_i = t \log \delta_i \tag{9}$$

3.2 Research method

To test the main hypothesis, which is the effect of quasi-hyperbolic parameters on academic procrastination, a robust OLS regression will be applied, because OLS regression can fit the dependent and independent variables well, and robust regression can reduce the error term. Thus, the following regression equation will be tested:

$$APS_i = \alpha_i + \beta_{1i} * PresentBias + \beta_{2i} * Discount + \gamma_i * Controls + \varepsilon_i \quad (10)$$

In this regression equation, dependent variable APS is the academic procrastination score for each individual i. The control variables are age, gender, education level, academic stress and ability to work under stress. The effect of control variables on academic procrastination will be estimate within the same model.

To expand the above model and further understand how the independent variables contribute to different aspects of academic procrastination, this research will test the effect of quasi-hyperbolic parameters on the outcomes of the five questions. Ordered logit model will be used for testing how would the independent variables predict the answers of each question that are asked in the short form of Academic Procrastination Scale, because the 5-point Likert scale can provide ordered outcomes. Also, the effect of control variables on the question outcomes will be estimate within the same model.

4. Results

4.1 Descriptive statistics

There are in total 198 participants who took part in this survey, and I received 117 completed feedbacks. Among the 117 participants, 60 are female, 57 are male. Since none of these participants described themselves as non-binary or third gender, a dummy variable is then created for the gender variable, which equals 1 if the individual is female and equals 0 if the individual is male. Most participants have a bachelor's degree or equal, with 45.3% (53) indicate bachelor's degree as highest completed level of education, 17.09% (20) indicated as high as master's degree, and 0.85% (1) have a doctoral degree. 31.62% (37) of the participants' highest level of education is high school graduate, and 5.13% (6) of the participants do not have a higher degree than high school. The oldest of them is 30 years old and the youngest is 20 years old, and the average age is 21.6 years old.

The average academic procrastination scale is 17.3, and the standard deviation is 5.51. The average of discounting parameter (δ) is 0.90, and the average of present bias parameter (β) is 0.64.

A more detailed description of summarized statistics can be found in the following table 2.

Table 2: Descriptive statistics of the sample

Variable	Mean	Standard deviation	Min	Max
Dependent variable				
APS score	17.299	5.517	5	25
Question1*	3.726	1.291	1	5
Question2*	3.581	1.440	1	5
Question3*	3.966	1.144	1	5
Question4*	2.966	1.479	1	5
Question5*	2.974	1.517	1	5
Independent variable				
Present bias (β)	0.640	0.234	0.253	0.997
Discounting (δ)	0.896	0.035	0.839	0.982
Age	21.641	2.291	17	30
Female	0.513	0.502	0	1
Education**			1	5
Study-induced stress***	5.538	2.132	1	10
Ability under stress****	6.077	2.073	1	10

*Question 1-5 are answered on a 5-point Likert scale. 1 = disagree and 5 = agree.

**Education is a categorical variable, see the above paragraph for its distribution. 1 = Lower than high school, 2 = High school graduate, 3 = Bachelor's degree, 4 = Master's degree, 5 = Doctorate or higher.

***1 = not stressful at all, 10 = extremely stressful.

****1 = totally incapable of working under pressure, 10 = perfectly capable of working under pressure.

4.2 Regression results

4.2.1 OLS regression results

To avoid multicollinearity problem in the OLS model, the correlation between the independent variables are tested. The following table 3 provides the correlation between the variables used in the main hypothesis.

Table 3: Correlations of independent variables

	Discount	Present bias	Education	Female	Age	Stress	Ability
Discount	1.000						
Present bias	0.554***	1.000					
Education	0.221**	0.340***	1.000				
Female	0.174*	0.044	-0.066	1.000			
Age	0.078	0.247***	0.590***	0.004	1.000		
Stress	-0.114	-0.086	-0.120	0.167*	-0.103	1.000	
Ability	-0.072	0.099	-0.020	-0.105	0.071	0.099	1.000

*: p<0.1, **: p<0.05, ***: p<0.01.

As can be seen from table3, there is a relatively high correlation between discount rate and present bias, which is significant at 1% significant level. The correlation between education level and age is also significant at a 1% level. Thus, besides equation (10) that contains both discount rate and present bias, this research also tests the effect of the two variables on academic procrastination separately, using equation (11) and (12):

$$APS_i = \alpha_i + \beta_{1i} * PresentBias + \gamma_i * Controls + \varepsilon_i \qquad (11)$$

$$APS_i = \alpha_i + \beta_{2i} * Discount + \gamma_i * Controls + \varepsilon_i \qquad (12)$$

Table4 displays the value of the coefficients and the standard deviation of the analysed models. The regression results of equation (10) (11) (12) with different control variables are listed in separate columns. The discount rate parameter shows significant coefficients in every model, while other variables do not. The most extensive model has the highest explanatory power, and both discount rate and present bias parameter are statistically significant in this model.

Table4: Robust OLS regression results: effects on academic procrastination

	Present bias & Discount model			Present bias only model			Discount rate only model		
Present bias	-4.831*	-3.511	-3.613	-7.702***	-6.029***	-6.089***			
	(2.464)	(2.435)	(2.494)	(2.096)	(2.096)	(2.098)			
Discount factor	-33.645**	-31.036**	-30.266*				-51.350***	-42.665***	-42.374***
	(15.761)	(15.484)	(15.937)				(13.376)	(13.256)	(13.313)
Education									
High school		-5.965***	-5.965***		-6.279***	-6.267***		-6.177***	-6.181***
		(1.579)	(1.586)		(1.545)	(1.548)		(1.489)	(1.494)
Bachelor's		-5.785***	-5.981***		-6.006***	-6.292***		-6.261***	-6.403***
		(1.443)	(1.505)		(1.405)	(1.456)		(1.318)	(-7.150)
Master's		-6.092***	-6.502***		-6.457***	-7.060***		-6.859***	-7.150***
		(1.805)	(2.067)		(1.753)	(2.023)		(1.694)	(1.978)
Doctoral or higher		-0.048	-0.626		-0.577	-1.427		0.331	-0.050
		(1.587)	(2.233)		(1.543)	(2.120)		(1.531)	(2.123)
Female	1.040	1.027	0.989	0.678	0.680	0.635	1.127	1.065	1.040
	(1.010)	(1.009)	(1.025)	(0.988)	(0.980)	(0.987)	(1.020)	(1.013)	(1.030)
Age	0.036		0.108	0.069		0.162	-0.060		0.072
	(0.231)		(0.293)	(0.237)		(0.229)	(0.223)		(0.278)
Stress	0.193	0.250	0.254	0.242	0.288	0.293	0.197	0.257	0.260
	(0.226)	(0.227)	(0.227)	(0.230)	(0.229)	(0.229)	(0.229)	(0.226)	(0.227)
Ability	-0.282	-0.297	-0.304	-0.225	-0.244	-0.257	-0.350	-0.343	-0.349
	(0.245)	(0.213)	(0.243)	(0.246)	(0.243)	(0.244)	(0.246)	(0.240)	(0.242)
Constant	49.868***	52.789***	50.040***	20.414***	26.508***	23.355***	65.042***	61.591***	59.913***
	(15.868)	(13.260)	(15.723)	(5.347)	(2.389)	(6.207)	(13.158)	(11.770)	(13.217)
R-Squared	0.162	0.223	0.224	0.132	0.197	0.200	0.135	0.209	0.210
Root MSE	5.187	5.065	5.084	5.255	5.123	5.138	5.244	5.084	5.106

Standard errors in parentheses. *: p<0.1, **: p<0.05, ***: p<0.01. Education group 'Lower than high school' is omitted.

4.2.1.1 Hypothesis 1

Hypothesis 1a and 1b are the main hypotheses of this research. The first hypotheses predict that greater preference for leisure at present would be related with higher tendency to procrastinate on academic tasks. In other words, when an individual's quasi-hyperbolic discounting function has a smaller present bias parameter and a smaller discount rate, this individual would be more likely to put off the tasks. In line with Reuben et al. (2015) and Patiño and Gómez-García (2019), the OLS regression analysis shows that discount factor significantly predicts academic procrastination. The relation between discount factor and academic procrastination is negative, which suggests that participants who are more impatient and discount the future more heavily are more likely to procrastinate on academic tasks, and thus Hypothesis 1b is supported. However, the results do not support Hypothesis 1a well. It is assumed that when present bias parameter (β) become closer to 0, an individual would have more preference for an immediate reward and would be more likely to procrastinate. OLS results suggest that although present bias parameter is negatively related to academic procrastination, as previously assumed, the relation is not statistically significant in one of the models. This result could be explained by participants' self-awareness of their time-inconsistency, which will be further discussed in the discussion part.

4.2.1.2 Hypothesis 2

The second hypothesis proposes that age and procrastination are negatively related. Thus, as an individual aging, he/she/they learns to avoid academic procrastination. This hypothesis is not supported. Except for the model that both present bias and education level are excluded, the coefficients between age and academic procrastination are all positive, indicating that older participants tend to procrastinate more. Besides, the relations are not significant

even at a 10% significance level among all the models discussed.

4.2.1.3 Hypothesis 3

Hypothesis 3 predicts that education level is negatively related to academic procrastination. This hypothesis is partly supported by the OLS models. With other variables held constant, being a high school graduate, having a Bachler's degree and having a Master's degree each has a significant and negative relation with academic procrastination, which implies that obtaining a higher level of education is associated with less tendency to procrastinate on academic tasks. However, having a Doctoral or higher degree does not significantly predict academic procrastination, mainly because only 1 of the 117 participants indicated a Doctoral or higher degree in the questionnaire.

4.2.1.4 Hypothesis 4

Based on some empirical findings, the fourth hypothesis predicts that male participants tend to procrastinate more. This hypothesis is not supported by the regression results. The academic procrastination scale is positively related to dummy variable female, which indicates that female participants might have greater tendency to put off academic tasks. However, this relation is not significant even at a 10% significance level.

4.2.1.5 Hypothesis 5

The fifth hypothesis proposes that the level of study-induced stress is

positively associated with academic procrastination. This hypothesis is not fully supported by the regression results. Although a positive relation is suggested by the coefficients, which indicates that participants with higher stress level tend to procrastinate more, the relation is not significant even at a 10% significance level.

4.2.1.6 Hypothesis 6

The last hypothesis predicts that the level of self-assessed ability to work under stress is positively associated with academic procrastination. This hypothesis is not supported by the regression results. The coefficients between the ability variable and academic procrastination are negative, which suggest that participants who have more self-belief that they are able to work under stress tend to procrastinate less. And the negative relation between self-assessed ability to work under stress and academic procrastination is not significant even at a 10% significance level.

4.2.2 Ordered logit regression results

Considering the complex nature of procrastination, in this sub section, the robustness of the results will be tested estimating logit and probit models. The dependent variables used in the logit model are the answers of each question (Table1) that were asked in the survey to calculate the academic procrastination scale.

There are 117 participants who finished the questions in total. The first question is 'I put off projects until the last minute.' Nearly 70% of the participants agreed or somewhat agreed with such statement, with 41 participants chose

'somewhat agree' and 39 chose 'agree'. About 20% of them were against this statement, with 12 participants chose 'disagree' and 10 chose 'somewhat disagree'. The rest 15 participants neither agree or disagree with it. The second question is 'I know I should work on school work, but I just don't do it.' Similar to the first question, most of the participants agreed or somewhat agreed this statement, where 39 participants chose 'agree' and 39 chose 'somewhat agree'. About 30% of the participants disagree or somewhat disagree with question 2, with 18 participants chose 'disagree' and 13 chose 'somewhat disagree'. Only 8 participants were neutral about this. The third question is 'I get distracted by other, more fun, things when I am supposed to work on school work.' This question is the most agreed and least disagreed one among all five questions, with 43% (50) participants chose 'agree' and 3% (4) participants chose 'disagree'. 33, 18 and 12 participants chose 'somewhat agree', 'neither agree nor disagree' and 'somewhat disagree' respectively. The fourth question is 'When given an assignment, I usually put it away and forget about it until it is almost due.' Fewer participants reported agree or somewhat agree compared to the previous questions, with 22% (26) participants chose 'agree' and 19% (22) participants chose 'somewhat agree'. Also, more participants reported disagree and somewhat disagree in this question, with 21% (25) participants chose disagree and 24% (28) chose somewhat disagree. The fifth question is 'I frequently find myself putting off important deadlines.' Similar to question 4, about 40% of the participants disagreed (29) or somewhat disagreed (21) with this statement. And about 40% of the participants chose 'agree' (27) or 'somewhat agree' (22). The rest 18 participants chose 'neither agree nor disagree'.

The regression results of logit model, including the value of the average marginal effect of the probability to agree with the given questions and the standard deviation, are separately displayed in Table5, considering that agree with the questions implies the highest level of academic procrastination.

Table5: Ordered logit regression results

Question	1[1]	2[2]	3[3]	4[4]	5[5]
Present bias	-0.193	-0.155	-0.220	-0.218*	-0.098
	(0.176)	(0.170)	(0.199)	(0.114)	(0.135)
Discount factor	-2.392**	-1.343	-1.748	-1.751**	-1.990**
	(1.142)	(1.112)	(1.257)	(0.755)	(0.902)
Education					
High school graduate	-0.465**	-0.723***	-0.437**	-0.758***	-0.486**
	(0.211)	(0.068)	(0.194)	(0.062)	(0.204)
Bachelor's degree	-0.404*	-0.687***	-0.335*	-0.856***	-0.588***
	(0.217)	(0.057)	(0.195)	(0.037)	(0.203)
Master's degree	-0.383	-0.744***	-0.381*	-0.859***	-0.594***
	(0.244)	(0.094)	(0.223)	(0.062)	(0.213)
Doctoral degree or higher	0.269	-0.000	0.215	-0.000	-0.482
	(0.206)	(0.001)	(0.183)	(0.002)	(0.358)
Female	0.066	0.121*	0.149*	0.037	0.015
	(0.070)	(0.069)	(0.081)	(0.045)	(0.054)
Age	-0.014	0.010	0.015	0.015	0.007
	(0.019)	(0.018)	(0.020)	(0.012)	(0.014)
Stress	0.000	0.007	0.019	0.006	0.014
	(0.017)	(0.016)	(0.019)	(0.011)	(0.013)
Ability	0.000	0.014	-0.253	-0.018	-0.014
	(0.017)	(0.016)	(0.018)	(0.011)	(0.014)

Standard errors in parentheses. *: p<0.1, **: p<0.05, ***: p<0.01. Education group 'Lower than high school' is omitted.

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[1] I put off projects until the last minute.
[2] I know I should work on school work, but I just don't do it.
[3] I get distracted by other, more fun, things when I am supposed to work on school work.
[4] When given an assignment, I usually put it away and forget about it until it is almost due.
[5] I frequently find myself putting off important deadlines.

Other results of the logit model, including the value of the coefficients and the average marginal effect of answering 'disagree' to the questions, are displayed in the appendix table5a and 5b.

The results from Table5 are mostly in line with the findings from robust OLS regression, in which participants who are more biased toward present and discount the future more heavily are more likely to agree with the statements regarding academic procrastination, and higher education level is somewhat associated with less likely to choose 'agree'. Moreover, the relations between discount rate and the answers of question 1,4 and 5 are significant at a 5% significance level. Both discount rate and present bias can significantly predict the answers of question 4.

5. Discussion and limitation

5.1 Discussion

To answer the research question 'How does time preference associate with academic procrastination?', several regression models are used. The regression results support the main hypothesis that both discount parameter and present bias parameter are negatively associated with academic procrastination scale. However only significant relation between discount rate and academic time preference is found. Present bias parameter, on the other hand, appears to somewhat weakly associate with academic procrastination. Discount factor and present bias tend to play different roles in affecting certain behaviour. In this research, discount factor seems to have greater influence on academic procrastination compared to present bias. For instance, in the field research conducted by Burks et, al. (2012), in total six types of dependent variables are discussed: smoking habit, credit score, body mass index, leaving the job, washout for training, and going absent without leave from the job. They find that discount factor δ explains leaving the job and going absent without leaving the job better, whereas present bias β have greater influence on credit score. These findings together indicate that discounting and present bias might influence some behaviours differently, which stresses the importance to further understand the nature of certain behaviours. Meier and Sprenger (2012) find that the correlation between present bias and creditworthiness is not significant, while correlation between discounting rate is significant, which is somewhat similar to the findings in this research. According to their conclusion, it can be inferred that, like creditworthiness score, the academic procrastination scale might be mainly driven by the long-run factor (δ) of discounting rather than the short-run factor (βδ).

Participants' self-awareness of their time-inconsistency is not included in

this research because Patiño and Gómez-García (2019) does not find significant relation between participants' quasi-hyperbolic parameters and categories of time preference. However, this might be one explanation for the lack of explanatory power of present bias parameter in this research. In the online survey, questions regarding academic procrastination were placed before measuring time preference, therefore could have influenced participants' awareness of their inconsistent time preference. According to O'Donoghue and Rabin (1999), people who have a present bias can be classified into two categories. On the one hand, sophisticated people are aware of the existence of present bias, therefore they take measures to deal with their self-control problems. In general, the measures taken by sophisticated people consist in carrying out the actions earlier, such as pre-commitment. On the other hand, naïve people cannot foresee that they will change preference and suffer from self-control problems in the future, therefore they would not adopt any measure to adjust to the planned behaviour. Several years later, O'Donoghue and Rabin (2008) introduce partially sophisticated people as a new category of people who have present bias. Like sophisticated people, partially sophisticated people are aware of present bias, but they underestimate the degree and cannot adjust themselves well. We can use a new parameter $\hat{\beta}$ to measure people's estimation of their present bias. For people with consistent time preferences, $\hat{\beta} = \beta = 1$. For people with inconsistent time preferences, $0 < \beta < 1$. When β is closer to 0, people would show more preference for immediate rewards. Naïve people are not aware of their present bias while they have, therefore $\beta < 1 = \hat{\beta}$. Sophisticated people can predict their present bias ahead of time, so $\beta = \hat{\beta} < 1$. Partially sophisticated people have $\beta < \hat{\beta} < 1$ since they underestimate their present bias. Take into consideration of the self-awareness factor, the reason why the robust OLS regression did not find statistically significant relation between present bias and academic procrastination might be that part of the participants were sophisticated or at least partially sophisticated, thus they did not procrastinate more even though they were more

present-biased.

The ordered logit model highlights the importance of question 1, 4 and 5 of the short form of Academic Procrastination Scale. Question 1 is 'I put off projects until the last minute.' According to McCloskey (2011), this is one of the questions to measure task aversiveness, which is mentioned by Schraw et al. (2007) as one dimension of procrastination. Question 4 is 'When given an assignment, I usually put it away and forget about it until it is almost due.' Question 5 is 'I frequently find myself putting off important deadlines.' Question 4 and 5 together are among the questions asked to measure time management skills. Difficulty in time management is one of the reasons why students put off their academic tasks concluded by Solomon and Rothblum (1984). Therefore, the regression results could be interpreted in another way: discount rate is significantly related to students' tendency to averse academic tasks and time management skills, while present bias is related to time management skills only. Further research regarding the effect of time preference on task aversiveness and time management is suggested.

5.2 Limitation

One limitation that has already been mentioned in the discussion subsection is that the research survey did not include question sets to measure participants' self-awareness of present bias and distinguish them into different categories. This is because that previous research on academic procrastination and quasi-hyperbolic discounting (Patiño and Gómez-García, 2019) does not find relation between present biases and some of the categories of people, and reached somewhat ambiguous conclusion. For follow-up research, researchers could develop a more accurate measure for actual and estimate present bias.

Moreover, the order of the survey questions in this survey might influence the results. Since Qualtrics only allows questions to be randomized on a block basis, the order of the three question blocks were not randomized, thus order effect might exist. In the online survey, participants were first asked questions to measure academic procrastination scale, then questions regarding time preference, and finally demographic questions. Questions regarding procrastination behaviour might rise participants' self-awareness of their inconsistent time preference, therefore the relations between academic procrastination and time preference suggests by the survey results might be different from participants' behaviour in reality.

Another limitation comes from the sample. The sample used in this research is limited and lack variation. Since no monetary incentives were used during the survey and I only distributed the survey through Erasmus University students and my own social network, the sample is influenced. For example, the education level variable is skewed towards a high level (undergraduate students and master students), but only one of the participants have a doctoral degree. As mentioned in literature review section, much research regarding academic procrastination of college students has been done, therefore follow-up studies could include more participants from all different levels of education. Moreover, considering the correlation between education level and age, researchers could use the total amount of years of education as the control variable instead of using a categorical variable for education level.

6. Conclusion

This research aims to add on previous research and shed some light on the relation between time preference and academic procrastination. Academic procrastination is prevailing among students and is often viewed as related to self-control problems. One of the wildly accepted theoretical explanations is that people's inconstant time preference could be a source of procrastination. The quasi-hyperbolic discounting function has been used extensively by behavioural economists to model time preferences that underestimate future utility due to present biases. Also, empirical studies have found that quasi-hyperbolic parameters (β,δ) could explain some problematic behaviours regarding lack of self-control. Therefore, this research applies quasi-hyperbolic formulation to measure time preference. To generate data, an online survey to measure time preference and academic procrastination and collect other relevant date is designed and distributed among students. Although monetary rewards are commonly used to measure time preference by economists, considering that the mechanism that determines people's financial behaviour could be different from that of other types of decision making, the survey uses leisure time instead of money to measure time preference along the lines of Fischer (1999), in which participants were asked to choose between a sooner but shorter period for leisure and a later but longer period. Psychology researchers have developed numerous measures of procrastination behaviour, and the survey applies the short form of Academic Procrastination Scale, which contains five questions to be answered on a 5-point Likert scale.

There are two main parameters in quasi-hyperbolic discounting formulation, discount rate (δ) and present bias (β). Regression results suggest a significant relation between discount rate and academic procrastination, and a weaker relation between present bias and academic procrastination. When students discount leisure time more heavily and show more preference for immediate

entertainment, they are more likely to procrastinate on their academic tasks. Further analysis also indicates that discount rate and present bias have different influence on the factors regarding academic procrastination, especially on task aversiveness and time management skills. To be precise, discount rate can significantly predict the level of task aversiveness and time management skills, while present bias can be the predictor of time management skills. However, the effects of other independent variables introduced in this research on academic procrastination are somewhat ambiguous.

The results of this research should be evaluated cautiously. It is worth mentioning that the mechanism underlying the evaluation and management of leisure time might not be the same as making decisions about when and how to working on academic tasks, and the time preference parameters are inferred from a hypothetical questionnaire. Although some statistically significant correlations are found, we cannot conclude that there is a casual relationship between time preference and academic procrastination. Further research still needs to be done to understand academic procrastination behaviour in both psychological and behavioural economical context, which might serve as a guide for policies and public actions to improve students' well-being and the quality of school education the future.

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Appendix

Appendix Table5a: Ordered logit regression results-coefficient

Question	1	2	3	4	5
Present bias	-1.012	-0.855	-1.048	-1.807*	-0.652
	(0.931)	(0.943)	(0.966)	(0.933)	(0.903)
Discount factor	-12.517**	-7.396	-8.338	-14.544**	-13.269**
	(6.127)	(6.181)	(6.097)	(6.025)	(5.938)
Education					
High school graduate	-2.202*	-16.977	-2.110*	-16.841	-2.306*
	(1.156)	(1223.005)	(1.201)	(953.825)	(1.182)
Bachelor's degree	-1.886	-16.796	-1.638	-17.548	-2.947**
	(1.168)	(1223.005)	(1.208)	(953.825)	(1.202)
Master's degree	-1.784	-17.091	-1.845	-17.575	-2.989**
	(1.274)	(1223.006)	(1.303)	(953.825)	(1.283)
Doctoral degree or higher	12.052	-0.205	11.817	-0.986	-2.283
	(727.075)	(3330.618)	(932.206)	(2925.236)	(1.979)
Female	0.345	0.665*	0.696*	0.305	0.102
	(0.371)	(0.385)	(0.382)	(0.374)	(0.363)
Age	-0.072	0.055	0.070	0.126	0.045
	(0.097)	(0.097)	(0.095)	(0.097)	(0.094)
Stress	0.002	0.039	0.089	0.051	0.091
	(0.089)	(0.088)	(0.091)	(0.087)	(0.085)
Ability	0.000	-0.075	-0.121	-0.150	-0.092
	(0.088)	(0.091)	(0.089)	(0.093)	(0.090)

Standard errors in parentheses. *: p<0.1, **: p<0.05, ***: p<0.01.

Note: in column 2 and 4, seven observations completely determined. Standard errors questionable.

Appendix Table5b: Ordered logit regression results- probability of disagree

Question	1	2	3	4	5
Present bias	0.090	0.107	0.034	0.257*	0.107
	(0.085)	(0.009)	(0.035)	(0.133)	(0.148)
Discount factor	1.111*	0.924	0.268	2.068**	2.181**
	(0.597)	(0.778)	(0.231)	(0.823)	(0.951)
Education					
High school graduate	0.114**	0.173***	0.039*	0.157***	0.157***
	(0.047)	(0.054)	(0.023)	(0.046)	(0.055)
Bachelor's degree	0.083**	0.149***	0.022	0.258***	0.263***
	(0.034)	(0.040)	(0.014)	(0.051)	(0.059)
Master's degree	0.075	0.189**	0.029	0.262***	0.271***
	(0.047)	(0.075)	(0.022)	(0.085)	(0.096)
Doctoral degree or higher	-0.017	0.000	-0.006	0.000	0.154
	(0.020)	(0.000)	(0.007)	(0.000)	(0.220)
Female	-0.031	0.083*	-0.022	-0.437	-0.017
	(0.033)	(0.050)	(0.015)	(0.053)	(0.060)
Age	0.006	-0.007	-0.002	-0.018	-0.007
	(0.009)	(0.012)	(0.003)	(0.137)	(0.155)
Stress	-0.000	-0.005	-0.003	-0.007	-0.015
	(0.008)	(0.011)	(0.003)	(0.013)	(0.014)
Ability	-0.000	0.009	0.004	0.021	0.015
	(0.008)	(0.011)	(0.003)	(0.013)	(0.014)

Standard errors in parentheses. *: p<0.1, **: p<0.05, ***: p<0.01.