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Aline Bütikofer[1], Rita Ginja[2,*], Katrine V. Løken[1], and Fanny Landaud[1]

Abstract: Although many students suffer from anxiety and depression, and often identify school pressure and concerns about their futures as the main reasons for their worries, little is known about the consequences of the schooling environment on students' mental health. Using a regression discontinuity analysis in the largest Norwegian cities, we show that eligibility to enrol in a higher achievement high school increases the probability of enrolment in higher education and decreases the probability of diagnosis or treatment of psychological conditions. We provide suggestive evidence that changes in both teacher and peers' characteristics are likely drivers of these effects.

Keywords: health, school inputs, quality of education

Classification: I12, I21, I24

*Correspondence address: rita.ginja@uib.no

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1 Introduction

Depression and anxiety are among the leading causes of illness and disability among adolescents (WHO, 2019). For instance, roughly one in three high school students in the US report suffering from depression or anxiety symptoms in a given year (HHS, 2017). Adolescent mental illness is also widespread in countries that conventionally rank among the happiest countries according to the World Happiness Report. In Norway, for example, 22% of high school students report symptoms of depression or anxiety (Ungdata, 2018). This is important because mental health conditions among adolescents are associated with various costly long-term outcomes such as lower labour market productivity, less marriage stability, and other adult health conditions (Currie *et al.*, 2010; Goodman *et al.*, 2011; Lundborg *et al.*, 2014).

Survey evidence indicates that school pressure and concerns about the future are one of the main causes of adolescent worries (see e.g., Eriksen *et al.*, 2017). However, we know little about the relationship between the school environment, in particular higher achieving peers, and adolescent mental health. As it stands, the potential effects of going to a better school with higher achieving peers on mental health are ambiguous. On the one hand, being surrounded by higher achieving peers mechanically decreases a student's ranking among his/her peers. In such a schooling environment, students may feel a greater pressure to compete and improve their ranking, resulting in worse mental health (Kiessling and Norris, 2022). On the other hand, high-ability peers may have different health care usage and display better health behaviours such as lower smoking rates or greater physical activity. Moreover, enrolling in a higher achievement school could result in different teacher characteristics and may be an inspiring experience. Lastly, accessing a higher achievement school may boost students' schooling performance, opening up new and brighter perspectives. These features of higher achievement schools could positively influence student aspirations and mental health in both the short and long term. Because common determinants likely influence student choice of enrolling in a higher achievement high school and student health and health behaviours, and because data linking detailed school and health outcomes are not easily available, evidence on the causal effects of the school environment on student mental health remains very scarce.

This paper overcomes these identification and data challenges, providing new insights into how going to a better school affects mental health. First, to overcome the identification problem, we build on the features of the high school assignment system in the two largest Norwegian cities, which assign students to high schools through a centralized process giving priority to students with the best average grades in middle school. This assignment system enables a regression discontinuity analysis, where we compare the long-term outcomes of students that are very similar at the end of middle school except for their eligibility to enrol in a higher achievement high school. Second, we link several administrative data sources, including information about educational institutions and school grades, as well as health care take-up, and create a long panel allowing us to document the effects of attending schools with higher achieving peers during and beyond high school.

The available data enable us to jointly estimate the effects of going to a higher achievement school on students' education and health, and to characterise the features of a higher achievement school environment with respect to peer and teacher characteristics, school size, and the number of students per teacher. These features may differ across countries and contexts and are therefore important to document in order to gain a deeper understanding of the mechanisms. Abdulkadiroğlu *et al.* (2014), for example, demonstrate that going to an exam school in Boston implies going to a school with higher achieving peers, fewer Black and Hispanic students, more experienced teachers, and larger class sizes. In the context of Romania, Pop-Eleches and Urquiola (2013) also find variations in peer and teacher characteristics across schools. In France, where the central administration attempts to equalize resources across schools, Landaud *et al.* (2020) reveal little variation in teacher characteristics or class sizes across Parisian high schools, despite large variation in student ability. Beyond documenting the features of higher achievement schools in Norway, we also explore how the education and health effects vary according to where schools' admission cutoffs are located in the distribution of students' admission score. This enables us to document the relationship between changes in peers characteristics, teachers characteristics, or other school features and changes in students' education and health. To further dig into this relationship, we make use of the fact that we have variation in which school input changes more when enrolling in a higher achievement high school and implement a heterogeneity analysis. In essence, we estimate our regression discontinuity model for each of the 84 admission thresholds and each school feature separately and estimate whether changes in longer-term outcomes are greater when students gain eligibility to schools where peer characteristics, teacher characteristics or other school resources change by a larger margin at the admission thresholds.

We present four key findings. First, we find that students that are eligible to enrol in a higher achievement high school are 8.3 percentage points more likely to enrol in this school. Further, we show that eligibility to enrol in a higher achievement high school increases the likelihood of high school completion by 2.3 percentage points (4.2%) and the likelihood of enrolment in higher education by 1.6 percentage points (4.0%). Second, we document that eligibility to enrol in a higher achievement school does not change the likelihood of diagnosis or treatment for mental health conditions during high school years. However, we find that a higher achievement school environment decreases the incidence of diagnosis or treatment for mental health conditions by 1.8 percentage points (7.5%) during the three following (post-high school) years. We also show that the positive effects of higher achievement schools are driven by students gaining access to the top achieving schools, that is to schools whose admission threshold is located in the top half of the distribution of admission cutoffs. Third, we investigate what features of the school environment change at the threshold to gain a better understanding of the reasons why higher achieving schools improve students' education and mental health. We document that eligibility for enrolment in a higher achievement high school significantly changes the ability level of peers, students' ranking among their peers, peers' parental education and income, and the number of students per teacher. Lastly, our heterogeneity analysis provides suggestive evidence that improvements in students' mental health are stronger when students gain access to schools that positively impact their schooling outcomes. Our heterogeneity analysis also reveals that changes in both peers and teacher characteristics seem important for explaining our effects on students' education. Taken together, our findings provide evidence that the schooling environment does matter for students' mental health, either directly or indirectly through its effect on students' educational outcomes.

This paper particularly contributes to the literature on the relationships between education and health. Most empirical research identifying the causal effects of education on physical or mental health exploits exogenous variations from compulsory schooling reforms, regulations on school starting age, or school tracking (see, e.g., Lleras-Muney, 2005;

Clark and Royer, 2013; Crespo *et al.*, 2014; Dursun and Cesur, 2016; Lager *et al.*, 2016; Meghir *et al.*, 2018; Böckerman *et al.*, 2021). We expand this literature by moving beyond changes in compulsory education, which mostly target individuals at the lower end of the educational distribution, and analyse the extent to which the high school environment links to health. In OECD countries, the vast majority of students now have access to secondary and tertiary education (https://data.oecd.org/students/enrolment-rate-in-secondary-and-tertiary-education.htm#indicator-chart). However, there are large variations in the quality of their high school education and several papers have emphasized that accessing higher achievement schools strongly correlates with student mental health and well-being (Fletcher and Frisvold, 2011; Frisvold and Golberstein, 2011; Fletcher and Frisvold, 2014). In such context, a first order question concerns the effects enrolling in high schools of different quality, as well as the influence of high school peers, teachers, and financial resources on student health—even if changes in schooling quality could in part matter trough improvements in the quantity of students' education. Establishing this link is crucial for education policies aiming at improving the learning environment for students to increase their long-term welfare.

In addition, this paper complements the growing literature on the consequences of enrolling in a higher achievement school (see e.g., Cullen *et al.*, 2006; Jackson, 2013; Pop-Eleches and Urquiola, 2013; Abdulkadiroğlu *et al.*, 2014; Dobbie and Fryer Jr, 2014; Clark and Del Bono, 2016; Abdulkadiroğlu *et al.*, 2017; Landaud *et al.*, 2020).[1] First, we expand the

[1] Note that our paper mostly relates to studies on higher achievement schools in the context of non-elite schools. This is why we follow (see e.g., Pop-Eleches and Urquiola, 2013) who studies a similar setting to ours in Romania, in characterizing the school environment as higher achieving schools. In our setting, school admission cutoffs are located between the 4^{th} and the 97^{th} percentile of the test score distribution after middle school in the areas of interest and on average located around the 40^{th} percentile. See Figure A1 for the comparison between the distribution of middle school GPA in the cities of Oslo and Bergen for the period studied and the distribution of the admission thresholds in the high schools in our sample.

set of outcomes by studying the effects on health and educational outcomes after high school to provide a more complete longer-term picture of the effects of a higher achievement school environment. Our second contribution concerns the mechanisms behind the estimates. We combine a unique setting of 84 different school admission thresholds with detailed information on several school inputs (characteristics of peers, teachers, school size, and the number of students per teacher) to investigate which features of the school environment may help explain our findings. Understanding the role of school inputs for educational outcomes or mental health is important for explaining in what context a higher achievement school environment matters. This could help reconcile why enrolling in a higher achievement school has negative or no effects in some contexts and positive effects in others.

2 Institutional context

2.1 The Norwegian school system

The Norwegian education system consists of four levels: primary school (grades 1–7), middle school (grades 8–10), high school with academic (grades 11–13) and vocational (grades 11–14) tracks, and college and university education. Norwegian compulsory education starts at age six, lasts for 10 years, and consists of primary and middle school. Compulsory schooling is organized by Norwegian municipalities and the vast majority (98%) of pupils attend local public schools. The curriculum is identical in all primary and middle schools, there is no streaming by ability, and all pupils are allocated to schools based on fixed school catchment areas within municipalities.

While there are no grades in primary school, the school system becomes more competitive from middle school onward, where exit exams and teacher grades are crucial for admission into the best high schools in the areas with a free school choice system. At the end of grade 10, all students obtain a diploma with a total grade point average (hereafter, middle school GPA). This is the average of all teacher-awarded grades, combined with the grades from written and oral exams in randomly drawn subjects.[2] The middle school GPAs possible range is from zero to 60, where 60 is the best possible grade.[3] Assignment to high schools varies across counties.[4] This paper focuses on the two largest cities in Norway Oslo and Bergen, which have varied their intake systems over recent years. In this paper, we consider those years where they followed a free school choice system with a centralized intake based on the middle school GPA.

In contrast to the compulsory middle schools, enrolment in high schools is voluntary. Nevertheless, all students aged 16 to 23 years in Norway have a statutory right to enrolment at this level. However, this right is at the county level and does not ensure enrolment in a specific school or program. First time enrolment in high school in Norway is high: 98% of students enrol in the first year. Students enrol either in general studies (50%), in vocational programs (45%), or in alternative training plans (3%). There is, however, considerable dropout in the second and third years: only 80% of students initially enrolled in general studies programs graduate. Graduation rates for vocational programs are even lower. Graduating in general studies provides students with the required qualifications for

[2]The subjects of the teacher-awarded grades are written (two courses) and oral Norwegian, written and oral English, mathematics, nature and science, social sciences, religion, home economics, physical education, music, and arts and craft.
[3]The GPA can take decimal values.
[4]Twelve of the 19 counties in Norway had a free school choice system in 2016. In rural counties, geographic criteria still largely determine student high school choice.

enrolment in higher education, while students graduating in the vocational track need to spend an additional year of study before reaching similar qualifications.

Importantly high school ranks are not a determinant for access to higher education; high school grades and national exams at the end of high school are the only determinants of access to and types of higher education. In Norway, the intake to public higher education follows a centralized admission system based on total grade points from high school (hereafter, high school GPA). For those graduating high school with a general studies degree, about 40% do not enrol in any general higher education program.

2.2 High schools in Oslo and Bergen

There are 15 public high schools in Bergen offering general education programs and 20 in Oslo. For Bergen, we focus on the five cohorts of students completing middle school between 2006 and 2010. For Oslo, we consider the two cohorts of students completing middle school between 2009 and 2010.[5] During these periods, assignment to high schools worked through a centralized system where students ranked schools and education programs, and were then assigned based on their ranked-ordered list and middle school GPA. Students' assignment to high schools and education programs is based on a school-proposing deferred acceptance mechanism. A similar assignment system for secondary education also exists in Finland and Paris, and for college admissions in Norway, Ireland, Taiwan, Tunisia and Turkey (Fack *et al.*, 2019). For each education program, students could rank up to six different schools. The key feature of this assignment system is that there is a minimum admission score for enrolment in general studies for each oversubscribed high school. Oversubscribed high schools are

[5] The health data we are using covers the years 2006–2016 which is why we start with the graduating cohort of 2006 in Bergen. For Oslo, we start in 2009 because high school assignment was based on geographical criteria rather than on the middle school GPA for the graduating cohorts between 2006 and 2008.

high schools that receive more applications than they can accommodate. In the years we study, the majority of high schools in Bergen and Oslo were oversubscribed for enrolment in general studies, and we observe significant discontinuities in the rate of enrolment of students at specific cutoff points of the distribution of middle school GPA. This feature makes it possible to implement a regression discontinuity analysis to assess the effect of enrolment in general education programs in a higher achievement high school on subsequent health and educational outcomes.

To help with interpretation, we now briefly describe the schooling environment in the Oslo and Bergen high schools. We focus on how they are similar and how they differ along key dimensions, such as peer quality, teacher quality and financial resources. We also emphasize how these variations in peer quality, teacher quality and financial resources may increase or decrease stress and anxiety among the students.

High school admission in Oslo and Bergen hinges on students' middle school GPA. This generates large variations in peer ability across the Oslo and Bergen high schools: the top quartile of schools in terms of student ability have students with an average middle school GPA of 50, while the lowest quartile of schools has students with an average GPA of 37.7.[6] To better understand the consequences of such variations in peer quality, Appendix Table A1 uses publicly available school level data from the Student Survey[7] to investigate the relationship between schools' peer quality—proxied by students' average exam scores in 11th grade—and students' school experience in Oslo and in the Bergen area. This table shows that

[6] A middle school GPA of 50 or 37.7 corresponds to the 83rd percentile or the 35th percentile of the distribution of middle school GPA, respectively. In addition, because middle school GPA is correlated with gender and family background, there are also large variations in these student characteristics across high schools.

[7] The Student Survey (Elevundersøkelsen) is conducted by the Norwegian Directorate of Education every spring among 7th graders, 10th graders and 11th graders. Schools have the obligation to administer this survey, but students' answers are voluntary. Aggregate answers at the school level are publicly available at https://www.udir.no/tall-og-forskning/statistikk/statistikk-videregaende-skole/elevundersokelsen–resultater-fra-vg1/elevundersokelsen-vg1–laringsmiljo–sortert-etter-fylker-og-skoler/.

students feel a greater need to perform well at school when they are surrounded by better peers. Additionally, being surrounded by higher achieving peers mechanically decreases a student's ranking among their peers. In such contexts, students need to compete harder not to be among the lowest performing students of their class, thereby increasing school pressure. However, higher performing peers may also be more motivating and less prone to problematic behaviours. In particular, Table A1 shows a positive correlation between peer quality and the peacefulness of the classroom environment, as well as between peer quality and students' knowledge of the school rules. Table A1 also shows a negative correlation between peer quality and the share of students who were bullied by their peers. These correlations emphasize that being surrounded by better peers may have both positive and negative effects on students' stress and anxiety, and an important empirical question is whether the negative effects dominate the positive effects, or conversely. Table A1 further shows a positive correlation between peer quality and teachers' positive behaviours toward their students, which could contribute to improving students' school experience.

There are large variations in teachers' characteristics across high schools in Bergen and Oslo: the top quartile of schools in terms of teacher diploma have about 65% of teachers with a master's degree, while the lowest quartile of schools have none. Similarly, we observe important differences in the students to teacher ratio, with the top quartile of schools in terms of the students to teacher ratio having just nine students per teacher, while the lowest quartile of schools have 19.8. Here, the students to teacher ratio does not only reflect classroom size, but also the variety of programs offered by the schools. All the high schools in Bergen and Oslo offer compulsory core curriculum subjects like languages, natural sciences, and human sciences, but there is greater variety across schools in the availability of more specialised subjects like music, media, arts, and sports. In such contexts, a lower students to teacher ratio could improve students' school experience both through decreases in class size and through increases in students' course choice.

Lastly, high schools in Oslo and Bergen have on average about 540 students per school but school size varies significantly with the largest school gathering 1285 students, and the smallest ones counting about 260 students. As resources for high schools are centrally allocated and based on the numbers of students, these variations in school size generate sizeable variations in schools' financial resources, which could also contribute to impacting students' school experience.[8]

In Section 5, we document how school characteristics vary with students' eligibility to enrol in a higher achievement high school, and we leverage this information on differences in school inputs at the admission thresholds to provide insights into what school characteristics may explain our main effects.

2.3 Health services in Norway

In Norway, health services are publicly financed and universally accessible for all Norwegian citizens. The services are organized in two levels: primary care and specialist care. Primary health care is the responsibility of the municipalities and includes general practitioners, emergency rooms, infant and child health care centres, school health services, and elderly care. Specialist care is the responsibility of the four health regions in Norway and it includes somatic specialist care, psychiatric health services, and private referral specialists.

[8] Although schools in Bergen and Oslo differ in several dimensions, it is important to note that changes in peer quality and resources are less dramatic than in the context of some other countries (see e.g., Abdulkadiroğlu *et al.*, 2014; Dobbie and Fryer Jr, 2014; Clark and Del Bono, 2016).

Primary and specialist health services. General practitioners (hereafter GPs) and local emergency rooms (hereafter ERs) are the basis of the primary care services. The vast majority of Norwegian citizens belong to a specific GP's list, and GPs are responsible for providing primary health care services to the patients on their list. GPs diagnose their patients, certify sick leave, prescribe treatments, and refer their patients to specialist care when needed. They also follow up on their patient after they have received care in the specialist system. In general, the GPs serve as gatekeepers to the specialist care system and health-related welfare benefits.

Most specialist care is provided through public hospitals and outpatient care clinics, but contracted private specialists can also provide specialist care. Most importantly, the first contact with specialist care takes place via the referral of the patient by the GP or the ER because it is not possible for a patient to proceed directly to specialist care within the public health care system. Hence, GPs and ERs are crucial gatekeepers in the Norwegian public health care system for all types of diagnosis and treatment including mental health conditions.

School health services. All Norwegian school children and youth are entitled to vaccinations, health education, and guidance, as well as medical examinations and access to health care professionals when needed (Helse- og omsorgsdepartementet, 2003). For school-age children, these are responsibilities of the school health services.[9] School health care services are easily accessible to students and are free of charge. These services are available at school premises during school hours and primarily provided by school nurses. School nurses are

[9] Younger children receive these services in child health care centres that also provide pre- and postnatal services for mothers and newborns.

employed by municipalities and not by schools and may provide services to more than one school simultaneously. Importantly, the school health services are preventive. For curative purposes, the children are referred to primary or specialist care services (Helsetilsyn, 1998). One exception is that school nurses are entitled to prescribe birth control pills (free of charge) to young women aged 16–19 years.

There is no systematic registry of the actual use of school health services by students (Abrahamsen *et al.*, 2021). Survey information from 2013 shows that about 25% of the students in high school use school health services at least once a year (Bakken, 2018). However, there are substantial gender differences in use: only about 13% of high school boys consult school nurses at least once a year, but 35% of high school girls. The most common reason for using school health services during high school are matters regarding sexuality and contraception.

3 Data and empirical strategy

3.1 Data

The data for this paper is compiled from several Norwegian administrative records, including the national educational registers, tax records, family registers, and health registers. We consider the sample of students that completed 10^{th} grade between 2006 and 2010 in Bergen and in 2009 or 2010 in Oslo. In total, our sample comprises 19,932 individuals attending 87 different middle schools.

3.1.1 Demographic and socioeconomic information

The demographic and socioeconomic information is from registers covering the entire resident population in Norway up to 2014, which includes information such as the year and month of birth, gender, immigration status, municipality of residence in each year (Statistisk Sentralbyrå, 2017a),[10] and highest educational attainment. Information on earnings is from the tax registers (Statistisk Sentralbyrå, 2017b).[11] All registers include unique identifiers, and the population register specifies unique identifiers for the parents of each individual. This enables us to recover for each individual and his/her parents all relevant socioeconomic information.[12]

3.1.2 Schools and educational data

Information on enrolment in middle school, high school, and university is from the national educational registers and is available up to 2014. For each individual in our sample, we observe the middle and high schools attended, as well as the track in which the student enrolled, and the degrees, if any, completed. Educational choices and attainments are reported by the schools directly to Statistics Norway, thereby minimizing any measurement error from misreporting. For each student, we also observe the 10^{th} grade GPA and the GPA upon completion of high school. Finally, these registers contain information about whether individuals enrolled in college up to four years after completion of middle school, including

[10] Demographic information on all individuals with a Norwegian ID number is collected by the Statistics Norway. The documentation about these data can be found at `https://www.ssb.no/data-til-forskning/utlan-av-data-til-forskere/variabellister/befolkning`.

[11] Data on individuals' income is collected by the Tax Authority and kept by the Statistics Norway. The documentation about these data can be found at `https://www.ssb.no/data-til-forskning/utlan-av-data-til-forskere/variabellister/inntekt`.

[12] Both parental income and education are measured when students complete grade 10. For parental income, we specify the sum of the earnings of the mother and father. For parental education, we create an indicator variable taking a value of one if at least one parent completed a higher education degree (Bachelor's degree).

those who enrol in college immediately after graduating from high school or following a gap year (Statistisk Sentralbyrå, 2017c).[13]

For each high school, we have information about its staff from the Social Security records (Statistisk Sentralbyrå, 2017d,e).[14] This information allows us to construct proxies for teacher quality and school financial resources. In particular, we specify variables indicating the share of teachers with a master's degree, the average age of teachers, the proportion of female teachers, students per teacher, students per non-educational staff, and the number of students per program. We also use information on student characteristics and high school enrolment to construct variables indicating for each student the average characteristics of peers in high school, such as the middle school GPA of peers, gender, parental education, and parental income.

3.1.3 Health data

Information on visits to GPs and ERs is from the Control and Payment of Health Refunds database (acronym *KUHR* in Norwegian), which is available between 2006 and 2016 (Helsedirektoratet, 2017a).[15] GPs and ERs are obliged to report all consultations and relevant International Classification of Primary Care (ICPC-2) codes to this national claims

[13]Data on individuals' educational attainment, middle and high school GPAs and schools of enrolment is collected by the National Education Database (*Nasjonal utdanningsdatabase*) and kept by the Statistics Norway. The documentation about these data can be found at `https://www.ssb.no/data-til-forskning/utlan-av-data-til-forskere/variabellister/utdanning`.

[14]The information on employment is obtained from several register-based employment statistics, and in particular we rely on information from the Employer and Employee Register from the Norwegian Labour and Welfare Administration that is maintained by the Statistics Norway. The documentation about these data can be found at `https://www.ssb.no/data-til-forskning/utlan-av-data-til-forskere/variabellister/arbeidsmarked`.

[15]These data are available from the Norwegian Health Directorate; see `https://www.helsedirektoratet.no/tema/statistikk-registre-og-rapporter/helsedata-og-helseregistre/kuhr`. Health data are not available before 2006, thereby preventing us to look into and control for students' mental health conditions prior to enrolling in high school. However, as highlighted in Appendix Figure A2, the prevalence of mental health conditions is very low prior to enrolling in high school while it increases by about 50% during high school years.

database to receive payment. ICPC codes convey information about the GPs' assessment of the patient's health conditions and the type of care provided. Specifically, each ICPC code is made of one letter, indicating where the symptoms or diseases are located in the body, and two numbers indicating whether the GPs assessed health symptoms, diseases, prescribed a screening or preventive procedure, prescribed medication or treatments, analysed test results, or performed an administrative task.[16] According to the Norwegian Public Health Institute, the most frequently occurring mental health related diagnoses among high school students are depression, anxiety disorders, adjustment disorders, and eating disorders. Therefore, we also study impacts on particular symptoms/diagnoses detected by doctors.

Using this information, we constructed variables indicating whether and how many times each student visited a GP or ER between middle school completion and up to six years later, that is during the three years of high school and the first three post-high school years. In addition, as a higher achievement school environment may have specific impacts on mental health, we constructed for each student a variable indicating whether during any consultation a GP assessed psychological symptoms or disease (ICPC codes beginning with the letter "P").[17] When constructing these variables, we consider academic rather than calendar years, that is, we consider for each year t visits between August t and July $t + 1$.

The time range of our data enables us to look into students' health during the three years after middle school completion (i.e., years when students are enrolled in high school), and during the three following years (i.e., years when students have left high school). Changes in the schooling environment during high school could affect students' health either directly, or indirectly through improvements in students' educational prospects. To look into these

[16] See Appendix B for the list of ICPC-2 codes.
[17] Note that we do not know whether students are diagnosed or treated for a psychological condition for the first time because we only observe GP and ER visits since 2006.

alternative mechanisms, we study separately the effects of higher achievement high schools during and after high school years.

Finally, we also consider hospitalizations due to mental health conditions and substance abuse, which we obtain from the National Patient Register (Helsedirektoratet, 2017b). This data is only available between 2008 and 2014, therefore it provides limited possibilities to study the mental health impacts of higher achievement schools.[18] Nevertheless, we use this data with a restricted working sample (the cohorts of 2008 to 2010) to assess the consequences of better schools on hospitalizations during the three years of high school and the first post-high school year.[19]

3.2 Cutoff admission scores

Our data provide detailed information on student demographic characteristics, school environment, health, and education. However, we do not have information on student applications to and rankings of high schools. As a result, it is not possible to directly identify high school admission thresholds from the data.[20] We, therefore, build on the methodology in Hansen (2000) to overcome this issue. This method was recently used by Hoekstra (2009)

[18]These data are available from the Norwegian Health Directorate; see `https://www.helsedirektoratet.no/tema/statistikk-registre-og-rapporter/helsedata-og-helseregistre/norsk-pasientregister-npr`.

[19]Note that many students suffering from mental health conditions are not hospitalized. In general, the treatment plans and the length of the treatment for different mental health symptoms or diagnoses vary greatly by diagnosis and by the individual effectiveness of the treatment. For example, about 25% of the adolescents diagnosed with depression receive antidepressants in addition to other forms of therapy and an increasing share of adolescents with anxiety disorders receives sleep medication. Whereas about 17-20 percent of girls aged 16 to 24 years are diagnosed in the primary health care service with mental health conditions, about half of them also receive mental health treatment by specialists (see https://www.fhi.no/nettpub/hin/psykisk-helse/psykisk-helse-hos-barn-og-unge/ for details).

[20]Unlike admissions to universities, which follow a nationwide assignment mechanism used in Kirkeboen *et al.* (2016), at high school level the admission system is decentralized at the county level. Unfortunately, we do not have information on student applications in these decentralized systems. For admission into high schools, students first list their preferences regarding the education programs they want to enrol in (up to two). Then, for each education program, students list their preferred high schools (up to six). The high school application data would therefore provide us with an ordered list of students' preferences over programs and high schools with a maximum of 12 different choices.

to identify admission thresholds and estimate the effect of going to a flagship university in the US and by Landaud *et al.* (2020) to study the effect of enrolment in higher achievement Parisian high schools.[21] In addition, Porter and Yu (2015) show that this procedure can be used in combination with a standard regression discontinuity (RD) analysis without further adjustment or assumptions. In short, we identify schools for which there exists a significant positive discontinuity in enrolment rates and the procedure selects for each school the threshold that minimizes the number of incorrectly assigned students (i.e., enrolled students below the threshold or un-enrolled students above the threshold).

In practice, for each cohort and high school in Bergen, we focus on the sample of 10^{th} graders in Hordaland county (the county where the city of Bergen is located). For high schools in Oslo, we consider the sample of 10^{th} graders in Oslo county. For each value g of the 10^{th} grade GPA score distribution, we define a dummy which takes a value of one if student's i score, f_i, is greater than or equal to the cutoff score g, $D^g_{iz} = 1\,[f_i \geq g]$. For each high school z in year t, we estimate the following regression for each value g (omitting subscript t):

$$E_{iz} = \alpha + \psi_z D^g_{iz} + \varepsilon_{iz}, \tag{1}$$

where E_{iz} takes a value of one if student i enrols in high school z in year t, and zero otherwise. For each high school z in year t, we select as admission cutoff, f_z, the value of the 10^{th} grade GPA score g that maximizes the R^2 of equation (1) with a significantly positive $\hat{\psi}_z$.[22]

[21] This approach has also been used in other settings, such as testing for discontinuities in the dynamics of neighbourhood racial composition (see e.g., Card *et al.*, 2008), or evaluation of social programs (see e.g., Carneiro *et al.*, 2019).

[22] We consider that schools without any significantly positive $\hat{\psi}_z$ at the 1% level are undersubscribed. For these schools, we cannot detect any variations in enrolment probability around specific points of the GPA

Further, we exclude a few admission thresholds with very small estimated discontinuities in enrolment rates around these cutoffs.[23] For each oversubscribed high school z, we then define the subsample of 10$^{\text{th}}$ graders whose middle school is located within eight kilometres of z.[24] Then, for each student, we define his/her GPA score-distance $f_i - f_z$ to the cutoff admission score of high school z, and we use regression discontinuity analysis where we pool all subsamples of students and use $f_i - f_z$ as a running variable.

3.3 Empirical approach

Specification. To estimate the effects of a higher achievement school environment, following Lee and Lemieux (2010), we implement a standard regression discontinuity analysis where we compare students whose middle school GPA fell either just above or below the admission threshold of an oversubscribed high school. For each educational or health outcome Y_i in our data, we start by estimating the following model (omitting subscript t):

$$Y_i = \delta + \alpha \mathbb{1}\{f_i - f_z \geq 0\} + \eta\big(f_i - f_z\big) + \lambda\big(f_i - f_z\big) \times \mathbb{1}\{f_i - f_z \geq 0\} + \mathbf{X_i}\gamma + \omega_z + u_i, \quad (2)$$

score distribution, indicating that there is no admission threshold preventing students with a low GPA score to enrol. These undersubscribed schools are therefore excluded from the regression discontinuity analysis.

[23]From the 105 estimated cutoffs, we exclude 21 with estimated discontinuities in enrolment rates below 0.015 percentage points, obtaining 84 oversubscribed high schools during the period of interest. In detail, we obtain 11 oversubscribed high schools in Bergen in 2006, 2008, and 2010, 10 in 2007, and 12 in 2009. For Oslo, we obtain 14 oversubscribed high schools in 2009 and 15 in 2010. Within each city and year, the admission cutoffs vary on average by two points between every two high schools with adjacent admission cutoffs.

[24]Within each area, Bergen or Oslo, students can apply to and enrol in any high school whose admission threshold is lower than their GPA score. However, Fack *et al.* (2019) provide evidence that geographical proximity is a strong driver of student preferences over high schools. Coherently, we find that about 90% of students graduating from middle schools located in Bergen or Oslo during the years of interest and enrolled in general studies went to high schools located within eight kilometres of their middle school. Therefore, to maximize our first stage results given that we do not have information on students' application lists, we use a geographical criterion to define for each high school the set of students who are likely to apply to this high school. The results are robust with respect to longer or smaller distance criteria when constructing the working sample.

where $f_i - f_z$ measures the distance in points between school z's admission threshold and student i's middle school GPA. $\mathbf{X_i}$ is a set of control variables, which includes student age, gender, family background, and average GPA in grade 10 in mathematics and Norwegian. We also include as control variables a full set of (school z # year t) fixed effects, ω_z.[25] u_i represents the unobserved determinants of student health and education. Under the maintained assumption that there is no discontinuity in the distribution of u_i at the cutoffs, the parameter α can be interpreted as the causal effect of eligibility for admission in a higher achievement high school on the outcome Y_i. The standard errors are clustered at the individual level.[26] In our main analyses, we exclude students whose middle school GPA fell within 0.1 points of the admission thresholds from the analysis to avoid measurement error issues due to estimated cutoffs. We follow Calonico *et al.* (2014) to choose an optimal bandwidth around admission thresholds, which is 5.19 points. Finally, we use a triangular kernel centred on the admission cutoffs. In the following sections, we show that our results are robust to alternative functional forms, bandwidths, and sets of control variables.

Interpretation of the treatment. The coefficient of interest in Equation 2 is α. Under the assumption that there is no discontinuity in the distribution of unobserved u_i at the cutoffs, this parameter can be interpreted as the causal effect of eligibility for admission in a high school with a higher admission threshold on the outcomes under consideration. In the following subsection, we provide results that are consistent with this identifying assumption.

[25] As we have 84 oversubscribed high schools during the period of interest, our regression includes 84 fixed effects capturing the 84 regression discontinuity samples. These fixed effects include year fixed effects.

[26] We cluster the standard errors at the individual level because each student may appear several times in our sample if his/her middle school is close to several oversubscribed high schools, and if his/her GPA score is in the vicinity of several admission thresholds. Note that this specification is the same as in Pop-Eleches and Urquiola (2013), which studies the consequences of enrolling in a higher achievement school in a setting very similar to ours, and the chosen level of clustering is consistent with recent developments on the clustering of standard errors (Abadie *et al.*, 2017).

In this context, students whose admission score fell just above or below any cutoff f_z are at baseline similar, expect for the set of high schools in which they can enrol. Compared to students whose admission score fell just below the cutoffs, students whose admission score fell just above the cutoffs are eligible for enrolment in general studies in one additional high school, and this high school has a higher admission threshold than any other available high school. As a consequence, we may expect that students whose admission score ends up above the cutoffs enrol in high schools with higher achieving peers (and end up with a lower ranking among their higher achieving peers). As students' GPA is correlated with other characteristics, such as gender or family background, we may also expect that falling above the cutoffs changes peers' gender and social background. As teacher and school characteristics also vary greatly from one high school to the other, we may further wonder whether eligibility for enrolment in a higher achievement school (that is, in a high school requiring a higher GPA score for enrolment) also changes these dimensions of the schooling environment. In Section 5, we will document changes in peer, teacher, and school characteristics around the thresholds to precisely document the consequences of being eligible for admission in a high school with a higher admission threshold. We will also exploit changes in our measures of the schooling environment at the cutoffs to document the relationship between peers, teachers or other school characteristics and students' outcomes.

Our main analyses are conducted separately on students whose admission score fell around admission thresholds located in the top half or bottom half of the distribution of admission cutoffs. In our context, the admission thresholds under consideration concern students' enrolment in general studies (i.e., the more demanding high school track which enables the students to pursue in higher education). As a consequence, falling above an admission threshold may change both the high school environment and the high school track, except around top admission thresholds where the vast majority of students enrol in general studies. Therefore, analysing separately the discontinuities in outcomes around high and low admission thresholds allows us to discuss whether the effects of being eligible for admission in a high school with a higher admission threshold arise through changes in the high school track and/or changes in the schooling environment.

Multiple hypothesis testing. Since we study the effects of higher achievement schools on a relatively large number of potentially correlated outcomes, we use a stepwise multiple testing procedure that controls for familywise error rate. Whenever stated in the table notes, we include stars next to each coefficient that indicate whether it is statistically different from zero, after accounting for multiple hypotheses testing using the procedure in algorithms 4.1 and 4.2 of Romano and Wolf (2005). We test hypotheses for the estimates presented in each table separately. Therefore, depending on the table, we test between 15 (in Table 3) and 33 (in Table 1) hypotheses simultaneously. The procedure in algorithms 4.1 and 4.2 of Romano and Wolf (2005) is an iterative rejection/acceptance method for a fixed level of significance. We use 1,000 block-bootstrap replications to obtain the adjusted critical values (the block is the individual) and the result tables indicate whether the coefficients remain significant at a level of 1, 5, or 10 percent after using this procedure.

Instrumental variable approach. In our context, the mapping from eligibility to enrolment is not one-to-one because students may not effectively enrol in the high schools for which they are eligible due to, for example, preferences for other programs or locations. Therefore, we present instrumental variable (IV) estimates where enrolment in a given higher achievement high school is instrumented with eligibility for enrolment in this high school (Hahn *et al.*, 2001). Note that these results should be interpreted cautiously because IV requires that the exclusion restriction and monotonicity hold.[27] Eligibility for a higher achievement school increases enrolment to a preferred school, but could also have indirect effects via changes in psychological factors such as aspirations and disappointment. We provide suggestive evidence that this is unlikely to be a major concern because the estimated effects on mental health appear mostly after high school, and thus do not reflect the mere short-term bliss (disappointment) effect of enrolling (or failing to enrol) in a preferred school.[28] We also emphasize that we estimate the IV on a set of compliers that may have different characteristics than the average students at the thresholds.

Descriptive statistics. Table A2 provides descriptive statistics. For the sake of comparison, the table includes three samples: all students completing 10^{th} grade in Norway between 2006 and 2010, students completing 10^{th} grade in the county of Hordaland (where the city of Bergen is located) between 2006 and 2010 and in Oslo in 2009 and 2010, and our regression discontinuity sample. The main takeaway is that the average student in Hordaland or Oslo (Column (3)) is comparable to our RD sample of students (Column (5)). However, when compared with the average student in Norway (Column (1)), we can see that students in Oslo and Bergen are positively selected on educational outcomes and demographic characteristics. For example, students in Oslo and Bergen area in our RD sample specialise more often in the general education track compared with the average student in Norway. In addition, these

[27]We discuss possible violations of the monotonicity assumption in more details in Subsection 4.1).
[28]However, as discussed in Section 5, changes in the schooling environment may on the longer-run affect students' prospects and aspirations, and this could play a role in explaining our main results.

students have better-off peers with higher middle school GPAs. They are also more likely to graduate from high school and enrol in higher education up to four years after commencing high school. Interestingly, students in Oslo and Bergen and our RD sample are as likely to visit a GP or an ER as the average student completing 10^{th} grade in Norway. There are also no differences in the use of primary health care services or likelihood of being diagnosed or treated by GPs for mental health conditions.

Appendix Figure A2 and Table A3 provide a more detailed description regarding the prevalence of mental health conditions among adolescents in Norway. Firstly, Appendix Figure A2 shows the prevalence of mental health condition in our RD sample by year relative to middle school graduation. This figure shows that the prevalence of mental health conditions increases sharply during high school years (+50% between the first and last year of high school). This raises the question of the relationship between the high school environment and students' mental health. This figure highlights that the prevalence of mental health conditions varies greatly depending on whether students can enrol in higher or lower achievement schools (that is, depending on whether their middle school GPA lies in the top or bottom half of the GPA score distribution). Appendix Table A3 further provides information on the prevalence of mental health conditions by gender and family background. This table shows that mental health conditions are more prevalent among girls, and among students whose parents have lower educational attainments and lower incomes. As students' gender and family background strongly correlates with their GPA, and therefore with the type of high school they may enrol in, these statistics emphasize the need to account for students observable and unobservable characteristics in order to properly estimate the causal relationship between higher achievement schools and students' mental health. Our regression discontinuity analysis precisely aims at addressing this issue.

Lastly, Table A3 shows that high school graduates and students who enrol in higher education are less likely to suffer from mental health conditions. These facts lay ground for the idea that the effects of higher achievement schools on students' mental health could potentially go through improvements in students' education, which could brighten students' prospects for their future career. To try and discuss this potential mechanism, we will present the estimated effects of higher achievement schools during and after high school years.

3.4 Tests of identifying assumptions

Students just above and below the cutoffs differ in their eligibility to enrol in a higher achievement high school, but we assume that they are similar in all other (observable and unobservable) predetermined dimensions. Below, we present evidence for the validity of our identification assumption.

Strategic manipulation around the cutoffs. One threat to identification would be that students willing to enrol in specific high schools manage to earn a score just above the admission thresholds. To provide empirical evidence that there is no strategic manipulation of the running variable at the cutoffs, Figure A3 presents the results when implementing the density tests suggested in McCrary (2008) on the full sample and separately between the highest achievement schools and the schools with lower achieving students. The panels in the figure illustrate that the density of the running variable is continuous at the cutoffs for the three samples, providing evidence supporting our identifying assumption.

Covariate balance. Further, to assess the validity of our identification assumption of no discontinuity in unobserved determinants of students' health and education at the cutoffs, Table A4 reports the results of estimating model (2) using student baseline characteristics such as gender, nationality, and parental background as dependent variables.[29] Consistent with our identification assumption, we do not observe systematic discontinuities in the predetermined characteristics of students whose middle school GPA fell just above or below the admission threshold of an oversubscribed high school. This is shown in Figure A4 in the Appendix, which includes the corresponding graphical estimates of model (2), excluding controls X_i and ω_z, for the three samples we examine.

The finding that student characteristics are continuous around admission thresholds is not very surprising in the setting we consider. Indeed, in our setting students' admission score is determined by the average of about 15 different grades, unknown at the time of application. This makes students' admission score impossible to precisely manipulate. Besides, while high schools' selectivity rank is relatively stable over time, their precise admission cutoff is ex ante impossible to predict precisely. Schools' admission cutoffs can take decimal values implying that they can take a large number of possible values. These cutoffs are jointly determined by the preferences and middle school GPAs of all 10$^{\text{th}}$ graders in Hordaland or Oslo, which are unknown at the time of application. On average, they vary by 4.3 points from one year to the

[29] When estimating model (2) for balancing tests, we include a full set of *school#year* fixed effects as control variables but do not control for student baseline characteristics. Note that this table shows variations in students' own characteristics at the threshold. To characterise how eligibility for enrolment in a higher achievement school changes the schooling environment, in Section 5 we study changes in peer characteristics at the threshold.

next, meaning that students can broadly guess for each high school whether it is completely out of reach or if it is a very safe possibility, but they cannot predict or manipulate whether their admission score will fall just above or below its admission cutoff.

Note that the results reported in Table A4 and Figure A4 do not rule out that the average ability of student peers varies discontinuously at the thresholds, along with other characteristics of peers and the school environment. For example, a higher achievement school might be able to attract better teachers. In Section 5, we discuss this in detail and attempt to quantify whether the changes in a high school's environment at the cutoff explains the effects of enrolment in a higher achievement high school on student education and health.

4 Empirical results

In this section, we first investigate how eligibility for enrolment in a higher achievement school affects actual enrolment in this high school. We then turn to consider the impacts on subsequent education and health.

4.1 First stage results

Figure 1 presents our first stage results, that is, the effect of eligibility for enrolment in a higher achievement school on actual enrolment in this high school. For each figure, the solid lines plot the fitted regression lines after estimating model (2) without controls for student baseline characteristics or *school#year* fixed effects (i.e., X_i and ω_z). The plotted points are the conditional means of the dependent variable for students in a 0.25-points binwidth. At the top of each figure, we report the estimated α, which is the estimated effect of eligibility for enrolment in a higher achievement high school on actual enrolment, and its standard error. There is one figure for each sample under consideration: the whole sample (Panel A), students located around the highest admission thresholds (Panel B), and students located around lower admission thresholds (Panel C).[30] The three figures depict a significant increase in enrolment probability at the cutoffs. More precisely, the figures show that the enrolment probability of students is close to 2% below admission cutoffs, and increases by about eight percentage points for students scoring just above the cutoffs.[31] This indicates that there are about 8% of compliers in our sample, meaning that there are about 8% of students who are willing to attend a higher achievement school when offered this opportunity. Figure 1 also shows that there are 2% of always-takers, that is students with specific admission criteria which enable them to enrol in their high school of choice even when their middle school GPA is below the admission threshold; and there are about 90% of never-takers, that is students who do not wish to enrol in the high school corresponding to the cutoff under consideration.[32] The estimates for α in model (2) in Column (1) in Table 1 confirm these results.

Monotonicity in high school choice. While we have shown that eligibility for enrolment in a higher achievement school predicts actual enrolment in this high school, the validity of eligibility as an instrument for enrolment also relies on the monotonicity assumption, that is, on the assumption that there are no defiers. This implies that increases in students' GPA around any threshold z do not decrease students' probability to enrol in the corresponding high school (which we call high school z). Such assumption could be violated if increases in

[30]We split the main sample in two depending on whether schools' admission threshold are located in the top or bottom half of the cutoff distribution.

[31]Note that one reason why the enrolment probability is not zero below the cutoff is that students with special needs (e.g., physical disabilities) may be accepted with a lower GPA to the geographically closest school. We do not have information on whether students have special needs.

[32]Recall that we do not know individual student preferences, hence many students could have preferences for other programs or school locations, explaining why a high share of students are never-takers.

students' GPA in the vicinity of z also changed students' eligibility to enrol in the next best school (high school $z + 1$), and if the compliers around threshold z were the same as those around threshold $z + 1$.

To test whether there is such a violation of the monotonicity assumption, we estimate whether students' enrolment in high school z changes around the threshold of high school $z + 1$. The results are presented in Table A5. This table shows no variation in students' enrolment in high school z around the threshold $z + 1$, indicating that the students enrolling in high school z are not compliers for enrolment in high school $z + 1$. These results suggest that the monotonicity assumption is unlikely violated in our setting.

4.2 Educational outcomes

Figure 2 and Figure 3 present the estimated effects of eligibility for enrolment in a higher achievement school on the subsequent education of students. We focus on two outcomes: high school graduation in the general track and enrolment in general higher education, either on time or after a gap year. Figure 2 shows a discontinuity of 2.4 percentage points at the cutoff on the likelihood of high school graduation, driven entirely by the highest achievement high schools (Panel B). Figure 3 exhibits no average impact on enrolment in higher education (Panel A). However, there is an increase of 2.9 percentage points for the highest achievement high schools (Panel B). Columns (2) and (3) in Table 1 confirm these results. Note that these findings remain significant after adjusting inference for testing simultaneously 33 hypotheses in Table 1, using the procedure described in Romano and Wolf (2005).

Our finding that eligibility for enrolment in a higher achievement school has positive effects on student educational outcomes differs from previous studies showing that elite school attendance in the US does not affect educational outcomes (see e.g., Abdulkadiroğlu *et al.*, 2014; Dobbie and Fryer Jr, 2014; Abdulkadiroğlu *et al.*, 2017). However, it is in line with Pop-Eleches and Urquiola (2013) and Jackson (2013) who also consider non-elite settings and document the positive effects of attending higher achievement schools. To understand in our setting how the distribution of admission thresholds compares to the admission score distribution, Figure A1 plots the density of both middle school GPA and admissions cutoffs; on average the cutoffs are located around the 63$^{\text{rd}}$ percentile of the GPA distribution. We note that the results that eligibility for enrolment in a higher achievement school significantly affects high school completion and enrolment in higher education are similar to the findings of Clark and Del Bono (2016), who focus on individuals born in the 1950s. Hence, our focus on non-elite high schools—implying that the marginal students differ by context—may be an explanation for the differences in effects compared with the US. Other features of the education system, such as the centralized admission system to higher education in Norway, may also play a role in our findings. In particular, student ranks within their class or school are not of direct importance for access to higher education because only their rank in the national high school GPA distribution is crucial for the centralized admission system. This setting is different from the setting in the US or France where rank in a class or school is a central factor in college applications (Dobbie and Fryer Jr, 2014; Landaud *et al.*, 2020).

Columns (1) and (2) in Table A6 in the Appendix present the IV estimates, where we rescale the intention-to-treat estimates by the probability of enrolment in a higher achievement high school upon gaining eligibility for enrolment. Panel A shows that enrolment in a higher achievement high school increases the probability of high school graduation and enrolment in higher education by 28 and 19 percentage points, respectively. While these estimates are large, the 95% confidence intervals are also quite large, so that we cannot rule out quite modest effects.

4.3 Health outcomes

Next, we analyse the impacts of eligibility for enrolment in a higher achievement school on student health during and following high school. We first focus on the probability and number of visits to GPs or ERs. We then split the visits into two types: visits during which patients are diagnosed or treated for a mental health condition (i.e., ICPC-02 codes beginning with a "P" as described in Appendix B) and visits for other health assessments or treatments.[33] Figure 4 depicts no discontinuities around the eligibility cutoffs in the probability of consulting with GPs or ERs (for any type of visit) during the six years after middle school graduation. However, Figure 5 shows a reduction of 1.7 percentage points in the likelihood of being diagnosed or treated for a mental health condition during GP or ER visits (Panel A). Individuals gaining access to the highest achievement schools (Panel B) drive this fall. Interestingly, Figure 5 shows that students' likelihood of being diagnosed or treated for a mental health condition is quite stable below the cutoffs, suggesting that the discontinuity observed at the thresholds is not driven by a concentrated increase in mental health conditions among students who just failed to gain access to a higher achievement school.

The estimates in Columns (4)–(11) in Table 1 present the corresponding point estimates for α in model (2). In order to study whether changes in the schooling environment directly affect students' mental health, or whether a higher achievement schooling environment may

[33] We note that it is possible that there are multiple symptoms and/or diagnoses during a visit to GP or ER.

matter indirectly through improvements in students' educational prospects, Table 1 presents health effects separately between high school years and post-high school years. This table shows that the positive effects of higher achievement schools are stronger in the post-high school period.[34] While these stronger effects in the post-high school years might be a result of the development of the illness and the diagnosis process,[35] improvements in students' education may play a role in explaining why higher achievements schools are protective of students' mental health.[36]

In Table 2, we focus on post-high school years and we examine the use of primary health care services in detail. In particular, we use the ICPC-2 codes to classify the different types of mental health conditions, and create four categories: anxiety or depression symptoms and diseases, substance use, hyperkinetic disorders, and other psychological symptoms or disorders (see Table A7 for the classification of mental health conditions).[37] As shown, the reduction in visits with depression or anxiety drives the reduction in the likelihood of consultations with mental health diagnoses or treatments. Note that this finding remains significant after adjusting the inference for multiple hypothesis testing.

[34]The p-value for $HA : \alpha_{during} \neq \alpha_{post}$ is 0.017 in Panel A, 0.072 in Panel B and 0.096 in Panel C.

[35]Throughout adolescence, the human brain undergoes a substantial development and this process makes the developing brain over time particularly vulnerable to stressful or negative impacts (Blakemore, 2019). Moreover, self-stigmatization might prevent adolescents from seeking help in the health care system during the first phase of the illness (Kaushik *et al.*, 2016). Furthermore, to receive a diagnosis for some of the more severe mental health illnesses we consider, an individual needs to exhibit a set of symptoms over a longer period of time (Currie and Stabile, 2009).

[36]Columns (3) and (4) in Table A6 in the Appendix present the corresponding IV estimates, carrying with them the same cautiousness in interpretation as discussed for educational outcomes. Enrolment in a higher achievement high school instrumented by eligibility reduces the likelihood of being diagnosed or treated by a GP or an ER for psychological symptoms and diseases by 21.2 percentage points during post-high school years.

[37]We bundle anxiety and depression together given the possibility of co-diagnoses and common treatments for both conditions (see, e.g., Pratt *et al.*, 2017). Hyperkinetic disorders include inattention, overactivity, and impulsivity. They include a variety of attention disorders such as attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD).

We then turn to behaviours and mental health related specialist treatments and hospitalizations. Table A8 shows no effects on teen pregnancies among females under the age of 20, hospitalizations in general (Column 2) and due to any mental health conditions (Column 3; measured by ICD10 codes F), hospitalizations due to use of psychoactive substances (Column 4; measured by ICD10 codes F10-19) or injuries (Column 5; measured by ICD10 codes S or T including injury, poisoning and certain other consequences of external causes).

One important question concerns the interpretation of the reduction in the likelihood of being diagnosed or treated for a mental health condition observed in Table 1. Does it reflect an actual improvement in students' mental health, or could it be explained by alternative explanations? We will in turn consider three possible alternative explanations, namely incapacitation effects, the supply of health services within high schools, and short-term feelings of success/failure.

Higher achievement schools could have an incapacitation effect if, for example, students have to study longer hours in higher achievement schools and do not have time to visit health services. This does not appear as a likely mechanism because we do not find any impact on the extensive or intensive margin of visits to GP/ER during high school (Columns (4) and (5) of Table 1). The reduction in the number of visits to GPs/ERs in the post-high school period (Column 9) does not suggest that mental health diagnoses or symptoms are untreated; if this was the case then besides the documented reduction on the likelihood of diagnoses for mental health conditions (Column 10) we would also expect a reduction in the likelihood of other diagnoses and that is not the case (Column 11).

Additionally, untreated mental health conditions during college years is difficult to reconcile with the increase in probability of enrolment in higher education. Alternatively, our effects could reflect differences across schools in the availability or quality of school nurses.[38] To shed light on this potential mechanism, we evaluate year by year how GP or ER consultations with a psychological diagnosis or treatment vary across our sample. If school nurses were substitutes for psychological consultations during high school years, we would expect a sharp rise in the number of consultations with a psychological diagnosis or treatment after high school graduation (i.e., between year three and year four post-middle school graduation). Figure A2 in the Appendix reports the prevalence of mental health diagnoses or treatments upon GP/ER visits in our sample for each year after middle school graduation. The figure depicts a stable increase in the prevalence of primary health services with mental health diagnoses or treatments, which provides suggestive evidence that school nurses do not seem to act as substitutes for GP/ER visits.

Finally, in our setting, gaining access to a higher achievement school also implies gaining access to a preferred school. As discussed earlier, our estimated effects on mental health appear mostly after high school (see Table 1), providing suggestive evidence that our effects do not reflect the mere short-term bliss or disappointment effect of enrolling (or failing to enrol) in a preferred school.[39]

Overall, our results do not seem driven by incapacitation effects, differences in the supply of health services, nor do they seem linked to a short-term feeling of success or failure. Rather, our results suggest that a higher achievement schooling environment is protective of mental health. It is still possible that students perceive a higher achievement high school environment as more stressful, but our results suggest that the positive aspects of a higher achievement environment outweigh any potential increases in school pressure.

[38] As discussed in Section 2.3, school nurses are employed by municipalities not by schools.

[39] However, changes in the schooling environment may on the longer-run affect students' prospects and aspirations, and this could play an additional role in explaining our main results.

4.4 Robustness checks

To assess the robustness of our results, we check whether our main findings are sensitive to the choice of control variables, to different specifications, to alternative bandwidths, to alternative definitions of the highest achievement schools, to using placebo admission cutoffs from previous years, and to focusing separately on the two cities we consider.

In our main specification, model (2), we control for several predetermined individual characteristics. In Table A9 we check that our main findings are robust to excluding these control variables, and to selecting a smaller set of control variables. Table A9 presents estimates for five outcomes: high school enrolment, high school graduation, enrolment in higher education, the probability of visits to GP/ER, and the probability of mental health diagnosis or treatment during post-high school years. For each outcome in Table A9, the first column does not include controls for the predetermined individual characteristics. In the second column, we select relevant control variables using the double lasso procedure suggested in Belloni *et al.* (2013). The point estimates remain nearly unchanged relative to our baseline results.

In addition, the estimates reported in Table A10 show that our main findings are robust to different functional forms for the running variable. Our preferred model controls for a linear spline function of the running variable with triangular weights. Table A10 presents the results with alternative functional forms for each of the five main outcomes. For each of the outcomes in Table A10, we allow for cutoff-specific trends when estimating model (2) in the first column. In the second column, we follow Lee and Lemieux (2010) who propose goodness-of-fit tests as an ancillary means to select an optimal polynomial function. The recommended polynomial presented in the bottom of each panel is in general the linear specification. In the third column, we employ nonparametric estimations using local linear regressions. The results are again similar to our baseline estimates.

In Figure A5, we report the point estimates and confidence intervals for our main outcomes for a wide range of bandwidths. The estimates show that our baseline estimates are highly robust to the choice of bandwidths in the neighbourhood of the optimal bandwidth (i.e., the bandwidth that minimizes the mean squared error).

In our main sample, we exclude students whose middle school GPA fell within 0.1 points of the admission thresholds due to potential measurement error arising because of estimated threshold. In Table A11 we show that our main results are similar relaxing this restriction and excluding just observations with a GPA exactly equal to the admission threshold.

For our main analysis, we divide the sample in two depending on whether schools' admission thresholds are located in the top or bottom half of the cutoff distribution. In Table A12, we further divide our sample in three depending on whether schools' admission cutoffs are located in the top tercile, second tercile or bottom tercile of the cutoff distribution. This table shows that the positive effects of higher achievement schools are driven by the top two terciles of the distribution.

As a placebo test, Table A13 reproduce our main analysis while using cutoffs from the previous year. Reassuringly, this table shows no positive first stage and no second stages on students' education and health.

Lastly, we turn our attention to see if a particular city is driving our main results. Table A14 presents estimates for α in equation 2 separately for each city (Bergen and Oslo). The estimates for α are similar for both cities, suggesting that the main findings are not driven by one city alone. This provides suggestive evidence regarding the external validity of our results across cities.

5 Suggestive mechanisms

Although all public Norwegian high schools follow a similar national curriculum, high schools vary along several dimensions. Because high school assignment is based on middle school GPA, student average ability varies significantly from one high school to another. Further, as a student's middle school GPA is correlated with their gender and family background, the proportion of female students and student parental backgrounds may also vary significantly across high schools. In addition, schools are independent in their hiring decisions resulting in a heterogeneous distribution of teacher characteristics across schools. Moreover, the allocation of financial resources to schools depends on the number of students, so that financial resources also vary by school size. To provide insights into what features of the schooling environment may influence student education and, on the longer run, student health, we also investigate changes in school characteristics at the thresholds. In a second step, we implement a heterogeneity analysis where we estimate our regression discontinuity model for each admission threshold and each school feature separately. This helps us to consider whether changes in longer-term educational choices and health outcomes are larger when students gain eligibility to schools where peer characteristics, teacher characteristics, or school resources change by a larger margin at the admission threshold.

First, Table 3 documents changes in peer characteristics at the threshold. Panel A of Table 3 shows that eligibility for enrolment in a higher achievement school improves the ability level of peers, increasing peer average middle school GPA by 4.4% of a standard deviation.[40] This rise in peer ability generates a significant decrease in students' own rank among their peers (Column (2)). This suggests that the positive consequences of better peers may be mitigated by the negative consequences of a decrease in students' rank (see e.g., Murphy and Weinhardt, 2020). In addition, this findings suggests that our RD design may underestimate the positive consequences of higher achievement schools. The positive effects of higher achievement schools on students' education and mental health may in fact be larger far away from the cutoffs, where students experience a positive increase in peer ability without the negative consequences on their rank.

Table 3 further shows that just above the threshold, peers also have more educated parents with higher income levels. In contrast, we do not identify differences in the gender composition of peers on average (Panel A). The estimated impacts on peer ability are similar for high schools in the top and bottom halves of the admission cutoff distribution (Panels B and C). However, eligibility to enrol in a higher achievement school increases the share of female peers for the highest achievement schools but does not change peer parental background. On the contrary, there is no effect on the share of female peers, but a significant impact on peers' parental income and education for schools with lower achievement levels.

Next, we explore how eligibility for enrolment impacts the high school educational program and school and teacher characteristics (see Table 4). The estimates in Columns (1) and (2) show that eligibility to enrol in a higher achievement high school increases the likelihood of enrolling in the general track, and correspondingly decreases the probability of enrolling in the vocational track. There are no impacts on high school programs around the cutoffs

[40]For each student, we computed the average standardized middle school GPA among students enrolled in the same track and high school in August following middle school completion.

of the highest achievement high schools (Panel B); instead, schools in the bottom half of the admission cutoff distribution (Panel C) appear to drive this program substitution. This suggests that changes in high school programs are unlikely to explain the positive effects of higher achievement schools on students' education and mental health, as these positive effects are concentrated among the highest achievement schools.

Then, we study school financial resources and the number of teachers and staff members per student. As discussed, the central allocation of financial resources to schools is based on the number of students. Hence, we proxy financial resources by the number of students enrolled in the same program-cohort. The estimates in Column (3) show that eligibility to enrol in a higher achievement high school is associated with 4.76 extra students in each student's own program at the cutoff (i.e., about 7% of the control mean). This appears driven by high schools in the bottom half of the admission cutoff distribution. Eligibility to enrol in a higher achievement high school also decreases the number of students per teacher (Column (4); this effect does not survive adjustment of inference for multiple hypothesis testing) but does not change the number of students per non-teaching staff (Column (5)).

Lastly, we consider variations in teacher characteristics. In particular, we study whether eligibility to enrol in a higher achievement school changes the proportion of teachers with a master degree, the average age of high school teachers, and the proportion of female teachers. Panel A shows no significant discontinuities in teacher characteristics, except for the proportion of female teachers.

In sum, enrolment in a higher achievement high school not only directly affects the characteristics of the peers with whom students interact and the relative position of students among their peers, but also the types of programs in which students enrol, the characteristics of their teachers and their number, and the financial resources of their school. The impacts on peers, teachers, and resources vary across the admission cutoff distribution and motivate the next section where we use these variations to explore the most likely mechanisms driving our estimates.

5.1 Heterogeneity analysis by changes in school inputs at the thresholds

5.1.1 Empirical approach

To further our understanding of higher achievement school effects on education and health, we develop a heterogeneity analysis, which makes use of the fact that we have 84 different admission cutoffs with variations in how school characteristics change around these cutoffs. In this section, we analyse whether we obtain larger estimated effects on health and education around thresholds with larger changes in peer characteristics, teacher characteristics, or other school features. We also study whether larger effects on students' mental health coincide with larger improvements in their educational outcomes and prospects.

We restrict the analysis to three outcomes of interest: high school graduation, student enrolment in higher education and the probability of diagnosis or treatment of students by GPs or ERs for psychological conditions in the post-high school years. We consider 11 different school inputs: the average middle school GPA of peers, the proportion of female students among high school peers, the parental education of peers, peers' parental income, the proportion of teachers with a master degree, the average age of teachers, the proportion of female teachers, the number of students per teacher, school size, the number of students per non-teaching staff, and student probability of enrolling in the general track. In addition, to document whether the positive effects of higher achievement schools on students' mental health are stronger when their educational perspectives improve by a larger margin, we also consider two school outputs: high school graduation and enrolment in higher education. For each admission threshold z and each school input or output m, we estimate our standard RD model described in the previous section:

$$Y_{m,z,i} = \delta_{m,z} + \alpha_{m,z} \mathbb{1}\{f_i - f_z \geq 0\} + \eta_{m,z}(f_i - f_z) + \lambda_{m,z}(f_i - f_z) \times \mathbb{1}\{f_i - f_z \geq 0\} + \mathbf{X_i}\gamma + u_{m,z,i}. \quad (3)$$

The only difference relative to model (2) is that we estimate model (3) for each admission threshold separately, rather than pooling all admission thresholds with cutoffs by year fixed effects. For each school input/output and each admission threshold, we obtain the estimated parameters $\widehat{\alpha_{m,z}}$, which indicate the magnitude of the variation in the school input/output m around the admission threshold z. For each school input/output separately, we then divide the sample depending on whether the estimated effect on the input/output under consideration is above or below the median estimated effect, $\widetilde{\widehat{\alpha_{m,z}}}$.

For each outcome, we then estimate our basic RD model separately on subsamples characterised by the magnitude of the change in the school input/output under consideration at the thresholds. We use this heterogeneity analysis to respond to the following questions: do larger changes in peer characteristics, teacher characteristics, or in other school features coincide with greater estimated effects on student education? Besides, do larger improvements in students' education coincide with greater estimated effects on student mental health?

5.2 Findings

Figure 6 provides the results of our heterogeneity analysis. First, Panel A in Figure 6 documents that there are significant differences in how each school input/output varies at the thresholds.[41] Along all the dimensions we consider, the average change at the threshold in the input/output under consideration is significantly different for schools with a below- or above-median change. For example, for one group of schools, eligibility for enrolment in a higher achievement school implies an increase in the share of female peers, while it implies a decrease in the share of female peers in the second group of schools. Similarly, for one group of schools, eligibility for enrolment in a higher achievement school implies an increase in the ratio of students per teacher, but a decrease in this ratio for the second group of schools. Panel B of Figure 6 reports the RD results on high school graduation using the same subsamples as in Panel A. This figure shows five significant differences: larger changes in peer ability and in the parental background of peers (higher education and income) are associated with larger estimates on high school graduation; but also changes in some characteristics of teachers, namely, students–teacher ratio and the proportion of teachers with a master degree coincide with larger impacts on high school graduation. In Panel C of Figure 6, we show the results for enrolment in higher education; there are two significant differences: larger changes in the student–teacher ratio and the age of teachers coincide with larger estimated effects on enrolment in higher education. Finally, for the probability of diagnosis or treatment by a GP for psychological symptoms or diseases during post-high school years (Panel D of Figure 6), we find that the reduction in mental health conditions are stronger when higher

[41]When estimating equation 3, we use standardized school inputs/outputs with a mean of zero and a standard deviation of one, so that the variations are easier to compare across inputs/outputs.

achievement schools improve students' educational prospects, but the differences are not statistically significant at conventional levels.

Overall, our heterogeneity analysis suggests that both changes in peers and teacher characteristics are probably important to explain the observed positive impacts of attending a higher achievement school on educational outcomes, while for health changes the improvements in students' education seem to be important. This suggests that better peers and teachers may indirectly and on the longer run improve students' mental health through their positive effects on students' education.[42]

Note that this analysis is only descriptive and that we should not interpret the findings as causal effects. In particular, while student characteristics do not vary at the cutoff, they vary across cutoffs. In this context, to interpret our findings causally, we would need to assume that the effects of higher achievement schools are homogeneous across all types of students, which is a very strong assumption. Besides, the estimates do not survive adjustment for multiple hypothesis testing. Lastly, despite including many school-level inputs, this analysis does not exclude alternative mechanisms such as changes in student ambitions, confidence in the future, or aspirations that are unobserved and could also be impacted by the schooling environment.

6 Conclusion

This paper provides new insights into the relationship between a higher achievement schooling environment and student educational outcomes and mental health. To identify causal effects, we build on the features of the high school assignment system in the two largest

[42]See also Almond *et al.* (2018) who review the impacts of childhood circumstances on adult outcomes.

Norwegian cities, where the assignment of middle school students to high schools happens through a centralized process that gives priority to students with the best average middle school grades. This assignment system enables a regression discontinuity analysis, where we compare the education and health outcomes of students that are similar at the end of middle school but are eligible to enrol in higher or lower achievement high schools. The direction of the effects on health and education outcomes is theoretically ambiguous. On the one hand, a higher achievement school environment might be a stressful experience for marginal students and increase their (mental) health conditions. On the other hand, a higher achievement school with better peers and different teachers might be an inspiring experience that opens up new perspectives and improves student (mental) health in both the short and long term.

Our results show that eligibility for enrolment in a higher achievement school significantly improves school outcomes, increasing the likelihood of both high school completion and enrolment in higher education. In addition, we document that the eligibility to enrol in a higher achievement school does not affect the overall use of primary care services up to three years after high school completion, but does decrease a student's likelihood of diagnosis or treatment by a GP for mental health conditions. These estimated effects on education and mental health appear driven by access to the top achievement schools, and they do not appear during high school but after, once students have experienced an improvement in their schooling prospects.

Our heterogeneity analysis exploiting the 84 different admission cutoffs reveals that larger changes in peers ability and parental background, students–teacher ratio and the proportion of teachers with a master degree coincide with larger impacts on high school graduation.

Additionally, changes in the student–teacher ratio and the age of teachers coincide with larger estimated effects on enrolment in higher education, and larger improvements in students' graduation probability and access to higher education coincide with larger estimated effects on student mental health. Overall, this analysis suggests that both changes in peers and teacher characteristics could be important, directly or indirectly, for explaining the effects of a higher achievement school environment for a student's subsequent education and health.

Besides complementing the existing literature on the effects of higher achievement schools on educational outcomes, we provide new knowledge on the relationship between the schooling environment and mental health, and demonstrate that access to higher achievement schools decreases the risk of mental health conditions. By looking at marginal students along a wide interval of the GPA distribution, our results are relevant for the impacts of higher achievement schools in the context of non-elite schools, that are available in most European countries. While a higher achievement school environment might still be a stressful experience for marginal students, our results suggest that the positive effects of enrolling in a higher achievement school outweigh this extra pressure over the long term. However, there are still open questions for future research including the effect of attending higher achievement high schools on labour market outcomes, aspirations and socioemotional skills.

Affiliations

[1]Department of Economics, Norwegian School of Economics, Bergen, Norway

[2]Department of Economics, University of Bergen, Bergen, Norway; Institute for Fiscal Studies

7 Supplementary data

The authors were granted an exemption to publish their data because access to the data is restricted. However, the authors provided a simulated or synthetic dataset that allowed the Journal to run their codes. The synthetic/simulated data and codes are available on the Journal repository. They were checked for their ability to generate all tables and figures in the paper, however, the synthetic/simulated data are not designed to reproduce the same results. The replication package for this paper is available at the following address: https://doi.org/10.5281/zenodo.7961513.

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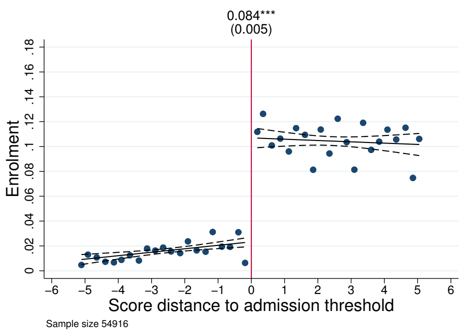
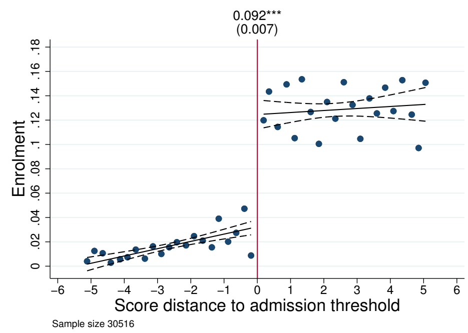
Figure 1: *Enrolment probability*

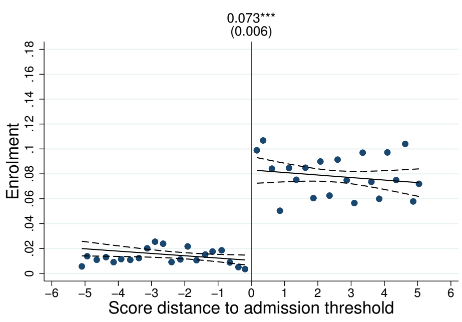
(a) *All*



(b) *Top half admission cutoffs*



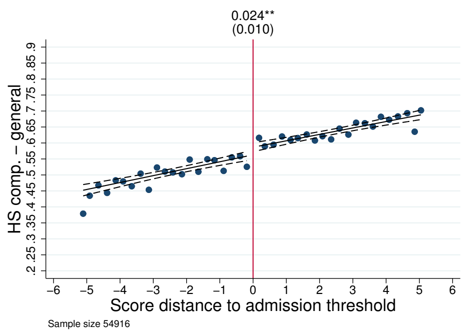
(c) *Bottom half admission cutoffs*



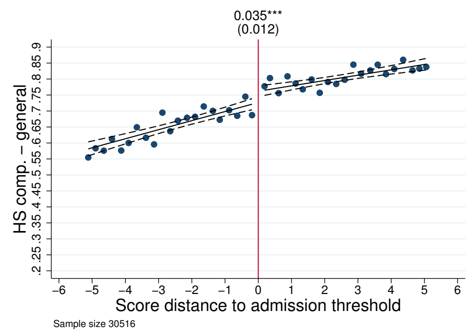
NOTE: These figures plot the point estimates of α from equation (2) using a linear trend specification and triangular weights. The standard errors for the point estimates are clustered at the individual level. The dashed lines are 95 percent confidence intervals. *** p<0.01, ** p<0.05, * p<0.1.

Figure 2: *High school graduation*

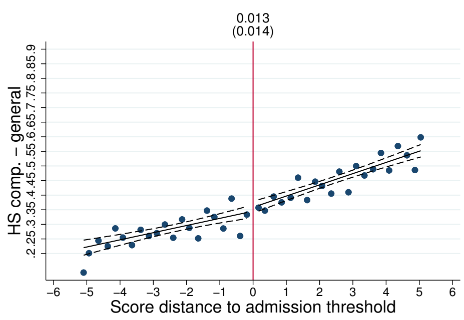
(a) *All*



(b) *Top half admission cutoffs*



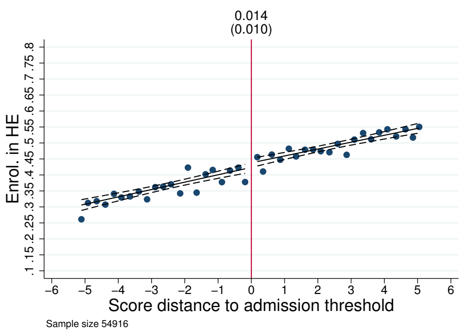
(c) *Bottom half admission cutoffs*



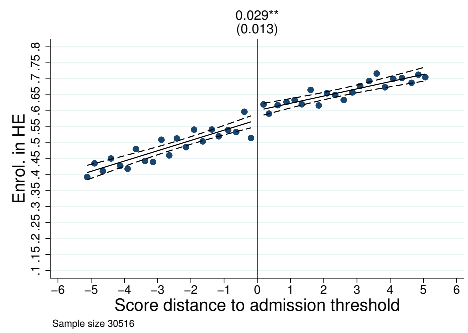
Note: These figures plot the point estimates of α from equation (2) using a linear trend specification and triangular weights. The standard errors for the point estimates are clustered at the individual level. The dashed lines are 95 percent confidence intervals. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Figure 3: *Enrolment in higher education*

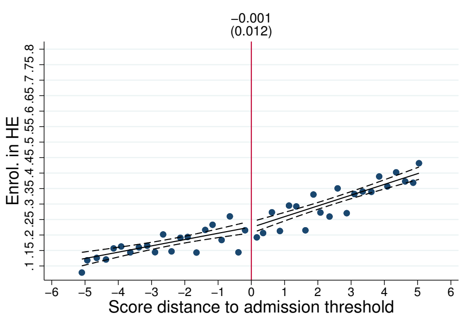
(a) *All*



(b) *Top half admission cutoffs*



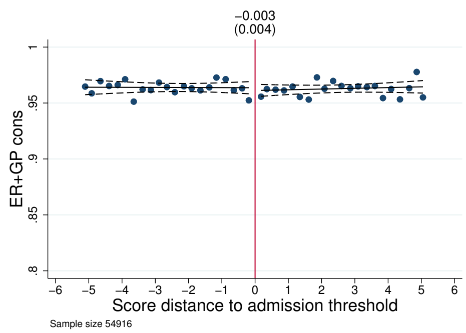
(c) *Bottom half admission cutoffs*



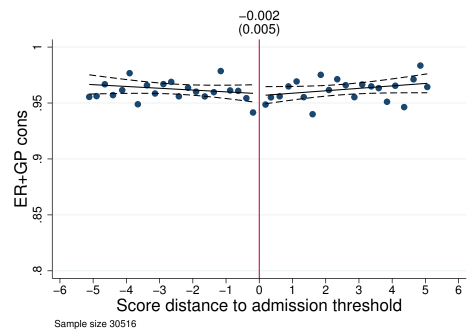
Note: These figures plot the point estimates of α from equation (2) using a linear trend specification and triangular weights. The standard errors for the point estimates are clustered at the individual level. The dashed lines are 95 percent confidence intervals. *** p<0.01, ** p<0.05, * p<0.1.

Figure 4: *Probability of consulting with a GP or an ER*

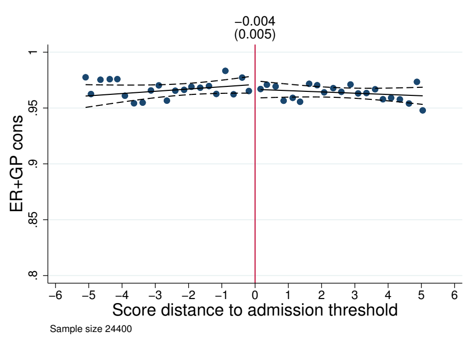
(a) *All*



(b) *Top half admission cutoffs*



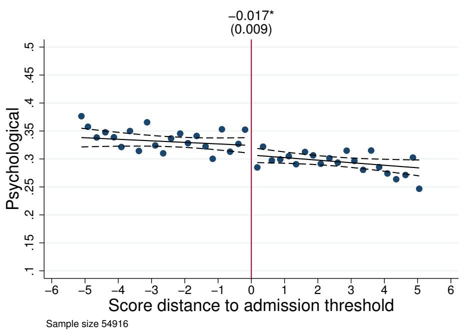
(c) *Bottom half admission cutoffs*



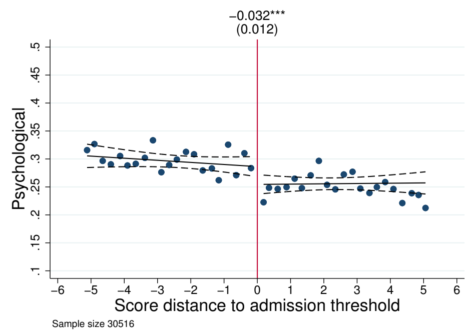
NOTE: These figures plot the point estimates of α from equation (2) using a linear trend specification and triangular weights. The standard errors for the point estimates are clustered at the individual level. The dashed lines are 95 percent confidence intervals. *** p<0.01, ** p<0.05, * p<0.1.

Figure 5: *Probability of being diagnosed or treated for a mental health condition*

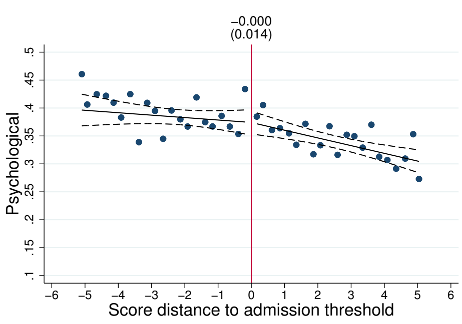
(a) *All*



(b) *Top half admission cutoffs*



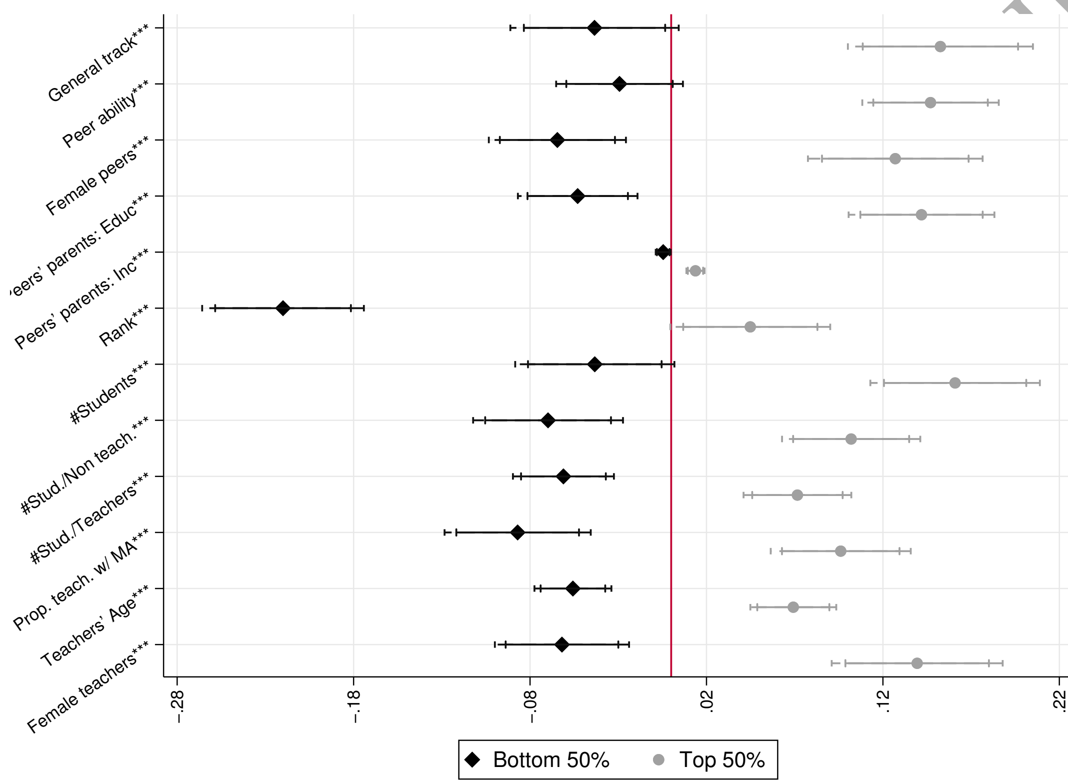
(c) *Bottom half admission cutoffs*



NOTE: These figures plot the point estimates of α from equation (2) using a linear trend specification and triangular weights. The standard errors for the point estimates are clustered at the individual level. The dashed lines are 95 percent confidence intervals. *** p<0.01, ** p<0.05, * p<0.1.

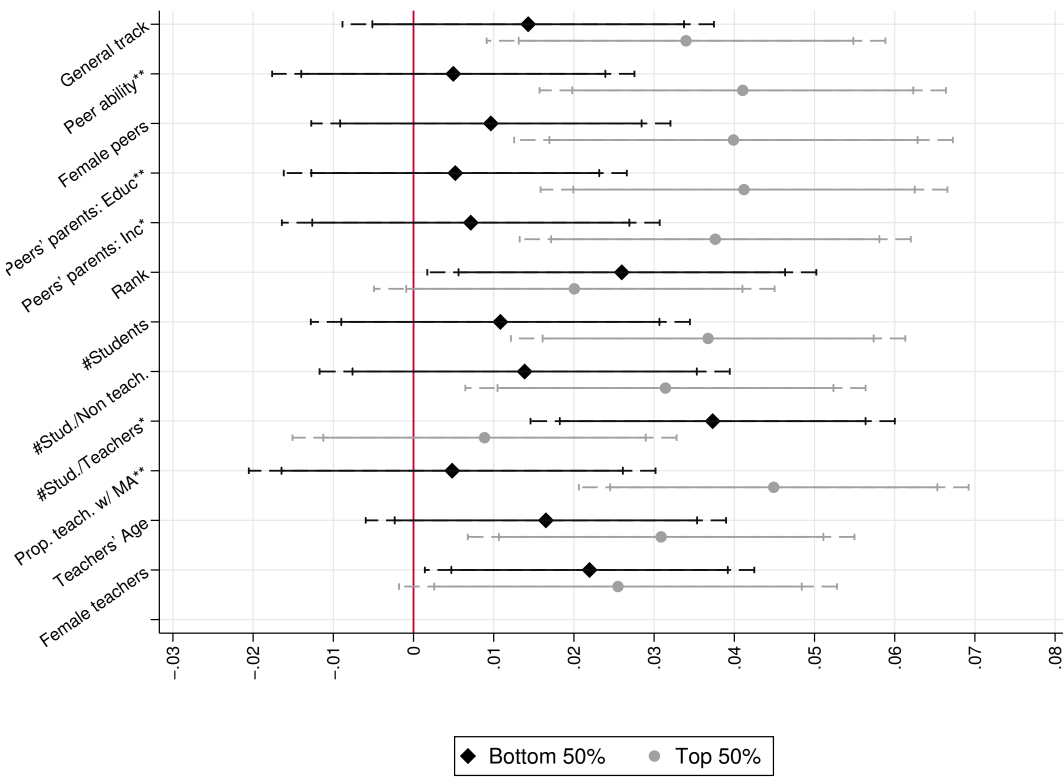
Figure 6: *Heterogeneity of higher achievement school effects by changes in school characteristics*

(a) *Changes in School Characteristics at the Thresholds*



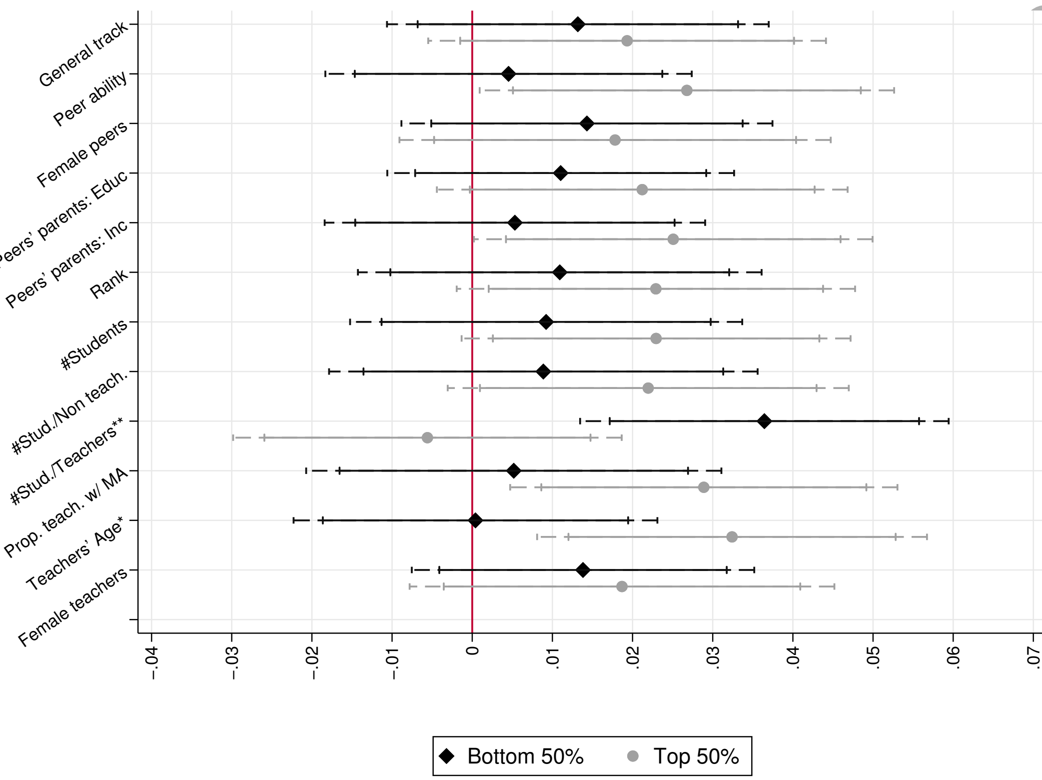
NOTE: Asterisks refer to the results of tests of the null hypothesis of no difference in the changes in inputs across subsamples with above or below median estimated changes in each school input, where *** p<0.01, ** p<0.05, * p<0.1. All differences are statistically different at the 5% level after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

(b) *Changes in school characteristics and high school graduation*



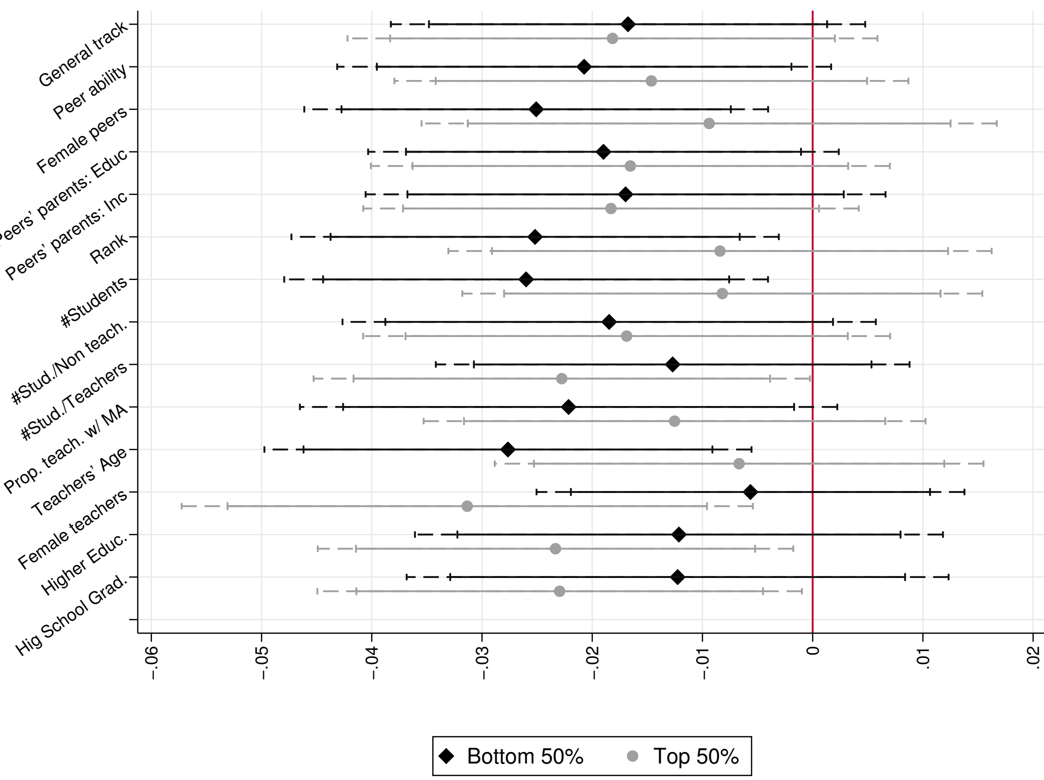
NOTE: Asterisks refer to the results of tests of the null hypothesis of no difference in the changes in high school graduation across subsamples with above or below median estimated changes in each school input, where *** p<0.01, ** p<0.05, * p<0.1. Joint tests of the differences are no longer statistically different at the 10% (or lower) level after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

(c) *Changes in school characteristics and enrolment in higher education*



NOTE: Asterisks refer to the results of tests of the null hypothesis of no difference in the changes in higher education enrolment across subsamples with above or below median estimated changes in each school input, where *** p<0.01, ** p<0.05, * p<0.1. Joint tests of the differences are no longer statistically different at the 10% (or lower) level after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

(d) *Changes in school characteristics and mental health conditions (post-high school)*



NOTE: Asterisks refer to the results of tests of the null hypothesis of no difference in the changes in mental healh conditions across subsamples with above or below median estimated changes in each school input or output, where *** p<0.01, ** p<0.05, * p<0.1. Joint tests of the differences are no longer statistically different at the 10% (or lower) level after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

Table 1: *Higher achievement schools: education and health*

	(1) First stage	(2) High School	(3) Enrolment	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
				During High School				Post-High School			
	enrolment	graduation	in HE	ER-GP cons.	Nb. of ER-GP	Mental Health	Other conditions	ER-GP cons.	Nb. of ER-GP	Mental Health	Other conditions
Panel A: All											
Eligibility (α)	0.083***	0.023***	0.016*	0.004	0.113	0.004	0.002	0.004	-0.456	-0.018**	0.001
	$(0.005)^{+++}$	$(0.009)^{+++}$	(0.009)	(0.006)	(0.153)	(0.007)	(0.006)	(0.006)	(0.278)	$(0.008)^{++}$	(0.006)
Control Mean	.0212	.542	.402	.905	7.69	.182	.899	.863	10	.239	.853
N	54916	54916	54916	54916	54916	54916	54916	54916	54916	54916	54916
Panel B: Top Half Admissions Cutoffs											
Eligibility (α_H)	0.091***	0.031***	0.026**	0.010	0.083	-0.006	0.008	0.006	-0.821**	-0.027***	0.004
	$(0.007)^{+++}$	$(0.011)^{+++}$	$(0.012)^{++}$	(0.008)	(0.192)	(0.009)	(0.008)	(0.009)	$(0.363)^{++}$	$(0.010)^{+++}$	(0.009)
Control Mean	.0266	.696	.539	.899	7.38	.155	.895	.852	9.25	.211	.844
N	30516	30516	30516	30516	30516	30516	30516	30516	30516	30516	30516
Panel C: Lower Half Admissions Cutoffs											
Eligibility (α_L)	0.073***	0.015	0.004	-0.004	0.185	0.018	-0.006	-0.001	-0.000	-0.006	-0.004
	$(0.006)^{+++}$	(0.013)	(0.011)	(0.008)	(0.247)	(0.012)	(0.009)	(0.009)	(0.413)	(0.013)	(0.009)
Control Mean	.0134	.321	.206	.912	8.13	.22	.905	.878	11.1	.279	.866
N	24400	24400	24400	24400	24400	24400	24400	24400	24400	24400	24400
P-Value: HA: $\alpha_H \neq \alpha_L$	.053	.342	.184	.214	.741	.100	.225	.615	.127	.195	.561

NOTE: This table reports point estimates of α from equation (2) using a linear trend specification and triangular weights. The calculated mean of the outcome variable is for the control group, i.e., those with a score distance to admission cutoffs at most two points below the cutoff. Clustered standard errors (at the individual level) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1; $^{+++}$ p<0.01, $^{++}$ p<0.05, $^{+}$ p<0.1 after adjusting inference for testing all the estimates presented in this table using the procedure described in Romano and Wolf (2005).

Table 2: *Higher achievement schools and mental health diagnoses and treatments during post-high school years*

	(1) Depression/Anxiety	(2) Subs. abuse	(3) ADHD	(4) Other psy.
Panel A: All				
Eligibility (α)	-0.012*	-0.003	-0.005	-0.009
	(0.007)	(0.003)	(0.003)	(0.006)
Control Mean	.166	.033	.026	.104
N	54916	54916	54916	54916
Panel B: Top Half Admissions Cutoffs				
Eligibility (α_H)	-0.018**	-0.003	-0.007*	-0.015**
	$(0.009)^{+}$	(0.004)	(0.004)	$(0.007)^{+}$
Control Mean	.149	.024	.020	.094
N	30516	30516	30516	30516
Panel C: Lower Half Admissions Cutoffs				
Eligibility (α_L)	-0.004	-0.003	-0.002	-0.001
	(0.011)	(0.006)	(0.005)	(0.010)
Control Mean	.190	.045	.033	.119
N	24400	24400	24400	24400
P-Value: HA: $\alpha_H \neq \alpha_L$	.322	.960	.452	.249

NOTE: This table reports the point estimates of α from equation (2) using a linear trend specification and triangular weights. The calculated mean of the outcome variable is for the control group, i.e., those with a score distance to admission cutoffs at most two points below the cutoff. Clustered standard errors (at the individual level) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1; $^{+++}$ p<0.01, $^{++}$ p<0.05, $^{+}$ p<0.1 after adjusting inference for testing all the estimates presented in this table using the procedure described in Romano and Wolf (2005).

Table 3: *Characteristics of high school peers*

	(1) Peers' av. MS GPA	(2) Rank	(3) Prop. of female peers	(4) Parents of Peers Av. inc. (log)	(5) Parents of Peers Education
Panel A: All					
Eligibility (α)	0.044***	-3.030***	0.006	0.016***	0.011***
	$(0.010)^{+++}$	$(0.459)^{+++}$	(0.004)	$(0.005)^{+++}$	$(0.003)^{+++}$
Control Mean	.064	47.1	.463	13.5	.481
N	54916	54916	54916	54916	54916
Panel B: Top Half Admissions Cutoffs					
Eligibility (α_H)	0.039***	-3.127***	0.012***	0.011	0.007
	$(0.012)^{+++}$	$(0.627)^{+++}$	$(0.004)^{+++}$	(0.007)	(0.004)
Control Mean	.353	53.4	.496	13.8	.568
N	30516	30516	30516	30516	30516
Panel C: Lower Half Admissions Cutoffs					
Eligibility (α_L)	0.046***	-3.035***	0.000	0.018***	0.015***
	$(0.015)^{+++}$	$(0.673)^{+++}$	(0.007)	$(0.007)^{+++}$	$(0.005)^{+++}$
Control Mean	-.349	38	.416	13.1	.357
N	24400	24400	24400	24400	24400
P-Value: HA: $\alpha_H \neq \alpha_L$	.755	.920	.152	.462	.190

NOTE: This table reports the point estimates of α from equation (2) using a linear trend specification and triangular weights. The calculated mean of the outcome variable is for the control group, i.e., those with a score distance to admission cutoffs at most two points below the cutoff. Clustered standard errors (at the individual level) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1; $^{+++}$ p<0.01, $^{++}$ p<0.05, $^{+}$ p<0.1 after adjusting inference for testing all the estimates presented in this table using the procedure described in Romano and Wolf (2005).

Table 4: *High school education and characteristics of high schools attended*

	(1) General track	(2) Vocational track	(3) #Stud. own program	(4) #Stud. /teachers	(5) #Stud. /non-teacher	(6) Share teachers w. masters	(7) Teachers' mean age	(8) Share female teachers
Panel A: All								
Eligibility (α)	0.022**	-0.018**	4.757***	-0.475*	0.189	-0.001	0.049	0.005**
	$(0.009)^{++}$	$(0.008)^{++}$	$(1.153)^{+++}$	(0.280)	(0.348)	(0.003)	(0.089)	$(0.002)^{+}$
Control mean	.539	.403	69.3	15	21.2	.225	45.6	.498
N	54916	54916	54916	54916	54916	54916	54916	54916
Panel B: Top half admission cutoffs								
Eligibility (α_H)	0.007	-0.002	3.032*	-0.539	-0.142	-0.007	0.104	0.005
	(0.012)	(0.010)	(1.671)	(0.351)	(0.430)	(0.005)	(0.124)	(0.003)
Control mean	.673	.241	92.1	15.6	22.8	.244	45.7	.517
N	30516	30516	30516	30516	30516	30516	30516	30516
Panel C: Bottom half admission cutoffs								
Eligibility (α_L)	0.042***	-0.041***	6.890***	-0.450	0.569	0.006	-0.024	0.006
	$(0.014)^{+++}$	$(0.013)^{+++}$	$(1.481)^{+++}$	(0.530)	(0.552)	(0.005)	(0.124)	(0.004)
Control mean	.346	.635	36.7	14.2	18.8	.197	45.4	.472
N	24400	24400	24400	24400	24400	24400	24400	24400
p								
P-Value: HA: $\alpha_H \neq \alpha_L$	.050	.020	.0822	.894	.299	.063	.462	.786

NOTE: This table reports the point estimates of α from equation (2) using a linear trend specification and triangular weights. The calculated mean of the outcome variable is for the control group, i.e., those with a score distance to admission cutoffs at most two points below the cutoff. Clustered standard errors (at the individual level) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1; $^{+++}$ p<0.01, $^{++}$ p<0.05, $^{+}$ p<0.1 after adjusting inference for testing all the estimates presented in this table using the procedure described in Romano and Wolf (2005).