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# Helpful or harmful? The role of personality traits in student experiences of the COVID-19 crisis and school closure[†]

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**Abstract.** Little is known about the individual differences in student experiences and expectations of the COVID-19 crisis and the resulting school closures. Yet, as the crisis may have uniquely impacted students, in either a helpful or harmful way, knowledge about students' personality is highly relevant. The present paper explores whether particular personality traits, as measured through the lens of the Big Five scheme, amplified consequences of the crisis in 347 students in 35 Flemish secondary schools. Using two unique data sets, we show the importance of personality traits in students' responses to the crisis with respect to multiple facets, including students' well-being, remote learning experiences, perception of family and social life, and expectations of school results. In particular, while the crisis appears to have benefited students with high conscientiousness and openness, the reverse holds for students with high extraversion and neuroticism. Further, we find that only a few students expected a decrease in their school results. However, extraverted students were more likely to expect a decrease in school results than introverted students did.

**Keywords.** Personality; Big Five; COVID-19; School closure; Secondary education.

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## 1. Introduction

The COVID-19 crisis has led to changes in almost all social and economic sectors, with education being no exception. On March 16, 2020, the Belgian government ordered extensive restrictions on public and economic life, including a nation-wide school closure as emergency measure to prevent the spreading of the virus. Abruptly, students experienced serious disruption to their school and social life.

In response to COVID-19, research has emerged in the education field, including the impact on experiences and expectations of higher education students (Aucejo, French, Araya, & Zafar, 2020), the impact on standardised learning outcomes of primary school students (Maldonado & De Witte, 2020) and the search for online learning resources (Bacher-Hicks, Goodman, & Mulhern, 2020). Yet, while most studies seek to uncover general and demographic patterns, many believe that the COVID-19 crisis impacted children to different degrees and in different ways. For instance, it is expected that especially children who are naturally sensitive to negative emotions experienced more fear (Kluger, 2020).

A growing amount of research in the psychology field examines the link between personality and individual responses to the crisis. Studies show that personality traits have a significant impact on psychological outcomes (e.g., Kroencke, Geukes, Utesch, Kuper, & Bach, 2020; Modersitzki, Phan, Kuper, & Rauthmann, 2020; Somma, Gialdi, Krueger, Markon, Frau, Lovallo, & Fossati, 2020), stockpiling behaviour (e.g., Garbe, Rau, & Toppe, 2020), and compliance with imposed restrictions (e.g., Zajenkowski, Jonason, Leniarska, & Kozakiewicz, 2020; Abdelrahman, 2020). Hence, though the impact on student experiences remains unexplored, the literature points to the importance of personality in response to the crisis.

The present paper aims to shed light on the experiences of the COVID-19 crisis and long-lasting school closure in secondary education students in Flanders, the Northern region of Belgium. In particular, the objective of the paper is to theorise and examine the role of personality traits in student experiences and expectations. We explore whether particular personality traits amplified consequences of the lockdown and school closures, either positively or negatively. For this purpose, we use two unique data sets involving 347 students in 35 schools. Data on the personality traits, measured through the lens of the Big Five scheme (i.e., extraversion, agreeableness, conscientiousness, neuroticism, and openness), were collected in January 2020, about two and a half months prior to the COVID-19 outbreak, such that student responses were not influenced by the exceptional situation. Survey data on student experiences and expectations of the crisis and school closure were collected in June 2020, three and a half months after the COVID-19 outbreak. The post-survey measured multiple facets, including students' well-being, remote learning experiences, and perception of family and social life.

The paper is organised as follows. In section 2, we outline the theoretical framework for personality and construct multiple hypotheses with respect to the role of the Big Five personality traits in student experiences and expectations. Section 3 describes the setting of our study. Section 4 discusses the methods. Section 5 and 6 present the empirical strategy and results, respectively. Section 7 concludes.

## 2. Theoretical Framework

Personality traits are conceptualized as relatively enduring patterns of behaviour, cognition, and emotion that reflect the tendency to respond in certain ways under certain circumstances (Roberts, 2009). In recent years, the Big Five personality traits have emerged as the dominant determinants of human personality (Costa & McCrae, 1992; Goldberg, 1992; McCrae & Costa, 1999), with application to a wide range of fields, including education (Poropat, 2009). The Big Five scheme includes the following traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness (to experience). *Extraverted* individuals have an energetic approach to life, show outgoing and sociable behaviour, and tend to have positive emotions in general. Individuals who score high on *agreeableness* are considerate, sympathetic, helpful, generally prosocial, and willing to subordinate own interests. *Conscientiousness* is associated with the way individuals control, regulate, and send impulses. A high score on conscientiousness implies being goal-oriented, persistent, dutiful, organised, and adherent to norms and rules. *Neuroticism* defines the emotional stability of an individual and aspects of anxiety, uneasiness, and feelings of vulnerability. Neurotic individuals tend to be sensitive to negative emotions. Individuals who score high on *openness* are open-minded, creative, intellectually curious, and generally interested in new experiences and ideas.

We construct our hypotheses on the following theoretical approaches. First, given the vast amount of literature indicating that personality traits have some genetic base (for review, see Sanchez-Roige, Gray, MacKillop, Chen, & Palmer, 2018) and are relatively stable across the life span (Damian, Spengler, Sutu, & Roberts, 2019), personality traits offer an opportunity to study how fundamental, enduring differences in traits affect how individuals respond differently to the same experiences (Danckert, Dinesen, Klemmensen, Nørgaard, Stolle, & Sønderskov, 2017; Gerber, Huber, Doherty, Dowli, & Ha, 2010). Second, according to the Person-Job Fit theory, these differences in individuals' responses can be explained by the fit between the personality of an individual and particular environmental or situational factors. In their meta-analysis, Kristof-Brown, Zimmerman, and Johnson (2005) found that the degree of congruence between the personality of an individual and particular job characteristics determines their job satisfaction and organisational commitment. In an academic context, Keller and Karau (2013) found that students' perceptions of a learning environment are influenced by the fit between personality and particular learning characteristics. Accordingly, we base our expectations on the idea that particular personality traits 'fit' more positively with the (new) living and learning situation of students, and that the fit will influence their experiences and expectations of the COVID-19 crisis and school closure.

### *2.1 Effects of Personality on the Experience of COVID-19 and School Closure*

The literature allows us to deduce some hypotheses related to the potential role of the Big Five personality traits in student experiences and expectations of the COVID-19 crisis and school closure.

Students who score high on extraversion draw energy from being with others. Therefore, we expect that they have encountered more difficulty during the crisis due to a lack of social interaction. For introverted students, on the other hand, the crisis may have offered a pause from the exhausting effects of social interaction.

Due to the closure of schools, Flemish students had to learn from home for a long period of time (see Section 3). Remote learning requires self-regulation learning strategies, such as time management and effort regulation, which is linked to high conscientiousness (Bidjerano & Dai, 2007). Consequently, we hypothesise that students with a high score on conscientiousness took responsibility for their learning and developed a more positive perception of remote learning. This would be consistent with prior findings in the online course context (Keller & Karau, 2013; Cohen & Baruth, 2017).

Students scoring high on neuroticism, those more exposed to anxiety and fear, might have found the uncertainty associated with the crisis and school closure unappealing (Keller & Karau, 2013). Further, neuroticism is found to (negatively) affect the quality of relationship young adults have with their parents (Belsky, Jaffee, Caspi, & Moffitt, 2003). Consequently, as students had to spend more time with their parents and siblings during the COVID-19 crisis, we hypothesise that students with high neuroticism felt more frustrated during the crisis than others did.

The more open, the better an individual copes with uncertainty over a long, sustained period – as in the case of the COVID-19 crisis. Students with a high score on openness enjoy engaging in new (learning) experiences (Keller & Karau, 2013). Accordingly, we predict that these students benefited from the novel situation.

From the earlier literature, it is less clear to hypothesise how *agreeableness* would influence the way students experienced the crisis and remote learning. Agreeableness is assumed to correlate with prosocial behaviour and volunteerism (Ozer & Benet-Martínez, 2006). Hence, we may expect that students who score high on agreeableness were more willing to help others during the crisis, in- and/or outside their household, than others.

## 3. Setting

On March 16, 2020, all Flemish schools were required to suspend courses and transition to remote learning. In the first month after the school closure, students worked on homework assignments based on subjects already covered in school. From mid-April 2020 onwards, teachers were expected to teach new learning material for the first time via digital tools and for a second time once schools would re-open (cfr. 'pre-teaching' phase). From mid-May 2020 onwards, the government recommended a gradual re-opening of schools in Flanders, under strict organisational conditions. Figure I presents a graphical representation at the secondary education level. Note that, depending on the grade, students returned to their classroom at different points in time.

In addition to the closure of schools, the government ordered extensive restrictions on public and economic life on March 16, 2020. In particular, for at least two months, citizens were asked to stay at

home as much as possible, companies were required to organise working from home, non-essential travel outside Belgium was prohibited, activities and events were suspended, and most shops, outdoor markets, sports centres, and playgrounds were closed. Consequently, it is important to note that, apart from not attending school, children were isolated at home, unable to meet with friends, pursue their hobbies, etc. In what follows, we thus measure the combined effect of a long-lasting school closure and lockdown.

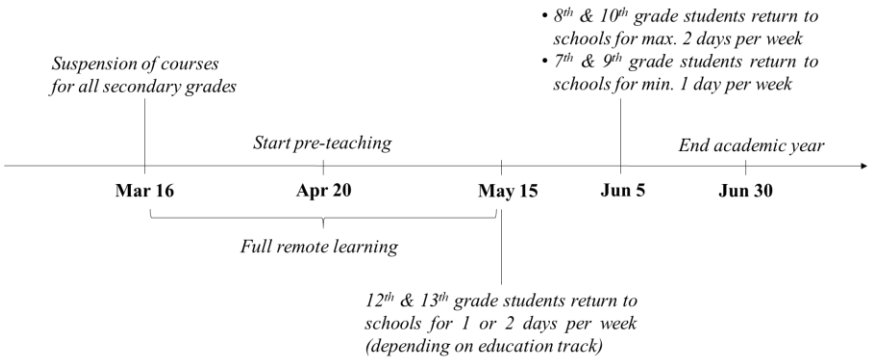


Figure I: Closure and Gradual Re-opening of Flemish Secondary Schools

*Note*: Schools could only re-open if they met strict safety measures. Accordingly, it is possible that students in certain schools had to learn from home until the end of the academic year.

## 4. Methods

### *4.1 Data*

In January 2020, a first set of data was collected as part of a larger field experiment run in multiple secondary schools in Flanders (for more details, see Iterbeke, De Witte, Declercq, and Schelfhout, (2020)). The schools were approached via an open call to participate in a programme in entrepreneurship education. Due to the COVID-19 outbreak and the closure of schools, the actual design of the experiment could not be realised. Yet, given the field experiment's baseline data comprised of a wide range of student background characteristics, including personality traits, it represented an excellent foundation to study the importance of student characteristics on the experiences of the crisis. The baseline survey took 16 minutes to complete, on average. Next, to evaluate student experiences and expectations of the COVID-19 crisis and school closure, we collected a second set of data by sending a survey to all participating schools in the field experiment at the end of June 2020. Students were asked to complete the post-survey at home and they had a chance at winning a 30 euros gift voucher of their choice as an incentive to complete the survey. The survey took seven minutes to complete, on average.

### *4.2 Sample*

The final sample (including students present in both data sets) consisted of 347 students in 56 classes in 35 Flemish secondary schools.[1] Of the 347 students, 30 were in the ninth grade, 31 in the tenth grade,

[1] Note that there are few students per class and school in our sample. This can be explained by our method of data collection. In particular, while many classes and schools were sent the follow-up survey (i.e., all schools participating in the experiment),

207 in the eleventh grade, 76 in the twelfth grade, and three in the thirteenth grade. Based on a power analysis, we find that the sample size provides sufficient power. To assess the external validity of our sample, we compared four common types of socio-economic indicators as measured in administrative datasets (i.e., the percentage of students with a low-educated mother, the percentage of students receiving an allowance, the percentage of non-native students, and the percentage of students living in a neighborhood with high retention rates) for in- and out-of-sample schools.[2] Table A.I in Appendix shows that the demographic composition of our sample of schools compares well with that of the average Flemish secondary school. Accordingly, we believe our sample is a reasonable representation of students at other Flemish secondary schools.

### *4.3 Measures*

#### 4.3.1 Personality traits

Section 4.4 presents the descriptive statistics of the variables used in the analyses.

The personality traits of students, as assessed two and a half months prior to the COVID-19 outbreak and school closure, were measured by the *Quick Big Five* questionnaire (Vermulst & Gerris, 2005), a shortened Dutch version of Goldberg's (1992) Big Five questionnaire. The questionnaire has been shown to have a good construct validity (Mabbe, Soenens, Vansteenkiste, & Van Leeuwen, 2016). The questionnaire consisted of 30 adjectives which measured the five personality dimensions, i.e., extraversion, agreeableness, conscientiousness, neuroticism, and openness. The personality dimensions were assessed by six adjectives each, such as 'talkative' (extraversion), 'helpful' (agreeableness), 'careful' (conscientiousness), 'anxious' (neuroticism), and 'creative' (openness). Students indicated on a seven-point Likert scale, ranging from 'completely incorrect' (1) to 'completely correct' (7), to what extent each of the adjectives applied to them. Cronbach's alpha was 0.91 for extraversion, 0.85 for agreeableness, 0.85 for conscientiousness, 0.85 for neuroticism, and 0.74 for openness.

#### 4.3.2 Experience of COVID-19

Inspired by a survey assessing the emotional well-being of Flemish youngsters during the COVID-19 crisis,[3] we designed a survey to assess student experiences and expectations of the COVID-19 crisis and school closure. By including factors for which we hypothesised an influence of the crisis, we assessed students' well-being, remote learning experiences, and perception of family and social life. Six outcome measures were constructed based on multiple underlying items. Responses to all underlying items were given on a five-point Likert scale ranging from 'completely incorrect' (1) to 'completely

only few students within the class or school completed it because (1) it was not compulsory (students took the survey at home on a voluntary basis) or (2) because their teacher did not provide the survey.

[2] AGODI, Cijfermateriaal - Leerlingenkenmerken (2018-2019), available at http://www.agodi.be/cijfermateriaal-leerlingenkenmerken

[3] https://ppw.kuleuven.be/PraxisP/in-de-kijker/deelnemers-gezocht-jongeren-tussen-13-en-18-jaar-voor-studie-naar-emotioneel-welbevinden-tijdens-corona

correct' (5). See Table A.II in Appendix for a detailed description of the underlying items of each measure.

The first measure 'Tensions at home' aimed to capture the extent students experienced tensions at home. Students were asked to evaluate five items such as '*I regularly argued with my family members'* and *'In the period I did not have to go to school, I regularly received admonishments from my parents'.* Cronbach's alpha was 0.68. Second, we measured students' willingness to help using a single item '*I tried to do things for others (for instance, volunteer work, go to the supermarket for others)'*. Third, students' experience of remote learning was assessed via six items, such as *'I managed well to focus on schoolwork every day'* and *'Working independently makes me stressed'* (reverse scored). Cronbach's alpha was 0.66 for 'Positive experience of remote learning'.[4] Fourth, whether students learned themselves new skills was assessed by a single item *'I learned myself new skills (such as a new language, cooking)'.* Fifth, we asked students to evaluate how much they missed school attendance. The variable 'Miss school life' was measured using four items, such as *'I liked that we didn't have to go to school for so long'* (reverse scored) and *'In the period I did not have to go to school, I looked forward seeing my friends at school'.* Cronbach's alpha was 0.76. Sixth, we assessed to what extent the school closure made students feel nervous and worried via the variable 'Stress from school closure', for which three items were used, such as *'I am afraid I fell behind in my education'* and *'Not going to school for so long makes me stressed'*. Cronbach's alpha was 0.71. Finally, in addition to student experiences, a seventh outcome measure assessed student expectations concerning school results, i.e., whether students expected that their results would decrease, increase, or remain unchanged because of the crisis.

### 4.3.3 Control variables

To minimise bias, we included a range of potentially confounding variables in the analyses. As for the personality traits, most characteristics were measured during the first data collection. At individual level, we included the gender, age, language spoken at home, socioeconomic status, education track, and score on a knowledge test. The socioeconomic status was approximated by the number of times a student travelled abroad during the last year as students were expected to easily recall this. This measure is found to be correlated with household income (Maldonado, De Witte, & Declercq, 2019). The education track was represented by a dummy variable taking value one if the student followed an academic track, zero otherwise. Differences in students' academic performance were captured using students' knowledge scores in a 13-questions multiple-choice test. In addition, we controlled for students' home environment during the school closure, i.e., whether the student lived in a household with one or more household members belonging to a risk group for COVID-19 (as measured in the follow-up survey via the item *'Does someone in your household belong to a risk group for COVID-19*

[4] Note that, while the Cronbach's alpha's for the measures 'Tensions at home' and 'Positive experience of remote learning' are below the conventional 'acceptable' value of 0.70, they are in line with those reported in other studies assessing the perception of the COVID-19 crisis (e.g., Zajenkowski et al., 2020).

*(e.g., due to a weakened immune system or a chronic condition such as asthma/diabetes/heart disease)?'*). Finally, we observed the class and school of students.

Table I: Descriptive statistics of measures and variables

| Variables | N | Per cent | Mean | SD |
|---|---|---|---|---|
| *Personality traits* | | | | |
| Extraversion (7) | | | 4.49 | 1.30 |
| Agreeableness (7) | | | 5.70 | 0.69 |
| Conscientiousness (7) | | | 4.60 | 1.11 |
| Neuroticism (7) | | | 4.14 | 1.14 |
| Openness (7) | | | 4.60 | 0.91 |
| *Experience of COVID-19* | | | | |
| Tensions at home (5) | | | 2.63 | 0.75 |
| Willing to help (5) | | | 3.50 | 1.05 |
| Positive experience of remote learning (5) | | | 2.99 | 0.73 |
| Learn new skills (5) | | | 3.29 | 1.17 |
| Miss school life (5) | | | 3.13 | 0.85 |
| Stress from school closure (5) | | | 2.79 | 0.95 |
| Expectation of school results | | | | |
| *Decrease* | 68 | 16.60 | | |
| *Unchanged* | 139 | 40.06 | | |
| *Increase* | 140 | 40.35 | | |
| *Controls* | | | | |
| Female | 187 | 53.89 | | |
| Age | | | 16.86 | 0.96 |
| Dutch | 297 | 85.59 | | |
| Number of holidays per year | | | | |
| *Zero* | 29 | 8.36 | | |
| *1 time* | 78 | 22.48 | | |
| *2 times* | 95 | 27.38 | | |
| *3 times* | 63 | 18.16 | | |
| *More than 3 times* | 82 | 23.63 | | |
| Academic track | 197 | 56.77 | | |
| Knowledge score (13) | | | 8.39 | 2.85 |
| Household with COVID-19 risk | 133 | 32.56 | | |

*Note*: Values in brackets after the variables denote maximum value.

### *4.4 Descriptive statistics*

Table I presents the descriptive statistics of the variables used in the analyses. 54 percent of students in our sample were female and 86 percent spoke Dutch at home. Students were, on average, 17 years old. Of the 347 students, 197 students followed an academic track. Almost 33 percent of students reported living in a household with one or more household members belonging to a risk group for COVID-19. As shown in Table A.III in Appendix, the students in our sample showed similar values for each of the five personality traits as found in previous studies with Flemish secondary students (Teppers, Klimstra, Van Damme, Luyckx, Vanhalst, & Goossens, 2013; Mabbe et al., 2016).

Table A.IV in Appendix presents the correlations between variables. Overall, female students show significant positive correlations with the traits agreeableness (scoring 2 percent higher on the measure than average), conscientiousness (scoring 5.5 percent higher), and neuroticism (scoring 7.6 percent higher), and all outcome measures, except for 'Tensions at home' and 'Expectation of school results'. We do not find any significant correlation between the age of students and the traits or outcome

measures, suggesting no influence of age on the measures. Students following an academic track show a positive correlation with the outcome measures 'Positive experience of remote learning' (scoring 2.6 percent higher) and 'Learn new skills' (scoring 4.1 percent higher). The academic performance of students is positively correlated with the measure related to remote learning (i.e., students with an above-average academic performance score 1.6 percent higher on the measure) and negatively correlated with the stress level of students because of the school closure (i.e., students with an above-average academic performance score 5.7 percent lower on the corresponding measure). Finally, we find that students living in a household with COVID-19 risk show a positive correlation with the measure 'Stress from school closure' (scoring 4.9 percent higher).

## 5. Empirical strategy

To analyse the importance of personality traits on the experience of the crisis and school closure, we estimated ceteris paribus effects on student experiences and expectations using the seven outcome measures outlined above. Accordingly, the effect of each personality trait was assessed, holding all other effects constant. We used an ordinary least squares (OLS) model for the outcomes constructed using multiple underlying Likert items, whereas ordered logistic models for the ordinal outcomes or outcomes based on a single Likert item. The use of parametric models for Likert type data has been subject to debate. Yet, it is generally accepted that parametric models can be used if the Likert items are first summed to construct a measure as the sums can be treated as interval data measuring a latent variable (Carifio & Perla, 2008).[5] The model reads as follows:

$$Y_{i,c} = \alpha + \sum_j \beta_j T_{i,j} + \sum_k \beta_k X_{i,k} + \sum_c \beta_c C_{i,c} + \varepsilon_{i,c} \qquad (1)$$

The variable $Y_{i,c}$ represents an outcome measure (e.g., Tensions at home). The vector $T_{i,j}$ includes the five personality traits *j*, i.e., extraversion, agreeableness, conscientiousness, neuroticism, and openness, for student *i*. As stated in the *Quick Big Five* manual (Vermulst & Gerris, 2005), all traits were transformed to categorical variables with three levels, i.e., a low, average, and high score.[6] The vectors $X_{i,k}$ and $C_{i,c}$ refer to the set of control variables $k$ and the set of class fixed effects $c$ for student $i$, respectively. The former is included to aid precision. The latter is included to account for differences in (1) teaching approaches across classes and schools, (2) the time students returned to their classrooms (see Section 3), and (3) the personality traits of students in the classroom. To account for within-cluster dependence, we clustered the standard errors $\varepsilon_{i,c}$ at class level $c$.

[5] We find similar results if we use ordered logistic regressions for outcome measures constructed using multiple Likert items.
[6] To determine the cut-offs, we transformed the raw score for each personality trait to a percentile score. This was done for male and female respondents separately because of significant differences in answering patterns. Then, a low, average, and high score was defined as the percentile score below or equal to the 25$^{th}$ percentile, between the 25$^{th}$ and 75$^{th}$ percentile, and above the 75$^{th}$ percentile, respectively.

## 6. Results

### *6.1 Student experience of COVID-19 and school closure*

We first examine the importance of the Big Five personality traits in explaining the differences in student experiences, as presented in Table II. In the next paragraphs, we discuss the impact of each personality trait, holding all other effects constant. Note that, because we test multiple hypotheses, the estimates significant at the five and ten percent level must be interpreted with caution (see section 6.4).

*Extraversion* is found to significantly predict student experiences of tensions at home. In particular, students with a high score on extraversion score 14.4 percent (or 0.38 points) higher on the 'Tensions at home' measure as compared to students with an average score. Moreover, the results suggest that extraverted students missed the normal school environment relatively more (an increase of 6.5 percent on the 'Miss school life' measure). They were more likely to learn new skills (an increase of 7.3 percent in the probability of agreeing with the statement *'I learned myself new skills (such as a new language, cooking)'*). Introverted students, on the other hand, report lower stress levels because of the school closure (a decrease of 10.9 percent on the 'Stress from school closure' measure) and were 6.6 percent less likely to agree with the statement related to willingness to help.

Although no significant estimates at the one percent level are found for *agreeableness*, the results suggest that students with a low score on *agreeableness* (i.e., students who have a lower tendency to be helpful, prosocial, and willing to subordinate own interests) appeared to report more tensions at home than average (an increase of 9 percent or 0.23 points on the 'Tensions at home' measure).

*Conscientiousness* (i.e., being goal-oriented, systematic, dutiful, organised) is significantly linked to student experiences of remote learning. Ceteris paribus the other characteristics, we find that students with a high score on conscientiousness had a significantly better experience of remote learning, scoring 12.7 percent (or 0.38 points) higher on the corresponding outcome measure than average. This finding is in line with the existing evidence found in the online course context (Keller & Karau, 2013; Cohen & Baruth, 2017). Simultaneously, the results suggest that students with a high score on conscientiousness experienced fewer tensions at home and less stress because of the school closure than others (a decrease of 7.5 and 8.2 percent on the corresponding measures, respectively).

In congruence with our hypotheses, *neuroticism* appears to determine students' experiences of remote learning, and the extent they experienced tensions at home, missed going to school, and were stressed because of the school closure. In particular, students with a low score on neuroticism, i.e., those less sensitive to negative emotions, score 9.4 percent (i.e., 0.246 points) lower on the 'Tensions at home' measure, 6.8 percent lower on the 'Miss school life' measure, and 8.6 percent lower on the 'Stress from school closure' measure than average. Students with high neuroticism, on the other hand, score 6.3 percent lower on 'Positive experience of remote learning' and 15.5 percent higher on 'Stress from school closure'. Note that these estimates are only significant at the five or ten percent level.

Table II: Effect of personality differences on student experiences of COVID-19 and school closure

| **Dependent variable** | | (1) **Tensions at home** | (2) **Willingness to help** | (3) **Positive experience with distance learning** | (4) **Learn new skills** | (5) **Miss school life** | (6) **Stress from school closure** |
|---|---|---|---|---|---|---|---|
| Extraversion | *Low* | -0.0374 | -0.0657* | 0.114 | 0.0375 | -0.0938 | -0.304** |
| | | (0.118) | (0.0378) | (0.109) | (0.0256) | (0.128) | (0.130) |
| | *High* | 0.380*** | 0.0213 | 0.0227 | 0.0725** | 0.205* | -0.0539 |
| | | (0.130) | (0.0396) | (0.104) | (0.0286) | (0.119) | (0.156) |
| Agreeableness | *Low* | 0.234** | -0.00768 | -0.0498 | -0.0129 | -0.0704 | 0.0162 |
| | | (0.0956) | (0.0439) | (0.107) | (0.0383) | (0.115) | (0.163) |
| | *High* | -0.0537 | 0.0276 | -0.0639 | 0.0277 | -0.0607 | 0.123 |
| | | (0.114) | (0.0519) | (0.123) | (0.0289) | (0.139) | (0.132) |
| Conscientiousness | *Low* | 0.0720 | -0.0703 | -0.118 | -0.0531 | -0.160 | -0.0993 |
| | | (0.117) | (0.0428) | (0.0909) | (0.0346) | (0.136) | (0.163) |
| | *High* | -0.197* | -0.0223 | 0.379*** | 0.00542 | -0.117 | -0.228* |
| | | (0.106) | (0.0380) | (0.104) | (0.0275) | (0.114) | (0.114) |
| Neuroticism | *Low* | -0.246** | -0.0396 | -0.0841 | 0.0256 | -0.213* | -0.241* |
| | | (0.101) | (0.0528) | (0.117) | (0.0270) | (0.114) | (0.139) |
| | *High* | 0.0862 | -0.0747 | -0.187* | 6.30e-05 | 0.136 | 0.432** |
| | | (0.136) | (0.0483) | (0.0936) | (0.0437) | (0.162) | (0.175) |
| Openness | *Low* | -0.0403 | -0.130*** | -0.0133 | -0.119*** | 0.0263 | 0.0224 |
| | | (0.0963) | (0.0455) | (0.107) | (0.0414) | (0.109) | (0.0963) |
| | *High* | 0.181 | -0.0472 | -0.0724 | -0.00141 | -0.00722 | 0.0553 |
| | | (0.141) | (0.0543) | (0.119) | (0.0262) | (0.134) | (0.112) |
| Controls | | Yes | Yes | Yes | Yes | Yes | Yes |
| Class FE | | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | | 347 | 347 | 347 | 347 | 347 | 347 |

*Note:* Clustered standard errors at class level in parentheses; *** p<0.01, ** p<0.05, * p<0.1; OLS models are estimated in columns 1, 3, 5, and 6, ordered logistic models with corresponding marginal effects for the category 'agree' in columns 2 and 4; Controls include gender, education track, age, language spoken at home, socioeconomic status, knowledge score, and an indicator for household with COVID-19 risk; Average score on personality trait serves as reference category; A low, average, and high score is defined as the percentile score $\leq 25^{th}$ percentile, between the $25^{th}$ and $75^{th}$ percentile, and $> 75^{th}$ percentile, respectively.

*Openness* (i.e., curiosity and creativity) significantly predicts students' willingness to help, i.e., a low score on openness as compared to an average score decreases the probability of agreeing with the corresponding statement by 13 percent. Also, the probability of agreeing with the statement *'I learned myself new skills (such as a new language, cooking)'* decreases by 11.9 percent for students low in openness.

### *6.2 Student expectation of school results*

Figure II illustrates the predicted probabilities of student expectations of changes in school results because of the COVID-19 crisis and school closure. Overall, we find that only a few students expected a decrease in their school results. However, while this is evident across all personality traits, the figure points to differences across scores in personality traits. In particular, differences in conscientiousness and extraversion appear to be linked with different expectations.

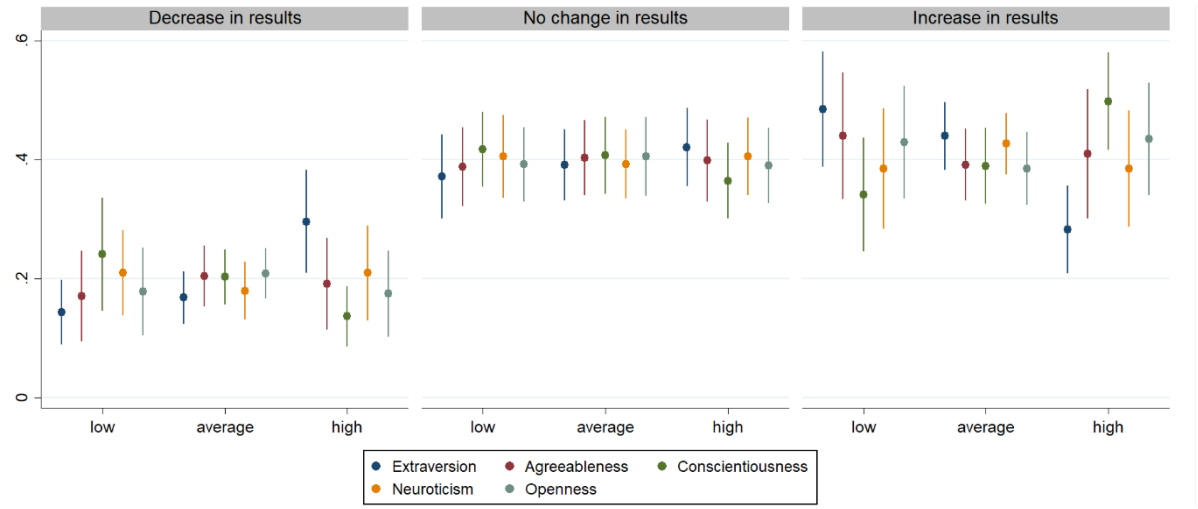


Figure II: Predicted probabilities of student expectations of school results across personality traits

*Note*: The figure shows the point estimate (dot) and confidence interval (line) for each score in a personality trait; Predicted probabilities are calculated based on the estimates of three ordered logistic models; Each model includes clustered standard errors at class level and the following controls: gender, education track, age, language spoken at home, socioeconomic status, knowledge score, an indicator for household with COVID-19 risk, and class fixed effects.

The results in Table III support this notion. Holding all other effects constant, a high score in extraversion reduces the probability of higher expected results significantly by 15.7 percent, whereas the reverse seems to hold for students with a high score on conscientiousness, i.e., the probability that these students expected higher results because of the crisis is 10.9 percent higher compared with students low in conscientiousness (note that this estimate is significant at the ten percent level). Similarly, the probability of lower expected results because of the crisis is 12.7 percent higher for students high in extraversion, while the results suggest that this probability is 6.6 percent lower for students high in conscientiousness.

Table III: Effect of personality differences on student expectation of school results

| **Dependent variable** | | **Expectation of school results** | | |
|---|---|---|---|---|
| | | (1) | (2) | (3) |
| | | *Decrease* | *Unchanged* | *Increase* |
| Extraversion | *Low* | -0.0253 | -0.0195 | 0.0448 |
| | | (0.0355) | (0.0355) | (0.0289) |
| | *High* | 0.127*** | 0.0296*** | -0.157*** |
| | | (0.0486) | (0.00985) | (0.0532) |
| Agreeableness | *Low* | -0.0331 | -0.0158 | 0.0489 |
| | | (0.0454) | (0.0244) | (0.0695) |
| | *High* | -0.0127 | -0.00514 | 0.0179 |
| | | (0.0513) | (0.0214) | (0.0727) |
| Conscientiousness | *Low* | 0.0380 | 0.0101 | -0.0481 |
| | | (0.0570) | (0.0129) | (0.0697) |
| | *High* | -0.0661* | -0.0426* | 0.109* |
| | | (0.0347) | (0.0254) | (0.0592) |
| Neuroticism | *Low* | 0.0299 | 0.0128 | -0.0426 |
| | | (0.0451) | (0.0175) | (0.0624) |
| | *High* | 0.0295 | 0.0127 | -0.0422 |
| | | (0.0484) | (0.0187) | (0.0670) |
| Openness | *Low* | -0.0310 | -0.0136 | 0.0446 |
| | | (0.0461) | (0.0229) | (0.0689) |
| | *High* | -0.0344 | -0.0156 | 0.0500 |
| | | (0.0417) | (0.0217) | (0.0632) |
| Controls | | Yes | Yes | Yes |
| Class FE | | Yes | Yes | Yes |
| Observations | | 347 | 347 | 347 |

*Note*: Clustered standard errors at class level in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Ordered logistic models with corresponding marginal effects are estimated; Controls include gender, education track, age, language spoken at home, socioeconomic status, knowledge score, and an indicator for household with COVID-19 risk; Average score on personality trait serves as reference category; A low, average, and high score is defined as the percentile score $\leq 25^{th}$ percentile, between the $25^{th}$ and $75^{th}$ percentile, and $> 75^{th}$ percentile, respectively.

### *6.4 Robustness*

We perform two analyses to test the robustness of our results. First, Tables A.V through A.VII in Appendix show that the estimates remain largely robust against the inclusion of control variables and class fixed effects. Second, because we estimate effects on multiple outcomes, this raises the concern of multiple hypothesis testing. To address this issue, we use a conservative two-step method proposed by Benjamini, Krieger, and Yekutieli (2006) and implemented in Stata by Anderson (2008). The method calculates sharpened q-values, which control for the false discovery rate (FDR), i.e., the expected share of Type I errors. Table A.VIII shows that our results are relatively robust to the adjustment, i.e., all estimates significant at the one percent level have q-values of 0.1 or less. However, estimates significant at the five or ten percent level do not have q-values below 0.1. Accordingly, we must interpret these with caution.

## 7. Discussion and conclusion

We contribute to the literature by providing the first analysis of the importance of personality traits in student experiences and expectations of the COVID-19 crisis and long-lasting school closure. Following the Person-Job Fit theory, we based our expectations on the idea that the fit between students'

personalities and the (new) living and learning situation determines their perceptions of the crisis and school closure. In particular, through the lens of the Big Five scheme, we conjectured individuals high in neuroticism or extraversion to be more likely than less harmed by the crisis and school closure, while the reverse would hold for students high in conscientiousness or openness. We tested multiple hypotheses related to students' well-being, remote learning experience, and perception of family and social life, using two unique data sets involving 347 students in 35 Flemish secondary schools.

The results of our paper support our main expectations. In particular, conscientiousness was an important predictor for students' experiences of remote learning. Students high in conscientiousness showed better self-regulation learning strategies, such as time management, than their counterparts. Students having a high score on openness were more likely to help others and to consider the period as an opportunity to invest in personal growth and learn new skills. More extraverted students were found to experience more tensions at home and were more likely to expect a decrease in school results because of the crisis than introverted students did. Finally, in line with our hypotheses (though not robust to the conservative method of controlling for multiple inferences), the results suggested that a high score on neuroticism was associated with an overall negative experience of the crisis and school closure. Collectively, the results thus confirm that, while especially students high in conscientiousness and openness benefited from the crisis and school closure, students high in extraversion and neuroticism were harmed.

One limitation of our study is that we rely on self-reported measures only. Yet, while this could lead to common method bias (i.e., variance that is attributable to the measurement method rather than to the constructs the measures represent), it should be noted that the dependent and independent variables in our model were collected using separate surveys at two different points in time. Moreover, as the personality traits were measured prior to the COVID-19 outbreak, we ensured that student responses were not influenced by the crisis.

Our findings have important implications for the future of education. With COVID-19, schools all over the world were urged to change from a traditional school setting to an online setting using digital tools. The present paper showed the personality-dependent impact remote learning can have on secondary education students. As many believe the change in the way schools are organised is here to stay, policymakers and educators may be able to prevent widening (achievement) gaps in secondary education by addressing the individual differences between students.

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## Appendix

*Appendix A: Tables*

Table A.I: External Validity

| **School characteristic** | **In-sample Schools** | **Out-of-sample Schools** | *p-value* |
|---|---|---|---|
| % low educated mothers | 0.23 | 0.25 | 0.520 |
| % on allowance | 0.29 | 0.30 | 0.591 |
| % non-native | 0.15 | 0.18 | 0.334 |
| % neighborhood high retention | 0.23 | 0.25 | 0.614 |

*Note:* Mean values and *p*-value of each school characteristic are computed using a *t*-test.

Table A.II: Description of Outcome Measures

| **Measure** | **Underlying items** |
|---|---|
| Tensions at home | In the period I did not have to go to school, I regularly argued with my family members. |
| | My family members supported me. (reverse scored) |
| | I feel more connected to my family members than before. (reverse scored) |
| | I was more annoyed with my family members than before. |
| | In the period I did not have to go to school, I regularly received admonishments from my parents. |
| Willing to help | I tried to do things for others (for instance, volunteer work, go to the supermarket for others). |
| Positive experience of remote learning | I managed well to focus on schoolwork every day. |
| | I tried to keep my day well-structured. |
| | In the period I did not have to go to school, I worked every day for school. |
| | In the period I did not have to go to school, I woke up around the same time as I did for school. |
| | Working independently makes me stressed. (reverse scored) |
| | In the period I did not have to go to school, I organised my schoolwork in my own way. |
| Learn new skill | I learned myself new skills (such as a new language, cooking). |
| Miss school life | I liked that we didn't have to go to school for so long. (reverse scored) |
| | In the period I did not have to go to school, I looked forward going back to school. |
| | In the period I did not have to go to school, I looked forward seeing my friends at school. |
| | I liked the period we didn't have to go to school. (reverse scored) |
| Stress from school closure | I am afraid I fell behind in my education. |
| | Not going to school for so long makes me stressed. |
| | In the period I did not have to go to school, I was concerned about the future. |

Table A.III: Comparison of Personality Traits across Studies

| Measure | Present study | | Teppers et al. (2013) | | Mabbe et al. (2016) | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD |
| Extraversion | 4.49 | 1.30 | 4.82 | 1.14 | 4.93 | 1.04 |
| Agreeableness | 5.70 | 0.69 | 5.54 | 0.66 | 5.56 | 0.82 |
| Conscientiousness | 4.60 | 1.11 | 4.00 | 1.19 | 4.32 | 1.23 |
| Neuroticism | 4.14 | 1.14 | 4.11 | 1.07 | 4.08 | 1.16 |
| Openness | 4.60 | 0.91 | 4.63 | 0.89 | 4.72 | 0.94 |

*Note:* The personality traits range from 1 (low) to 7 (high). The present study includes 347 students in 35 Flemish secondary schools ($M_{age}$ = 16.86 years, $SD_{age}$ = 0.96). The sample in Teppers et al. (2013) includes 1388 students from two Flemish secondary schools ($M_{age}$ = 15.72 years, $SD_{age}$ = 1.19). The sample in Mabbe et al. (2016) includes 432 Flemish students ($M_{age}$ = 12.43 years, $SD_{age}$ = 1.13). Note that 'neuroticism' was measured as 'emotional stability' (the inverse) in both studies.

Table A.IV: Correlations between Variables

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Extraversion | | | | | | | | | |
| 2. Agreeableness | 0.19*** | | | | | | | | |
| 3. Conscientiousness | -0.16** | 0.33*** | | | | | | | |
| 4. Neuroticism | -0.33*** | 0.01 | 0.06 | | | | | | |
| 5. Openness | 0.17** | 0.23*** | 0.08 | -0.11* | | | | | |
| 6. Tensions at home | 0.09 | -0.14** | -0.22*** | 0.07 | 0.04 | | | | |
| 7. Willing to help | 0.04 | 0.11* | 0.07 | 0.04 | 0.11* | -0.01 | | | |
| 8. Positive experience of remote learning | -0.05 | 0.09 | 0.27*** | 0.01 | 0.00 | -0.24*** | -0.00 | | |
| 9. Learn new skills | 0.05 | 0.19*** | 0.14* | -0.07 | 0.23*** | -0.06 | 0.16** | 0.19*** | |
| 10. Miss school life | -0.01 | 0.04 | 0.05 | 0.10 | -0.01 | 0.15** | 0.12* | -0.12* | 0.09 |
| 11. Stress from school closure | -0.11* | 0.06 | 0.00 | 0.28*** | -0.02 | 0.22*** | 0.16** | -0.20*** | 0.03 |
| 12. Expectation of school results | -0.12* | -0.01 | 0.09 | 0.02 | -0.05 | -0.04 | -0.02 | 0.17** | -0.01 |
| 13. Female | -0.08 | 0.19*** | 0.25*** | 0.30*** | 0.03 | -0.05 | 0.15** | 0.11* | 0.14** |
| 14. Age | 0.04 | 0.09 | 0.10 | -0.05 | 0.07 | -0.07 | 0.02 | -0.04 | -0.00 |
| 15. Dutch | 0.05 | 0.02 | -0.14** | 0.17** | -0.08 | 0.04 | 0.05 | 0.11* | -0.02 |
| 16. Number of holidays per year | 0.08 | -0.04 | -0.01 | -0.02 | 0.02 | -0.02 | 0.02 | 0.05 | 0.05 |
| 17. Academic track | 0.03 | -0.02 | 0.00 | -0.09 | -0.15** | -0.00 | -0.04 | 0.12* | 0.14* |
| 18. Knowledge score | 0.14** | 0.05 | -0.07 | -0.11* | 0.05 | -0.03 | -0.10 | 0.11* | -0.01 |
| 19. Household with COVID-19 risk | 0.01 | 0.05 | 0.07 | 0.16** | 0.02 | 0.04 | 0.05 | -0.03 | -0.01 |

| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Extraversion | | | | | | | | | |
| 2. Agreeableness | | | | | | | | | |
| 3. Conscientiousness | | | | | | | | | |
| 4. Neuroticism | | | | | | | | | |
| 5. Openness | | | | | | | | | |
| 6. Tensions at home | | | | | | | | | |
| 7. Willing to help | | | | | | | | | |
| 8. Positive experience of remote learning | | | | | | | | | |
| 9. Learn new skills | | | | | | | | | |
| 10. Miss school life | | | | | | | | | |
| 11. Stress from school closure | 0.50*** | | | | | | | | |
| 12. Expectation of school results | -0.07 | -0.17** | | | | | | | |
| 13. Female | 0.19*** | 0.18*** | -0.01 | | | | | | |
| 14. Age | 0.08 | 0.09 | -0.01 | 0.07 | | | | | |
| 15. Dutch | -0.00 | -0.00 | 0.08 | 0.08 | -0.01 | | | | |
| 16. Number of holidays per year | 0.04 | 0.01 | 0.04 | 0.07 | -0.03 | 0.16** | | | |
| 17. Academic track | 0.10 | 0.01 | 0.17** | 0.03 | 0.02 | 0.25*** | 0.28*** | | |
| 18. Knowledge score | -0.07 | -0.21*** | 0.13* | -0.14** | 0.14** | 0.35*** | 0.12* | 0.38*** | |
| 19. Household with COVID-19 risk | -0.04 | 0.11* | -0.07 | 0.04 | 0.01 | 0.06 | -0.02 | -0.06 | -0.01 |

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

Table A.V: Effect of personality differences on student experiences – Gradual inclusion of controls

| **Dependent variable** | | **Tensions at home** | | | **Willingness to help** | | | **Positive experience with distance learning** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Extraversion | *Low* | 0.0183 | 0.00899 | -0.0374 | -0.0360 | -0.0465 | -0.0657* | 0.0954 | 0.0946 | 0.114 |
| | | (0.0942) | (0.100) | (0.118) | (0.0383) | (0.0352) | (0.0378) | (0.0784) | (0.0838) | (0.109) |
| | *High* | 0.377*** | 0.383*** | 0.380*** | 0.0209 | 0.0147 | 0.0213 | 0.0974 | 0.0710 | 0.0227 |
| | | (0.108) | (0.112) | (0.130) | (0.0382) | (0.0440) | (0.0396) | (0.0919) | (0.0925) | (0.104) |
| Agreeableness | *Low* | 0.196** | 0.199** | 0.234** | -0.0174 | -0.00479 | -0.00768 | -0.0372 | -0.00350 | -0.0498 |
| | | (0.0836) | (0.0826) | (0.0956) | (0.0405) | (0.0400) | (0.0439) | (0.105) | (0.0968) | (0.107) |
| | *High* | -0.0549 | -0.0499 | -0.0537 | 0.00997 | -0.00463 | 0.0276 | -0.0336 | -0.0240 | -0.0639 |
| | | (0.0963) | (0.101) | (0.114) | (0.0555) | (0.0531) | (0.0519) | (0.105) | (0.0972) | (0.123) |
| Conscientiousness | *Low* | 0.115 | 0.110 | 0.0720 | -0.0383 | -0.0363 | -0.0703 | -0.198** | -0.240** | -0.118 |
| | | (0.113) | (0.114) | (0.117) | (0.0378) | (0.0427) | (0.0428) | (0.0857) | (0.0905) | (0.0905) |
| | *High* | -0.196** | -0.192** | -0.197* | -0.0169 | -0.00613 | -0.0223 | 0.337*** | 0.334*** | 0.379*** |
| | | (0.0897) | (0.0909) | (0.106) | (0.0369) | (0.0386) | (0.0380) | (0.0909) | (0.0895) | (0.104) |
| Neuroticism | *Low* | -0.234** | -0.233** | -0.246** | -0.108** | -0.0795 | -0.0396 | -0.152 | -0.135 | -0.0841 |
| | | (0.0957) | (0.0949) | (0.101) | (0.0479) | (0.0520) | (0.0528) | (0.117) | (0.106) | (0.117) |
| | *High* | 0.129 | 0.130 | 0.0862 | -0.0832* | -0.0798* | -0.0747 | -0.253*** | -0.236*** | -0.187* |
| | | (0.114) | (0.122) | (0.136) | (0.0504) | (0.0483) | (0.0483) | (0.0837) | (0.0784) | (0.0936) |
| Openness | *Low* | 0.0153 | -0.00309 | -0.0403 | -0.102** | -0.0946** | -0.130*** | -0.0336 | -0.0297 | -0.0133 |
| | | (0.0824) | (0.0823) | (0.0963) | (0.0408) | (0.0420) | (0.0455) | (0.0873) | (0.0912) | (0.107) |
| | *High* | 0.162 | 0.178 | 0.181 | 0.0105 | 0.0167 | -0.0472 | -0.0647 | -0.0428 | -0.0724 |
| | | (0.115) | (0.115) | (0.141) | (0.0543) | (0.0544) | (0.0543) | (0.108) | (0.112) | (0.119) |
| Female | | | -0.0819 | -0.144 | | 0.0537 | 0.0543 | | 0.174* | 0.195* |
| | | | (0.0709) | (0.0867) | | (0.0368) | (0.0389) | | (0.0893) | (0.113) |
| Academic track | | | 0.0722 | -0.467 | | -0.00943 | 0.203*** | | 0.0577 | 0.258 |
| | | | (0.117) | (0.282) | | (0.0483) | (0.0336) | | (0.0957) | (0.276) |
| Age | | | -0.0245 | -0.0418 | | 0.0137 | 0.0343 | | -0.0644 | -0.0187 |
| | | | (0.0425) | (0.0778) | | (0.0216) | (0.0310) | | (0.0405) | (0.0625) |
| Knowledge score | | | -0.0162 | -0.00730 | | -0.0162** | -2.01e-05 | | 0.0294* | 0.0106 |
| | | | (0.0160) | (0.0187) | | (0.00719) | (0.00897) | | (0.0165) | (0.0189) |
| Dutch | | | 0.0170 | -0.247 | | 0.0916 | 0.102 | | 0.164 | 0.129 |
| | | | (0.122) | (0.177) | | (0.0628) | (0.0688) | | (0.123) | (0.148) |
| Holidays_1 time | | | -0.0503 | -0.0634 | | -0.117 | -0.114 | | -0.0322 | -0.0337 |
| | | | (0.128) | (0.151) | | (0.0846) | (0.0983) | | (0.183) | (0.232) |
| Holidays_2 times | | | -0.00952 | -0.0321 | | -0.0388 | -0.0332 | | -0.0304 | -0.0186 |
| | | | (0.122) | (0.124) | | (0.0854) | (0.0951) | | (0.170) | (0.199) |
| Holidays_3 times | | | 0.0543 | -0.00165 | | -0.0404 | -0.0249 | | -0.0291 | -0.0759 |
| | | | (0.129) | (0.158) | | (0.0901) | (0.107) | | (0.146) | (0.194) |
| Holidays_more than 3 times | | | -0.111 | -0.131 | | -0.0586 | -0.0475 | | -0.00563 | -0.0258 |
| | | | (0.158) | (0.195) | | (0.0962) | (0.110) | | (0.166) | (0.201) |

*Table A.V Continued: Effect of personality differences on student experiences – Gradual inclusion of controls*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Household with COVID-19 risk | | 0.0281 | 0.0428 | | 0.0190 | 0.0184 | | -0.0566 | -0.0565 |
| | | (0.102) | (0.115) | | (0.0469) | (0.0496) | | (0.115) | (0.128) |
| Class FE | No | No | Yes | No | No | Yes | No | No | Yes |
| Observations | 347 | 347 | 347 | 347 | 347 | 347 | 347 | 347 | 347 |

*Note:* Table shows estimates from three model specifications for each outcome variable; Clustered standard errors at class level in parentheses; *** p<0.01, ** p<0.05, * p<0.1; OLS models are estimated in columns 1 to 3 and 7 to 9, ordered logistic models with corresponding marginal effects for the category 'agree' in columns 4 to 6; Average score and zero times serve as reference categories for the personality traits and number of holidays per year, respectively; A low, average, and high score is defined as the percentile score ≤ $25^{th}$ percentile, between the $25^{th}$ and $75^{th}$ percentile, and > $75^{th}$ percentile, respectively.

Table A.VI: Effect of personality differences on student experiences – Gradual inclusion of controls

| **Dependent variable** | | **Learn new skills** | | | **Miss school life** | | | **Stress from school closure** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Extraversion | *Low* | 0.0373 | 0.0378 | 0.0375 | -0.0837 | -0.0912 | -0.0938 | -0.133 | -0.139 | -0.304** |
| | | (0.0236) | (0.0239) | (0.0256) | (0.109) | (0.107) | (0.128) | (0.119) | (0.113) | (0.130) |
| | *High* | 0.0549* | 0.0611* | 0.0725** | 0.0784 | 0.153 | 0.205* | -0.115 | -0.0673 | -0.0539 |
| | | (0.0330) | (0.0328) | (0.0286) | (0.123) | (0.118) | (0.119) | (0.147) | (0.138) | (0.156) |
| Agreeableness | *Low* | -0.0391 | -0.0361 | -0.0129 | -0.0675 | -0.0513 | -0.0704 | 0.0398 | 0.0188 | 0.0162 |
| | | (0.0385) | (0.0373) | (0.0383) | (0.102) | (0.107) | (0.115) | (0.127) | (0.140) | (0.163) |
| | *High* | 0.0280 | 0.0293 | 0.0277 | -0.0626 | -0.104 | -0.0607 | 0.181 | 0.106 | 0.123 |
| | | (0.0292) | (0.0297) | (0.0289) | (0.135) | (0.135) | (0.139) | (0.123) | (0.111) | (0.132) |
| Conscientiousness | *Low* | -0.0354 | -0.0325 | -0.0531 | -0.209* | -0.188 | -0.160 | -0.0743 | -0.00456 | -0.0993 |
| | | (0.0351) | (0.0326) | (0.0346) | (0.121) | (0.125) | (0.136) | (0.128) | (0.132) | (0.163) |
| | *High* | 0.0144 | 0.0109 | 0.00542 | -0.153 | -0.142 | -0.117 | -0.265** | -0.247** | -0.228* |
| | | (0.0322) | (0.0312) | (0.0275) | (0.110) | (0.101) | (0.114) | (0.108) | (0.0991) | (0.114) |
| Neuroticism | *Low* | 0.0122 | 0.00859 | 0.0256 | -0.101 | -0.143 | -0.213* | -0.239* | -0.205 | -0.241* |
| | | (0.0272) | (0.0275) | (0.0270) | (0.115) | (0.0950) | (0.114) | (0.140) | (0.136) | (0.139) |
| | *High* | -0.0512 | -0.0352 | 6.30e-05 | 0.128 | 0.155 | 0.136 | 0.461*** | 0.472*** | 0.432** |
| | | (0.0425) | (0.0442) | (0.0437) | (0.150) | (0.132) | (0.162) | (0.164) | (0.138) | (0.175) |
| Openness | *Low* | -0.111*** | -0.118*** | -0.119*** | 0.0190 | 0.0326 | 0.0263 | 0.00371 | 0.0661 | 0.0224 |
| | | (0.0429) | (0.0454) | (0.0414) | (0.104) | (0.100) | (0.109) | (0.0894) | (0.0877) | (0.0963) |
| | *High* | 0.00740 | 0.00874 | -0.00141 | 0.0133 | 0.0547 | -0.00722 | 0.0815 | 0.159 | 0.0553 |
| | | (0.0272) | (0.0259) | (0.0262) | (0.135) | (0.120) | (0.134) | (0.112) | (0.105) | (0.112) |
| Female | | | 0.0535* | 0.0523 | | 0.297*** | 0.215** | | 0.207** | 0.176* |
| | | | (0.0309) | (0.0330) | | (0.0910) | (0.0921) | | (0.0881) | (0.104) |
| Academic track | | | 0.0893** | 0.132* | | 0.241* | 0.0229 | | 0.265** | 1.007*** |
| | | | (0.0405) | (0.0672) | | (0.128) | (0.277) | | (0.131) | (0.261) |
| Age | | | -0.00877 | -0.0215 | | 0.0839 | 0.0750 | | 0.138** | 0.228** |
| | | | (0.0142) | (0.0223) | | (0.0632) | (0.0936) | | (0.0518) | (0.0954) |
| Knowledge score | | | -0.00316 | -0.00195 | | -0.0376* | -0.00535 | | -0.0911*** | -0.0317 |
| | | | (0.00581) | (0.00714) | | (0.0196) | (0.0235) | | (0.0179) | (0.0288) |
| Dutch | | | -0.0280 | 0.0736 | | -0.0693 | -0.0104 | | 0.0635 | 0.279 |
| | | | (0.0384) | (0.0708) | | (0.121) | (0.161) | | (0.161) | (0.198) |
| Holidays_1 time | | | 0.0476 | 0.0761 | | 0.103 | 0.105 | | 0.103 | 0.105 |
| | | | (0.0492) | (0.0579) | | (0.156) | (0.160) | | (0.195) | (0.231) |
| Holidays_2 times | | | 0.0464 | 0.0640 | | 0.112 | 0.0359 | | 0.0535 | 0.0361 |
| | | | (0.0437) | (0.0537) | | (0.169) | (0.159) | | (0.233) | (0.269) |
| Holidays_3 times | | | 0.0346 | 0.0554 | | 0.389** | 0.361* | | 0.120 | 0.110 |
| | | | (0.0550) | (0.0664) | | (0.175) | (0.201) | | (0.213) | (0.289) |
| Holidays_more than 3 times | | | 0.0170 | -0.00673 | | -0.0110 | -0.0990 | | 0.0928 | 0.0946 |
| | | | (0.0499) | (0.0685) | | (0.200) | (0.212) | | (0.195) | (0.253) |

*Table A.VI Continued: Effect of personality differences on student experiences – Gradual inclusion of controls*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Household with COVID-19 risk | | -0.0134 | -0.0147 | | -0.116 | -0.138 | | 0.172 | 0.114 |
| | | (0.0251) | (0.0288) | | (0.104) | (0.115) | | (0.104) | (0.104) |
| Class FE | No | No | Yes | No | No | Yes | No | No | Yes |
| Observations | 347 | 347 | 347 | 347 | 347 | 347 | 347 | 347 | 347 |

*Note:* Table shows estimates from three model specifications for each outcome variable; Clustered standard errors at class level in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Ordered logistic models with corresponding marginal effects for the category 'agree' in columns 1 to 3; OLS models are estimated in columns 4 to 9; Average score and zero times serve as reference categories for the personality traits and number of holidays per year, respectively; A low, average, and high score is defined as the percentile score ≤ 25$^{th}$ percentile, between the 25$^{th}$ and 75$^{th}$ percentile, and > 75$^{th}$ percentile, respectively.

Table A.VII: Effect of personality differences on student expectations – Gradual inclusion of controls

| **Dependent variable** | | **Expectation of school results** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *Decrease* | | | *Unchanged* | | | *Increase* | | |
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Extraversion | *Low* | -0.00315 | -0.00626 | -0.0253 | -0.00232 | -0.00464 | -0.0195 | 0.00547 | 0.0109 | 0.0448 |
| | | (0.0299) | (0.0298) | (0.0355) | (0.0221) | (0.0223) | (0.0289) | (0.0519) | (0.0520) | (0.0643) |
| | *High* | 0.0939** | 0.102** | 0.127*** | 0.0348** | 0.0356** | 0.0296*** | -0.129** | -0.138*** | -0.157*** |
| | | (0.0414) | (0.0421) | (0.0486) | (0.0151) | (0.0140) | (0.00985) | (0.0513) | (0.0511) | (0.0532) |
| Agreeableness | *Low* | -0.000495 | -0.0109 | -0.0331 | -0.000271 | -0.00573 | -0.0158 | 0.000766 | 0.0166 | 0.0489 |
| | | (0.0420) | (0.0412) | (0.0454) | (0.0230) | (0.0224) | (0.0244) | (0.0650) | (0.0636) | (0.0695) |
| | *High* | 0.0135 | -0.000116 | -0.0127 | 0.00666 | -5.65e-05 | -0.00514 | -0.0201 | 0.000173 | 0.0179 |
| | | (0.0430) | (0.0439) | (0.0513) | (0.0204) | (0.0214) | (0.0214) | (0.0633) | (0.0653) | (0.0727) |
| Conscientiousness | *Low* | 0.0223 | 0.0319 | 0.0380 | 0.00790 | 0.0106 | 0.0101 | -0.0302 | -0.0425 | -0.0481 |
| | | (0.0491) | (0.0500) | (0.0570) | (0.0167) | (0.0149) | (0.0129) | (0.0656) | (0.0645) | (0.0697) |
| | *High* | -0.0637** | -0.0644** | -0.0661* | -0.0442** | -0.0450** | -0.0426* | 0.108** | 0.109** | 0.109* |
| | | (0.0284) | (0.0291) | (0.0347) | (0.0197) | (0.0220) | (0.0254) | (0.0460) | (0.0497) | (0.0592) |
| Neuroticism | *Low* | -0.0149 | -0.00393 | 0.0299 | -0.00865 | -0.00210 | 0.0128 | 0.0235 | 0.00604 | -0.0426 |
| | | (0.0346) | (0.0412) | (0.0451) | (0.0212) | (0.0223) | (0.0175) | (0.0558) | (0.0635) | (0.0624) |
| | *High* | 0.0178 | 0.0129 | 0.0295 | 0.00817 | 0.00611 | 0.0127 | -0.0260 | -0.0190 | -0.0422 |
| | | (0.0433) | (0.0444) | (0.0484) | (0.0182) | (0.0201) | (0.0187) | (0.0614) | (0.0645) | (0.0670) |
| Openness | *Low* | -0.0360 | -0.0254 | -0.0310 | -0.0203 | -0.0130 | -0.0136 | 0.0563 | 0.0383 | 0.0446 |
| | | (0.0403) | (0.0391) | (0.0461) | (0.0267) | (0.0222) | (0.0229) | (0.0666) | (0.0612) | (0.0689) |
| | *High* | -0.0129 | -0.0246 | -0.0344 | -0.00614 | -0.0125 | -0.0156 | 0.0191 | 0.0371 | 0.0500 |
| | | (0.0413) | (0.0398) | (0.0417) | (0.0207) | (0.0223) | (0.0217) | (0.0619) | (0.0619) | (0.0632) |
| Female | | | -0.00146 | 0.0149 | | -0.000736 | 0.00657 | | 0.00220 | -0.0214 |
| | | | (0.0373) | (0.0470) | | (0.0187) | (0.0210) | | (0.0560) | (0.0679) |
| Academic track | | | -0.0782** | 0.0995 | | -0.0386** | 0.0390 | | 0.117** | -0.138 |
| | | | (0.0309) | (0.106) | | (0.0169) | (0.0330) | | (0.0457) | (0.139) |
| Age | | | 0.0105 | 0.0205 | | 0.00529 | 0.00897 | | -0.0158 | -0.0295 |
| | | | (0.0149) | (0.0277) | | (0.00772) | (0.0120) | | (0.0225) | (0.0396) |
| Knowledge score | | | -0.00974 | -0.00858 | | -0.00490 | -0.00375 | | 0.0146 | 0.0123 |
| | | | (0.00611) | (0.00778) | | (0.00332) | (0.00349) | | (0.00929) | (0.0112) |
| Dutch | | | -0.0474 | -0.0678 | | -0.0189 | -0.0198 | | 0.0663 | 0.0877 |
| | | | (0.0541) | (0.0873) | | (0.0157) | (0.0144) | | (0.0692) | (0.101) |
| Holidays_1 time | | | -0.0482 | -0.0477 | | -0.0222 | -0.0138 | | 0.0704 | 0.0615 |
| | | | (0.0631) | (0.0869) | | (0.0293) | (0.0253) | | (0.0915) | (0.111) |
| Holidays_2 times | | | -0.0439 | -0.0677 | | -0.0195 | -0.0241 | | 0.0634 | 0.0918 |
| | | | (0.0499) | (0.0582) | | (0.0221) | (0.0190) | | (0.0706) | (0.0730) |
| Holidays_3 times | | | -0.0109 | -0.0264 | | -0.00366 | -0.00600 | | 0.0145 | 0.0324 |
| | | | (0.0556) | (0.0729) | | (0.0184) | (0.0155) | | (0.0739) | (0.0880) |
| Holidays_more than 3 times | | | -0.0244 | -0.0544 | | -0.00925 | -0.0169 | | 0.0337 | 0.0713 |
| | | | (0.0548) | (0.0672) | | (0.0196) | (0.0180) | | (0.0741) | (0.0835) |

*Table A.VII Continued: Effect of personality differences on student expectations – Gradual inclusion of controls*

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Household with COVID-19 risk | | 0.0280 | 0.00952 | | 0.0133 | 0.00407 | | -0.0413 | -0.0136 |
| | | (0.0400) | (0.0447) | | (0.0177) | (0.0185) | | (0.0575) | (0.0632) |
| Class FE | No | No | Yes | No | No | Yes | No | No | Yes |
| Observations | 347 | 347 | 347 | 347 | 347 | 347 | 347 | 347 | 347 |

*Note:* Table shows estimates from three model specifications for each outcome category; Clustered standard errors at class level in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Ordered logistic models with corresponding marginal effects are estimated; Average score and zero times serve as reference categories for the personality traits and number of holidays per year, respectively; A low, average, and high score is defined as the percentile score $\leq 25^{th}$ percentile, between the $25^{th}$ and $75^{th}$ percentile, and $> 75^{th}$ percentile, respectively.

Table A.VIII: Significant results –
Original *p*-values and FDR-adjusted *q*-values

| **Table and Column Number** | | | |
|---|---|---|---|
| **II** (1-2) | **II** (3-4) | **II** (5-6) | **III** (1-2-3) |
| 0.380*** | 0.379*** | 0.205* | 0.127*** |
| *0.005* | *0.001* | *0.092* | *0.009* |
| [0.078] | [0.078] | [0.488] | [0.122] |
| 0.234** | -0.187* | -0.213* | -0.0661* |
| *0.018* | *0.050* | *0.066* | *0.057* |
| [0.155] | [0.397] | [0.427] | [0.422] |
| -0.197* | 0.0725** | -0.304** | 0.0296*** |
| *0.069* | *0.011* | *0.023* | *0.003* |
| [0.427] | [0.131] | [0.179] | [0.078] |
| -0.246** | -0.119*** | -0.228* | -0.0426* |
| *0.018* | *0.004* | *0.051* | *0.093* |
| [0.155] | [0.078] | [0.397] | [0.488] |
| -0.0657* | | -0.241* | -0.157*** |
| *0.082* | | *0.088* | *0.003* |
| [0.488] | | [0.488] | [0.078] |
| -0.130*** | | 0.432** | 0.109* |
| *0.004* | | *0.017* | *0.066* |
| [0.078] | | [0.155] | [0.427] |

*Note*: The table aggregates all statistically significant estimates at the 10 percent level or better. Regression coefficients are in plain text, unadjusted *p*-values in italics, and sharpened *q*-values in square brackets.