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Students' perspectives on their academic achievement during the Covid-19 pandemic: Learner autonomy, school satisfaction and adult support

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ABSTRACT

Distance education, used to contain the spread of Covid-19 in 2020, radically altered adolescents' learning experiences and affected their academic achievements. Based on a survey with adolescents aged 12–16 in Luxembourg, this study investigates the differences the 332 adolescents perceived in schoolwork when learning at school and from home during the pandemic in 2021, as well as predictors of their reported academic achievement. The findings show that the participants perceived their work as less interesting or useful and more difficult while learning from home and that the main predictors of their academic achievements were school achievements before the pandemic, school satisfaction, learner autonomy, and the ways that adults listen to them. Teacher and parent support played a subordinate role.

1. Introduction

Shortly after the first Covid-19 lockdowns in 2020, schools around the world were forced to close. The length of the closures varied between countries, averaging 79 days, with schools opening sooner in higher income countries than in countries of middle and lower income (OECD, 2021). The distance education put in place drastically changed children's and adolescents' learning experiences. During the first wave of the pandemic in 2020, teachers in many high-income countries frequently made use of online platforms and offered asynchronous and, more rarely, synchronous lessons (see Kirsch et al., 2021, for an overview). In low- and middle-income countries, governments tended to offer remote learning via TV and radio (OECD, 2021). Teachers gained experience with distance education and, therefore, were better prepared for the second lockdown in Winter 2020. As a result, 26% of children in Germany had access to daily online instruction compared to 6% in the first lockdown (Bujard et al., 2021). Independently of the country, distance education was more limited for children of disadvantaged than advantaged backgrounds and the learning gap between children increased.

Results of large-scale assessment tests in Europe, the USA and China demonstrate that students tended to perform less well in mathematics, reading competence and languages in 2020 (Blainey et al., 2020; Engzell et al., 2021; Maldonado & De Witte, 2020; OECD, 2021; Tomasik et al., 2020). The learning loss was higher for younger children and

particularly high for children of less affluent families with an ethnic minority background or who did not speak the national language(s) (Blainey et al., 2020; Bujard et al., 2021; Engzell et al., 2021; Maldonado & De Witte, 2020; OECD, 2021; Panagouli et al., 2021). Furthermore, there were differences between high-achieving and lower-achieving students, with the former tending to maintain their performances or improve on them, and the latter to suffer learning loss. Evaluations of studies in Germany, the Netherlands, Switzerland, the USA, China and Luxembourg in 2021 confirm that these trends persisted over time (Fischbach et al., 2021; Hammerstein et al., 2021).

Many large-scale assessment studies, particularly after the first year of the pandemic, showed that student outcomes were influenced by sociodemographic factors, which in turn also affected the learners' access to educational resources as well as the support offered by teachers and parents (Engzell et al., 2021; Maldonado & De Witte, 2020; Tomasik et al., 2020). Studies that investigate predictors based on self-reported learning outcomes are rarer (Helm & Huber, 2022). One example based on student questionnaires is the study by Huber and Helm (2020) who identified the important role of student autonomy. Student satisfaction has also been found to be related to school achievement both in studies on school climate (Daily et al., 2020; Samdal et al., 1999) and the quality of distant education (Eom et al., 2006; Gopal, Singh, & Aggarwal, 2020; Huber & Helm, 2020; Kucuk & Richardson, 2019; Steinmayr et al., 2021). Finally, positive and negative emotions such as anxiety have been shown to predict performance (Giusti et al., 2021; Huber &

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Helm, 2020).

The present paper of the project COVID-Kids II examines students' perceptions of the differences between their learning experiences at home and at school during the ongoing pandemic in 2021 in Luxembourg as well as correlates and predictors of their reported school achievements. It draws on survey data from 332 secondary-school participants aged 12 to 16, that sought to collect insights into how these students experienced learning both at school and with distance education from home, at times when schools were closed or students in isolation, and how they perceived their school achievements in 2021, a year with ongoing changes regarding their learning environment. The hypotheses were that (1) the students' perceptions of their schoolwork (content, quality, quantity) differed according to whether they were working at school or at home and (2) learner autonomy, school satisfaction, positive and negative feelings, and adult support influenced and predicted the students' reported school achievements. As satisfaction and emotions are the cognitive and affective dimensions of subjective well-being (Diener et al., 2018; Engel et al., 2021), the present study also explores the achievements of secondary students in the light of well-being. It thereby builds on a previous study on adolescents' learning experiences during the pandemic in Luxembourg, Germany and Brazil, that found that, among other aspects, the volume, difficulty, and content of schoolwork and the satisfaction with the ways that adults listen to children correlated with their subjective well-being (Engel et al., 2021).

The present study aims to contribute to an emerging body of literature that seeks to shed light on the students' views of their school achievements and learning experiences. Asking children and adolescents directly about their learning experiences and performance is important as adults do not comprehend the children's experiences, emotions, and behavior in the same way as children (Ben-Arieh, 2010; Bousselin, 2022; Helm & Huber, 2022). Studies that consider the learners' perspectives could contribute to our understanding of performance, guide the provision of teaching support and enhance the effectiveness of mediation programs.

2. Context of the study

Luxembourg is a small trilingual country in the West of Europe, bordering France, Belgium and Germany. Less than two weeks after seeing the first case of Covid-19 in Luxembourg, the government called for a lockdown and closed schools from 16th March 2020. From May 2020 onwards, students of different grades gradually returned to school with strict social and physical prevention measures in place such as the wearing of a mask, sanitization, regulation of movement in the corridors and aeration of rooms.

2.1. Covid-19 policies for schools in 2020-21 in Luxembourg

After the summer holidays in 2020, the Education Ministry adopted additional measures which allowed regions and schools to react quickly in line with the infection rates. The new approach had three, later four, scenarios that defined the severity of the infection rates at school with scenario 1 referring to unique cases of infection in one class, attributable to one unique cause, and scenario 4 to clusters. Depending on the scenario, one child or a whole class was quarantined (while still allowed to attend school) or a school was closed. Distance education was in place for students who could not attend school, for instance, because they were in isolation for 10 days following a Covid-19 infection, because their whole class was isolated or their school closed. The number of infections was closely monitored by the Ministries of Education and Health as well as schools. All schools were closed for two weeks in Winter 2020 owing to the high infection rates which led to a second lockdown in much of Europe. The social and physical distancing measures were progressively lifted from January 2021, but many remained in place during the data collection in June 2021.

The Luxembourgish case may be unique for several reasons. Firstly, owing to the small size of the country, flexible measures were put in place which enabled the school management to react quickly and ensure that a maximum number of students were able to attend school. Second, most families in this high-income country have access to digital resources (DESI, 2021) and schools are well resourced which may explain why lack of resources was rarely mentioned as being an issue. Third, the Luxembourgish student population is highly heterogeneous, and students face particular challenges in the multilingual schools which affect their academic achievement. About a 64% of the students do not speak Luxembourgish at home and many are bilingual but not necessarily in the state schools' languages of instructions, German and French (MENJE, 2021). While some studies evaluated the students' achievements in several subjects during the pandemic, few investigated the predictors of learning outcomes.

2.2. Relevant empirical studies in Luxembourg

Large-scale assessment tests in Luxembourg Autumn 2020 and 2021 showed that the students' academic results depended on the type of state secondary education. The Year 9 students in the secondary classic education performed similarly to previous years. By contrast, the Year 9 students in general secondary education and vocational education performed less well in 2021 than in 2020, and in 2020, underachieved in mathematics as well as in German and French reading comprehension compared to the students in 2019 (University of Luxembourg & LUCET, 2022). Little is known on the performances of students in private schools.

The results of the COVID-Kids II survey (Kirsch et al., 2022) from which the present paper continues, indicated a significant difference in the reported scores on performance before the pandemic ($M = 3,30$, $SD = 0,78$) and after the pandemic ($M = 3,18$, $SD = 0,80$): $t(326) = 2,26$, $p < .05$). Almost half of the students (46%) reported doing well or very well at school before the pandemic but only 39% mentioned doing well or very well in 2021. The participants, particularly girls, also reported negative emotions and worries: 32% of all adolescents indicated being frequently or very frequently sad, anxious, lonely or bored and 46% being worried or very worried of falling behind at school. At the same time, 75% of the participants reported being satisfied or very satisfied with school and 71% agreed or strongly agreed that they had been well prepared for distance education. Nevertheless, 96% indicated that learning at school was more effective than learning with distance education from home.

The participants mentioned a range of support structures at school and at home. The teachers were reported frequently or very frequently giving synchronous online classes (reported by 85.5% of adolescents), giving explanations (69.3%) and checking that the work was completed (67.7%). Fewer teachers were reported giving feedback. About a quarter of the participants indicated that their teachers advised on learning strategies and 25% that they asked about the students' well-being. As for the parents, a third of them was reported to help with the completion of schoolwork or check if it had been completed, and a third to teach additional topics. Furthermore, about a quarter of the adolescents indicated that their parents helped with the organization of schedules and facilitated communication with teachers and peers.

Having identified the dip in students' self-reported performance scores, the positive and negative feelings and the range of support offered by teachers and parents (Kirsch et al., 2022), the current study from the project COVID-Kids II presents the students' perceptions of their schoolwork as well as the predictors of their academic achievement. Given the paucity of data emerging from private schools, it opted to recruit participants from state and private schools. Of the approximately 23,000 secondary students aged 12–16, 18% attended one of the 14 private schools in Luxembourg where there are fewer languages of instruction (MENJE, 2021). Of these, five follow the Luxembourg national curriculum, the remainder independent curricula. The private

schools attract student populations with highly diverse educational and linguistic needs, aspirations and social economic backgrounds and have fees structures ranging from free to thousands of euros per year.

3. Correlates and predictors of school achievements

Owing to the predicted, and later confirmed learning losses, studies investigated factors that influenced or predicted academic achievement. Frequently reported aspects were demographic and socioeconomic variables (e.g. age, gender) and access to resources (Helm, 2020; Panagouli et al., 2021). Among the influential learner variables are student engagement (Steinmayr et al., 2021), self-reported learning time (Huber & Helm, 2020), subject-specific and interdisciplinary skills and the ability to use digital tools (Züchner & Jäkel, 2021), as well as positive and negative emotions (Huber & Helm, 2020). They all seem to influence learner autonomy. Contextual predictors identified include, for instance, the quality of distance education (Steinmayr et al., 2021; Züchner & Jäkel, 2021) and parental support (Huber & Helm, 2020) although the latter correlated negatively with student achievement.

The present study will explore learner-related dimensions as well as support structures in line with the “offer-and-use-model” (Helmke, 2015) used in the German research tradition. This model is based on a pedagogical-psychological perspective of learning which understands learning as mediated by students’ perspective on instruction as well as motivational, volitional, emotional, and social processes (see Helm & Huber, 2022). To take account of students’ own views and identify a range of possible predictors, the present study considered empirical work in several fields.

- Studies on students’ self-reported learning experiences during the Covid-19 pandemic
- School satisfaction and school climate
- School satisfaction and emotions in the field of well-being
- Studies on distance education prior to the pandemic

In what follows, three of the most influential predictors explored in the present study are presented: learner autonomy, school satisfaction, and teacher support.

3.1. Learner autonomy

Based on a survey completed by almost 8500 students in Germany, Austria and Switzerland during the pandemic in 2020, Huber and Helm (2020) calculated the predictors of their learning outcomes which they defined as self-rated learning achievement, effort, and motivation. This study was of particular importance for the present article as it was one of few that calculated predictors based on reported achievements and considered a wide range of correlates based on the students’ answers. The authors found that learner autonomy and teacher support were more influential than access to technical resources at home and parental support. Autonomy was related to a range of aspects such as the ability to regulate emotions (Huber et al., 2020), self-motivate (Huber et al., 2020; Wößmann et al., 2021), and organize work (Huber et al., 2020; Wößmann et al., 2021). These factors appear to be interconnected. Furthermore, Huber and Helm (2020) demonstrated that the interplay between learner autonomy and the children’s perceptions of the educational offer at school and at home, predicted academic achievements. Learner autonomy also emerged as the most significant predictor of achievement across the three surveys completed by the secondary students, teachers and parents in Germany and Austria (Helm & Huber, 2022).

3.2. School satisfaction

Studies in positive psychology show that satisfaction influences academic achievements (Daily et al., 2020; Samdal et al., 1999; Suldo

et al., 2014) while, in turn, learning outcomes also affect school satisfaction (Thapa et al., 2013). School satisfaction and life satisfaction, which are cognitive evaluations of subjective well-being, also correlate with affective dimensions of well-being, thus, positive and negative emotions (Bousselin, 2022). While studies in positive psychology found correlations between satisfaction and emotions, studies within the framework of school climate relate satisfaction to the learning environment.

“School climate”, a framework developed in the United States, is an ecological construct that connects various dimensions of school such as organizational structures (e.g. allowing for safety and protection); teaching and learning practices (e.g. allowing for participation and engagement); types of relationships between teachers, students and parents (e.g. facilitating interactions and autonomy), and a sense of shared values and connectedness (Rathmann et al., 2018; Zullig et al., 2011, 2018). Insights from studies on school climate are relevant for the present paper as many aspects of educational provision radically changed during the pandemic, for instance the possible interactions and rules related to safety of the physical environment. While researchers have consistently shown associations between school climate and academic achievements (Berkovitz et al., 2016), most identified predictors of school satisfaction of which the most widely reported are academic support (Suldo et al., 2008; Zullig et al., 2011, 2018), school connectedness (Zullig et al., 2011, 2018), positive student–teacher relationships (Wong & Sui, 2017; Zullig et al., 2011, 2018), opportunities for school engagement (Zullig et al., 2018) and order and discipline (Wong & Sui, 2017; Zullig et al., 2011, 2018).

3.3. Teacher support

Several aspects of teacher support offered to students during the pandemic have been reported in the literature: the quality of distance education (Steinmayr et al., 2021; Züchner & Jäkel, 2021); contact time with the teacher and teacher feedback (Huber & Helm, 2020; Steinmayr et al., 2021), the quality, quantity and frequency of schoolwork (Engel et al., 2021; Huber & Helm, 2020; Köller et al., 2020); teacher-student relationships (Huber & Helm, 2020) as well as the safety of the learning environment (Zhang et al., 2020). These results are in line with some findings in the field of distance learning which underline the complex interplay between student variables, learning environment and teacher support.

Studies on distance education demonstrated that learning outcomes were predicted by student satisfaction which, in turn, was influenced by the learning environment, course design, and teacher support (Eom et al., 2006; Gopal et al., 2020; Kucuk & Richardson, 2019). Several types of teacher support were identified. Firstly, supporting children’s subjective well-being and autonomy was shown to influence their ability to learn independently as well as their motivation, which, in turn, affected achievement (Rathmann et al., 2018). Second, learning outcomes depend on quality interactions (Donham et al., 2022; Moore, 2020) as well as prompt feedback (Eom et al., 2006) and clear instructions. Finally, the teachers’ social presence has been related to learning (d’Alessio et al., 2019).

During the Covid-19 pandemic, parent support was documented in a range of studies (Bonaf & González, 2020; Huber et al., 2020; Kirsch et al., 2021, 2022; Köller et al., 2020) but was negatively correlated with academic achievement (Huber & Helm, 2020; Züchner & Jäkel, 2021).

3.4. Summary

This literature review has shown that learning outcomes during (and before the pandemic) are influenced by a range of factors including demographic variables, learner-related dimensions (e.g. autonomy); cognitive and affective dimensions of well-being (i.e. school satisfaction and emotions) as well as teacher and parent support. Many of the above-mentioned studies were conducted during the first and, at times, a

second lockdown in 2020 and, therefore, it remains unclear how learning continued to be affected in the ongoing pandemic in 2021. Furthermore, few studies considered the adolescents' perspectives by asking them directly about their learning experiences and computing predictors of school achievement. Finally, few studies explored the relationship between students' reported learning outcomes and their subjective well-being during the pandemic. Students' well-being has been emphasized as a key to learning in many educational programs in the last two years.

The present study with adolescents aged 12 to 16, which addresses these research gaps and continues from earlier work (Kirsch et al., 2021, 2022), aims to explore the influence of a range of factors on the students' learning outcomes. The following hypotheses guide the study.

1. The students' perceptions of their schoolwork (content, quality & quantity) differ based on the experience of working at school or engaging in homeschooling at times when they could not go to school.
2. The reported school achievements are predicted by learner autonomy, school satisfaction, positive and negative feelings, as well as teacher support.

4. Methodology

The present paper reports on a quantitative survey of the adolescents aged 12–16 in Luxembourg. Participation was voluntary, and anonymous. The study was approved by the University of Luxembourg Ethics Review Panel and complied with the European Union's General Data Protection Regulation.

4.1. Participants

Convenient sampling of parents/guardians and educators was used to recruit a diverse range of secondary school-age children to take part in the project. Diversity was sought in terms of school type (i.e. state, private), socioeconomic status (based on the International Standard classification of Occupations ISCO 08 and the International Socio-Economic Index of Occupational Status ISEI-08), and language and cultural characteristics. The head teachers of the 14 private schools in Luxembourg were asked and to invite their students to complete either the online questionnaire or a pen-and-paper version (if students preferred) at home. Information about the project was also disseminated on social media platforms (see 4.2).

A total of 365 secondary school students aged 12–16 participated in the survey, of which 329 completed the online questionnaire and 36 the pen-and-paper version. Questionnaires were excluded if participants: a) did not meet the age criterion, b) missed more than 50% of the questions in the entire questionnaire, and c) omitted answering questions on school satisfaction and performance. Furthermore, participants who completed the online questionnaire were excluded if they had spent fewer than 8 min completing the answers. On average, the online-survey took the participants 30 min to complete. A total of 332 questionnaires (completion rate 90.95%.) were analyzed.

The participants' ages ranged from 12 to 16 years old ($M_{age} = 14.41$, $SD = 1.41$) and 70% were females. They came from urban (44%) and rural areas (56%), reported various linguistic backgrounds (37% French, 30% German, 10% English, 13% Luxembourgish, and 10% Portuguese) and indicated diverse educational backgrounds of their parents (35% secondary school or less, 65% a 4-year university degree). The provided information on caretakers' occupational backgrounds enabled us to establish the socioeconomic status (SES) based on the International Standard classification of Occupations ISCO 08 and the International Socio-Economic Index of Occupational Status (ISEI-08, Ganzeboom, 2010). The ISEI was categorized into three groups; low (64–89), medium (38–63) and high (1–37). More than half of the participants (62%) came from high-income families based on ISEI, 20% from middle and 18%

from low. At the time of the study, a large number of participants reported that they had missed school owing to Covid-restrictions (36% missed more than six weeks of school and 55% had missed between one to four weeks). Table 1 presents the demographics of the participants.

4.2. Questionnaire

4.2.1. The instrument

The self-report questionnaire used in COVID-Kids II was an adaptation of the COVID-Kids I questionnaire of children's well-being and development which had been completed by more than 3000 children and adolescents in four countries in 2020 (see Kirsch et al., 2021 and Engel et al., 2021 for more information). Items in the COVID-Kids I & II questionnaires which were relevant to children's life satisfaction, subjective well-being, and school performance came from validated screening tools on children's subjective well-being (e.g., Rees et al., 2016) and from the Organisation for Economic Co-operation and Development Programme for International Student Assessment (OECD, 2018). The translations into Luxembourgish, German, French, English and Portuguese were developed and validated through back-translations by four multilingual members of the COVID-Kids II team.

The COVID-Kids II survey comprised 64 questions and was divided into four parts. The first part included items about the children's socio-demographic characteristics (age, gender, household composition, employment status of the parents, educational degree of the parents) as well as dwelling characteristics (housing type, availability of an outdoor space). The second part gathered information about the children's subjective well-being, their leisure time activities, and their experiences and attitudes when learning at home and at school. Items included *How satisfied are you currently with your life at school?* (from very dissatisfied (1) to very satisfied (4)); *Think about the time before Covid-19. How well did you do at school then?* (from rather bad (1) to good or very good (4)); *How well do you do at school now? I am* (from rather bad (1) to good or very good (4)); *What are your average marks now? My marks at the end of the last school year were* (from unsatisfactory (1) to very good/excellent (4)). The final section asked the students to identify the best and worst aspects of the pandemic. These findings are reported in Kirsch and Neumann (2022).

Table 1

Frequencies and percentage of the demographic characteristics of the sample. (N = 332).

		% of sample
Gender	Female	70%
	Male	30%
Language the survey was completed in	French	37%
	German	30%
	English	10%
	Luxembourgish	13%
School	Private	83%
	State	17%
Residence (area)	Rural	56%
	Urban	44%
Higher occupational status parents	ISEI 1–37 (high)	62%
	ISEI 38–63 (middle)	20%
	ISEI 64–89 (low)	18%
Number of weeks missing school	less than 1 week	9%
	1–2 week(s)	17%
	2–4 weeks	19%
	4–6 weeks	19%
Age (years)	Mean	14.14
	SD	1.42

Note.: Socioeconomic status of parents was calculated based on the ISCO 08.

4.2.2. Procedure

We advertised the survey on social media platforms (e.g., Facebook, Instagram, WhatsApp) along with the link to the survey, and approached the head teachers of 14 private secondary schools. Seven agreed to invite their students to complete the online or pen-and-paper questionnaires at home and two distributed the pen-and-paper questionnaires to students.

Data was collected over a period of 6 weeks between the 7th June and 15th July 2021. The instructions specified that the participants should complete the questionnaire in a language of their choice themselves. Before they could access the online questions, the parents and adolescents were provided with information about the project, and both were required to give informed consent. Informed consent of the parents and the adolescents was also mandatory in the pen-and-paper questionnaires.

4.3. Plan of analyses

All statistical analyses were conducted using IBM SPSS Version 27 (IBM Corp., 2020). To test our first hypothesis that participants experienced increased learning challenges during the pandemic, we conducted paired samples *t*-test to compare mean scores of the participants' perception of schoolwork and their reported feelings, against means reported for the period before the pandemic.

To test the second hypothesis that teacher and family support, learner-related dimensions and aspects of subjective well-being influenced achievements and that some predicted learning outcomes, we employed Pearson's *r* bivariate correlations to investigate associations among the variables measuring students' perceptions on school experiences, support and subjective well-being with the aim to observe any possible associations among the variables of interest. Next, hierarchical multiple regression with two steps was conducted. The outcome variable was the participants' reported school achievement during the pandemic. To control for significant associations between age and type of school the participants attended, these two variables were included at Step 1.

Predictor variables included questions that pertained to learner performance (e.g. student autonomy), subjective well-being encompassing school satisfaction and emotional well-being (e.g. negative and positive feelings), teacher support (e.g. practices) and parent support (e.g. organization). All items were structured on a four-point scale ranging from "rather bad" (1) to "good or very good" (4). They were measured either through single items or computed by summing the scores across different items. Principal component analysis was applied to reduce the number of items and determine which items could be combined. For example, school achievement was measured through the mean score of two items (factor loadings above 0.60) in which the participants were asked to indicate how well they did at school (from rather bad (1) to good or very good (4)) and their current grades (from unsatisfactory (1) to very good/excellent (4)). Items that did not include enough variability were excluded. Items that led to a unidimensional factor solution were summed and averaged to form mean total overall scores (composites). In total, 18 variables were derived, measured either with single questions or computed by composite variables across different questions.

5. Results

While the academic year of 2019/2020 had been interrupted because of the lockdown and learning was subsequently changed through distance education, the academic year of 2020/2021 did not run smoothly either on account of the multiple times students were quarantined or in isolation, leaving them to do their schoolwork at times from home. As seen in section 4.1, 55% of the participants indicated having missed between one to four weeks of school. The following sections will provide insights into students' perceptions of schoolwork when working at school and from home (hypothesis 1) and explain the extent to which learner-related dimensions (e.g. autonomy), features of subjective well-

being (e.g. school satisfaction and emotions) and teacher and parent support influenced or even predicted their school achievements (hypothesis 2).

5.1. Descriptive statistics

Means and standard deviations for all variables in the study, that is, learner performance, subjective well-being, family support, and teacher support are presented in Table 2.

5.2. Differences between periods when students were able to go to school and those when they had to learn from home

To test an assumption of the study, that participants experienced increased learning challenges during the pandemic, we conducted paired samples *t*-test to compare mean scores of the participants' perception of schoolwork and their reported feelings, against means reported for the period before the pandemic. The results of the paired samples *t*-test (Table 3) showed statistically significant differences in the reported levels of schoolwork in terms of being understandable ($t = 5.55, p < .05$), interesting ($t = 2.68, p < .05$), and useful ($t = 2.80, p < .05$), and the quality ($t = -1.93, p = .054$) but there were no statistically significant differences between the two conditions (i.e. going to school or not) on the quantity of the work ($t = 1.35, p = .17$). Also, there were statistically significant differences in the participants' reported levels of feeling lonely ($t = 5.46, p < 0$) when going to school ($M = 2.33, SD = 0.91$) and when staying at home owing to Covid-19 ($M = 2.01, SD = 1.01$). Finally, there were no statistically significant differences at the reported levels of anxiety about schoolwork ($t = 0.47, p = .63$) in the two conditions, that is when going to school ($M = 2.16, SD = 0.87$) versus when staying at home because of Covid-19 ($M = 2.13, SD = 1.02$).

5.3. Correlates of reported school achievement

Pearson's *r* correlations showed that reported school achievements during the pandemic had strong, positive and significant associations with school satisfaction as well as with the students' prior school achievements, perceptions of the content, quality and quantity of their schoolwork, the offer of synchronous online classes and the satisfaction with the ways that adults listened to them. Furthermore, the correlation between school achievement and student autonomy was strong and significant as was the correlation with motivation. The association between school achievement and negative feelings during the pandemic

Table 2

Means and standard deviations for variables included in the study, N = 332.

Variables	Mean (SD)
<i>Learner performance</i>	
Student achievement during the pandemic (SA_DP)	3.15 (.65)
Student achievement before the pandemic (SA_BP)	3.39 (2.07)
Student autonomy (StA)	2.60 (.65)
Student motivation (StM)	2.45 (1.95)
<i>Subjective well-being</i>	
Negative feelings homeschooling (NF-H)	2.25 (.76)
Negative feelings during the pandemic (NF-P)	2.22 (.74)
School satisfaction	2.87 (.76)
Satisfaction with the way adults listen (SALY)	2.97 (1.01)
Fear of illness (FI)	1.89 (.26)
<i>Family Support</i>	
Help with schoolwork (HS)	2.25 (.98)
Help with organization of schoolwork (HOS)	2.04 (.86)
Help with communication with teachers/peers (HCTP)	1.75 (.84)
<i>Teacher Support</i>	
Online classes	3.38 (.84)
Teaching practices	2.57 (.65)
Teacher empathy	1.87 (.95)
Schoolwork content (SC)	2.25 (.82)
Schoolwork quantity & quality (SQQ)	3.32 (1.52)

Table 3

Comparison of means: perceived differences between aspects of schoolwork and emotions when at school and at home.

Aspects of schoolwork	In person (go to school)		Online		t	p
	M	SD	M	SD		
Understandable	2.94	.78	2.69	.79	5.52	.00
Interesting	2.26	.81	2.14	.84	2.68	.00
Useful	2.42	.87	2.31	.83	2.80	.00
Too difficult	1.88	.76	1.97	.78	-1.93	.054
Too much	2.32	1.00	2.25	.93	1.35	.17
Emotions						
Feeling lonely	2.33	0.91	2.01	1.00	5.46	.00
Feeling anxious	2.16	.87	2.13	1.02	.47	.63

was negative and significant, meaning that the more the students worried, the less satisfied they reportedly were with their school achievements. Of interest to our study, support from parents related to the organization of schoolwork and support from teachers related to their teaching practices and teacher empathy did not correlate with perception on school achievements, although they significantly and positively correlated with the participants' reported school satisfaction. Similarly, the offer of synchronous online classes correlated with school satisfaction. Strengths of correlations were interpreted following Cohen (2013). The results of the correlations computed for all variables in the study are presented in Table 4.

5.4. School and family life during the pandemic as predictors of perceived school achievements

The hierarchical linear regression analysis showed that the variables of interest significantly and strongly predicted the participants' perceived school achievements, $F(10, 306) = 49.43, p < .01, r^2 = 0.60$ after controlling for the gender of the participants and the type of school (public or private) they attended. Based on the standardized regression coefficients (β) prior school achievement was the most relevant predictor of the participants' perceived school achievements. The order of significant predictors of school achievements and their unique contribution to variance in perceived school achievements were: (1) school achievements before the pandemic ($\beta = 0.52, p < .05$); (2) school satisfaction ($\beta = 0.18, p < .05$), (3) student autonomy ($\beta = 0.12, p < .05$) and (4) satisfaction with the way adults listen to children ($\beta = 0.05, p < .05$). It is worth noting that the "adults" can refer to both teachers and parents. Results are reported in Table 5.

6. Discussion

The present study investigated the different perceptions of adolescents' schoolwork when learning from home and at school as well as factors predicting their academic achievements. These results confirmed the first hypothesis, showing that the participants aged 12 to 16 perceived their schoolwork as less interesting and useful, and more difficult under the conditions of homeschooling in Spring 2021, and felt lonelier. They mirror the findings of the students surveyed in Luxembourg, Germany and Brazil in Spring 2020 (Engel et al., 2021) who similarly perceived differences in the quality of their schoolwork while also reporting differences in the quantity. The reported content, quality and quantity of schoolwork predicted their subjective well-being in 2020.

The second aim of the article was to compute the students' predictors of academic achievement. As hypothesized, student autonomy and school satisfaction predicted learning outcomes and so did, which was not foreseen, satisfaction with the way adults listen to the adolescents and school achievements before the pandemic. By contrast, teacher and parental support appeared to play a secondary role. The dominance of learner variables could be related to the fact that the survey was

Table 4
Correlations on variables of interest to this study.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. SA_DP																
2. SA_BP	.95**															
3. SA	.29**	.27**														
4. SIM	.11*	.12*	.06													
5. NF_H	-.09	-.05	-.26**	.047												
6. NF_P	-.18**	-.14**	-.15**	.075	.473**											
7. School Satisfaction	.39**	.39**	.17**	.012	-.16**	-.36**										
8. SALLY	.25**	.22**	.09	-.034	-.17**	-.35**	.30**									
9. Fear of Illness	-.02	-.01	.01	-.008	.001	.01	-.02	-.09								
10. Help Schoolwork	-.02	.01	-.01	.06	-.01	-.08	.10	.28**	-.01							
11. HOS	-.001	-.02	-.002	.05	.01	-.09	.10	.31**	-.03	.82**						
12. HCTP	-.07	-.07	.01	-.04	-.03	.05	-.004	.14*	-.03	.46**	.60**					
13. Online classes	.23**	.22**	.20**	.07	-.07	-.02	.17**	.003	-.007	.04	.002	-.06				
14. Teaching Practices	.07	.07	.19**	.07	-.11*	-.15**	.33**	.19**	-.07	.14*	.22**	.20**	.24**			
15. Teacher Empathy	.04	.04	.05	.02	-.07	-.15**	.25**	.13*	-.16**	.07	.24**	.19**	.05	.45**		
16. Schoolwork Content	.17**	.15**	.16**	.15**	.10	-.14**	.23**	.21**	-.002	.13*	.19**	.15**	.06	.31**	.23**	
17. SQQ	-.15**	-.13*	-.05	-.19**	.17**	-.27**	-.27**	-.12*	.02	.03	.02	.05	-.01	-.09	-.09	-.11*

Note: Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). SA_DP: Student Achievement during the Pandemic, SA_BP: Student Achievement before the Pandemic, StA: Student Autonomy, SIM: Student Motivation, NF_H: Negative Feelings during Homeschooling, NF_P: Negative Feelings during the Pandemic, SALLY: Satisfaction with the Way Adults Listen, HOS: Help with Organization of Schoolwork, HCTP: Help with Communication with Teachers & Peers, SQQ: Schoolwork Quantity and Quality.

Table 5

Hierarchical multiple regression: predictors of reported school achievement during pandemic.

Step	Predictor	B	SE	β	P
1	Constant	2.71	.22	–	.00
	Gender	.04	.08	.03	.59
	Type of school	.21	.10	.12	.03
2	Constant	–.10	.25	–	.69
	School achievement before the pandemic	.52	.62	.62	.00
	School satisfaction	.18	.22	.22	.00
	Online classes	.05	.06	.06	.06
	Student autonomy	.12	.12	.12	.00
	Schoolwork content	.01	.01	.01	.68
	Schoolwork quality and quantity	–.02	–.03	–.03	.40
	Negative feelings during the pandemic	.02	.03	.03	.43
	Satisfaction with the way adults listen during the pandemic	.05	.08	.08	.04

Dependent Variable: School achievement during the pandemic (SA).

completed by adolescents rather than teachers or parents. Predictors of school achievement vary depending on the participants as shown by Helm and Huber (2022). All findings will be discussed in turn.

6.1. Learner-related factors

School achievements prior to the pandemic was the most significant predictor of academic performance during the pandemic, in line with previous studies (Huber et al., 2020; Moore, 2020). The second most important predictor was school satisfaction whose relevance has been continuously emphasized in positive psychology (Suldo et al., 2014), in studies on distant education (Eom et al., 2006; Gopal et al., 2020) and in those that examined predictors of performance during the pandemic in 2020 (Huber et al., 2020; Huber & Helm, 2020). As shown in the present study, school satisfaction continues to drive performance during the ongoing pandemic in 2021.

Like school satisfaction, learner autonomy has been consistently related to academic achievement during the pandemic (Helm & Huber, 2022; Rathmann et al., 2018; Wößmann et al., 2021) and many authors have provided evidence of children's and adolescents' ability or inability to structure their work and self-motivate (Bergdahl, Nouri, Fors, & Knutsson, 2020; Children's Commissioner for Wales, 2020; Fischbach et al., 2021; Kirsch et al., 2021, 2022). These abilities can strengthen the resolve to learn and improve the use of study time which has decreased during the pandemic (Bujard et al., 2021). Independence and effort are particularly important in periods of homeschooling where the level of support from adult differs and where students perceive their work as more difficult. While student autonomy is a significant predictor in this study, it is worth pointing out that the participants seemed to be very well supported by their parents and teachers as further explained in sections 6.2 and 6.3.

Satisfaction with the ways that adults (e.g. parents, teachers) listen to adolescents was the fourth significant predictor. Previously published descriptive findings showed that a quarter of the teachers were reported asking the adolescents how they felt (Kirsch et al., 2022). This degree of teacher empathy may be related to the level of satisfaction with being listened to. Being satisfied with the ways adults listened similarly predicted the subjective well-being of adolescents in Luxembourg, Germany and Belgium at the beginning of the pandemic in 2020 (Engel et al., 2021).

Finally, the participants' negative emotions correlated with school satisfaction and school achievement. This finding was expected as negative emotions influence learner autonomy (Huber et al., 2020) and predict achievement (Giusti et al., 2021). Furthermore, they decrease subjective well-being (Bousselin, 2022; Engel et al., 2021). However, negative emotions were not a significant predictor of school achievement in this study.

6.2. The importance of teacher support

In the present study teacher support comprised of several dimensions; teaching practices (e.g. giving feedback, explaining, checking work, advising on how to learn), teacher empathy, the provision of online lessons, as well as the content, quality and quantity of the schoolwork. While teaching practices and teacher empathy do not correlate with academic achievement, the offer of online classes as well as the content, quality and quantity of schoolwork, significantly correlate with academic achievement while not predicting it. By contrast, Huber and Helm (2020) had found that the perceived quality and quantity of distance learning as well as the quality and quantity of schoolwork predicted learning outcomes. This makes sense because the course design of distance education programs drives outcomes (Eom et al., 2006; Gopal et al., 2020). Previous studies have also shown that teacher feedback (Eom et al., 2006; Gopal et al., 2020; Kucuk & Richardson, 2019; Steinmayr et al., 2021; Züchner & Jäkel, 2021) and teacher-student interactions (Moore et al., 2020; Steinmayr et al., 2021) influence performance and, therefore, it is surprising that in the present study, teaching practices do not appear to affect learning outcomes. It is, however, difficult to compare the different studies as they do not all measure the same aspects of the addressed construct.

While the variables related to teacher support do not predict school achievement, they significantly correlate with school satisfaction. This finding echoes the results from studies on school climate and distance education that show a relationship between academic support and school satisfaction (Eom et al., 2006; Suldo et al., 2008; Zullig et al., 2011, 2018). Giving study tips – one type of academic support – is likely to promote learner autonomy as well, which, like school satisfaction, is a driver of academic performance (Huber et al., 2020; Rathmann et al., 2018; Wößmann et al., 2021). The offer of synchronous online classes (which relates to course design) has similarly been associated with school satisfaction (Gopal et al., 2020; Kucuk & Richardson, 2019). These “live” classes testify to the teachers' social presence (d'Alessio et al., 2019) and increase the frequency of teacher-student interactions necessary for learning (Donham et al., 2022; Moore, 2020; Steinmayr et al., 2021). They also stimulate good student-teacher relationships essential for well-being (Lloyd & Emerson, 2017; Wong & Sui, 2017; Zullig et al., 2011, 2018). In sum, in this study, all variables of teacher support significantly correlate with school satisfaction, which, in turn, is a predictor of academic performance (Eom et al., 2006; Gopal et al., 2020; Huber & Helm, 2020; Suldo et al., 2014).

6.3. The relevance of family support

Family support has not been found to be a predictor for school achievement, mirroring the findings of Huber and Helm (2020) and Züchner and Jäkel (2021) who worked with student surveys. By contrast, the lack of parental support was a predictor in surveys completed by adults (Helm & Huber, 2022). Despite or maybe because of the ongoing pandemic, the children and adolescents in the present study had support from family members. Studies carried out at the beginning of the pandemic have shown that the amount and type of parent support which consisted of helping children access learning materials, organizing, and completing schoolwork and motivating them to study depended on the children's age and needs as well as the parents' availability, language background, content knowledge, and pedagogical skills (Bonafé & González, 2020; Kirsch et al., 2021; Köller et al., 2020). Support was found to be necessary to develop children's ability to learn on their own. Parents in China indicated that their young children were unable to work independently at the beginning of the pandemic (Dong et al., 2020) and parents in Norway appeared to have contributed to their children's independent learning (Bubb & Jones, 2020). In the present study, about a quarter of the parents were reported helping with the organization of schoolwork schedules and a fifth with communication with teachers and peers. In this way, parents may have both

promoted learner autonomy and increased their children's level of satisfaction with the ways that parents listened to them. As seen in section 6.1, both factors drive school performance.

7. Conclusion

The present study of the project COVID-Kids II has offered valuable insights into the adolescents' perceptions of their schoolwork during the pandemic and into the relation of learner variables and learning achievements. Given the study's limitations, in particular its small sample where adolescents of high-income families and private schools were overrepresented, future studies could target a more diverse sample and further explore the complex relationship between achievements and school satisfaction as well as achievement and well-being.

The findings of the present study are particularly relevant on account of the participants and the context: adolescents rather than adults completed the survey, adolescents from the rarely studied private schools took part, and the study was conducted in a small country rarely studied. In this way, the results complement similar findings on student achievement carried out during the pandemic across the globe. Finally, the students' perspectives have implications for pedagogy. For instance, the adolescents connected synchronous online classes with autonomy, school satisfaction and school achievement. When in the future, policymakers promote distance education, they could emphasize the importance of the online presence of the teachers and the students as well as the need for frequent interactions. Furthermore, the participants seem to call for a "humanized pedagogy" where teachers put them at the center and teach with care and empathy (Bozkurt & Sharma, 2021). Seen from the adolescents' perspectives, supportive relationships with teachers and family members; the provision of engaging, meaningful and interesting schoolwork; practices that foster learner independence, as well as the offer of synchronous online classes, leave them satisfied with the educational offer and this satisfaction influences their achievements. It is hoped that the findings of this study help policymakers, teachers and parents invest in this type of pedagogy and support adolescents effectively at school and at home.

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Declaration of competing interest

The authors have no real or perceived conflicts of interest to declare.

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