Leading by Example in Science: Evidence from a Natural Experiment in High Schools *

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PRELIMINARY AND INCOMPLETE

ABSTRACT

We investigate how public recognition of students' scientific achievements impacts their peers' academic performance and university choices. We leverage unique data from the Hellenic Mathematical Society on award recipients, combined with administrative data on the academic outcomes of their peers, to estimate the causal effects of exposure to a math award winner within a student's educational environment. We employ two strategies for identification: across-cohort variation within schools, comparing cohorts with an award winner to those without, and the quasi-random assignment of students to classrooms, comparing classrooms with a randomly assigned math award winner to other classrooms without an award winner within school-cohorts. We find that the presence of a math award winner significantly improves the educational outcomes of male peers, while female students do not experience the same benefit. These effects are economically meaningful: having a math award winner in the peer group enhances performance by 4.8% of a standard deviation in standardized exams and and increases STEM and academic university enrollments by 3 and 1.6 percentage points, respectively. The spillover effects are especially pronounced in subjects related to the award winner's strengths. Furthermore, sharing a classroom with an award winner amplifies these positive effects for male students, suggesting that closer proximity and increased interaction opportunities enhance the spillover effects.

JEL Codes: J24, J21, J16, I24
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1 Introduction

Talented individuals in science are crucial for promoting innovation, technological advancements, and economic growth (Hsieh, Hurst, Jones, and Klenow, 2019; Murphy, Shleifer, and Vishny, 1991). Education systems worldwide devote significant resources in identifying and nurturing academic talent, often through awards and prizes. Such recognition serves a dual purpose: it acknowledges individual achievement and aims to inspire a broader audience. While extensive research has examined how recognition affects the outcomes of the individuals being honored (Angrist and Lavy, 2009; Kremer, Miguel, and Thornton, 2009; Levitt, List, Neckermann, and Sadoff, 2016), the broader social impacts of recognition have received less attention.[1] Despite the intention to motivate peers, recognition can sometimes lead to unintended effects, such as feelings of inadequacy or reduced motivation (Butera, Metcalfe, Morrison, and Taubinsky, 2022). Beyond formal recognition, the mere presence of academically talented individuals can also generate spillover effects, influencing the performance and aspirations of those around them (Akcigit, Caicedo, Miguelez, Stantcheva, and Sterzi, 2018; Azoulay, Graff Zivin, and Wang, 2010; Mohnen, 2022; Oettl, 2012; Waldinger, 2012). This line of reasoning prompts our research questions: Do academically talented students enhance the performance of their peers and does the public recognition of an individual's achievements also influence the wider peer group that observes these successes?

In addressing these questions, we are confronted with two key empirical challenges. First, achievements are not always publicly recognized, which raises questions about the visibility and salience of talented individuals for their peers. In many educational settings, there is lack of transparency about who receives recognition—such as awards, honors, or distinctions— and thus, it is difficult to study how public recognition impacts others. Second, accurately defining the relevant peer group before the recognition takes place is crucial for causal identification

[1] Beyond education, the effects of awards and recognition have also been studied in other contexts, such as the workplace (Bradler, Dur, Neckermann, and Non, 2016; Kosfeld and Neckermann, 2011).

of the spillover effects. This identification challenge requires that both recognized and non-recognized students are placed in comparable environments with similar characteristics, such as classrooms, before the recognition takes place. This ensures that there is minimal selection of students into specific groups. We tackle these challenges by examining the winners of national STEM competitions in Greece, focusing specifically on the annual National Hellenic Mathematical Competition for high school students. We investigate the impact of exposure to competition winners on their peers' educational outcomes in a context where recognition is highly visible and peer groups are established months before the recognition occurs.

The national mathematical competition is the largest annual competition in Greece, engaging participants from schools across the country. It is conducted in 3 sequential stages. Winners of the final stage of the competition represent Greece in the Balkan and International Mathematical Olympiads. Award winners typically receive honorary certificates and medals during school ceremonies and are publicly congratulated by teachers and principals. This public recognition that takes place in the school ensures the salience of the winners' achievements. Furthermore, students are allocated to peer groups at the beginning of the school year following transparent and established rules. Students are not permitted to switch to different cohorts or classrooms at any point during the school year, especially not in the middle of the year. Since the composition of the peer groups is established months before the winners are announced, this setting offers a unique opportunity to study spillover effects of publicly recognized academic achievements on student outcomes.

Our identification strategy leverages quasi-random variation in exposure to awarded or talented students that arises from within-school and across-cohort variation, as well as within-school-cohort classroom variation. First, we exploit within-school, across-cohort variation in award winners, as the assignment of an award winner to a specific cohort can be considered quasi-random, following an approach originally employed to estimate peer effects related to gender and race on student achievement (Hoxby, 2000). Second, within a school cohort, students are lexicographically assigned to classrooms based on their surnames, and thus, it is quasi-random if a student may end up in the same classroom as an award winner or in another. The public recognition that award-winning students receive, often through teacher and principal announcements, makes their achievements salient to peers who witness their success. This setting presents a unique opportunity to evaluate how exposure to talented students in scientific subjects within a school influences their peers' short and longer-term educational outcomes.

This paper is the first to provide a comprehensive analysis of how academic recognition influences peers' educational outcomes within their class and school. In addition, our data allow us to examine the heterogeneous effects of these spillovers by gender. This is especially relevant, since in line with studies that show that males are generally more willing to enter competitive settings, the majority of award winners in our setting are boys (Buser and Yuan, 2019; Croson and Gneezy, 2009; Iriberri and Rey-Biel, 2019; Niederle and Vesterlund, 2010). Our quasi-experimental research design enables us to present causal evidence on the impact of recognizing individual accomplishments in science, offering valuable insights for policies aimed at addressing the gender gap in performance and enrollment in scientific fields.

We use unique student-level data on high school students who have won prestigious awards in the Hellenic Mathematical Society's national competition and who received recognition for exceptional mathematical performance in their school communities. We combine this dataset with student-level administrative records from the Ministry of Education, allowing us to track the performance and educational choices of their peers. We analyze outcomes using a wide range of administrative data covering high school performance and post-secondary admission outcomes. Our baseline analysis focuses on students' performance in high-stakes, standardized high school exams. We also examine longer-term outcomes, such as post-secondary admissions and whether students enrolled in academic university programs compared with technical institutions.

In our baseline sample that encompasses all the students who took the national university entrance exams in 2009-11, we find that boys randomly exposed to male winners improve their performance in the national exams by 4.8% of a standard deviation (SD). We also find that the probability of enrollment in a an academic university degree program increases by 1.6 percentage points, relative to a 59.5% average. The results for females are very small and statistically insignificant. We also investigate whether our results vary by the size of the school cohort. Our intuition here is that ties and imitation tendencies among students might be larger in schools or classes of smaller size. Indeed, we find that the effects on boys are substantially larger in smaller peer groups, while for girls there is not much of a difference. For instance, for boys the effect size is equal to 9% of a SD improvement in their test scores in small schools, while it is much smaller and imprecise in large schools. The baseline effect that we find on boys' performance in standardized exams is meaningful, and non-negligible. The effects are of comparable magnitude to those in the literature on improving school inputs. For instance, our effect size is comparable to students being taught by a teacher between 1.5 and 2 SDs above the average (Hanushek, Kain, O'Brien, and Rivkin, 2005; Lavy and Megalokonomou, 2024) or to reducing the class size by 20% (Angrist and Lavy, 1999).

We then use a more detailed dataset from a representative sample of 69 schools to confirm and refine these findings; a subsample for which we have a broader set of outcome measures. Our analysis proceeds in multiple steps: first, we confirm the positive effects of exposure to male math award winners for male peers' on their university entrance exam scores (0.05 standard deviations) after controlling for previous academic performance and academic track. Second, we find that award winners primarily influence peer performance in subjects where they themselves excel. For instance, male peers exposed to male winners see significant gains in mathematics (0.07 standard deviations), while female peers of male winners achieve similar gains (0.09 standard deviations). In contrast, exposure to award winners does not significantly impact performance in language. We also find evidence that male peers exposed to winners are more likely to select STEM fields (an increase of 3 percentage points) and less likely to pursue humanities (a decline of 2 percentage points), indicating that the presence of award-winning students may shape peers' academic aspirations and track selection.

In a last step, we exploit an alternative identification strategy that leverages the quasi-random classroom assignments of students to classrooms. This alternative identification allows us to isolate the effects of direct classroom exposure to an award winner compared with other classrooms of similar characteristics within the same school-cohort. We find that male students sharing classrooms with award winners experience greater gains in test scores and are also more likely to enroll in highly ranked STEM programs, demonstrating that the benefits of award winner proximity extend beyond short-term academic outcomes to influence long-term educational trajectories.

Our paper contributes to several strands of the literature. First, it connects to research on the recognition and development of scientific talent, particularly in STEM fields. Prior work highlights the role of individual characteristics, such as gender and socioeconomic background, in shaping the pathways of academically gifted individuals, as well as the impact of competition-based recognition on students' outcomes and choices, with heterogeneous effects based on gender and background (Agarwal and Gaule, 2020; Aghion, Akcigit, Hyytinen, and Toivanen, 2017; Airoldi and Moser, 2024; Ellison and Swanson, 2010, 2016; Hoisl, Kongsted, and Mariani, 2023). Our study contributes to this literature by examining the spillover effects of publicly recognizing high-performing students in science and exploring how these effects vary by gender.

Our study also relates to the extensive literature on peer effects in education.[2] Within this large literature, a subset of studies focuses on the impact of high-achieving students on the educational outcomes and choices of their peers (Balestra, Sallin, and Wolter, 2023; Boucher, Rendall, Ushchev, and Zenou, 2024; Cools, Fernández, and Patacchini, 2022; Feld and Zölitz, 2022;

[2] See Epple and Romano (2011) and Sacerdote (2011, 2014) for excellent overviews

Fischer, 2017; Lavy, Silva, and Weinhardt, 2012; Modena, Rettore, and Tanzi, 2022; Mouganie and Wang, 2020). We contribute to this literature by examining the influence of a particular group of high-achieving peers who have received public recognition for their excellence in a science competition, thereby isolating the influence of both peer excellence and visibility.

Our paper also connects to the literature on role models in education. Most of the studies focus on teachers or advisors as role models.[3] However, to the best of our knowledge, little is known about the causal effect of peer role models on the education outcomes of peers. Only a recent paper examines the causal effect of peer role models and focuses on top performers across all subjects who receive the recognition of being in charge of the class attendance book (Goulas, Gunawardena, Megalokonomou, and Zenou, 2024). In this paper, we focus on winners of a national mathematical competition, which is an out-of-school competition. Additionally, most of those winners are males, which is different from the other setting.

Finally, our paper also contributes to the literature that examines the gender gaps in STEM (Buffington, Cerf, Jones, and Weinberg, 2016; Cimpian, Kim, and McDermott, 2020; Goulas, Griselda, and Megalokonomou, 2022a; Lavy and Megalokonomou, 2024). Despite the recent increase in girls' mathematics advancements in school, there exists a persistent gender gap in students' propensity to choose a STEM field of study. In our data, girls outperform boys in test scores in school. Nevertheless, we observe fewer girls earning an award in the mathematical competition. Our analysis highlights that the woman under representation, also has important downstream implications for other students, as male winners spur other boys to perform better in the national exam, thereby contributing to the STEM gender gap.

[3]Most studies find that female students benefit when they are assigned female teachers or advisors in male-dominated fields (Bettinger and Long, 2005; Breda, Grenet, Monnet, and Van Effenterre, 2023; de Gendre, Feld, Salamanca, and Zölitz, 2023; Griffith and Main, 2021; Hoffmann and Oreopoulos, 2009; Huntington-Klein and Rose, 2018; Porter and Serra, 2020).

2 Institutional Setting

2.1 The National Mathematical Competition

The national mathematical competition is the largest national annual competition that targets all schools in Greece. It is organized by the Hellenic Mathematical Society and takes place once a year. The competition is conducted in 3 stages and the Society's objective is to examine and advance overall mathematical thinking in the student population. The Hellenic Mathematical Society organizes the national competition in three annual national student competitions: Thales, Euclides, Archimedes. The competitions are sequential and are held in three rounds in October, January and February. Only the top performers in the Thales competition can participate in the Euclides competition and only the top performers in the Euclides competition can participate in the Archimedes competition. Each year after the top performers of the Archimedes competition are announced, the Hellenic Mathematical Society selects the team members that form the national team that represents Greece in the Balkan and International Mathematical Olympiads.

This competition culminates in formal ceremonies where award winners are publicly acknowledged, fostering a culture of achievement within schools and local communities. Such recognition not only honors individual accomplishments but also inspires other students to engage with mathematics, enhancing the subject's prestige. These celebratory events create opportunities for students to connect with peers and educators, reinforcing their interest in mathematics and potential career paths in the field. In each year, around 10 thousand students participate in the 1st phase of the competition across all relevant grades (grades 8-12). Around 15-20% proceed to the second phase (1.5-2 thousands students in total, which means around 300 students per grade). Only 10% of the initial participants proceed to the third and last phase of the competition. During school ceremonies winners of 1st and 2nd stages of the mathematical competition are awarded an honorary certificate and winners of the 3rd stage are awarded gold, silver, and bronze medals. Figure A.3 in the Appendix illustrates how this honorary mention certificate looks like.

Teachers promote the competition in the class during lessons, so that all students receive the related information. The principals also advertise the competitions during school events. Participating students in the different regions of Greece take the same exams on the same days. The duration of the exam is 3 hours. Two graders are assigned to each examination sheet. The Hellenic Mathematical Society selects the examiners for all competitions and decides on the examinable topics. A student's final grade is the average score submitted by the two independent examiners. Students are compared with each other across all regions in Greece and the best performing students in the country proceed to the next competition. Students participate in the Balkan, European, or International math competitions, and as a form of appreciation for their advanced skills and talent in mathematics, gain automatically admission to university departments without taking a national exam in mathematics (while everyone else does).

Teachers and classmates are highly likely to know who the award winners are. Teachers and principals publicly congratulate the award winners and the school usually advertises this achievement on their website. Interested individuals can also check the Hellenic Mathematical Society website as well as learn about the award winner in school. Schools usually also share this information on their announcement board at the entrance of the school. Classrooms usually consist of around 25 students and the average number of classrooms is 3 per school. Students in a given classroom take all core educational subjects together. Classmates in the core education classes remain together for several years until the end of senior high school.

2.2 Access to Postsecondary Education in Greece

The school education system in Greece is highly centralized (OECD, 2018). University admissions are also centralized and administered by the Ministry of Education. To be eligible for university admission, students must participate in standardized national tests. All schools adhere to the same curriculum, offering courses in both core and track-specific subjects that align with the material covered in the national exams. University admission decisions rely on algorithms that match students to specific college-major combinations based on their academic performance during the application process (Altjmed, Artemov, Barrios-Fernández, Bizopoulou, Kaila, Liu, Megalokonomou, Montalbán, Neilson, Sun, et al., 2024; Bizopoulou, Megalokonomou, and Simion, 2024). Students select a track in grade 11, and most continue in the same track during grade 12. The three available tracks are Classics, Science, and IT, and all schools offer these options. Students take core compulsory exams as well as track-specific exams. When choosing a track, students consider their aspirations for their intended field of study at university.

3 Data

We combine several data sources to construct the sample of award winners and their peers. The Hellenic Mathematical Society publicly announces the winners of the mathematical national competition every year and maintains an online archive. We tracked down the archives and constructed lists with the following information on the winners: first name, surname, grade and year in which they participate in the competition, school they attend and the district to which the school belongs. The district indicates which local school authority is in charge of the school the winner attends. From students' first names we deduce their gender. The data ranges from 2009 to 2011. In Appendix Figure A.1 we show as an example the beginning of a list of award winners for grade 12 and the year 2010-2011. Appendix Figure A.2 illustrates the universe of the school locations for award winners in grade 12 during the sampled years using the data collected by the Hellenic Mathematical Society. The blue dots show the male winners and the red dots show the female winners. Table 1 displays the number of final year mathematics award winners by gender and graduation year for grade 12. There are a total of

635 winners, of which 483 (76.1%) are boys.[4] We do not have information on the total number of students (and their gender) entering the competition.

We also use student-level administrative data obtained from the Ministry of Education, which include performance data on the national examinations that all high school students take in twelfth grade (Bizopoulou, Megalokonomou, and Simion, 2024; Dinerstein, Megalokonomou, and Yannelis, 2022). Our data span the universe of students taking the university entry exam in 2009-2011 and include each student's exam score and high school attended. Performance in these exams is the most important determinant for university admission. The exams are externally graded and are anonymized, i.e., the name of the student is hidden, to ensure impartiality (Lavy and Megalokonomou, 2024). To facilitate interpretation and comparison of our estimated effects with other studies, we convert the test scores to student standard deviation units by normalizing scores to have mean zero and standard deviation one in each year. This dataset also includes information about students' postsecondary choices and outcomes. In particular, we have information of students' enrolled degree (university and department) in tertiary education.[5] Each student receives an offer from a unique degree and thus, the majority of students accept this offer and enroll to their offered postsecondary degree.

Table 2 provides summary statistics for the students in our sample. Our full school sample includes 86,458 students, 55% of whom are female. The average high school graduation age is 18 years, and the mean size of each school-cohort (hereafter referred to as school-cohort size) is 90.07 students, though there is substantial variation in this size, which we leverage in our heterogeneity analysis. Students' national exam scores, which range from 0 to 20, have a mean of 13.59, while 67% of students are admitted to an academic university program.

Data from Sample of High Schools We also draw on data from a smaller sample of 69 schools where a math competition award winner is present. This subsample comprises 13,465 students

[4] Similar patterns of gender differences have been document at high levels of the American Mathematics Competition test scores (Ellison and Swanson, 2010, 2016, 2023).

[5] Each university department offers a unique degree.

and includes detailed student-level data on test scores across all subjects and exams taken during senior high school, as well as information on all educational choices made (e.g., selection of STEM or Classics track in grades 11 and 12). This dataset allows us to examine the short- and long-term impacts of math competition award winners on their peers' performance and academic decisions, complementing the broader analysis based on the Ministry's administrative dataset.

4 Empirical Strategy

To identify the effects of award recognition, we leverage the lack of student choice with regards to which school cohort or classroom they are assigned to. This setting allows us to assess the impact of having a mathematics competition winner in the peer group on the academic performance of other students. We employ two complementary identification strategies. In the first strategy, we use data from the universe of high schools in the country or a representative sample of high schools and rely on cohort-to-cohort comparisons within the same school to estimate the effects of exposure to the award winners on other schoolmates' outcomes. In practice, we compare cohorts with an award winner to those without. In the second approach, we exploit within-school, across-classroom variation, focusing on a smaller sample of schools where we can identify the classroom of each student. This allows us to compare classrooms with an award winner to those without within the same school and cohort. Although the classroom-level comparison provides a more granular analysis, it is limited to a smaller sample, as classroom assignment data is available for only a subset of schools. These complementary strategies allow us to isolate both the general spillover effects of award recognition and the influence of classroom proximity to high-achieving peers.

4.1 Within-School Across Cohort Analysis

Identifying the impact of an award winner on other students across cohorts is likely to be confounded by the effects of unobserved correlated factors. Such factors could result if the presence of an award winner influences self-selection into peer groups or sorting of students across schools. This could also occur if the presence of the award winner is associated with other school characteristics that may influence student outcomes.

One potential approach to address this issue is to utilize variations within schools in the exposure to the award winner across adjacent cohorts. In this way, we examine whether changes in student outcomes across adjacent cohorts are systematically linked to the presence of an award winner in that school for a given year. The basic idea is to compare outcomes between adjacent cohorts of students who share similar characteristics and experience the same school environment, with the only difference being that one cohort had a competition award winner due to factors that are effectively random. This approach allows us to isolate the effect of exposure to an award winner from other school-related influences.

Using repeated cross-sectional data, we estimate the following reduced-form equation separately for boys and girls:

$$Y_{i,s,t} = \theta_s + \theta_t + \beta D_{s,t} + \gamma X_{i,s,t} + \epsilon_{i,s,t}, \tag{1}$$

where $Y_{i,s,t}$ is the outcome of student i in school s and year t. θ_s and θ_t are school and year (cohort) fixed effects, respectively. $D_{s,t}$ is an indicator variable that takes the value of 1 if the school s is treated in year t. A school is treated if a final year student attending the school wins a mathematical competition. $X_{i,s,t}$ is a vector of student (age, gender, and student baseline math performance[6]) and cohort characteristics (average age, class size, and share of female classmates). We cluster the standard errors at the school by year level, as students attending the same school in a given year may share some error patterns.

[6]Students in all classes have to have a compulsory fall exam in mathematics soon after the beginning of grade 12. This is the earliest exam students take in grade 12. We use student performance in this exam as the baseline performance are typically conducted within the first weeks of the first semester of the school year.

In a variation of equation (1), we estimate the differential effect of the treatment based on the gender of the award winner separately for boys and girls:

$$Y_{i,s,t} = \theta_s + \theta_t + \beta_b D^b_{s,t} + \beta_g D^g_{s,t} + \gamma X_{i,s,t} + \epsilon_{i,s,t}, \tag{2}$$

where $D^b_{s,t}$ is a binary indicator for whether there was a boy winner in school s at time t, and $D^g_{s,t}$ is a binary indicator for a girl winner. This specification allows us to differentiate between the influence of boy high-achievers and girl high-achievers. Note that we have a panel of schools with repeated cross-sections of students, which means that we observe different cohorts of final-year high school students from the same schools.[7] Thus, our identification strategy relies on within-school, across-cohort variation. A key concern for identification is the presence of time-varying confounders at the school level that could simultaneously affect both the likelihood of a school having a math competition winner and the educational performance of other students. Such factors could introduce bias if they change in ways that are correlated with both outcomes of interest and competition participation.

To evaluate our identifying assumption that winners are quasi-randomly assigned across cohorts within schools, we test whether the presence of an award winner in a specific cohort is systematically associated with changes in student background characteristics or school-cohort size/enrollments. Table 3 presents the results for all students, and separately for male and female students. Panels A, B and C examine whether the presence of an award winner, boy winner, or girl winner in the school cohort is associated with changed in student age, baseline math performance, or school-cohort size, respectively. None of the estimated differences are significantly different from zero. Overall, these findings suggest that having an award winner in a specific cohort within a school is largely uncorrelated with variations in other student background characteristics, thereby supporting the validity of our assumption regarding quasi-random assignment.

In estimating equations (1) and (2), we exclude the award winners in treated schools from

[7] For each individual student, we only observe their outcomes once.

our sample. This exclusion ensures that our analysis focuses on the spillover effects on peers—the impact of exposure to the winner on the outcomes of schoolmates compared to students in other school cohorts that had no winner—rather than capturing the direct outcomes of the award winners themselves.

Additionally, in our analysis we present two distinct estimates coming from slightly different samples. The first estimate, discussed so far, excludes only the award winner from the analysis. The estimated coefficient then reflects the impact of exposure to the award winner on all other peers within the school cohort compared with cohorts that have no winners. Given that these award winners are high-achieving students, this coefficient may capture both the effect of having a high-performing peer (a classical peer effect) and the influence of having a recognized peer within that group. In the alternative estimation, we exclude not only the award winner from their respective cohort or classroom but also the highest-achieving individual from the remaining school cohorts. This specification enables us to compare the effects of exposure to the award winner with the effects of exposure to the highest-achieving student in similar environments (alternative school cohorts or classes) on the remaining students, thus isolating the impact of public recognition.

4.2 Within School-Cohorts and Across Classrooms

We exploit a unique institutional feature for identification. In particular, students in Greece are lexicographically assigned to classrooms within each school cohort based on their surnames. This assignment occurs in grade 10, and students remain in the same group of peers throughout senior high school (grades 10-12). This alphabetical classroom assignment ensures the randomization of peer characteristics across classrooms, a strategy that is employed in other studies (Goulas, Griselda, and Megalokonomou, 2022b, 2023; Goulas, Gunawardena, Megalokonomou, and Zenou, 2024; Goulas, Megalokonomou, and Zhang, 2023).

In Table A.5, we report formal checks to confirm the quasi-randomness of student assignment across classrooms. In particular, we regress a binary indicator variable for the presence of an award winner—of any gender (Panel A), boy winner (Panel B), and girl winner (Panel C)—on student characteristics and baseline performance measures, separately for male and female students. The majority of the estimates are near zero, with only 2 out of 18 being statistical significance. This evidence supports the identifying assumption of quasi-random assignment, as there is no meaningful correlation between the presence of an award winner and student characteristics across classrooms.

To exploit this across classroom variation, we focus on specific cohorts within schools that have award winners. This allows us to compare the effects of exposure to the award winner on classmates to those in the same cohort but in different classrooms. This approach enables us to better understand how proximity to award winners influences academic performance. That is, if peers who share the same learning classroom environment with an award winner demonstrate greater academic gains, this would suggest that the more frequent interactions with the award winner offer unique benefits, extending beyond the broader recognition effect that may benefit the entire cohort.

To examine this, we estimate specifications of the following form separately for boys and girls:

$$Y_{i,s,c,t} = \theta_{st} + \beta_1 W^b_{s,c,t} + \beta_2 W^g_{s,c,t} + \gamma X_{i,s,c,t} + \epsilon_{i,s,c,t}, \tag{3}$$

where $Y_{i,s,c,t}$ is the outcome of student i, in school s, classroom c, and year t. θ_{st} are school by cohort fixed effects. $W^b_{s,c,t}$ ($W^g_{s,c,t}$) is an indicator variable that takes the value of 1 if in school s, the classroom c had a boy (girl) award winner in year t. The vector $X_{i,c,s,t}$ includes student (age, gender, track) and cohort characteristics (average age, class size, and share of female classmates). Standard errors are clustered at the same level as the randomization, i.e., classroom level.[8]

[8]Results remain very similar if we cluster the standard errors at the school level (Abadie, Athey, Imbens, and Wooldridge, 2017).

5 Results from all Schools

As a starting point, we provide evidence of the impact of award winners on their schoolmates compared to cohorts that have no award winners within the same schools. We first discuss the results from the universe of schools with an award winner and then from a sample of schools with more detailed student-level data.

National University Entry Exam Table 4 presents our baseline estimates of the impact of award winners on their peers' performance in the grade 12 national university entry exams, derived from equations (1) and (2). In panel A, we report the estimated effects for male students in columns 1-3 and for female students in columns 4-6. Column 1 shows a positive effect of having a winner of any gender in the cohort (0.028 standard deviations), which is statistically significant at the 10% level. When we differentiate by the gender of the winner in column 2, we find that male winners have a more substantial impact (0.029 standard deviations) than female winners (-0.005 standard deviations) on male students, with only the effect of male winners being statistically significant at the 5% level. In column 3, as discussed above, we exclude top performers from cohorts without an award winner to capture the effect of recognition. The effect size for male students increases to 0.042 standard deviations, which is statistically significant at the 1% level. For female peers (columns 4-6), on the other hand, we find no statistically significant effects associated with the presence of a winner, regardless of the winner's gender.

Academic University Admission Next, we examine the impact of having a math competition award winner in one's school-cohort on peers' likelihood of enrolling in an academic university rather than a vocational institution, with results presented in Panel B of Table 4. Admission to university programs depends on the student's test scores and their list of preferred programs, with roughly 67% of students achieving this outcome, as seen in Table 2. The findings in Panel B align with the test score patterns observed earlier: for male students, having a male award winner in their cohort increases the likelihood of academic university enrollment by 1.6 percentage points when top performers are excluded (column 3). For female students, there is generally no statistically significant effect from having an award winner in the cohort, except in column 6, where exposure to a female award winner—after excluding top performers—shows a positive effect of 1.6 percentage points.

Overall, these results reveal a clear pattern: male award winners have a substantial positive effect on the academic outcomes of their male peers, while the presence of award winners appears to offer limited benefits for female students.

Intensity In our analysis so far, we have focused on the causal effect of having at least one award-winning classmate. However, students' actual exposure to winners varies: 82% do not encounter a winner, 11.5% have exactly one winner in their cohort, and 6.5% experience multiple winners (up to six). To investigate whether the intensity of exposure impacts outcomes, we estimate a specification that differentiates between having a single winner and having multiple winners within the same school-cohort. The results, presented in Appendix Table A.1, indicate that having multiple winners does not yield additional academic benefits to peers beyond the presence of a single winner, suggesting that there are diminishing returns to exposure.

School-Cohort Size Heterogeneity We next turn attention to whether our overall findings may conceal significant heterogeneity by school-cohort size. Specifically, we explore whether the impact of an award winner is stronger in *smaller schools*, where winners are likely to be more prominent and interactions with peers more frequent and intense. In Table 5, we present results that split the sample by the median school-cohort size, with a cutoff of 88 students.

For boys, the results show that in smaller schools, the effect of a male award winner on his male classmates' scores is considerably stronger than in larger schools. Specifically, a male winner raises the scores of male peers by 0.051 standard deviations, an effect that is statistically significant at the 1% level. This effect grows to 0.070 standard deviations in column 2 when top performers in cohorts without winners are excluded. In contrast, in larger schools, the presence of a winner does not yield statistically significant effects on male peers' performance. Interestingly, the presence of a female winner in smaller schools has a modest negative effect on male peers' scores (-0.059 standard deviations), significant at the 10% level, although this effect diminishes in size and becomes statistically insignificant (-0.044 standard deviations) once top performers are excluded.

For female students, the heterogeneity analysis by school-cohort size also uncovers some interesting patterns. In smaller schools, exposure to a male winner has a positive impact (0.033 standard deviations, significant at the 10% level) on female peers' scores when top performers are excluded, indicating some academic benefits. Conversely, in larger schools, the presence of a winner has a negative effect on female students' performance (-0.051 standard deviations), which is statistically significant at the 1% level.

These findings suggest that school-cohort size significantly moderates academic spillover effects, with smaller schools likely increasing the visibility of award winners and the frequency of peer interactions, leading to stronger positive impacts. In larger schools, however, these effects appear weaker or even negative, particularly for female students.

Robustness To assess the robustness of our results, we perform an additional analysis. We exclude from the sample students from private and experimental schools, as the students that are admitted to these schools might be different. Results are shown in Table A.2. Comparing results in Table A.2 to those in Table 4 indicates that for boys the impact of boy winners is slightly smaller in these sub-samples, yet remains clearly robust. These findings provide further reassurance regarding the reliability of our main results.

6 Results from a Sample of Schools

We next turn attention to results from the sample of 69 schools for which we have access to detailed records of students' exam performance in every exam and grade throughout high school. We merged this dataset with the data on award winners. Importantly, as shown in Appendix Table A.3, these 69 schools are representative, as student characteristics in this subset do not systematically differ from those in schools with winners in the broader sample.

Our analysis proceeds in two steps. First, we estimate the effects of award winners on their peers by using within-school, across-cohort comparisons, following an approach similar to that employed with the full sample. Then, in a second step, we zoom into schools and cohorts with at least one award winner, comparing the outcomes of peers in classrooms with an award winner to peers in classrooms without one, but within the same school and cohort. This approach allows us to assess whether the direct classroom exposure to an award winner provides additional academic benefits beyond the general recognition effect experienced across the entire cohort.

6.1 Across-cohort comparisons

Impact of Award Winners on Peers' Test Scores in University Entrance Exams We begin by presenting results from estimating an augmented version of our baseline specification (1), which includes controls for students' prior academic performance through their GPA from the previous grade and the academic track they are pursuing. These results are presented in Table 6. The key distinction between columns (2) and (3) is that in column (3), we exclude top performers from cohorts without an award winner.

Consistent with our earlier findings in the full sample (Table 4), we find significant positive impacts on university entrance exam scores for boys exposed to male award winners, with an effect size of approximately 0.05 standard deviations, statistically significant at the 10% level.

However, exposure to female award winners appears to negatively impact boys, though these effects are not statistically significant. For female students, exposure to male winners shows a positive effect, though it is not statistically significant. In contrast, exposure to female winners has a negative impact of 0.07 standard deviations on female peers' scores, which is statistically significant at the 10% level.

These results suggest that prior academic performance does not substantially alter the pattern observed earlier that exposure to male award winners tends to benefit male students, while the presence of female winners may have a small, negative impact on female peers.

In additional analyses, presented in Appendix Table A.4, we examine whether these impacts on test scores also translate into differences in the quality of university programs that peers eventually enroll in.[9] These findings highlight the potential for peer recognition to shape not only immediate academic outcomes but also the quality of future educational opportunities, suggesting lasting impacts on students' academic trajectories.

Impact of Award Winners on test scores in Mathematics & Language (Core Education) To determine whether exposure to award winners leads to general academic improvements or subject-specific gains, we examine performance in two core subjects taken by all students: mathematics and Greek language. Results in Table 7 show a significant positive effect of exposure to a winner on math scores for boys, with an effect size of 0.056 standard deviations. This is primarily driven by exposure to male winners, with a more substantial effect of 0.07 standard deviations, while the impact of female winners on boys' math performance is small and not statistically significant. On the other hand, for boys, exposure to winners does not yield statistically significant effects on Greek language performance.

For girls, exposure to an award winner also positively impacts math performance, with an

[9] The results are robust to an alternative approach for calculating program quality, which uses the admission cutoff score for each university department, defined as the score of the last admitted student. We assign these quality measures to the relevant post-secondary programs and exclude the year 2003 from the regressions. For brevity, we do not report these alternative results.

overall effect size of about 0.09 standard deviations. The winner's gender appears crucial, as exposure to a male winner produces a positive, statistically significant effect of approximately 0.14 standard deviations, whereas exposure to a female winner has no statistically significant impact. Similar to the results for boys, we observe no significant spillover effects on Greek language scores for female students.

These findings suggest that award winners predominantly influence peers in subjects that align with their own academic strengths, with spillover effects concentrated in mathematics rather than in language-based subjects.

Impact of Award Winners on Test Scores in Specialized Track Subjects The detailed nature of our data allows us to analyze the impact of award winners in specialized track subjects. In Greek high schools, students select one of three academic tracks—Science, Classics, and IT—and take track-specific exams accordingly. Table 8 presents our results by track area, excluding an "Any Winner" column for brevity. We find significant positive effects of exposure to a male award winner for students within the Science track: male students experience a 0.16 standard deviation improvement in test scores, and female students show a 0.12 standard deviation increase, statistically significant at the 1% and 5% levels, respectively. For male students in other tracks, there are no statistically significant effects from exposure to award winners. Interestingly, for female students, exposure to a female award winner appears to have a negative impact, though this effect varies by track.

These findings indicate that the benefits of exposure to award winners are primarily concentrated within the Science track, particularly for male award winners, and suggest that the positive spillovers are more pronounced when the award winner's track aligns with the peers' chosen field of study.

Admission to STEM or Humanities Degrees We further examine whether award winners influence the types of university degrees pursued by their schoolmates, focusing on choices between STEM and Humanities fields. Results in Table 9 indicate that for male students, exposure to winners leads to a 3 percentage point increase in STEM enrollment and a corresponding 2 percentage point decrease in Humanities enrollment, with these shifts driven primarily by exposure to male award winners. In contrast, for female students, we find no statistically significant effects of exposure to winners on their field of study choices. These results suggest that award winners shape not only academic performance but also influence subject preferences, particularly encouraging male students to pursue STEM fields over Humanities.

6.2 Within school-cohort and across-classroom comparisons

We next zoom into schools and cohorts that had at least one award winner, comparing the outcomess of peers in classrooms with an award winner to those in the same school and cohort but in classrooms without an award winner that year.

Table 10 presents the results of estimating equation (3) on the sample of schools that have at least one winner. Our estimation now exploits school-by-year FE allowing variation only across classrooms within school-cohorts. In column 1 we only exclude the award winner, while in column 2 we also exclude the top performers from the other classrooms of school-cohorts with at least one winner. For boys (columns 1-2), we find that both male and female award winners exert a positive influence on male peers within the same classroom, with effect sizes of 0.008 SD and 0.012 SD from boy and girl winners, respectively. This suggests that direct exposure to an award winner within the same classroom setting enhances boys' academic outcomes, potentially due to increased collaborative learning opportunities facilitated by proximity to a high-performing peer. For girls (columns 3-4), the effects of within-class award winners are small and not statistically significant, indicating that girls are probably not influenced by the presence of an award winner in their classroom.

Finally, in Appendix Table A.6, the long-term academic impact on male students exposed to male award winners within their classroom, focusing on the quality of STEM university programs they subsequently enter. We find that male students with a male award winner in their classroom are more likely to enroll in higher-ranked STEM programs, suggesting that classroom proximity to high-achieving peers may have lasting benefits on educational choices and pathways, particularly within fields demanding strong quantitative skills.

7 Conclusion

Recognizing academic excellence is an important part of education. In this study, we estimate the spillover effect of having a math award winner in a classroom on other students' performance in a high-stake exam that determines access to higher education. To do so, we employ a natural experiment in Greece in which students can participate in national STEM competitions which are high-stakes and very salient. To study this questions, we use unique data from the Hellenic Mathematical Society, which we combine with administrative data sources to study the impact those talented students have on their peers. Our data include detailed information on award winners and their peers' test scores, postsecondary admission outcomes, and the major of the enrolled university degree.

For identification, we exploit quasi-experimental variation in exposure to those awarded students generated by two sources. First, we exploit within school and across-cohort variation in award winners; it can be regarded as random which cohort will end up having an award winner. Second, within a school-cohort students are lexicographically assigned to classrooms based on their surnames, and thus, it is quasi-random if a student ends up in the classroom of the award winner or the others.

We find positive effects of exposure to award winners in school. The effects all come from males. In particular, the presence of a same-gender science award winner improves the short and longer-term outcomes of males but not those of females. The estimated effects are economically meaningful—having a winner in the peer group improves performance by 5% of a standard deviation in standardized exams—and have long-term implications: enrollment to academic postsecondary degrees for peers of science award winners increase by 1.6 percentage points and enrollment to STEM university degrees increases by 3 percentage points. The spillover effects are especially pronounced in subjects related to the award winner's strengths, i.e., mathematics. We also find that our estimated effects are stronger in smaller groups in which winners are more salient and interactions are likely to be more intense. When we consider the findings of the different identification methods, we find that sharing a classroom with an award winner amplifies these positive effects for male students, suggesting that closer proximity and increased interaction opportunities enhance the spillover effects.

These findings suggest that male award winners act as a significant motivating factor for their male counterparts. Future research should focus on uncovering the precise mechanisms through which math award winners influence their peers, as this would inform the design of effective educational strategies and interventions aimed at maximizing student performance and addressing the gender gap in STEM fields.

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Tables and Figures

Table 1: Mathematics Award Winners, Mathematical Society Dataset

Graduation Year	Girl Winners	Boy Winners	Total Winners
2009	32	125	157
2010	50	181	231
2011	70	177	247
Total	152	483	635

Notes: This table presents the number of mathematics award winners in our sample for the years 2009 through 2011. The winners originate from 291 distinct high schools.

Table 2: Descriptive Statistics about Sampled Students

	Mean	Std. Dev.	Min.	Max.	N
Panel A: Population of Schools with Winners					
Age	18.03	0.22	17.00	23.00	86,458
Female	0.55	0.50	0.00	1.00	86,458
Specialty in Classics	0.39	0.49	0.00	1.00	86,458
Specialty in Science	0.16	0.36	0.00	1.00	86,458
Specialty in Exact Science	0.45	0.50	0.00	1.00	86,458
Any Winner==1	0.39	0.49	0.00	1.00	86,458
Boy Winner==1	0.32	0.47	0.00	1.00	86,458
Girl Winner==1	0.12	0.33	0.00	1.00	86,458
Average Age	18.04	0.05	17.90	22.14	86,458
Share of Female Schoolmates	0.55	0.08	0.00	1.00	86,458
School-Cohort Size	90.07	35.40	6.00	202.00	86,458
National Exam Performance	13.59	4.20	1.70	19.95	86,458
Enroll in Academic University	0.67	0.47	0.00	1.00	74,180
University Entry Exam Test Scores	14666.18	3727.92	1756.00	23623.00	74,217
Panel B: Sample of Schools with Winners					
Age	18.03	0.21	17.00	22.00	13,465
Female	0.56	0.50	0.00	1.00	13,465
Overall Performance in Previous Grade	14.73	2.79	6.00	20.00	13,465
Specialty in Classics	0.40	0.49	0.00	1.00	13,465
Specialty in Science	0.16	0.36	0.00	1.00	13,465
Specialty in Exact Science	0.45	0.50	0.00	1.00	13,465
Any Winner==1	0.27	0.45	0.00	1.00	13,465
Boy Winner==1	0.22	0.41	0.00	1.00	13,465
Girl Winner==1	0.11	0.31	0.00	1.00	13,465
Average Age	18.03	0.04	17.94	18.28	13,465
Share of Female Schoolmates	0.56	0.08	0.30	1.00	13,465
School-Cohort Size	85.41	29.89	12.00	143.00	13,465
National Exam Performance	13.55	4.11	2.07	19.78	13,465
University Entry Exam Test Scores	14558.15	3705.75	2150.00	23392.00	11,591
National Exam Score in Mathematics in Grage 12	11.57	6.34	0.00	20.00	13,465
National Exam Score in Modern Greek in Grage 12	13.47	2.77	0.00	20.00	13,465
Overall National Exam Score in Classics Track Subjects	13.00	4.33	0.70	19.85	5,298
Overall National Exam Score in Science Track Subjects	14.54	4.29	1.35	20.00	2,092
Overall National Exam Score in IT Track Subjects	11.47	4.68	1.40	20.00	5,874
Enrollment in a STEM University Degree	0.13	0.34	0.00	1.00	13,465
Enrollment in a Humanities University Degree	0.12	0.32	0.00	1.00	13,465
Panel C: Sample of Classes with Winners					
Any Winner==1	0.36	0.48	0.00	1.00	3,124
Boy Winner==1	0.26	0.44	0.00	1.00	3,124
Girl Winner==1	0.12	0.33	0.00	1.00	3,124

Notes: This table presents sample statistics across different variables. Each panel refers to a different sample: Panel A includes all schools with winners, Panel B focuses on the subset of schools with winners in our study, and Panel C provides data for classes with winners.

Table 3: Balancing Exercise for the Presence of Award Winner

	Boys			Girls		
	Panel A: Winner of Any Gender					
	(1)	(2)	(3)	(4)	(5)	(6)
Student Age (in Years)	0.001			0.003		
	(0.007)			(0.005)		
Baseline Math Performance		0.000			0.001	
		(0.001)			(0.001)	
School-Cohort Size			0.001			0.001
			(0.001)			(0.001)
	Panel B: Boy Winner					
	(1)	(2)	(3)	(4)	(5)	(6)
Student Age (in Years)	0.005			0.005		
	(0.007)			(0.005)		
Baseline Math Performance		0.000			0.001	
		(0.001)			(0.001)	
School-Cohort Size			0.001			0.001
			(0.001)			(0.001)
	Panel C: Girl Winner					
	(1)	(2)	(3)	(4)	(5)	(6)
Student Age (in Years)	-0.006			-0.002		
	(0.004)			(0.003)		
Baseline Math Performance		-0.000			0.000	
		(0.001)			(0.001)	
School-Cohort Size			0.001			0.001
			(0.001)			(0.001)
Observations	38,907	38,902	38,907	47,549	47,542	47,549
Track FE	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of student characteristics and school-cohort size on the likelihood of having an award winner in this school cohort. Standard errors clustered at the school level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 4: Impact of Award Winners in School-Cohort on Schoolmates' Test Scores in National Exams and Likelihood to Enroll to Academic University

	Panel A: Standardized National Exam Score					
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Winner	0.028			-0.015		
	(0.015)*			(0.014)		
Boy Winner		0.029	0.042		-0.023	-0.011
		(0.015)**	(0.015)***		(0.014)*	(0.014)
Girl Winner		-0.005	0.002		0.002	0.010
		(0.021)	(0.021)		(0.019)	(0.019)
Observations	38,907	38,907	38,578	47,549	47,549	47,090
	Panel B: Likelihood to Enroll in Academic University					
	(1)	(2)	(3)	(4)	(5)	(6)
Winner	0.009			-0.003		
	(0.007)			(0.006)		
Boy Winner		0.009	0.013		-0.009	-0.006
		(0.007)	(0.007)*		(0.006)	(0.006)
Girl Winner		-0.005	-0.003		0.013	0.016
		(0.009)	(0.009)		(0.009)	(0.009)*
Observations	38,909	38,909	38,578	47,547	47,547	47,090
Controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having a winner of any gender, a boy, or girl winner in the school cohort on the national exam score (Panel A) and the Likelihood to Enroll to Academic University (Panel B). The national exam score is an average of the different subjects' exam scores a student obtains. Test scores have been standardized to have a mean equal to 0 and a standard deviation equal to 1. Enroll to Academic University is a binary indicator that takes the value of 1 if a student enrolls in some academic university and 0 if they enroll in a vocational degree. We focus on schools that have at least one winner in at least one school-cohort. The difference between columns (2) and (3) is that we drop the top performers from school-cohorts that do not have a winner in the later specification. Controls include student age (in years), student baseline math performance, and school-cohort-level controls (average age, class size, and share of female school-cohort peers). Standard errors clustered at the school by cohort level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 5: Heterogeneity Effects by School-Cohort Size

	Outcome: Standardized National Exam Score							
	Boys				Girls			
	Small Schools		Large Schools		Small Schools		Large Schools	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Boy Winner	0.051	0.070	0.028	0.035	0.011	0.027	-0.060	-0.051
	(0.027)*	(0.026)***	(0.022)	(0.022)	(0.024)	(0.024)	(0.019)***	(0.019)***
Girl Winner	-0.015	-0.005	0.012	0.014	-0.006	0.008	0.030	0.034
	(0.035)	(0.035)	(0.029)	(0.029)	(0.031)	(0.031)	(0.026)	(0.026)
Observations	19,654	19,411	19,253	19,167	24,229	23,886	23,320	23,204
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having a winner of any gender, a boy, or girl winner in the school cohort on the standardized national exam score by school-cohort size. Small schools are those with a school-cohort size below the median (88 students in grade 12). Large schools are those with a school-cohort size above the median (88 students in grade 12). We focus on schools that have at least one winner in at least one school-cohort. The difference between columns (1) and (2), (3) and (4), (5) and (6), and (7) and (8) is that we exclude the top performers from school-cohorts that do not have a winner in the later specifications. Controls include student age (in years), student baseline math performance, and school-cohort-level controls (average age, class size, and share of female school-cohort peers). Standard errors clustered at the school by cohort level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 6: Impact of Award Winners on Schoolmates' Overall National Exam Test Scores and University Entry Exam Test Scores, Sample of Schools

	Panel A: Overall National Exam Performance					
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Any Winner=1	0.022			0.003		
	(0.025)			(0.027)		
Boy Winner=1		0.048	0.049		0.042	0.043
		(0.027)*	(0.027)*		(0.027)	(0.027)
Girl Winner=1		-0.026	-0.024		-0.070	-0.068
		(0.035)	(0.034)		(0.041)*	(0.041)*
Observations	5,876	5,876	5,820	7,589	7,589	7,495
	Panel B: University Entry Exam Test Scores					
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Any Winner=1	0.030			0.010		
	(0.025)			(0.025)		
Boy Winner=1		0.053	0.056		0.039	0.041
		(0.027)**	(0.027)**		(0.028)	(0.028)
Girl Winner=1		-0.035	-0.032		-0.030	-0.026
		(0.040)	(0.040)		(0.041)	(0.040)
Observations	5,132	5,132	5,076	6,459	6,459	6,365
Controls	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having a winner of any gender, a boy, or girl winner in the school-cohort (compared with other school-cohorts) on the university admissions score. The overall national exam performance is an average national exam score a student obtains in the different subjects. The university admission score is a weighted average of the different exam test scores each student who enroll in some postsecondary institution obtains (weights depend on the university degrees each student applies to). Both test scores have been standardized to have a mean equal to 0 and a standard deviation equal to 1. The difference between columns (2) and (3) is that we drop the top performers from the school-cohorts that do not have a winner. Controls include student age (in years), a student's overall performance in the previous grade, and classroom-level controls (average age, class size, and share of female classmates). Standard errors clustered at the school level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 7: Impact of Award Winners on Schoolmates' Test Scores in Mathematics and Language, Sample of Schools

	Panel A: Test Score in Mathematics (Core)					
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Any Winner=1	0.056			0.088		
	(0.032)*			(0.044)**		
Boy Winner=1		0.070	0.072		0.135	0.138
		(0.037)*	(0.037)*		(0.046)***	(0.047)***
Girl Winner=1		-0.000	0.003		-0.027	-0.022
		(0.045)	(0.045)		(0.056)	(0.056)
Observations	5,876	5,870	5,814	7,589	7,582	7,488
	Panel B: Test Score in Language (Core)					
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Any Winner=1	0.007			0.005		
	(0.046)			(0.040)		
Boy Winner=1		-0.003	-0.001		0.009	0.013
		(0.047)	(0.047)		(0.041)	(0.041)
Girl Winner=1		0.075	0.076		0.026	0.028
		(0.069)	(0.069)		(0.057)	(0.057)
Observations	5,876	5,876	5,814	7,589	7,582	7,488
Controls	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having a winner of any gender, a boy, or girl winner in the school-cohort (compared with other school-cohorts) on student standardized national test scores in mathematics (Panel A) and language (Panel B) . The national exam score is an average of the different subjects' exam scores a student receives. The university admission score is a weighted average of the different exam results of students who enroll in some postsecondary institution. Both test scores have been standardized to have a mean equal to 0 and a standard deviation equal to 1. The difference between columns (2) and (3) is that we drop the top performers from the school-cohorts that do not have a winner. Controls include student age (in years), a student's overall performance in the previous grade, and classroom-level controls (average age, class size, and share of female classmates). Standard errors clustered at the school level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 8: Impact of Award Winners on Schoolmates' Test Scores in Track Subjects, Sample of Schools

	Panel A: Boys					
	Science Track		Classics Track		IT Track	
	(1)	(2)	(3)	(4)	(5)	(6)
Boy Winner=1	0.164	0.164	-0.046	-0.049	0.050	0.052
	(0.059)***	(0.059)***	(0.054)	(0.054)	(0.038)	(0.038)
Girl Winner=1	-0.071	-0.071	0.000	0.001	-0.015	-0.012
	(0.070)	(0.070)	(0.071)	(0.071)	(0.042)	(0.042)
Observations	849	849	1,155	1,143	3,753	3,711
	Panel B: Girls					
	Science Track		Classics Track		IT Track	
	(1)	(2)	(3)	(4)	(5)	(6)
Boy Winner=1	0.122	0.122	0.045	0.047	0.028	0.029
	(0.050)**	(0.050)**	(0.035)	(0.036)	(0.037)	(0.037)
Girl Winner=1	-0.096	-0.096	-0.089	-0.088	-0.087	-0.076
	(0.062)	(0.062)	(0.053)*	(0.053)*	(0.050)*	(0.047)
Observations	1,239	1,239	4,137	4,072	2,115	2,088
Controls	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having a winner of any gender, a boy, or girl winner in the school-cohort (compared with other school-cohorts) on student standardized national test scores in the track subjects for students in the science track (columns (1) and (2) for boys in Panel A and girls in Panel B), classics track (columns (1) and (2) for boys in Panel A and girls in Panel B), and IT Track (columns (1) and (2) for boys in Panel A and girls in Panel B). We show the average standardized score across the four compulsory track subjects. Test scores have been standardized to have a mean equal to 0 and a standard deviation equal to 1. The difference between columns (1) and (2), (3) and (4), (5) and (6) is that we drop the top performers from the school-cohorts that do not have a winner for the science, classics, and IT tracks, respectively. Controls include student age (in years), a student's overall performance in the previous grade, and classroom-level controls (average age, class size, and share of female classmates). Standard errors clustered at the school level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 9: Impact of Award Winners on Schoolmates' Likelihood to Enroll in a STEM or a Humanities University Degree, Sample of Schools

	Panel A: Enrollment in a STEM University Degree					
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Any Winner=1	0.027			0.002		
	(0.017)			(0.008)		
Boy Winner=1		0.030	0.030		0.007	0.008
		(0.018)*	(0.018)*		(0.009)	(0.009)
Girl Winner=1		-0.008	-0.006		-0.007	-0.006
		(0.018)	(0.018)		(0.010)	(0.010)
Observations	5,876	5,870	5,814	7,589	7,582	7,488
	Panel B: Enrollment in a Humanities University Degree					
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Any Winner=1	-0.018			-0.023		
	(0.010)*			(0.013)*		
Boy Winner=1		-0.020	-0.019		-0.022	-0.024
		(0.011)*	(0.011)*		(0.015)	(0.015)
Girl Winner=1		-0.007	-0.007		-0.012	-0.014
		(0.010)	(0.010)		(0.014)	(0.015)
Observations	5,876	5,870	5,814	7,589	7,582	7,488
Controls	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having a winner of any gender, a boy, or girl winner in the school-cohort (compared with other school-cohorts) on the likelihood to enroll in a STEM university degree (Panel A) and a Humanities university degree (Panel B). Enrollment in a STEM University Degree is a binary indicator that takes the value of 1 if a student enrolls in a STEM university degree and 0 otherwise. Enrollment in a STEM University Degree is a binary indicator that take the value of 1 if a student enrolls in a Humanities University Degree that takes the value of 1 if a student enrolls in a Humanities university degree and 0 otherwise. The difference between columns (2) and (3) is that we drop the top performers from the school-cohorts that do not have a winner. Controls include student age (in years), a student's overall performance in the previous grade, and classroom-level controls (average age, class size, and share of female classmates). Standard errors clustered at the school level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 10: Impact of Award Winners in Class on Classmates' Test Scores in National Exams

	Outcome: Standardized National Exam Score			
	Boys		Girls	
	(1)	(2)	(3)	(4)
Boy Winner=1	0.008	0.008	0.004	0.004
	(0.004)**	(0.004)**	(0.003)	(0.003)
Girl Winner=1	0.011	0.012	-0.001	-0.000
	(0.006)*	(0.006)*	(0.006)	(0.006)
Observations	1,314	1,283	1,810	1,744
Controls	✓	✓	✓	✓
Track FE	✓	✓	✓	✓
School-by-Year FE	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having a winner of any gender, a boy, or girl winner in the classroom on the national exam score. The national exam score is an average of the different subjects' exam scores a student obtains. Test scores have been standardized to have a mean equal to 0 and a standard deviation equal to 1. We focus on schools that have at least one winner in at least one classroom. The difference between columns (1) and (2), and (3) and (4) is that we drop the top performers from the classrooms that do not have a winner from the later. Controls include student age (in years), a student's overall performance in the previous grade, a student's prior performance in mathematics, and classroom-level controls (average age, class size, and share of female classmates). Standard errors clustered at the classroom level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Appendix

A Figures and Tables

Figure A.1: Example of a List of Math Award Winners

Σύνδεσμοι | Επικοινωνία

ΕΛΛΗΝΙΚΗ ΜΑΘΗΜΑΤΙΚΗ ΕΤΑΙΡΕΙΑ

Βάση ασκήσεων | Ψηφιακή βιβλιοθήκη

Αρχική | Νέα | Διαγωνισμοί | Συνέδρια | Κατασκηνώσεις | Εκδόσεις | i JME | Bulletin

Διαγωνισμοί - 2010 - 2011

- ΝΕΑ ΤΩΝ ΔΙΑΓΩΝΙΣΜΩΝ
- Θαλής
  - Θέματα & Λύσεις
  - Επιτυχόντες
    - Β' Γυμ.
    - Γ' Γυμ.
    - Α' Λυκ.
    - Β' Λυκ.
    - **Γ' Λυκ.**
- Ευκλείδης
  - Θέματα & Λύσεις
  - Επιτυχόντες
    - Β' Γυμ.
    - Γ' Γυμ.
    - Α' Λυκ.
    - Β' Λυκ.
    - Γ' Λυκ.
- Αρχιμήδης
  - Θέματα & Λύσεις
- Μικρός Ευκλείδης
  - Θέματα & Λύσεις
- Διεθνείς Ολυμπιάδες

Γ' Λυκείου 2010-2011

ΕΠΩΝΥΜΟ	ΟΝΟΜΑ	ΣΧΟΛΕΙΟ	ΝΟΜΟΣ
ΑΘΑΝΑΣΙΑΔΗΣ	ΙΩΑΝΝΗΣ	4ο ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΒΕΡΟΙΑΣ	ΗΜΑΘΙΑΣ
ΑΘΑΝΑΣΙΟΥ	ΓΕΩΡΓΙΟΣ	ΕΝΙΑΙΟ ΠΕΙΡΑΜΑΤΙΚΟ ΛΥΚΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟΥ ΠΑΤΡΩΝ	ΑΧΑΙΑΣ
ΑΘΑΝΑΣΙΟΥ	ΑΠΟΣΤΟΛΟΣ	1ο ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΗΛΙΟΥΠΟΛΗΣ	Α' ΑΘΗΝΑΣ ΑΤΤΙΚΗ
ΑΝΑΣΤΑΣΙΑΔΗΣ	ΧΑΡΑΛΑΜΠΟΣ	1ο ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΗΡΑΚΛΕΙΟΥ	ΗΡΑΚΛΕΙΟΥ
ΑΝΤΟΥΛΙΝΑΚΗΣ	ΦΟΙΒΟΣ	1ο ΑΡΣΑΚΕΙΟ ΨΥΧΙΚΟΥ	Β' ΑΘΗΝΑΣ ΑΤΤΙΚΗ
ΑΞΙΩΤΗΣ	ΚΥΡΙΑΚΟΣ	2ο ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΓΕΡΑΚΑ	ΑΝΑΤΟΛΙΚΗΣ ΑΤΤΙΚΗΣ
ΑΠΟΣΤΟΛΕΡΗΣ	ΔΗΜΗΤΡΗΣ	ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΨΥΧΙΚΟΥ	Β' ΑΘΗΝΑΣ ΑΤΤΙΚΗ
ΑΡΒΑΝΙΤΑΚΗΣ	ΣΤΑΥΡΟΣ	2ο ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΦΛΩΡΙΝΑΣ	ΦΛΩΡΙΝΑΣ
ΑΡΦΑΡΑΣ-ΜΕΛΑΪΝΗΣ	ΑΓΓΕΛΟΣ	2ο ΑΡΣΑΚΕΙΟ ΨΥΧΙΚΟΥ	Β' ΑΘΗΝΑΣ ΑΤΤΙΚΗ
ΑΣΗΜΑΚΟΠΟΥΛΟΥ	ΣΤΑΥΡΟΥΛΑ	-	ΔΥΤΙΚΗΣ ΑΤΤΙΚΗΣ
ΑΣΤΕΡΗ	ΕΙΡΗΝΗ	2ο ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΝΑΟΥΣΑΣ	ΗΜΑΘΙΑΣ
ΒΑΛΕΤΑ	ΜΑΡΙΝΑ	ΕΛΛΗΝΟΓΑΛΛΙΚΗ ΣΧΟΛΗ ΚΑΛΑΜΑΡΙ	Α' ΘΕΣΣΑΛΟΝΙΚΗΣ
ΒΑΛΛΙΟΥ	ΜΑΡΙΑ	3ο ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΘΗΒΑΣ	ΒΟΙΩΤΙΑΣ
ΒΑΡΒΕΛΗΣ	ΒΑΓΓΕΛΗΣ	2ο ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΕΥΟΣΜΟΥ ΘΕΣΣΑΛΟΝΙΚΗΣ	Β' ΘΕΣΣΑΛΟΝΙΚΗΣ
ΒΑΡΔΑΚΑΣ	ΝΙΚΟΣ	1ο ΕΝΙΑΙΟ ΛΥΚΕΙΟ ΤΡΙΚΑΛΩΝ	ΤΡΙΚΑΛΩΝ
ΒΑΣΔΕΚΗΣ	ΓΕΩΡΓΙΟΣ	ΛΕΟΝΤΕΙΟ ΛΥΚΕΙΟ	Α' ΑΘΗΝΑΣ ΑΤΤΙΚΗ

Πληρωμές Online

Ενημέρωση από Ε.Μ.Ε.

ΕΜΕ

- Η Εταιρεία
- Διοικητικό Συμβούλιο
- Αποφάσεις Δ.Σ. - Γ.Σ.
- Παλαιά Δ.Σ.
- Επιτροπές
- Καταστατικό
- Συμμετοχή
- Συνδρομή
- e-Ενημέρωση

Πυθαγόρας

Νέος πρωτότυπος διαγωνισμός

100 χρόνια ΕΜΕ

100 χρόνια ΕΜΕ, 2018 έτος Μαθηματικών

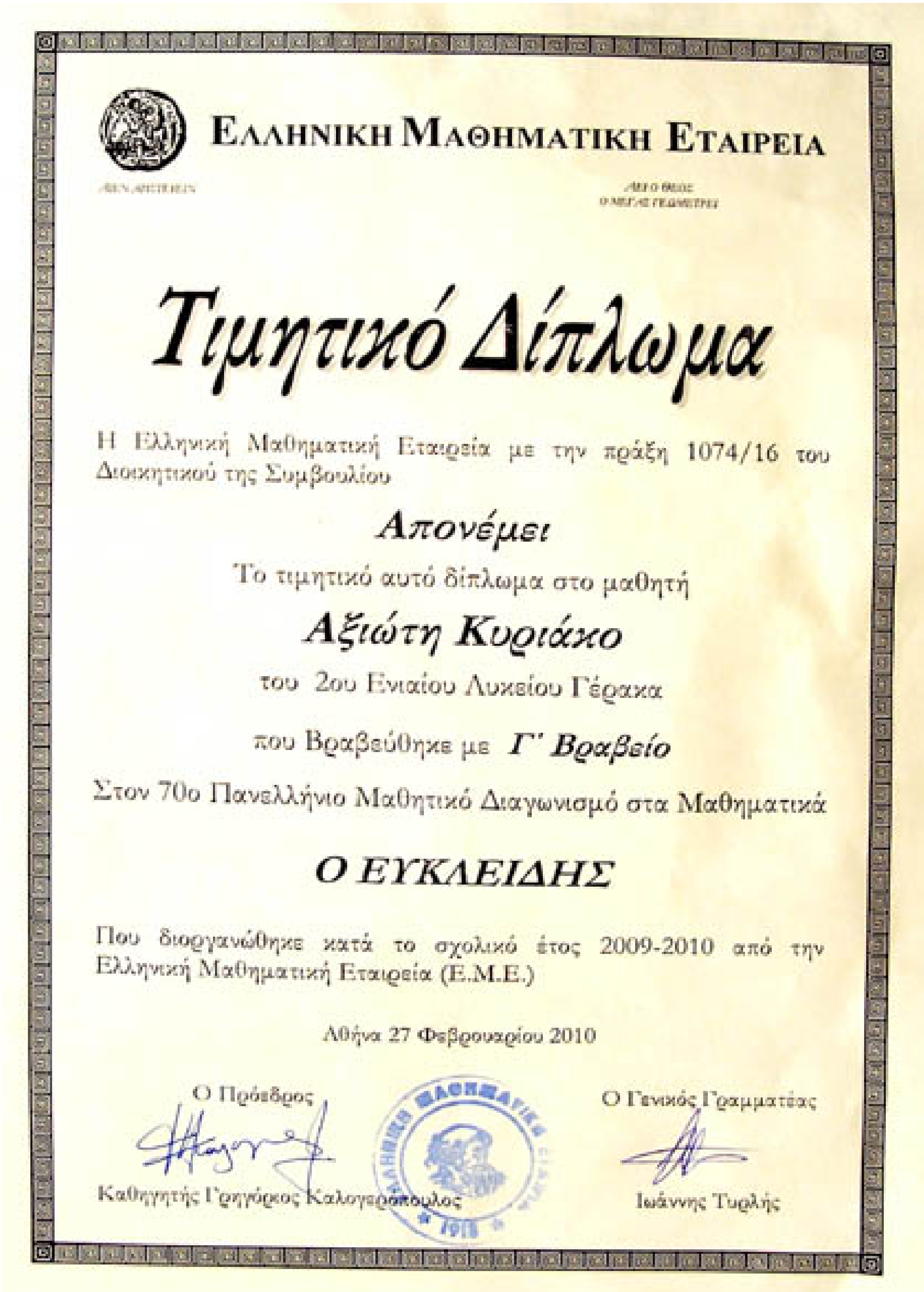
SCGM-2022

Notes: This list shows how the math award winners for a specific competition (Thalis), grade (12) and year (2010-2011) appear on the website of the Hellenic Mathematical Society. First names of winners appears in the first column, surnames of winners appears in the second column, the name of the high school winners attended appears in the third column, and the district in which the high school is located in reported in the forth column. The district also indicates with local school authority is each winner assigned.

Figure A.2: Location of Award Winners in the Country, Hellenic Mathematical Society

Notes: The figure shows the school locations of the winners in the country in grade 12. Blue dots denote male winners and red dots denote female winners.

Figure A.3: Honorary Mention Certificate


ΕΛΛΗΝΙΚΗ ΜΑΘΗΜΑΤΙΚΗ ΕΤΑΙΡΕΙΑ

Τιμητικό Δίπλωμα

Η Ελληνική Μαθηματική Εταιρεία με την πράξη 1074/16 του Διοικητικού της Συμβουλίου

Απονέμει

Το τιμητικό αυτό δίπλωμα στο μαθητή

Αξιώτη Κυριάκο

του 2ου Ενιαίου Λυκείου Γέρακα

που Βραβεύθηκε με ***Γ' Βραβείο***

Στον 70ο Πανελλήνιο Μαθητικό Διαγωνισμό στα Μαθηματικά

Ο ΕΥΚΛΕΙΔΗΣ

Που διοργανώθηκε κατά το σχολικό έτος 2009-2010 από την Ελληνική Μαθηματική Εταιρεία (Ε.Μ.Ε.)

Αθήνα 27 Φεβρουαρίου 2010

Ο Πρόεδρος

Καθηγητής Γρηγόριος Καλογερόπουλος

Ο Γενικός Γραμματέας

Ιωάννης Τυρλής

Notes: The figure shows the honorary mention certificate awarded by the Mathematical Society to students who win the 2nd or 3rd stages of the mathematical competitions.

Table A.1: Treatment Intensity: Impact of Single and Multiple Winners on Standardized National Exam Score

	Outcome: Standardized National Exam Score							
	Boys				Girls			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Single Winner Any Gender=1	0.030	0.045			-0.011	0.004		
	(0.017)*	(0.017)***			(0.016)	(0.016)		
Multiple Winner Any Gender=1	0.025	0.038			-0.024	-0.011		
	(0.020)	(0.020)*			(0.019)	(0.019)		
Single Boy Winner=1			0.036	0.049			-0.023	-0.010
			(0.017)**	(0.017)***			(0.015)	(0.015)
Multiple Boy Winners=1			0.011	0.022			-0.025	-0.016
			(0.022)	(0.022)			(0.020)	(0.020)
Single Girl Winner=1			-0.011	-0.003			-0.004	0.005
			(0.022)	(0.022)			(0.020)	(0.020)
Multiple Girl Winners=1			0.058	0.065			0.037	0.044
			(0.051)	(0.052)			(0.052)	(0.052)
Observations	38,907	38,578	38,907	38,578	47,549	47,090	47,549	47,090
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having one or multiple winner or winners of any gender, a boy, or girl winner in the school cohort on the standardized national exam score. We focus on schools that have at least one winner in at least one school-cohort. The difference between columns (1) and (2), (3) and (4), (5) and (6), (7) and (8) is that we drop the top performers from school-cohorts that do not have a winner in the later specifications. Controls include student age (in years), student baseline math performance, and classroom-level controls (average age, class size, and share of female classmates). Standard errors clustered at the school by cohort level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A.2: Robustness Exercise: Effect of Winners in Different Subsamples

	Panel A: Standardized National Exam Score					
	Baseline	Exclude Private	Exclude Experimental	Baseline	Exclude Private	Exclude Experimental
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Boy Winner	0.048	0.041	0.040	-0.004	-0.012	-0.014
	(0.014)***	(0.016)***	(0.015)***	(0.011)	(0.015)	(0.014)
Girl Winner	-0.001	-0.016	-0.000	0.016	0.008	0.009
	(0.020)	(0.022)	(0.018)	(0.018)	(0.021)	(0.020)
Observations	38,578	34,028	37,084	47,090	42,310	45,381
	Panel B: Academic University Admission					
	(1)	(2)	(3)	(4)	(5)	(6)
Boy Winner	0.016	0.015	0.012	-0.004	-0.009	-0.007
	(0.007)*	(0.007)**	(0.007)*	(0.005)	(0.006)	(0.006)
Girl Winner	-0.006	-0.001	-0.004	0.015	0.016	0.016
	(0.010)	(0.010)	(0.010)	(0.009)*	(0.010)	(0.009)*
Observations	38,578	34,028	37,084	47,090	42,310	45,381
Controls	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having one or multiple boy or girl winners in the school cohort on the standardized national exam score. We focus on schools that have at least one winner in at least one school-cohort. We also drop the top performers from school-cohorts that do not have a winner from all specifications. Controls include student age (in years), student baseline performance in mathematics, and classroom-level controls (average age, class size, and share of female classmates). Standard errors clustered at the school by cohort level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A.3: Sample Representativeness Check

Variable	Sample with Winners (69 Schools)	Remaining Schools with Winners (555 Schools)	Difference S.E.
	(1)	(2)	(3)
Share of Female Students (%)	0.551	0.562	-0.011
	0.054	0.077	0.010
P-value			0.250
Average Student Age	18.045	18.049	-0.004
	0.061	0.081	0.010
P-value			0.669
University Admission Score	14239.921	14202.276	37.645
	858.631	1152.922	148.249
P-value			0.800
National Exam Score	13.191	13.219	-0.028
	1.164	1.631	0.203
P-value			0.891
District Unemployment	14.596	13.873	0.723
	3.278	3.854	0.501
P-value			0.149
Classics	0.396	0.417	-0.021
	0.054	0.094	0.012
P-value			0.079
Science	0.139	0.134	0.004
	0.048	0.064	0.008
P-value			0.589
Exact Science	0.465	0.449	0.017
	0.058	0.090	0.011
P-value			0.148

Notes: We compare schools with winners from the Ministry of Education with schools with winners from the school sample check the representativeness of our sample. We use years 2008, 2009, and 2010, as in the main analysis. This table examines the representativeness of the sampled schools with winners compared with the remaining schools with winners in the country. We compare our sample and population of winners in terms of students' characteristics (such as gender, age, being born in 1^{st} quarter of calendar year, track choices), income level and urban locality at school level. Column (1) presents the means and the standard deviation of variables in our study sample (6 schools), column (2) presents the means and the standard deviation of variables in the remaining schools of schools in Greece (containing 1,150 schools). Columns (3) presents the differences between sample and population mean, the standard error of the difference, and p-values.

Table A.4: Impact of Award Winners on Schoolmates' Rank of Enrolled University Degree

	Rank of Enrolled University Degree					
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Any Winner=1	0.314			-0.359		
	(1.036)			(0.920)		
Boy Winner=1		1.863	1.918		1.443	1.590
		(1.045)*	(1.035)*		(0.966)	(0.958)*
Girl Winner=1		-2.349	-2.225		-2.827	-2.762
		(1.159)**	(1.117)**		(1.225)**	(1.190)**
Observations	4,391	4,391	4,349	5,518	5,518	5,442
Controls	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓
School FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having a winner of any gender, a boy, or girl winner in the school-cohort (compared with other school-cohorts) on the percentile rank of the enrolled university degree. This variable is calculated for students who enroll to some university degree. The rank of the enrolled university degree varies from 0 to 100 with greater values indicating more selective university degrees. The percentile rank of the enrolled university degree is a quality measures for each post-secondary program and is measured in the following way: we use mean performance of enrolled students in each post-secondary program. The difference between columns (2) and (3) is that we drop the top performers from the school-cohorts that do not have a winner. Controls include student age (in years), a student's overall performance in the previous grade, and classroom-level controls (average age, class size, and share of female classmates). Standard errors clustered at the school level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A.5: Balancing Exercise for the Presence of Award Winner at the Classroom Level

	Boys			Girls		
	Panel A: Winner of Any Gender					
	(1)	(2)	(3)	(4)	(5)	(6)
Student Overall Performance in Grade 11	-0.005			0.009		
	(0.005)			(0.004)**		
Student Age (in Years)		-0.082			-0.057	
		(0.063)			(0.041)	
Student Baseline Performance in Mathematics			-0.018			0.007
			(0.013)			(0.011)
	Panel B: Boy Winner					
	(1)	(2)	(3)	(4)	(5)	(6)
Student Overall Performance in Grade 11	-0.005			0.002		
	(0.004)			(0.004)		
Student Age (in Years)		-0.016			-0.013	
		(0.056)			(0.035)	
Student Baseline Performance in Mathematics			-0.009			0.002
			(0.012)			(0.010)
	Panel C: Girl Winner					
	(1)	(2)	(3)	(4)	(5)	(6)
Student Overall Performance in Grade 11	-0.003			-0.002		
	(0.003)			(0.002)		
Student Age (in Years)		0.022			0.069	
		(0.033)			(0.028)**	
Student Baseline Performance in Mathematics			-0.003			0.001
			(0.006)			(0.007)
Observations	1,589	1,685	1,589	2,050	2,165	2,053
Track FE	✓	✓	✓	✓	✓	✓
School-by-Year FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of student characteristics on the likelihood of having an award winner of any gender, boy winner, or girl winner in the classroom. Standard errors clustered at the classroom level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table A.6: Impact of Award Winners in Class on the Quality of Classmates' Enrolled STEM University Degree

	Outcome: Percentile Quality of STEM University Degree					
	Boys			Girls		
	(1)	(2)	(3)	(4)	(5)	(6)
Any Winner=1	3.753			0.009		
	(1.417)***			(3.096)		
Boy Winner=1		2.414	2.638		2.723	2.920
		(1.434)*	(1.433)*		(3.691)	(3.756)
Girl Winner=1		-1.976	-2.611		6.751	7.537
		(2.685)	(2.864)		(4.909)	(5.053)
Observations	1,314	1,314	1,283	1,810	1,810	1,744
Controls	✓	✓	✓	✓	✓	✓
Track FE	✓	✓	✓	✓	✓	✓
School-by-Year FE	✓	✓	✓	✓	✓	✓

Notes: Each column corresponds to estimation results that come from a different regression. The table reports estimated coefficients of having a winner of any gender, a boy, or girl winner in the classroom on the percentile quality of the enrolled STEM university degree. Test scores have been standardized to have a mean equal to 0 and a standard deviation equal to 1. We focus on schools that have at least one winner in at least one classroom. The difference between columns (2) and (3) is that we drop the top performers from the classrooms that do not have a winner in the later specification. Controls include student age (in years), a student's overall performance in the previous grade, a student's prior performance in mathematics, and classroom-level controls (average age, class size, and share of female classmates). Standard errors clustered at the classroom level are reported in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.