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The effect of online class attendance on academic performance in finance education

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ABSTRACT

This study presents new evidence on how attending class –particularly synchronous virtual lessons– affects academic performance in higher education. We analyse data from over 500 undergraduate students enrolled in four finance courses at the University of Murcia, a Spanish public university where attendance is non-mandatory. After controlling for the student's previous admission grade, academic experience, and demographic factors, the results show that online class attendance significantly increases the likelihood of taking the exam and improves the success rate as well as the final grades. Moreover, when the analysis distinguishes between attending lectures and practical lessons, there is a similar (positive) effect on student performance.

1. Introduction

Class attendance is perhaps one of the determinants of university students' academic performance to have received most attention by the literature. Although most studies report a positive relationship between attendance and university students' grades and success rates, the conclusions remain controversial. After controlling for certain student characteristics, some papers fail to provide conclusive evidence on whether attendance can predict student performance (Krohn & O'Connor, 2005; Martins & Walker, 2006; Andrietti, 2014; Andrietti & Velasco, 2015, among others).

Furthermore, absenteeism in university classrooms is an important widespread problem (Oldfield et al., 2018, 2019) that has worsened considerably since the COVID-19 pandemic. According to a recent article in Times Higher Education (Basken, 2023), "class attendance in US universities is at a record low". In the same vein, in Spain, the report by the Foundation CYD (2023) states that experts observe "a notable increase in absenteeism" in Spanish universities post pandemic.[1] In this context of increasing absenteeism among higher education students –and in an increasingly digitalised world where myriad asynchronous online courses are available– investigating whether regularly attending university lessons still has a significant positive effect on students' learning outcomes has

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[1] In addition to universities, absenteeism is also becoming a concern at lower levels of the education system. According to Dee (2024), who analyses data from 40 states, chronic absenteeism in K-12 public schools in the US increased by 13.5 percentage points between the 2018/19 and 2021/22 school years. In the UK, Eyles et al. (2023) show that persistent absence in state-maintained schools increased by nearly 12 percentage points from 2017/18 to 2021/22.

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become a key issue. Moreover, since the pandemic has also accelerated the implementation of online education –and given that most of the prevailing literature on this topic has been devoted to face-to-face instruction– focusing the debate on the relationship between online class attendance and academic achievement may provide valuable insights.

This research aims to analyse the effect of attending synchronous virtual lessons on the academic performance of university students by examining the probability of taking the exam, the probability of passing the exam and, finally, in terms of the grade achieved. Our study is based on business and economics undergraduates from the University of Murcia, a medium-sized public university in Spain. The sample includes students from four finance courses in the second, third, fourth, and fifth years, and in which lessons are taught by six different lecturers. All the courses have a common assessment method, and attendance is neither mandatory nor rewarded. Due to the COVID-19 pandemic, during the 2020/21 academic year lessons were taught synchronously online and not recorded. However, all the examinations were carried out on-site under supervision. Our analyses allow us to distinguish the effect between lectures and practical lessons, where each group is split into two. We also present differentiated results for the effect on students taking the exam in the first call (ordinary call), on the one hand, and in all the calls considered, on the other.

Our results show that online class attendance positively influences the likelihood of taking and passing the exam as well as the final grade, both for ordinary and extraordinary examination sessions (calls). Moreover, for the three performance measures, attending lectures and practical lessons have a similar (positive) effect on the student's academic performance, which underlines the importance of attending class, regardless of the teaching method or class design.

This paper contributes to the existing literature in five ways. First, we add to the still scarce evidence about the influence of synchronous online course attendance on student outcomes. Although numerous studies have compared the efficacy of face-to-face versus online courses in terms of success rates (Dellana et al., 2000; Szeto, 2014; Lightner & Lightner-Laws, 2016; Spencer & Temple, 2021; Kortemeyer et al., 2023, among others), very few papers have explored the relationship between live online attendance and academic achievement (e.g. Nieuwoudt, 2020; Vale et al., 2020). Second, we extend the evidence on the relationship between attendance and academic performance regarding business and economics studies at a public Spanish university (Andrietti & Velasco, 2015; Cansino et al., 2018; Pons Florit et al., 2012; Sacristán-Díaz et al., 2012). In Spain, as in many European countries, higher education is heavily subsidised, and the lower tuition fees may lead students to undervalue the utility of attending lectures and tutorials and to underestimate the opportunity cost of not attending lessons. Third, our data are enriched with students from several courses who are in various years at university and who have different lecturers, although the data are still homogeneous because a unified assessment system is used with the same graded events across courses and lecturers.

While prior literature distinguishes between lectures and practical lessons in a face-to face attendance context (Hosal-Akman & Simga-Mugan, 2010; Kirby & McElroy, 2003; Shi, 2019; Stanca, 2006), to the best of our knowledge, the evidence for online courses is scarce (Bekkering & Ward, 2020). We therefore add new evidence on how the teaching method (class type) influences the academic performance of economics students in synchronous online courses. Finally, we use three different measures of academic performance: one related to taking the final exam, and two proxies for success in completing the courses. The latter two –namely the probability of passing the course and the final grade– have been widely used in previous studies. However, the probability of taking the exam is a variable that has received little attention in the literature on this topic. By using these three measures, we take into account all the students enrolled in the courses, unlike most previous studies, which only look at students who actually take the final examinations.

The rest of the paper proceeds as follows. Section 2 reviews the literature on class attendance as a determinant of success in higher education and sets out the hypotheses. Section 3 describes the data and methodology used in this study. Section 4 reports the results obtained. Section 5 provides a discussion of the results, and section 6 concludes the study.

2. Literature review and hypothesis development

Analysis of the determinants of student academic performance has been a much-debated topic in higher education research for decades. Among all the different factors, many studies have examined the influence of class attendance on student performance in a wide array of settings, i.e. disciplines, countries, mandatory or voluntary attendance policies, face-to-face or online teaching (e.g., Calafiore & Damianov, 2011; Chan et al., 1997; Ha et al., 2024; Karnick et al., 2020; Marburger, 2006; Romer, 1993; Stanca, 2006; Tettamanzi et al., 2023).

As Friedman et al. (2001) point out, class attendance is a puzzle. On the one hand, prior studies have highlighted the benefits of classroom attendance for students, such as benefitting from the lecturer's ability to sum up and explain complex material (Sleigh & Ritzer, 2001), the positive learning benefits of taking class notes (Cohn et al., 1995), interaction with lecturers and classmates, the development of soft skills and personal traits such as responsibility, self-confidence, and good work habits (Bean, 1985; Cohn & Johnson, 2006), coupled with the sense of belonging to a learning environment (Oldfield et al., 2018). On the other hand, students seem to be somewhat sceptical about the importance of attending lessons, which is reflected in high levels of absenteeism (Credé et al., 2010). Prior research has also investigated the reasons given by students for not attending their lessons (Oldfield et al., 2019). These include: students' lack of application and scrupulousness (Moore et al., 2008; Woodfield et al., 2006); the availability of alternative information resources (Grabe et al., 2005; Mearman et al., 2014); class size and the risk of feeling anonymous in large groups (Friedman et al., 2001); poor lecturer quality (Friedman et al., 2001; Romer, 1993); how difficult or easy the course is (Massingham & Herrington, 2006); students' personal circumstances, other university commitments, and mental health issues (Longhurst, 1999; Kottasz, 2005; Mearman et al., 2014, Oldfield et al., 2018, McClelland & Case, 2023).

While there is an ongoing debate in academic circles concerning the value of attending lessons (e.g., Goulas et al., 2023; Pani & Kishore, 2016; Pilotti & El Alaoui, 2023), most studies examining the relationship between class attendance and student performance find that attendance is a significant determinant of student academic performance (Finlay et al., 2022). Focusing on studies that have

explored the attendance effect in economics and business courses, the seminal works of Park and Kerr (1990) and Romer (1993) found a positive significant association between attendance and academic performance for finance and economics students, respectively, even after controlling for various student characteristics that may determine student grades.

Prior research also takes into account that attendance is an endogenous choice. After controlling for endogeneity and individual student characteristics, most prior evidence shows that more frequent attendance is associated with better performance when considering students in (macro and micro) economics (Cohn & Johnson, 2006; Durden & Ellis, 1995; Kirby & McElroy, 2003; Marburger, 2001; Stanca, 2006; Teixeira, 2016), agricultural economics (Devadoss & Foltz, 1996), or statistics (Rodgers, 2001). This positive influence is also observed in courses on consumer decision-making (Dey, 2018), public finance (Chen & Lin, 2008), business (Mearman et al., 2014), as well as other finance and economics courses (Büchelle, 2021; Chan et al., 1997; Didia & Hasnat, 1998; Douglas & Sulock, 1995). Nevertheless, some papers exploring the influence of student attendance in similar academic areas fail to find any significant link between attendance and grades (Krohn & O'Connor, 2005, Martins & Walker, 2006, Andrietti, 2014; Andrietti & Velasco, 2015).

The preponderance of evidence in favour of a positive correlation between attendance and performance is one of the arguments used by proponents of mandatory attendance policies. However, research on the influence of mandatory attendance also remains inconclusive. While there is evidence consistent with the notion that implementing an explicit mandatory attendance policy improves student performance (Marburger, 2006; Dobkin et al., 2010; Self, 2012; Teixeira, 2016), other studies show that this policy has no overall effect on student grades (Caviglia-Harris, 2006; Chan et al., 1997). More recent studies show that the effect of forced attendance on student performance differs depending on several factors, such as the level of the course, the teaching method, or student achievement (Goulas et al., 2023; Kapoor et al., 2021).

Most of the literature cited above primarily focuses on a traditional face-to-face attendance model. However, since the beginning of the 21st century, online distance learning has gained increasing importance, in both asynchronous and synchronous forms. In asynchronous online learning, course materials are available online alongside discussion boards, email communication, and recorded videos. In its synchronous form, lessons are taught via live-stream videoconferencing (MacLaughlin et al., 2004). The use of videoconferencing technology in distance learning peaked during the COVID-19 pandemic due to mandatory lockdowns and social distancing measures imposed by the authorities (e.g. Camilleri & Camilleri, 2022; Johnson & Meder, 2024; Massner, 2021; Vlachopoulos & Jan, 2020).

Numerous studies have analysed the differences between face-to-face and videoconferencing lessons, based on the perceptions of both students and teachers (e.g., Kortemeyer et al., 2023; Rossouw, 2018; Serhan, 2020; Spencer & Temple, 2021; Umphrey et al., 2008). While streamed videoconferencing lessons pose certain challenges for teachers and students (Gillies, 2008), they closely simulate face-to-face lessons, and enable participants to interact, communicate and collaborate with classmates in a manner similar to traditional classroom settings (e.g. Massner, 2021; Shin, 2002; Vázquez-Cano et al., 2013). The evidence provided by research in this area consistently shows that students positively appraise the flexibility and convenience that videoconferencing offers. This allows them to attend lessons from remote locations without the need to travel to campus, thus saving time and costs. Moreover, students appreciate having the opportunity to interact with classmates in a similar learning experience to students in face-to-face lessons, often without major technical difficulties during connections (Gillies, 2008; Rehn et al., 2016; Serhan, 2020; Wang et al., 2018).

However, web-conferencing learning has its limitations. Notably, these include the option to turn off cameras, which can lead to increased student distraction, and which can negatively affect their engagement in class (Wang et al., 2018; Stewart et al., 2011; Serhan, 2020). Furthermore, the ability to disable cameras, coupled with the available platform features, may hinder instructors' ability to assess student reaction in real time, making it challenging to motivate them and impeding non-verbal communication through gestures and facial expressions. This may reduce the quality of interaction, connection, and communication in videoconferencing settings when compared to face-to-face lessons (e.g. Gillies, 2008; Knipe & Lee, 2002; Massner, 2021; McBrien et al., 2009; Pons Florit et al., 2012). Nevertheless, Khlaif et al. (2021) suggest that turning off the camera does not always mean inactivity, as some students explain that they do so to concentrate better on the lesson or, in the case of shy students, to feel more at ease.

The synchronous communication facilitated by videoconferencing through the availability of audio, camera, and chat tools, enables real-time feedback for both students and teachers during the lesson (e.g. Alim et al., 2023; Hrastinski, 2008; Shahabadi & Uplane, 2015). Consequently, as with traditional classrooms, attending videoconferencing lessons can enhance the sense of belonging to a group and to an institution, added to which there is the support received from teachers and peers (Bergdahl, 2022; Giesbers et al., 2013; Gupta & Yadav, 2023; Shin, 2002; Vayre & Vonthron, 2019), which is pivotal to students' sense of self-efficacy and learning engagement (e.g. Hu & Hui, 2012). Vayre & Vonthron (2019) theorise that these relational and psychological factors play a crucial role when deciding whether or not to take the final exams and with regard to success completion of the course in online learning environments. Empirically, Vayre & Vonthron (2019) find that academic self-efficacy beliefs positively affect online student participation in exams. Furthermore, in traditional face-to-face learning, non-attendance has been seen to be highly correlated with not taking course examinations (e.g. Sacristán-Díaz et al., 2012). Consistent with these findings, Giesbers et al. (2013) show that students who did not take the final exam were those who never attended videoconferencing lectures or who seldom attended. Based on these studies, we formulate our first (directional) hypothesis as follows:

H1. Class attendance increases the likelihood of taking the final exam.

One strand of the literature has compared student performance between face-to-face and videoconferencing lessons. Most studies have failed to find any significant differences between the grades achieved by remote and by face-to-face students (e.g., Dellana et al., 2000; Kortemeyer et al., 2023; Lightner & Lightner-Laws, 2016; Pons Florit et al., 2012; Szeto, 2014). A smaller number of studies have examined whether academic success can be predicted by attending videoconferencing lessons. Nieuwoudt (2020) finds that attending

synchronous virtual lessons is positively correlated with final grades. In the same vein, Vale et al. (2020) show that attending live-streamed lessons has a positive and significant effect on grades.

Based on the literature showing the benefits of class attendance (regardless of whether remotely or face-to-face) –such as better understanding of content, the possibility of interacting with teachers to clarify misconceptions, together with the relational, social, and psychological benefits– we propose our second hypothesis. Specifically, we hypothesize that participating in finance videoconferencing lessons serves as a reliable predictor of student achievement, formulated in a twofold manner by considering the two measures used to proxy for student performance:

H2a. Attending lessons increases the probability of passing the course.

H2b. Attending lessons increases the final course grade.

Finally, one key factor that can affect a student's academic performance is the teaching method or class design. In undergraduate courses at many universities –for example in the UK and Spain–teaching is based on a combination of lectures (usually conducted in large groups) and practical lessons, also known as tutorials or seminars (in smaller groups). But there is a lack of concluding remarks concerning the influence of the teaching method in student outcomes in higher education. For face-to-face teaching, several studies find that attending tutorials has a stronger effect on grades than attending lectures in different contexts, such as for first-year economics courses at Irish and Canadian universities (Boulatoff & Cyrus, 2022; Kirby & McElroy, 2003), or for business studies at US and Indonesian universities (Bell et al., 2004; Luntungan, 2012). These findings suggest that the specific teaching method in tutorials or practical lessons enhances learning by fostering more in-depth discussion and by helping to clarify difficult issues covered in lectures (Baderin, 2005). Focusing on business and economics degrees reveals that lectures and practical lessons have a similar effect on student performance (Martins & Walker, 2006; Stanca, 2006; Hosal-Akman & Simga-Mugan, 2010; Shi, 2019; Karnick et al., 2020; Swanepoel et al., 2021).

There is still very little literature addressing this research question for online or videoconference classes. Using data from two computer science courses at a US university, Bekkering & Ward (2020) find that the effect of student participation (attendance and attentiveness) on grades depends on the type of class, with a positive relationship being found for lectures, but with no relationship being reported for practical lessons (lab classes). However, when only laboratory attendance is considered (without counting attentiveness), the authors also find a positive and significant relationship with final exam grades. Based on the mixed prior evidence, we formulate our third hypothesis of this study in its null form:

H3. There are no differences in the effects of lecture and practical class attendance on student outcomes.

3. Materials and methods

3.1. Data

The data used in this research correspond to 529 business and economics undergraduates at the University of Murcia in both semesters of the 2020–2021 academic year. Specifically, students were enrolled in the Bachelor's Degree in Business Management and Administration (BMA), the Double Degree in BMA and Law, and the Bachelor's Degree in Economics. We consider class attendance in the following finance courses: "Financial Economics" and "Financial Management I" of the second and third year of the BMA degree, respectively, "Advanced Financial Economics" of both the fourth year BMA and the fifth year of the Double Degree in BMA and Law and "Fundamentals of Financial Economics" of the third year in the Degree in Economics.

We used different sources to obtain student data. Due to the COVID-19 public health emergency, lectures and practical lessons at the University of Murcia were taught online through the Zoom platform during the 2020–2021 academic year. Firstly, data on attendance in both lectures and practical lessons were obtained from the registration reports of Zoom. As already mentioned, attendance was not mandatory. Secondly, we considered the class grades published by each lecturer in the Virtual Classroom of the University of Murcia. Each group has the same graded events across teachers. In all the courses considered in this study, academic performance includes two mid-term exams (20% of the final grade) and a final exam (80% of the final grade). Exams were taken in person, which enhances academic integrity (Dellana et al., 2000).[2] The number of exam calls (the number of times a student took same exam) used by the student has no bearing on the final grade. Finally, administrative and academic data were provided by the Secretary of the Faculty of Economics and Business and the Information Technologies and Applied Communications Area of the University of Murcia. In accordance with ethical standards, the anonymity and confidentiality of students' details were guaranteed throughout the analysis process.

Due to the varying assessment systems in place across universities, it is necessary to explain the characteristics of the examination sessions (or calls) at the University of Murcia. There are three calls in each academic year, the first being the ordinary call. The first time a student enrols in a course, they can only sit two exam calls. A maximum of six attempts per course are allowed, although students can submit a request to the university chancellor for one additional opportunity to take an exam. Once these options have been exhausted, students may be withdrawn from the degree programme for a certain period of time, during which they will not be able to enrol (Florido et al., 2019).

[2] Taking exams in person reduces the likelihood of cheating, a phenomenon that was widespread in the full online teaching period during the COVID-19 pandemic (e.g. Ababneh et al., 2022).

3.2. Methodology

3.2.1. Dependent variables

We employ different variables to measure students' academic performance in the above-mentioned finance subjects. In particular, to test the first hypothesis of this study, we consider a dummy variable (*Extaken_first*) which takes the value of 1 when the student has taken the final exam in the ordinary call, and 0 otherwise, and another variable (*Extaken_all*) that takes the value of 1 when the student has taken the final exam in any call of the academic year, and 0 otherwise.

As regards the second hypothesis (H2a), we consider a dummy variable (*Expassed_first*) that takes the value of 1 if the student has passed the course in the ordinary call, and 0 otherwise. Again, we take into account in our models having passed the course in any call with another dummy variable (*Expassed_all*).

Finally, in order to capture students' academic performance in terms of the final grade indicated in H2b, we include the variable capturing the final grade obtained by the student in the ordinary call (*Grade_first*) and the best grade obtained in the course, considering all ordinary and extraordinary calls (*Grade_all*). The final grade ranges from 0 to 10. As previously mentioned, assessment in the four courses was the same: 80% of the final grade corresponds to the final examination (40% to a multiple choice test, and 40% for practical exercises) and 20% to intermediate tests based on practical exercises and short answer tests.

3.2.2. Independent variables

For the four finance courses, classroom teaching was conducted through synchronous online lectures and practical lessons. We consider three attendance variables –obtained from Zoom reports– in our models: the percentage of minutes the student attends all the lessons during the semester, related to total minutes (*TotalAtt)* and, in the same way, the percentage of minutes attending lectures *(TheoAtt)*, and the percentage of minutes corresponding to practical lessons *(PractAtt)*. In H3, we test the differentiation between lectures and practical lessons.

3.2.3. Control variables

Following prior literature (Karnick et al., 2020), we control for several variables in the empirical models. First, we consider the previous performance of the students using their university admission grades (*AdGrade)*. Second, the students' assessment experience in the course (*AssessExp*) is included in the empirical models, which is directly related to the University of Murcia assessment system. As explained before, since the students have six calls for each course (and an extra one upon request), this variable takes the value of 1 when the students pass the course the first time they take the final exam, 2 when the students have previously taken the exam once and then pass it in the second call, and 3 when the students have taken the exam more than twice. Third, the models control for students' academic experience (*AcadExp*) using a variable that captures the academic year in which the course is included in the official curriculum of the degree, taking the value of 2 for "Financial Economics", which is taught in the second year of the BMA Degree, 3 for "Financial Management I″ and "Fundamentals of Financial Economics", which are taught in the third year of the BMA and Economics Degree, respectively, and 4 and 5 for "Advanced Financial Economics", which is included in the fourth year BMA and the fifth year of the Double Degree BMA and Law, respectively. Finally, we include a gender variable (*Gender*) that takes the value of 1 for female students, and 0 for male students.

3.2.4. Models and analyses

We estimate logit models to analyse how attendance affects the probability of taking an exam, H1, and of passing the exam, H2a.

In line with the first hypothesis, H1, we formulate the following model:

$$\Pr\left(Extaken_i = 1\right) = F\left(\beta_0 + \beta_1 Attendance_i + \sum_j \beta_j Control_i + \varepsilon_i\right) \quad [1]$$

where $F(\cdot)$ is the cumulative logistic function, and *Extaken* is measured with two alternative dummy variables (*Extaken_first* and *Extaken_all*); *Attendance* is measured with three variables (*TotalAtt, TheoAtt* and *PractAtt*). *Control* includes the control variables: university admission grade (*AddGrade*), students' academic experience (*AcadExp*), students' assessment experience in the course (*AssesExp*), and gender (*Gender*). We expect β_1 to be positive and significant, which implies a positive effect of attending on the probability of taking the final exam.

In line with the second hypothesis, H2a, we formulate the following model:

$$\Pr\left(Expassed_i = 1\right) = F\left(\beta_0 + \beta_1 Attendance_i + \sum_j \beta_j Control_i + \varepsilon_i\right) \quad [2]$$

where *Expassed* is measured with two alternative dummy variables (*Expassed_first* and *Expassed_all*); *Attendance* and *Control* are measured as in Equation [1]. We expect β_1 to be positive and significant, which implies a positive effect of attending on the probability of passing the exam.

Finally, to measure the effect of attending on the grade achieved, we estimate a Tobit model, since the dependent variable (grade achieved) is a censored variable in the interval between zero and ten. In line with hypothesis, H2b, we formulate the following model:

$$Grade_i = \beta_0 + \beta_1 Attendance_i + \sum_j \beta_j Control_i + \varepsilon_i \quad [3]$$

where *Grade* is measured with two alternative dummy variables (*Grade_first* and *Grade_all*), and *Attendance* and *Control* are measured as in Equation [1]. We expect β_1 to be positive and significant, which implies that attendance has a positive effect on the final grade.

Statistical analyses were performed using Stata software. We use a logit function which allows logit models to be fitted into in Equations [1] and [2] by maximum likelihood, and the Tobit function to fit Equation [3], where the outcome variable is censored in the interval between zero and ten.

4. Results

This section shows the descriptive statistics of the variables included in the empirical models, the main results of the models, and a further analysis differentiating between *Business* (the Bachelor's Degree in BMA and the Double Degree in BMA and Law) and *Economics* (the Bachelor's Degree in Economics).

4.1. Descriptive statistics

Descriptive statistics for the full sample of 529 students are presented in Table 1. It can be seen that 53.3% of the students take the exam in the ordinary call, while this percentage increases to 75.4% when we consider all the potential calls in the academic year. As regards passing the course, only 30% of the students pass it in the ordinary exam period, whereas more than half manage to do so when the rest of the calls are included.[3] If we consider student performance in terms of the final grade in the finance subjects, both variables show a mean value below 5, which is explained by the assessment system in all the finance courses considered. As previously stated, within the 80% of the final examination, 40% corresponds to multiple choice tests and 40% to practical exercises. In order to be entitled to add the score of the continuous assessment, it is necessary to obtain a minimum of 40% in each part of the exam. If this is not the case, the final mark will be the grade obtained in the multiple-choice part, which is the reason for the reduced mean value of these variables. As regards the student attendance variables, mean attendance (total, lectures, and practical lessons) varies between 50% and 60% of the total minutes.

Table 2 shows the correlations between all the variables included in the empirical models. As expected, some interesting correlations between variables reflect the sense of the hypotheses formulated, such as the positive correlation between student attendance (total, lectures, and practical lessons) and all the variables included in the empirical setting to capture student performance. The highest correlations between attendance variables and student performance appear when the grade obtained in the course for all ordinary and extraordinary calls (*Grade-all*). The academic performance measures are also positively correlated with the student grades prior to university (*AdGrade*) and with the academic experience at university (*AcadExp*). However, student gender does not seem to be correlated with the student outcomes.

In order to control for multicollinearity problems, we calculate the variance inflation factor (VIF). All correlations are within acceptable limits, considering that the conventional cut-off for the VIF index is 10 (Hair et al., 2006).

4.2. Main results

Table 3 shows the results obtained for testing Hypothesis 1 regarding the class attendance effect on the probability of taking the exam, captured empirically by Equation [1]. While models 1 and 5 do not include the control variables for total attendance, models 2–4 and 6–8 include them for the analysis of the three attendance variables. In addition, Panel A shows the beta coefficients obtained from the empirical models. Panel B presents the marginal effects for the main variables of interest, including total attendance and the differentiation between lectures and practical lessons.

In all the models considered for the ordinary call, the coefficient of the attendance variables is positive and significant at 1%, thereby supporting the first hypothesis of this study. As students attend both lectures and practical lessons in the online setting, the probability of taking the exam increases. The estimated marginal effects are also statistically significant. For the first call, the difference in the probability of taking the final exam in the case of a student who has not attended class compared to another who has attended all the lessons is 60.6% (53.8% and 63% for theory and practical lessons, respectively).

This positive influence remains when we consider all the calls in which the student can take the final exam (Models 5–8). This can be seen in the coefficients of Models 5–8. Based on the estimated marginal effects, total attendance increases the probability of taking the final exam in any call by 41.2%.

Control variables show the expected sign: a positive effect of the university admission grade, assessment experience, and academic experience on the probability of taking the final exam in finance-related courses.

Table 4, which has a similar structure to Table 3, shows the results of Equation [2]. As far as Hypothesis 2a is concerned, the results indicate a positive and significant relationship between total attendance, attending lectures and attending practical lessons, and the probability of passing the finance courses. The significant marginal effects show, for instance, that total attendance increases the

[3] These rates are similar to those of the previous academic years with face-to-face exams (2017/18 and 2018/19). The rates were higher in the 2019/20 academic year, probably because examinations were taken online due to the restrictions imposed by the COVID-19 crisis.

Table 1
Descriptive statistics.

Variable	Mean	Standard deviation	10th percentile	Median	90th percentile
Extaken_first	0.533	0.500	0.000	1.000	1.000
Extaken_all	0.754	0.431	0.000	1.000	1.000
Expassed_first	0.301	0.459	0.000	0.000	1.000
Expassed_all	0.531	0.500	0.000	1.000	1.000
Grade_first	4.407	2.841	0.599	5.030	8.000
Grade_all	4.933	2.648	0.600	5.480	8.000
TotalAtt	0.553	0.369	0.000	0.607	0.993
TheoAtt	0.545	0.375	0.000	0.586	0.990
PractAtt	0.559	0.366	0.000	0.657	0.987
AdGrade	8.590	2.080	5.772	8.556	11.643
AssessExp	2.231	0.702	1.000	2.000	3.000
AcadExp	3.376	0.936	2.000	4.000	4.000
Gender	0.482	0.500	0.000	0.000	1.000

Note: Full sample of 529 students.

Table 2
Correlations between variables.

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1	*Extaken_first*	1.00												
2	*Extaken_all*	0.56	1.00											
3	*Expassed_first*	0.64	0.36	1.00										
4	*Expassed_all*	0.54	0.58	0.62	1.00									
5	*Grade_first*	0.75	0.42	0.93	0.63	1.00								
6	*Grade_all*	0.58	0.66	0.60	0.92	0.70	1.00							
7	*TotalAtt*	0.23	0.30	0.27	0.31	0.30	0.37	1.00						
8	*TheoAtt*	0.19	0.28	0.24	0.29	0.27	0.34	0.99	1.00					
9	*PractAtt*	0.29	0.32	0.28	0.33	0.32	0.39	0.95	0.89	1.00				
10	*AdGrade*	0.24	0.30	0.26	0.38	0.29	0.40	0.18	0.17	0.17	1.00			
11	*AssessExp*	0.29	0.52	−0.11	0.15	−0.00	0.20	−0.10	−0.11	−0.06	0.00	1.00		
12	*AcadExp*	0.51	0.21	0.40	0.34	0.48	0.39	0.03	0.00	0.05	0.21	0.04	1.00	
13	*Gender*	0.02	−0.02	0.01	−0.01	−0.00	−0.02	0.04	0.05	0.02	0.07	0.05	0.06	1.00

probability of passing the course in the first call by 37.5%. These results lead us to confirm Hypothesis 2a both for the first call (Models 1–4) and when we take into account all potential calls (Models 5–8). When all potential calls are considered, there is a higher influence of synchronous online attendance on the probability of passing the course, with estimated marginal effects around 50% and 60%.

Hypothesis 2b refers to the effect of student attendance on the final grade obtained in the course. Table 5 presents the results of Equation [3]. Table 5 does not include marginal effects since, due to the nature of the dependent variable, the beta coefficients directly represent the marginal effects of each of the variables. Attendance –both for lectures and practical lessons– is seen to have a positive influence on student performance, measured as the final grade obtained in the finance course. Results thus confirm Hypothesis 2b. The difference in the final grade of a student who attends all the lessons versus another student who does not attend any lesson is around 4 and 5 points.

Finally, the findings presented in Tables 3–5 suggest that there are no differences in the effects of lecture and practical class attendance on student outcomes, which leads us to support the null Hypothesis 3. Focusing on Models 3 and 4 for the ordinary call, and on Models 7 and 8 for all possible calls, the positive influence on student performance remains, regardless of the type of class (lectures and practical lessons), with no relevant differences in terms of the variable coefficients or estimated marginal effects. While for the first call it seems that the beta coefficients for *PractAtt* are slightly higher than for *TheoAtt*, the opposite occurs when all possible calls are considered. The estimated marginal effects show no significant differences. These findings underline the importance of attending class –both lectures and practical lessons– in terms of student outcomes in higher education.

4.3. Further analysis

In this section, a further analysis is conducted which shows the results for the three student performance variables for all potential calls by grouping the finance courses according to the bachelor's degree. In particular, the category of *Business* (Models 1–3 of Tables 6–8) includes "Financial Economics" and "Financial Management I″ of the second and third BMA year, respectively, and "Advanced Financial Economics" of both the fourth year BMA and the fifth year of the Double Degree in BMA and Law. The category of *Economics* (Models 4–6 of Tables 6–8) considers "Fundamentals of Financial Economics" of the third year in the Degree in Economics.

The results obtained in Tables 6–8 add robustness to those obtained in the previous section. We can confirm Hypothesis 1 and Hypotheses 2a and 2b for both the *Business* and the *Economics* categories. Attending class (total, lectures, and practical lessons) has a positive and significant influence on the likelihood of taking the final exam (see Table 6).

Table 3
Effect of student attendance on the probability of taking the final exam.

	Extaken_first				Extaken_all			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Logit model estimations								
TotalAtt	1.573***	2.433***			2.321***	4.025***		
	(0.250)	(0.350)			(0.306)	(0.519)		
TheoAtt			2.159***				3.837***	
			(0.335)				(0.503)	
PractAtt				2.527***				3.791***
				(0.408)				(0.579)
AdGrade		0.197***	0.294***	0.197***		0.440***	0.443***	0.473***
		(0.060)	(0.060)	(0.068)		(0.086)	(0.085)	(0.100)
AssessExp		1.574***	1.541***	1.632***		2.750***	2.723***	2.861***
		(0.205)	(0.201)	(0.249)		(0.277)	(0.272)	(0.324)
AcadExp		1.516***	1.504***	1.527***		0.498***	0.504***	0.545***
		(1.512)	(0.150)	(0.169)		(0.161)	(0.162)	(0.180)
Gender		−0.378	−0.366	−0.362		−0.770**	−0.752**	−0.785**
		(0.235)	(0.232)	(0.270)		(0.310)	(0.307)	(0.355)
Constant	−0.731***	−11.375***	−11.153***	−11.609***	0.017	−11.412***	−11.297***	−11.861***
	(0.164)	(1.093)	(1.072)	(1.264)	(0.164)	(1.252)	(1.239)	(1.430)
Model LR χ^2	41.87	297.94	258.96	221.87	65.52	298.73	294.44	234.82
Pseudo R^2	0.057	0.367	0.354	0.385	0.111	0.506	0.499	0.512
# obs.	529	529	529	416	529	529	529	416
Panel B. Attendance marginal effects								
TotalAtt	0.391***	0.606***			0.391***	0.412***		
	(0.062)	(0.087)			(0.048)	(0.056)		
TheoAtt			0.538***				0.398***	
			(0.084)				(0.055)	
PractAtt				0.630***				0.352***
				(0.101)				(0.059)

Note: In Panel A, coefficients β_j and standard errors in parenthesis from the logit model in Equation [1]. In Panel B, marginal effects for attendance variables (standard errors in parenthesis).
*** and ** significant at 1% and 5%, respectively.

This positive effect remains when analysing the probability of passing the course (see Table 7) and with regard to the final grade obtained by the students (see Table 8). In general, the results are not conclusive regarding a different effect of attending lectures and practical lessons on student performance. For *Economics*, the decrease in the statistical significance of beta coefficients in several cases leads to less or no significant marginal effects, which is due to the reduction in sample size.

Moreover, the university admission grade, assessment experience, and academic experience continue to show a positive influence on the three variables that capture student performance. It can be concluded that analysis of *Business* and *Economics* again provides support for the importance of attending both lectures and practical lessons in terms of improving undergraduate student performance in higher education.

5. Discussion of results

Although absenteeism has always been a chronic problem, since the COVID-2019 pandemic this phenomenon has grown in higher education institutions. According to Caviglia-Harris (2006), absenteeism can be a concern for professors at universities due to the unpleasant and unproductive atmosphere it creates, which reduces both teachers' ability to teach well and student learning. In this context, our findings may prove valuable to students and teachers as well as to university authorities in the ongoing fight against absenteeism, by showing the positive effects of attending lessons.

When examining the relationship between student academic performance and attendance at synchronous online university courses in finance, our results show that attending lessons positively influences different measures of student performance, such as the probability of taking the final exam, the probability of passing the course, and the final grade obtained. We also observe that the positive effects of attendance are found in both lectures and practical lessons. Our findings are therefore consistent with the notion that attending lessons provides students (teachers) with a structured and engaged environment for learning (for teaching), which encourages direct interaction both between students as well as between students and teachers, and helps to manage teaching material. Although this interaction is easier in the face-to-face context, students can also find it in the online setting with all the technological tools that have been developed over the last few years. In addition, student attendance can facilitate a deeper understanding of theoretical and practical concepts, as well as better retention and the application of the knowledge acquired.

In particular, our results tie in with prior literature focused on attending videoconferencing lessons and their benefits, including the sense of belonging to a group or an institution and the support students receive from teachers (Shin, 2002; Vayre & Vonthron, 2019; Gupta & Yadav, 2023; among others), which may lead to enhanced student outcomes. Moreover, it must be highlighted that although we analyse online attendance, the exams in all finance courses considered were face-to-face, thereby avoiding problems related to

Table 4
Effect of student attendance on the probability of passing the course.

	Extaken_first				Extaken_all			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Logit model estimations								
TotalAtt	1.935***	2.111***			2.101***	2.420***		
	(0.298)	(0.338)			(0.262)	(0.316)		
TheoAtt			1.954***				2.278***	
			(0.327)				(0.306)	
PractAtt				2.162***				2.150***
				(0.403)				(0.352)
AdGrade		0.231***	0.235***	0.194***		0.378***	0.381***	0.382***
		(0.054)	(0.054)	(0.062)		(0.058)	(0.058)	(0.063)
AssessExp		−0.568***	−0.548***	−0.580***		0.785***	0.784***	0.684***
		(0.172)	(0.171)	(0.204)		(0.166)	(0.165)	(0.185)
AcadExp		1.086***	1.082***	1.082***		0.848***	0.858***	0.772***
		(0.144)	(0.142)	(0.151)		(0.126)	(0.126)	(0.132)
Gender		−0.228	−0.233	−0.235		−0.149	−0.147	−0.241
		(0.225)	(0.224)	(0.260)		(0.216)	(0.214)	(0.242)
Constant	−2.019***	−6.646***	−6.584***	−6.325***	−1.028***	−8.964***	−8.920***	−8.371***
	(0.220)	(0.798)	(0.792)	(0.871)	(0.171)	(0.896)	(0.892)	(0.940)
Model LR χ^2	48.37	154.08	149.68	126.17	71.47	202.00	197.43	153.79
Pseudo R^2	0.075	0.238	0.231	0.253	0.098	0.276	0.270	0.267
# obs.	529	529	529	416	529	529	529	416
Panel B. Attendance marginal effects								
TotalAtt	0.389***	0.375***			0.523***	0.601***		
	(0.057)	(0.057)			(0.065)	(0.079)		
TheoAtt			0.350***				0.566***	
			(0.056)				(0.076)	
PractAtt				0.356***				0.537***
				(0.062)				(0.088)

Note: In Panel A, coefficients β_j and standard errors in parenthesis from the logit model in Equation [2]. In Panel B, marginal effects for attendance variables (standard errors in parenthesis). *** significant at 1%.

Table 5
Effect of student attendance on the final grade.

	Grade_first				*Grade_all*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TotalAtt	5.334***	4.889***			4.946***	4.539***		
	(0.665)	(0.588)			(0.466)	(0.398)		
TheoAtt			4.514***				4.331***	
			(0.577)				(0.392)	
PractAtt				4.933***				4.210***
				(0.695)				(0.452)
AdGrade		0.485***	0.504***	0.383***		0.598***	0.610***	0.575***
		(0.099)	(0.099)	(0.115)		(0.069)	(0.069)	(0.078)
AssessExp		1.004***	1.030***	1.094***		2.053***	2.079***	1.970***
		(0.330)	(0.332)	(0.392)		(0.226)	(0.228)	(0.257)
AcadExp		2.792***	2.809***	2.919***		1.204***	1.231***	1.237***
		(0.254)	(0.256)	(0.278)		(0.151)	(0.152)	(0.163)
Gender		−0.584 (0.407)	−0.599 (0.410)	−0.690 (0.475)		−0.650**	−0.672**	−0.765**
						(0.280)	(0.282)	(0.317)
Constant	2.586***	−18.041***	−18.056***	−17.714***	0.327	−12.978***	−13.070***	−12.398***
	(0.493)	(1.619)	(1.628)	(1.825)	(0.323)	(1.000)	(1.009)	(1.086)
Model LR χ^2	66.16	244.70	236.04	206.26	108.63	323.11	315.51	249.25
Pseudo R^2	0.033	0.121	0.117	0.133	0.044	0.131	0.128	0.128
# obs.	529	529	529	416	529	529	529	416

Note: coefficients β_j and standard errors in parenthesis from the Tobit model in Equation [3].
*** and ** significant at 1% and 5%, respectively.

taking the final exam using remote online proctoring services compared to traditional on-site exams (Wuthisatian, 2020). In line with Giesbers et al. (2013), our results indicate that students who attend online lessons –lectures and practical lessons– are more likely to take the final exam. This may be due to academic self-efficacy beliefs probably caused by self-attendance (Vayre & Vonthron, 2019). This higher probability of taking the final exam has also been studied by prior literature in the face-to-face learning context

Table 6
Business versus economics: Effect of student attendance on the probability of taking the final exam.

	Business			Economics		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Logit model estimations						
TotalAtt	3.949*** (0.533)			6.094** (2.820)		
TheoAtt		3.845*** (0.523)			4.271** (2.085)	
PractAtt			3.570*** (0.591)			15.389* (8.836)
AdGrade	0.440*** (0.090)	0.434*** (0.090)	0.493*** (0.107)	0.003 (0.402)	0.034 (0.391)	−0.361 (0.565)
AssessExp	2.617*** (0.283)	2.604*** (0.280)	2.693*** (0.334)	5.530*** (1.895)	5.002*** (1.635)	9.616* (4.979)
AcadExp	0.497*** (0.160)	0.515*** (0.160)	0.520*** (0.178)			
Gender	−0.691** (0.320)	−0.706** (0.319)	−0.640*** (0.366)	−1.503 (1.514)	−0.833 (1.301)	−5.067 (3.560)
Constant	−11.161*** (1.285)	−11.075*** (1.272)	−11.574*** (1.499)	−11.246** (5.160)	−9.862** (4.645)	−18.046*(9.488)
Model LR χ^2	258.38	256.50	192.18	40.79	38.37	46.97
Pseudo R^2	0.490	0.487	0.485	0.707	0.665	0.814
# obs.	458	458	345	71	71	71
Panel B. Attendance marginal effects						
TotalAtt	0.464*** (0.064)			0.051 (0.061)		
TheoAtt		0.455*** (0.063)			0.059 (0.057)	
PractAtt			0.407*** (0.070)			0.003 (0.012)

Note: In Panel A, coefficients β_j and standard errors in parenthesis from the logit model in Equation [1]. In Panel B, marginal effects for attendance variables (standard errors in parenthesis).
***, ** and * significant at 1%, 5% and 10%, respectively.

Table 7
Business versus economics: Effect of student attendance on the probability of passing the course.

	Business			Economics		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Logit model estimations						
TotalAtt	2.568*** (0.346)			1.611* (0.838)		
TheoAtt		2.455*** (0.338)			1.285* (0.781)	
PractAtt			2.214*** (0.389)			2.198** (0.949)
AdGrade	0.393*** (0.064)	0.389*** (0.063)	0.403*** (0.071)	0.347* (0.181)	0.351* (0.180)	0.348* (0.182)
AssessExp	0.849*** (0.185)	0.839*** (0.183)	0.767*** (0.213)	0.555 (0.417)	0.537 (0.413)	0.558 (0.421)
AcadExp	0.856*** (0.129)	0.877*** (0.130)	0.764*** (0.134)			
Gender	0.034 (0.236)	0.019 (0.235)	0.005 (0.269)	−1.098* (0.568)	−1.052* (0.560)	−1.221** (0.590)
Constant	−9.420*** (0.983)	−9.366*** (0.976)	−8.844*** (1.065)	−4.598** (1.985)	−4.371** (1.943)	−5.001** (2.051)
Model LR χ^2	192.41	189.22	140.22	13.51	12.44	15.54
Pseudo R^2	0.303	0.298	0.293	0.142	0.131	0.163
# obs.	458	458	345	71	71	71
Panel B. Attendance marginal effects						
TotalAtt	0.640*** (0.087)			0.377* (0.195)		
TheoAtt		0.612*** (0.084)			0.301* (0.182)	
PractAtt			0.553*** (0.097)			0.513** (0.221)

Note: In Panel A, coefficients β_j and standard errors in parenthesis from the logit model in Equation [2]. In Panel B, marginal effects for attendance variables (standard errors in parenthesis).
***, ** and * significant at 1%, 5% and 10%, respectively.

(Sacristán-Díaz et al., 2012).

Synchronous online attendance also leads to a higher probability of passing the course and positively affects the final grade obtained by the student in the course. As commented before, class attendance offers students the possibility of clearing up doubts with the teacher, a better understanding of the topics and content or, for instance, relational and social benefits as a result of sharing time with their classmates (Sleigh & Ritzer, 2001; Cohn & Johnson, 2006; among others). This research brings to light the benefits of attending lessons in the case of online learning environments (Nieuwoudt, 2020; Vale et al., 2020).

Consistent with prior literature focusing on the context of business and economics (Martins & Walker, 2006; Stanca, 2006; Hosal-Akman & Simga-Mugan, 2010; Shi, 2019), attending lectures or practical lessons positively affects student outcomes similarly when considering the first call or all the possible examination calls. On the one hand, regularly attending lectures can provide a solid foundation of conceptual and theoretical knowledge, which is essential for understanding the principles underlying the topics assessed in the examinations and for successfully facing the final examination. Attending practical lessons can offer unique opportunities for the practical application of previously learned theories and concepts, thereby reinforcing student understanding and improving the practical skills relevant to student success in the course. Taken together, these findings suggest that regularly attending lessons –both practical and theoretical lessons– plays a key role in students' academic performance by providing an enriched learning-teaching environment for both students and teachers.

Table 8
Business versus economics: Effect of student attendance on the final grade.

	Business			Economics		
	(1)	(2)	(3)	(4)	(5)	(6)
TotalAtt	4.664*** (0.426)			3.562*** (1.135)		
TheoAtt		4.489*** (0.422)			3.175*** (1.070)	
PractAtt			4.288*** (0.490)			4.082*** (1.236)
AdGrade	0.611*** (0.074)	0.614*** (0.075)	0.597*** (0.085)	0.562** (0.226)	0.572** (0.228)	0.564** (0.224)
AssessExp	2.140*** (0.246)	2.152*** (0.248)	2.123*** (0.289)	1.565** (0.592)	1.589** (0.597)	1.469** (0.583)
AcadExp	1.191*** (0.155)	1.237*** (0.157)	1.208*** (0.167)			
Gender	−0.513* (0.303)	−0.557* (0.306)	−0.568 (0.351)	−1.414* (0.727)	−1.366** (0.731)	−1.520** (0.724)
Constant	−13.370*** (1.063)	−13.453*** (1.072)	−12.927*** (1.189)	−6.854** (2.596)	−6.643** (2.602)	−7.088*** (2.589)
Model LR χ^2	295.38	288.88	220.23	25.18	24.16	26.25
Pseudo R^2	0.140	0.137	0.138	0.073	0.071	0.076
# obs.	458	458	345	71	71	71

Note: Coefficients βj and standard errors in parenthesis from the Tobit model in Equation [3].
***, ** and * significant at 1%, 5% and 10%, respectively.

6. Conclusions

This study examines the role of attending synchronous virtual lessons as a predictor of the academic performance of undergraduate students enrolled in several finance courses at a public university in Spain. Specifically, our data correspond to students from four degree programmes, enrolled in four courses taught by six different lecturers at the University of Murcia (Spain). All classes were taught via Zoom videoconferencing (not recorded), although the exams were taken face-to-face. Attendance rates were calculated for the total number of lessons as well as distinguishing between lectures and practical lessons. We also include in our analysis student characteristics, such as previous outcomes, gender, and age, among others, as key variables (Karnick et al., 2020).

Using a logit regression, we find that the attendance rate explains both the probability of taking the exam and the likelihood of passing it. Furthermore –using a censored regression– we find evidence that the final grade obtained by students is positively affected by the percentage of lessons they attend. When the analysis distinguishes between attending lectures and practical lessons, there is a similar (positive) effect on student outcome for the three measures of academic performance considered.

It is important to highlight that the likelihood of taking the exam is also a proxy for the performance of students enrolled in a course. There are students who attend lessons but who decide not to take the exam in one of the exam sessions of the academic year. This variable thus considers the whole population of students who attended lessons. However, with the other two variables –which are more widely used in the literature (probability of passing the course, and final grade)– we only measure the performance of those students who actually attended and who took the exam. Use of the three variables allows us to gain a more comprehensive understanding of the relationship between student attendance and outcomes by looking at the whole student population.

Our findings have practical implications for the educational community (students, educators, institutions, and policymakers). When faced with the decision to attend or skip lessons, these results show students that they can obtain better grades by attending lessons more often. Repeated absenteeism is associated with lower academic achievement because it usually means forgoing an important part of the course content, and it may lead to missing out on the chance to interact with teachers and other students, as well as failing to understand abstract or complex concepts or not acquiring new skills and technical abilities. For educators, our results reinforce the value of their classroom work by showing that higher attendance is related to better academic performance of their students. At the same time, the findings may motivate educators to develop more engaging teaching methods so as to increase and incentivise student attendance.

In terms of implications for higher education institutions and policymakers –wherein there is an ongoing debate concerning online or virtual teaching– our results show that class attendance remains a significant predictor of academic performance, even in a virtual synchronous class environment. Moreover, in the case of public universities, the problem of repeated absenteeism is not only educational but also economic in terms of the inefficient use of public funds. Therefore, the findings also highlight the need to design policies or strategies that encourage or require regular class attendance in order to increase academic success rates and improve the efficiency of public investment and spending.

Finally, several limitations from the theoretical point of view must be highlighted that point the way to interesting future lines of research. First, this research examines the attendance effect on academic performance without focusing on the reasons behind the high levels of absenteeism in the university context. In line with McClelland & Case (2023), further research should focus on exploring the causes of absenteeism to provide higher education authorities and teaching staff with more evidence-based suggestions to promote and encourage class attendance. Second, and as commented by Kassarning et al. (2017), it would be interesting to extend this research by examining the role of students' active participation in academic performance, since attendance alone does not imply active participation.

Limitations and future lines of research also emerge from the methodological point of view, where it is important to highlight three aspects related to data analysis, control variables, and sample representativeness. (1) Our results cannot be interpreted as causal effects, but as correlations. Future studies should address the endogeneity suggested by previous empirical studies between class attendance and academic performance by applying quasi-experimental techniques. (2) The models control for the student's previous

outcome, academic experience, and demographic factors, yet future research should consider the possibility of including other control variables related to the student's parental and socio-economic background, or should consider students on mobility programmes, such as the Erasmus programme. (3) This research focuses on the specific context of undergraduate students enrolled in finance courses in a Spanish public university. Thus, the sample and the results obtained may not be representative of other educational or cultural contexts. Future research should extend this study to provide more evidence of the influence of student attendance on academic performance in other different settings.

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CRediT authorship contribution statement

María Isabel Martínez-Serna: Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. **J. Samuel Baixauli-Soler:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **María Belda-Ruiz:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **José Yagüe:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. We would like to thank the Editor and the two anonymous reviewers for their helpful comments and guidance throughout the review process.

Declaration of competing interest

None.

Data availability

Data will be made available on request.

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