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Simon Amez
Ghent University

Stijn Baert
Ghent University, University of Antwerp, Université catholique de Louvain and IZA

Emily Heydencamp
Ghent University

Joey Wuyts
Ghent University

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Does Multitasking Affect Students' Academic Performance? Evidence from a Longitudinal Study

Multitasking – alternating between two different tasks at the same time – has become a daily habit for many university students. However, this may come at a cost since the existing literature emphasises the negative association between multitasking and academic performance. Nonetheless, this literature is based on cross-sectional observational data so that that estimates cannot be given a causal interpretation. To complement these studies, we opted for a longitudinal design in this study. Specifically, for three consecutive years, students at two Belgian universities, in more than ten different study programmes, were surveyed on their multitasking preferences and academic performance. Then, these results were merged with the students' exam scores. We exploited the longitudinal character of the data by running random and fixed effect models. Our results indicate that the positive and negative aspects of multitasking with respect to academic performance cancel each other out.

JEL Classification: I23, J24
Keywords: multitasking, academic performance, longitudinal data

Corresponding author:
Stijn Baert
Ghent University
Sint-Pietersplein 6
9000 Ghent
Belgium
E-mail: Stijn.Baert@UGent.be

1. Introduction

'Multitasking is the ability to screw everything up simultaneously.' – Jeremy Clarkson

'Want to learn faster? Stop multitasking and start daydreaming' (Letivin, 2015). 'Multitasking is actually kind of a problem' (Tsukayama, 2016). 'Why multitasking doesn't work' (Cleveland Clinic, 2021). The newspapers are filled with concerns about multitasking. Multitasking can be described as the ability to perform '*multiple task goals in the same general time period by engaging in frequent switches between individual tasks*' (Delbridge, 2000, p. 1). In other words, it is about alternating between different tasks at the same time (Ajao, 2012). Although multitasking is not a new phenomenon, it has received increased attention in recent years, which is related to the development of new technologies, as well as new media (Lee et al., 2011). Not only the number of technological devices but also their addictive traits and the way people are entangled with them make this an important – if challenging – topic to study (Burak, 2012).

Existing multitasking research seems to suggest that multitasking comes at a high cost in that it increases the number of errors people make and reduces productivity (Mokhtari et al., 2015). Theoretically, an initial potential explanation of the negative relationship between multitasking and performance is that some researchers believe that we can only perform multiple tasks at the same time when these tasks are automated (Kirschner & Karpinski, 2010).[1] Since academic tasks, for example, attending a lecture and taking notes or studying, require focused attention, combining it with other tasks at the same time will lead to a decrease in performance (Kirschner & Karpinski, 2010). A second reason for poorer performance can be that multitasking diminishes focus (Hallowell, 2005). This second reason can be attributed to two mechanisms. First, the time that students spend using media during academic activities may displace the time spent on the academic activity itself (e.g. Fox et al., 2009). If students do not spend sufficient time on academic assignments, they may not perform to the best of their abilities (van der Schuur et al., 2015). A second explanation is in line with what Miller (1956) discovered long ago, that people are restricted in the quantity of data they are not only able to receive but also process and remember. Since multitasking involves a greater flow of information, it can lead to the phenomenon called information overload (Lee et al., 2016; Vorderer et al., 2017). This phenomenon emphasises that people cannot successfully process multiple information streams at the same time.

Also, empirically, multiple studies have found that multitasking, and more specifically smartphone use, is effectively associated with poorer performance, especially in university students (Amez & Baert, 2020; Amez et al., 2021; Baert et al, 2020; Burak, 2012). A more concrete example of this is given by Ellis et al. (2010): they found that university students' grade performances were lower when multitasking occurred in the learning environment. This might be problematic since it has been discovered that university students multitask every day while doing homework, in class or while studying (Carrier et al., 2015). Furthermore,

[1] Automated tasks refer to tasks where thinking does not play a role, for example, chewing gum, talking and walking at the same time (Kirschner & Karpinski, 2010).

Wood et al. (2012) indicated that students who did not use any technologies to multitask during academic tasks performed better than students who did use technologies to multitask, regardless of the medium that was used. This kind of multitasking behaviour naturally leads to more distraction, which is something previous research has found to harm to student performance (Pool et al., 2000). Thus, engaging in different tasks at the same time tends to impact learning effectiveness (Mayer & Moreno, 2003).

Up until now, most studies exploring the relationship between multitasking and performance have relied on cross-sectional data, meaning that empirical findings may be biased by an endogeneity problem. That is, the observed relationship potentially contains (partially) unmeasured characteristics that interact with multitasking as well as academic performance. In this regard, the literature reveals a clear need for longitudinal studies (Doleck & Lajoie, 2018; Junco & Cotten, 2012; Uzun & Kilis, 2018). The use of longitudinal data has some advantages. First, estimators based on longitudinal data allow correction for time-constant unobserved individual heterogeneity. Second, these estimators are often more efficient since the data enable the use of both between- and within-individual variations (Bell et al., 2019). For this reason, this research attempted to understand the relationship between multitasking and university students' academic performance by using a longitudinal design wherein we expected multitasking to negatively affect students' academic outcomes concerning average exam scores.

2. Method

In the following section, we outline the method used to study the relationship between multitasking and academic performance. First, we discuss our research sample. Then, we explain the different measures that were used, and finally, we discuss the statistical framework used to analyse the data.

2.1. Research population

For three years in a row, data for several studies were gathered simultaneously by surveying students attending classes at two major Belgian universities (Ghent University and the University of Antwerp).[2] The students were enrolled in 11 different study programs.[3] In the first year of data collection, only first-year students from both universities were surveyed. The following year, new fist-year students, as well as the students who participated the previous year, were targeted in the survey. During the last year of data collection, again, new first-year students were targeted, and we attempted to include every student who had participated previously. However, this only applies to the University of Antwerp, since only there did we survey for three years. At Ghent University, we only surveyed for the first two years. The procedure was the same for both universities. First, during the last week before the Christmas break, a researcher gained access to students via their curriculum, and entered the classroom during a lecture . The researcher then asked the

[2] See Amez et al., 2021 and Baert et al., 2020.

[3] At Ghent University, the study programmes included business and economics, commercial sciences, and public administration and management. At the University of Antwerp, the study programmes included business economics, economic policy, business engineering, management information systems, communication studies, political science, social and economic sciences, and sociology.

students to complete a questionnaire. At the end of the questionnaire, an informed consent clause was added, asking the students whether they allowed us to cross-reference their questionnaire responses with the results of their upcoming exams . In general, the Christmas break is used by students to study for these upcoming exams. Students who filled in the questionnaire and consented to their responses being cross-referenced with their exam results did not have to provide their results themselves, as the results were obtained through the faculty administration. To maintain the students' anonymity, a third person cross-referenced the obtained exam results with the data collected from the questionnaires. Originally, the data collection in 2016, 2017 and 2018 resulted in 2,060 paper and pen questionnaires. However, of those 2060 questionnaires, 104 had to be excluded because the faculty administration was not able to provide the relevant exam scores, meaning that those 104 students dropped out before they took their exams. Another 83 observations had to be eliminated either because the student did not complete the questionnaire in full or their responses contained inconsistent information. The final sample comprises 1,873 observations, among which there are 240 with multiple observations. Besides being longitudinal in nature – albeit to a limited extent – this sample is substantially larger than samples used in earlier studies.

2.2. Measures

The questionnaire was divided into two parts, with one part focusing on multitasking and the second part focusing on academic performance and general socioeconomic features.

The multitasking preference inventory (MPI) was used to measure participants' preferences towards multitasking (Poposki and Oswald, 2010). The questionnaire consisted of four statements regarding multitasking, namely, 'when doing a number of assignments, I like to switch back and forth between them rather than do one at a time', 'I like to finish one task completely before focusing on anything else', 'I prefer to work on several projects in a day, rather than completing one project and then switching to another' and 'when I have a task to complete, I like to break it up by switching to other tasks intermittently'. The participants indicated the degree to which they agreed or disagreed with each statement on a 5-point scale ranging from 'completely disagree' to 'completely agree'. A higher score on the MPI means that a student has a higher preference for multitasking. The mean score on the MPI was 2.684, as can be seen in Panel A of Table 1.

--- Insert Table 1 here ---

Additionally, students were surveyed with respect to variables that might be correlated with academic performance. For these control variables, we made a distinction between three types of variables, based on how they change over time: there are (1) time-invariant variables, (2) predetermined time-varying variables and (3) time-varying variables. The first participants were asked about *time-invariant* socioeconomic variables that could predict academic performance, as suggested by Baert et al. (2015). These variables were (foreign) origin, gender, father's education level, language spoken at home, household composition and educational performance before university. Panel B of Table 1 shows the averages for each of these variables.

Then data was collected on *predetermined time-varying* variables, which means variables that can change over time but which are (generally) set at the beginning of the year. Concerning household composition, two questions were asked: whether the participant's parents were divorced and whether one of the parents had passed away. Students were also asked about their living arrangements in college (whether they live in a student room or not). Additionally, using binary variables, the students' curriculum backgrounds were established, indicating the students' academic programme at the time of the questionnaire. Furthermore, students were asked how many ECTS credits they aimed to obtain in the upcoming semester and whether they had had to retake one or more exams from the previous years. [4]

Next, students were asked about *time-varying* variables. In this part of the questionnaire, the college version of the academic motivation scale by Vallerand et al. (1992) was included. This scale is made up of 28 items, which the students scored on a 7-point scale. This results in an average academic motivation score between 1 and 7. Lower scores indicate lower academic motivation. Additionally, students were asked how they perceived their current health, with three possible answers: (a) fairly bad, (b) fairly good or (c) very good. The last time-varying variable that was included asked the participants if they were currently involved in a romantic relationship.

Finally, Panel E of Table 1 shows the participants' average scores for the two outcome variables. These variables were constructed based on the exam scores obtained from the faculty students administration. The first variable (average score: completed exams) was the student's average grade (a score between 0 and 20) based on all the exams the student took in the corresponding semester. The second variable (fraction of passed exams) was obtained by dividing the number of exams that the students passed (meaning they obtained at least 50%) by the total number of exams that the students took. As expected, based on the scientific literature mentioned in the introduction and the literature study, both educational performance variables are worse in the subsample of participants with an overall above average preference for multitasking. This correlational analysis, however, does not take into account potential confounding variables, either observable – listed in Panels B, C and D of Table 1 – nor unobservable. The random effects approach, discussed in the following section, does consider these potential confounding variables.

2.3. Used analyses

To analyse these longitudinal data, we could use either the random effects model or the fixed effects model. The choice of our benchmark model is based on a Hausman test that was performed. Based on the results of that test, the preferable model for this research is the random effects model. Hence, in our benchmark analysis, we opted for the random effects approach to identify the relationship between multitasking and academic performance. This approach exploits both the between- and within-individual variation, which is more efficient than the fixed effects approach, which only accounts for within-individual variation. We

[4] ECTS stands for European credit transfer and accumulation system. A full-time student is expected to complete a programme of 60 credits per year.

refer to the fixed effects model in our robustness analysis.[5]

3. Results

Table 2 provides the estimations results of our benchmark analysis. In the first model of the analysis, we regressed the average exam score of the students on their multitasking preference. For this model, we did not include any additional control variables. Then, for Model 2, we controlled for the aforementioned time-invariant control variables: gender, language spoken at home, origin, paternal education, number of siblings and education prior to university. In Model 3, we added the previously mentioned control variables that are (generally) predetermined at the start of the academic year, namely, whether one of the student's parents has passed away, whether the student's parents are divorced, whether the student lives in a student room and, finally, some academic programme characteristics (number of ECTS credits this year and whether a student has to retake an exam). For the last model, Model 4, we also added the time-varying control variables. These are academic motivation, relationship status and, finally, general health.

--- Insert Table 2 here ---

When we did not control for additional control variables (Model 1), we found an insignificant negative coefficient of −0.101 for multitasking preference on exam score. Similarly, no significant coefficient was found for Models 2 or 3. These models have a negative coefficient of, respectively, −0.019 and −0.047. The more elaborate model, Model 4, is preferred since this includes all the control variables. This model resulted in a coefficient of −0.057, but again, this was insignificant. These results contradict the literature discussed above. Based on this literature, we expected that an increase in multitasking preference would be associated with a decrease in average score. Nevertheless, these findings could be in line with what van der Schuur et al. (2015) called the 'trained attention hypothesis', which says that by constantly alternating between different media, young people could actually train and improve certain processes, such as filtering irrelevant information and switching tasks. Thus, some researchers argue that multitasking may also have positive effects (van der Schuur et al., 2015). Consequently, if we follow this hypothesis, the absence of a negative effect in our benchmark analysis could indicate that the negative and positive effects associated with multitasking balance each other out. For example, the negative association between multitasking and the availability of cognitive resources could be balanced out by the fact that students are better at filtering out irrelevant information. Thus, students can 'use' their remaining cognitive resources in a more efficient way. A second explanation could be related to the greater working memory capacity of young people (Cornelius et al., 2005). The working memory capacity is the mental space in which thinking occurs, and, according to Willingham (2010), people with more room in their working memory are better at multitasking. So, since young people have more working memory capacity, they are better at multitasking

[5] There were also theoretical reasons to opt for the random effects model as our benchmark approach. First, we did not have sufficient within-personal information in the data with respect to our independent variable over time. Second, we were not interested in every specific individual level since we focused on the student population's characteristics. Third, the random effects model exploits both the within-individual and the between-individual variation more efficiently than the fixed effects model, which focuses mainly on the within-individual variation.

(Verhaeghen & Salthouse, 1996).

A first robustness check concerned the use of an alternative outcome variable, 'fractions of passed exams'. As in our benchmark analysis, we ran different regressions with random effects and by increasingly adding control variables. These results, as can be seen in Table A1, are very similar to our benchmark analysis. Second, we performed a fixed effects analysis. Also, these estimation results, as presented in Table A2, are in line with our benchmark analysis.

4. Conclusion

The present study aimed to empirically measure whether multitasking impacts university students' academic performance. As the existing body of literature suggests, this topic is highly relevant since students are an age group frequently associated with multitasking, and this group's main activity is often studying, making study performance a major concern in their lives. With this study, we contribute to the literature, which demonstrates a clear need for longitudinal research concerning this topic. For three consecutive years, students at two major Belgian universities, in 11 programmes, were surveyed. The data from these surveys were then merged with the participants' exam scores. These longitudinal data of 1,673 university students were analysed by means of a random effects approach.

Based on our literature review, we hypothesised that multitasking has a negative effect on academic performance. However, we were unable to accept our hypothesis, that is, no significant association was found. A possible reason for the absence of a negative effect in our research could be linked to what van der Schuur et al. (2015) stated, that multitasking could also have positive effects on young people, including training them in multitasking behaviour, meaning they are more capable of switching between tasks and filtering out unimportant information. Consequently, the positive and negative effects associated with multitasking could balance each other out.

We end this article by acknowledging its main limitations, which should be considered when interpreting the results and taken into account for further research. The first limitation concerns the number of observations per student in the dataset. Although the dataset covered three consecutive years, only a select number of students participated multiple times. On top of that, the data is limited to three different moments in time, which is relatively limited. With this in mind, future research should aim to survey a significant number of participants but more importantly collect data over more moments in time.

Second, it is challenging to accurately measure students' multitasking practices and habits with the use of an indirect method, such as a questionnaire (Mokhtari et al., 2015). Researchers could minimise the design limitation of this kind of self-reporting instrument by using other methods, such as time-diary surveys, which provide a more accurate representation of the time spent multitasking and the time spent on academic tasks (Mokhtari et al., 2015). This also holds true for the scale measure used in our analyses, the MPI (Poposki & Oswald, 2010). This inventory measures students' individual preferences regarding multitasking rather than actual multitasking behaviour, which could lead to different results. A reason for

this is that multitasking behaviour may be affected by demands imposed by the environment; however, these do not necessarily correspond with personal preference (Poposki & Oswald, 2010). To address this limitation, future research could choose to include a different scale measure in addition to the MPI for comparison and to determine if they yield similar results.

Nevertheless, this study provides nuances to previous research reporting a negative association between multitasking and academic performance. Thus, more research, in line with our previous suggestions, needs to be conducted to be able to give conclusive suggestions for policies on reducing multitasking behaviour in academic settings.

5. References

Ajao, P. (2012). *Multitasking-impact of ICT on learning* (Bachelor's thesis). Lahti University of Applied Sciences, Finland. Retrieved from http://theseus.fi/bitstream/handle/10024/42889/AjaoPeter.pdf?sequence=1

Amez, S. & Baert, S. (2020). Smartphone use and academic performance: A literature review. *International Journal of Educational Research*, 103. https://doi.org/10.1016/j.ijer.2020.101618

Amez, S., Vujić, S., De Marez, L. & Baert, S. (2021). Smartphone use and academic performance: First evidence from longitudinal data. *New Media & Society*. https://doi.org/10.1177%2F14614448211012374

Baert, S., Verhaest, D., Vermeir, A. & Omey, E. (2015). Mister Sandman, bring me good marks! On the relationship between sleep quality and academic achievement. *Social Science & Medicine,* 130, 91–98. https://doi.org/10.1016/j.socscimed.2015.02.011

Baert, S., Vujić, S., Amez, S., Claeskens, M., Daman, T., Maeckelberghe, A., Omey., E. & De Marez, L. (2020). Smartphone use and academic performance: Correlation or causal relationship? *Kyklos*, 73(1), 22–46. https://doi.org/10.1111/kykl.12214

Bell, A., Fairbrother, M. & Jones, K. (2019). Fixed and random effects models: Making an informed choice. *Quality & Quantity*, 53(2), 1051–1074. https://doi.org/10.1007/s11135-018-0802-x

Burak, L. (2012). Multitasking in the university classroom. *International Journal for the Scholarship of Teaching and Learning,* 6(2), 1–12. https://vc.bridgew.edu/mahpls_fac/74

Carrier, M.L., Rosen, L.D., Cheever, A.N. & Lim, F.A. (2015). Causes, effects, and practicalities of everyday multitasking. *Developmental Review*, 34, 64–78. https://doi.org/10.1016/j.dr.2014.12.005

Cleveland Clinic (2021). Why multitasking doesn't work. Retrieved from https://health.clevelandclinic.org/science-clear-multitasking-doesnt-work/ on 20 April 2021.

Cornelius, J.K., Markus, B. & Murling, G. (2005). Working memory, fluid intelligence, and attention are predictors of multitasking performance, but polychronicity and extraversion are not. *Human Performance*, 18(3), 243–266. https://doi.org/10.1207/s15327043hup1803_3

Delbridge, K.A. (2000). *Individual differences in multi-tasking ability: Exploring a nomological network*. (Unpublished doctoral dissertation). Michigan State University, East Lansing.

Doleck, T. & Lajoie, S. (2018). Social networking and academic performance: A review. *Educationand Information Technology,* 23(1), 435–465. https://doi.org/10.1007/s10639-017-9612-3

Ellis, Y., Daniels, B. & Jauregui, A. (2010). The effect of multitasking on the grade performance of business students. *Research in Higher Education Journal*, 8(1), 1–10. https://ssrn.com/abstract=1595375

Ericsson. (2011). More than 50 billion connected devices. (White paper). Retrieved from http://www.ericsson.com/res/docs/whitepapers/wp-50-billions.pdf on 25 March 2021.

Fox, A.B., Rosen, J. & Crawford, M. (2009). Distractions, distractions: Does instant messaging affect college students' performance on a concurrent reading comprehension task? *CyberPsychology & Behavior*, 12(1), 51–53. https://doi.org/10.1089/cpb.2008.0107

Hallowell, E.M. (2005). Overloaded circuits: Why smart people underperform. *Harvard Business Review,* 83(1), 54–62.

Kirschner, P.A. & Karpinski, A.C. (2010). Facebook® and academic performance. *Computers in Human Behavior*, 26(6), 1237–1245. https://doi.org/10.1016/j.chb.2010.03.024

Junco, R., & Cotten, S. R. (2012). No A 4 U: The relationship between multitasking and academic performance. *Computers & Education*, *59*(2), 505-514. https://doi.org/10.1016/j.compedu.2011.12.023

Lee, A.R., Son, S.-M. & Kim, K.K. (2016). Information and communication technology overload and social networking service fatigue: A stress perspective. *Computers in Human Behavior*, 55, 51–61. https://doi.org/10.1016/j.chb.2015.08.011

Lee, L., Lin, J. & Robertson, T. (2011). Reading while watching video: The effect of video content on reading comprehension and media multitasking ability. *Journal of Educational Computing Research,* 45(2), 183–201. https://doi.org/10.2190%2FEC.45.2.d

Letivin, D.J. (2015). Want to learn faster? Stop multitasking and start daydreaming. Retrieved from https://www.theguardian.com/education/2015/oct/24/want-to-learn-faster-stop-multitasking-and-start-daydreaming on 13 April 2021.

Mayer, R.E. & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational Psychologist*, 38(1), 43–52. https://doi.org/10.1207/S15326985EP3801_6

Miller, G. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review,* 63(2), 81–97. https://psycnet.apa.org/doi/10.1037/h0043158

Mokhtari, K., Delello, J. & Reichard, C. (2015). Connected yet distracted: Multitasking among college students. *Journal of College Reading and Learning,* 45(2), 164–180. https://doi.org/10.1080/10790195.2015.1021880

Pool, M.M., van Der Voort, T.H.A., Beentjes, J.W.J. & Koolstra, C.M. (2000). Background televisionas an inhibitor of performance on easy and difficult homework assignments. *Communication Research*, 27(3), 293–326. https://doi.org/10.1177%2F009365000027003002

Poposki, E.M. & Oswald, F.L. (2010). The multitasking preference inventory: Toward an improved measure of individual differences in polychronicity. *Human Performance*, 23(3), 247–264.

https://doi.org/10.1080/08959285.2010.487843

van der Schuur, W., Baumgartner, S., Sumter, S. & Valkenburg, P. (2015). The consequences of media multitasking for youth: A review. *Computers in Human Behavior,* 53, 204–215. http://dx.doi.org/10.1016%2Fj.chb.2015.06.035

Tsukayama, H. (2016). Multitasking is actually kind of a problem—for kids and adults. Retrieved from https://www.washingtonpost.com/news/the-switch/wp/2016/05/04/multitasking-is-actually-kind-of-problem-for-kids-and-adults/ on 13 April 2021.

Uzun, A.M. & Kilis, S. (2018). Does persistent involvement in media and technology lead to lower academic performance? Evaluating media and technology use in relation to multitasking, self-regulation and academic performance. *Computers in Human Behavior*, 90, 196–203. https://doi.org/10.1016/j.chb.2018.08.045

Vallerand, R.J., Pelletier, L.G., Blais, M.R., Briere, N.M., Senecal, C. & Vallieres, E.F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic and amotivation in education. *Educational and Psychological Measurement*, 52(4), 1003–1017. https://doi.org/10.1177%2F0013164492052004025

Verhaeghen, P. & Salthouse, T.A. (1996). Meta-analyses of age-cognition relations in adulthood: Estimates of linear and nonlinear age effects and structural models. *Psychological Bulletin*, 122(3), 231–249. https://doi.org/10.1037/0033-2909.122.3.231

Vorderer, P., Hefner, D., Reinecke, L. & Klimmt, C. (2017). *Permanently Online, Permanently Connected: Living and Communicating in a POPC World.* New York, NY: Routledge.

Willingham, D.T. (2010). Have technology and multitasking rewired how students learn? *American Educator*, 34(2), 23–28.

Wood, E., Zivcakova, L., Gentile, P., Archer, A., De Pasquale, D. & Nosko, A. (2012). Examining the impact of off-task multi-tasking with technology on real-time classroom learning. *Computers & Education*, 58(1), 365–374. https://doi.org/10.1016/j.compedu.2011.08.029

6. Tables

Table 1: Summary Statistics

	1	2	3
	Full sample: N = 1873	Subsample: multitasking preference below average N = 1004	Subsample: multitasking preference above average N = 869
A. Multitasking			
Multitasking preference	2.684	2.032	3.438
B. Time invariant control variables			
Female	0.536	0.534	0.537
Foreign origin	0.168	0.172	0.162
Dutch is not the main language at home	0.090	0.099	0.081
Father's highest qualification: no tertiary education	0.371	0.349	0.398
Father's highest qualification: tertiary education in college	0.293	0.348	0.322
Father's highest qualification: tertiary education outside college	0.336	0.304	0.280
Number of siblings: none	0.106	0.100	0.113
Number of siblings: one	0.509	0.498	0.521
Number of siblings: two	0.274	0.286	0.260
Number of siblings: more than two	0.112	0.117	0.106
Programme in secondary education: economics – languages	0.133	0.133	0.132
Programme in secondary education: economics – maths	0.191	0.182	0.201
Programme in secondary education: ancient languages	0.148	0.151	0.144
Programme in secondary education: exact sciences – maths	0.145	0.142	0.147
Programme in secondary education: other	0.383	0.390	0.375
General final mark for secondary education: less than 70%	0.340	0.296	0.390
General final mark for secondary education: between 70%–80%	0.536	0.562	0.505
General final mark for secondary education: more than 80%	0.125	0.142	0.105

C. Predetermined time-varying control variables			
At least one parent passed away	0.029	0.026	0.033
Divorced parents	0.216	0.224	0.206
Living in a student room	0.340	0.338	0.342
Number of ECTS credits in programme	22.774	22.835	22.703
Retaking at least one course	0.021	0.016	0.028
Programme: University of Antwerp	0.472	0.483	0.459
Programme: Ghent University, business and economics	0.224	0.228	0.219
Programme: Ghent University, commercial sciences	0.247	0.241	0.254
Programme: Ghent University, public administration and management	0.057	0.047	0.068
Programme: University of Antwerp, business economics	0.191	0.199	0.181
Programme: University of Antwerp, economic policy	0.025	0.029	0.021
Programme: University of Antwerp, business engineering	0.029	0.030	0;028
Programme: University of Antwerp, management information systems	0.088	0.093	0.081
Programme: University of Antwerp, communication studies	0.032	0.032	0.032
Programme: University of Antwerp, political science	0.013	0.021	0.005
Programme: University of Antwerp, social and economic sciences	0.064	0.050	0.081
Programme: University of Antwerp, sociology	0.022	0.022	0.023
Programme: other	0.008	0.008	0.008
D. Time-varying control variables			
Academic motivation scale	4.971	4.981	4.960
General health: fairly bad	0.043	0.052	0.032
General health: fairly good	0.580	0.563	0.600
General health: very good	0.377	0.385	0.368
In a relationship	0.348	0.343	0.353
E. Academic performance			
Average score: completed exams	10.997	11.114	10.861
Fraction of exams passed	0.654	0.663	0.644

Note: See Section 3.2 for a description of the data.

Table 2: Estimation Results: Random Effects Analysis

	1	2	3	4
Dependent variable		Average score: completed exams		
Multitasking preference	–0.101 (0.083)	–0.019 (0.075)	–0.047 (0.075)	–0.057 (0.0752)
Female		0.195 (0.139)	0.121 (0.142)	0.133 (0.143)
Foreign origin		–0.779***(0.225)	–0.717***(0.225)	–0.705***(0.225)
Dutch is not the main language at home		–1.111***(0.287)	–1.067***(0.286)	–1.073***(0.286)
Father's highest qualification: tertiary education outside college		0.437**(0.171)	0.436**(0.170)	0.421**(0.169)
Father's highest qualification: tertiary education in college		0.416**(0.166)	0.434***(0.166)	0.408**(0.166)
Number of siblings: one		0.351 (0.235)	0.300 (0.234)	0.268 (0.234)
Number of siblings: two		0.320 (0.253)	0.279 (0.251)	0.260 (0.251)
Number of siblings: more than two		–0.062 (0.301)	0.042 (0.298)	0.031 (0.298)
General final mark for secondary education: between 70%–80%		1.881***(0.150)	1.935***(0.149)	1.922***(0.149)
General final mark secondary education: more than 80%		3.510***(0.235)	3.682***(0.236)	3.687***(0.236)
At least one parent passed away			0.336 (0.410)	0.386 (0.409)
Divorced parents			–0.289*(0.168)	–0.282*(0.168)
Living in a student room			0.211 (0.142)	0.218 (0.142)
Number of ECTS credits in programme			0.020 (0.019)	0.016 (0.019)
Retaking at least one course			0.356 (0.340)	0.371 (0.340)
Academic motivation scale				0.131 (0.107)
General health: fairly good				0.937***(0.302)
General health: very good				1.054***(0.311)
In a relationship				–0.023 (0.136)
Constant	11.070***(0.236)	8.537***(0.347)	9.208***(0.891)	7.750***(1.060)
Controls for programme in secondary education	No	Yes	Yes	Yes
Controls for programme in tertiary education	No	No	Yes	Yes
Number of observations	1873	1873	1873	1873

Note: The presented results are coefficient estimates, with standard errors in parentheses. ***(**)((*)) indicates significance level at the 1% (5%)((10%)) significance level.

7. Appendix: Additional tables

Table A1: Estimation Results: Random Effects Analysis With Alternative Outcome Variable

	1	2	3	4
Dependent variable		Fraction passed exams		
Multitasking preference	–0.007 (0.009)	0.001 (0.008)	–0.003 (0.008)	–0.004 (0.008)
Female		0.028*(0.015)	0.017 (0.016)	0.020 (0.016)
Foreign origin		–0.043*(0.025)	–0.040 (0.025)	–0.038 (0.025)
Dutch is not the main language at home		–0.126***(0.032)	–0.120***(0.032)	–0.121***(0.032)
Father's highest qualification: tertiary education outside college		0.051***(0.019)	0.050***(0.019)	0.047**(0.019)
Father's highest qualification: tertiary education in college		0.032*(0.018)	0.034*(0.018)	0.030 (0.019)
Number of siblings: one		0.026 (0.026)	0.021 (0.026)	0.017 (0.026)
Number of siblings: two		0.035 (0.028)	0.031 (0.028)	0.028 (0.028)
Number of siblings: more than two		–0.003 (0.033)	0.008 (0.033)	0.006 (0.033)
General final mark for secondary education: between 70%–80%		0.186***(0.017)	0.193***(0.017)	0.191***(0.017)
General final mark for secondary education: more than 80%		0.304***(0.026)	0.324***(0.026)	0.325***(0.026)
At least one parent passed away			0.064 (0.045)	0.072 (0.045)
Divorced parents			–0.032*(0.019)	–0.031*(0.019)
Living in a student room			0.020 (0.016)	0.022 (0.016)
Number of ECTS credits in programme			0.002 (0.002)	0.001 (0.002)
Retaking at least one course			0.066*(0.040)	0.069*(0.040)
Academic motivation scale				0.017 (0.012)
General health: fairly good				0.119***(0.034)
General health: very good				0.146***(0.035)
In a relationship				–0.008 (0.015)
Constant	0.655 (0.026)	0.413***(0.039)	0.525***(0.995)	0.338***(0.118)
Controls for programme in secondary education	No	Yes	Yes	Yes
Controls for programme in tertiary education	No	No	Yes	Yes
Number of observations	1873	1873	1873	1873

Note: The presented results are coefficient estimates, with standard errors in parentheses. ***(**)((*)) indicates significance level at the 1% (5%)((10%)) significance level.

Table A2: Estimation Results: Fixed Effects Analysis

	1	2	3
Dependent variable		Average score: completed exams	
Multitasking preference	−0.128 (0.170)	−0.180 (0.173)	−0.160 (0.174)
Female		/	/
Foreign origin		/	/
Dutch is not the main language at home		/	/
Father's highest qualification: tertiary education outside college		/	/
Father's highest qualification: tertiary education in college		/	/
Number of siblings: one		/	/
Number of siblings: two		/	/
Number of siblings: more than two		/	/
General final mark for secondary education: between 70%–80%		/	/
General final mark for secondary education: more than 80%		/	/
At least one parent passed away		1.425 (2.047)	1.559 (2.070)
Divorced parents		0.819 (0.945)	0.847 (0.948)
Living in a student room		−0.491 (0.396)	−0.480 (0.397)
Number of ECTS credits in programme		−0.002 (0.029)	−0.001 (0.029)
Retaking at least one course		0.772**(0.381)	0.791**(0.381)
Academic motivation scale			−0.159 (0.312)
General health: fairly good			0.009 (0.615)
General health: very good			0.571 (0.646)
In a relationship			−0.316 (0.395)
Constant	11.340***(0.458)	11.372***(0.982)	12.047***(1.875)
Controls for programme in secondary education	No	Yes	Yes
Controls for programme in tertiary education	No	Yes	Yes
Number of observations	1873	1873	1873

Note: The presented results are coefficient estimates, with standard errors in parentheses. ***(**)((*)) indicates significance level at the 1% (5%)((10%)) significance level.