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School selectivity, peers, and mental health

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21/34

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School selectivity, peers, and mental health

School Selectivity, Peers, and Mental Health

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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 a selective school environment on students' mental health. Using a regression discontinuity analysis in the largest Norwegian cities, we show that eligibility to enroll in a more selective high school increases the probability of enrollment in higher education and decreases the probability of diagnosis or treatment of psychological problems. We provide suggestive evidence that changes in both teacher and peers' characteristics are likely drivers of these effects.

JEL Codes: I12, I21, I24

Keywords: Health, school inputs, selective education.

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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 depression or anxiety issues (Ungdata, 2018). This is important because mental health problems among adolescents are associated with various costly long-term outcomes such as lower labor market productivity, less marriage stability, and other adult health problems (Currie et al., 2010; Goodman, Joyce and Smith, 2011; Lundborg, Nilsson and Rooth, 2014).

Survey evidence indicates that school pressure is 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, and in particular school selectivity, and adolescent mental health. As it stands, the potential effects of school selectivity on mental health are ambiguous. On the one hand, a selective school, with more high-ability peers, might be a more stressful experience negatively affecting student mental health. On the other hand, peers at more selective schools may have different health care usage and display better health behaviors such as lower smoking rates or greater physical activity. Moreover, enrolling in a more selective school could result in different teacher characteristics and may be an inspiring experience that opens up new perspectives. This 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 more selective high school and student health and health behaviors, 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 high school selectivity 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 but are eligible to enroll in less or more selective high schools. 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 on outcomes during and beyond high school.

The available data also enable us to characterize the features of a more selective 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 consider. Abdulkadiroğlu, Angrist and Pathak (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 teacher characteristics across selective schools. In France, where the central administration attempts to equalize resources across schools, Landaud, Ly and Maurin (2020) reveal little variation in teacher characteristics or class sizes across selective Parisian high schools, despite large variation in student ability. Beyond documenting the implications of enrolling in a more selective high school in terms of peers, teachers, and other school features, we make use of the fact that we have variation in which of these school inputs changes more when enrolling in a more selective 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 and teacher characteristics or 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 enroll in a more selective high school are 8.3 percentage points more likely to enroll in the more selective school. Further, we show that eligibility to enroll in a more selective high school increases the likelihood of

high school completion by 2.3 percentage points (4.2%) and the likelihood of enrollment in higher education by 1.6 percentage points (4.0%). Second, we document that eligibility to enroll in a more selective school does decrease the likelihood of diagnosis or treatment for mental health issues. In particular, we estimate that eligibility for enrollment in a more selective school reduces the likelihood of mental health diagnosis or treatment (driven by a reduction in anxiety and depression) by 1.7 percentage points (5.2%). Third, we investigate what features of the school environment change at the threshold. We document that eligibility for enrollment in a more selective high school significantly changes the ability level of peers, peers' parental education and income, the number of students per teacher, and the share of female teachers. Lastly, our heterogeneity analysis provides suggestive evidence that changes in both peers and teacher characteristics are important for explaining our main findings. Taken together, our findings provide key implications for ongoing policy debate over the consequences of school selectivity and the role of school inputs for student educational and health outcomes.

This paper particularly contributes to the literature on the relationships between education and health and school selectivity. 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., Böckerman et al., 2019; Clark and Royer, 2013; Crespo, López-Noval and Mira, 2014; Dursun and Cesur, 2016; Lager et al., 2016; Lleras-Muney, 2005; Meghir, Palme and Simeonova, 2018). We expand this literature by moving beyond changes in compulsory education, which mostly target individuals at the lower end of the educational distribution, and analyze the extent to which the high school environment links to health. Because the selectivity of higher education institutions correlates with student mental health and wellbeing (Fletcher and Frisvold, 2011, 2014; Frisvold and Golberstein, 2011), it is important to understand better the effect of high school selectivity, as well as the influence of high school peers, teachers, and financial resources on student health. 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 school selectivity (see e.g., Abdulkadiroğlu, Angrist and Pathak, 2014; Abdulkadiroğlu et al., 2017; Clark and Del Bono, 2016; Cullen, Jacob and Levitt, 2006; Dobbie and Fryer Jr, 2014; Jackson, 2013; Landaud, Ly and Maurin, 2020; Pop-Eleches and Urquiola, 2013).¹ First, we expand the 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 more selective 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 a more selective 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 selectivity matters. This could help reconcile why selective schools have 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.

¹Note that our paper mostly relates to studies on selectivity in the context of nonelite schools. In our setting, school admission cutoffs are located between the 4th and the 97th percentile of the test score distribution after middle school in the areas of interest and on average located around the 40th 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 selective high schools in our sample.

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. At the end of grade 10, all students obtain a diploma with a total grade point average (hereafter, middle school GPA). This is the weighted total 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 The two largest cities in Norway—Oslo and Bergen—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. That is, we study enrollment in general study programs in high schools located in Bergen from 2006 to 2010 and in Oslo from 2009 to 2010.

In contrast to the compulsory middle schools, enrollment in high schools is voluntary. Nevertheless, all students aged 16 to 23 years in Norway have a statutory right to enrollment at this level. However, this right is at the county level and does not ensure enrollment in a specific school or program. First time enrollment in high school in Norway is high: 98% of students enroll in the first year. Students enroll 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 enrollment in higher education, while students graduating in the vocational track need to spend an additional year of study before reaching similar qualifications.

Although high school ranks are not important for access to higher education, high school grades and national exams at the end of high school determine access to higher education. In Norway, the intake to public higher education follows a centralized admission system based on total grade points

²The 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.

³The GPA can take decimal values.

⁴Twelve 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.

from high school (hereafter, high school GPA). For those graduating high school with a general studies degree, about 40% do not enroll 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, Grenet and He, 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 enrollment in general studies for each oversubscribed high school. Oversubscribed high school are 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 enrollment in general studies, and we observe significant discontinuities in the rate of enrollment 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 enrollment in general education programs in more or less selective high schools on subsequent health and educational outcomes.

To help with interpretation, we now briefly describe the Oslo and Bergen high schools. We focus on how they are similar and how they differ along key dimensions, such as peer and teacher quality and financial resources. High schools in Oslo and Bergen have on average about 540

⁵The 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.

students per school, and there are about 15 students per teacher. Resources for high schools are centrally allocated and based on the numbers of students, and there is variation across schools in both financial and teacher resources. For example, the top quartile of schools in terms of the students to teacher ratio has just nine students per teacher, while the lowest quartile of schools have 19.8.⁶ Similarly, 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. Another key difference across high schools is student ability. 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 37.7.⁷ Because middle school GPA is correlated with gender and family background, we also observe significant differences in average student characteristics across high schools. Finally, all general programs offer compulsory core curriculum subjects like languages, natural sciences, and human sciences, but there is greater variety across schools in the availability of more specialized subjects like music, media, arts, and sports. Although schools differ in several dimensions, it is important to note that changes in peer quality and resources are less dramatic than in the context of other countries (see e.g., Abdulkadiroğlu, Angrist and Pathak, 2014; Clark and Del Bono, 2016; Dobbie and Fryer Jr, 2014).

In section 5, we document how school characteristics vary on average at the admission thresholds and leverage this information on differences in school inputs at the thresholds to provide insights into what school characteristics may explain the average effects on health and education.

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

⁶Note that the students to teacher ratio does not necessarily reflect classroom size, rather the variety of teachers employed by the school given we measure the number of teachers employed at each school rather than the number of full-time positions.

⁷A 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.

rooms, infant and child health care centers, 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.

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 problems.

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.⁸ 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 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

⁸Younger children receive these services in child health care centers that also provide pre- and postnatal services for mothers and newborns.

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 (Abrahamson, Ginja and Riise, 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 10th 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, and highest educational attainment. Information on earnings is from the tax registers. 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.⁹

⁹Both 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.

3.1.2 Schools and Educational Data

Information on enrollment 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 10th 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 those who enroll in college immediately after graduating from high school or following a gap year.

For each high school, we have information about its staff from the Social Security records. 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 enrollment 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. GPs and ERs are obliged to report all consultations and relevant International Classification of Primary Care (ICPC-2) codes to this national claims database to receive payment. ICPC codes convey information about the GPs' assessment of the patient's health problems 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, analyzed test results, or performed an administrative task.¹⁰

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 selective school environment may have specific impacts on mental health issues, 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”).¹¹ 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 $t + 1$.

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 directly to identify high school admission thresholds from the data.¹² We, therefore, build on the methodology in Hansen (2000) to overcome this issue. This method was recently used by Hoekstra (2009) to identify admission thresholds and estimate the effect of going to a flagship university in the US and by Landaud, Ly and Maurin (2020) to study the effect of enrollment in selective Parisian high schools.¹³ 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 enrollment rates and the procedure selects for

¹⁰See Appendix B for the list of ICPC-2 codes.

¹¹Note that we do not know whether students are diagnosed or treated for a psychological issue for the first time because we only observe GP and ER visits since 2006.

¹²Unlike admissions to universities, which follow a nationwide assignment mechanism used in Kirkeboen, Leuven and Mogstad (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.

¹³This approach has also been used in other settings, such as testing for discontinuities in the dynamics of neighborhood racial composition (see e.g., Card, Mas and Rothstein, 2008), or evaluation of social programs (see e.g., Carneiro, Galasso and Ginja, 2019).

each school the threshold that minimizes the number of incorrectly assigned students (i.e., enrolled students below the threshold or unenrolled students above the threshold).

In practice, for each cohort and high school in Bergen, we focus on the sample of 10th graders in Hordaland county (the county where the city of Bergen is located). For high schools in Oslo, we consider the sample of 10th graders in Oslo county. For each value g of the 10th 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 , $D_i^g = 1 [f_i \geq g]$. For each high school z in year t , we estimate the following regression for each value g (omitting subscript t):

$$E_{iz} = \alpha + \psi_z D_i^g + \varepsilon_{iz}, \quad (1)$$

where E_{iz} takes a value of one if student i enrolls 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 10th grade GPA score g that maximizes the R^2 of equation (1) with a significantly positive $\hat{\psi}_z$. Further, we exclude a few admission thresholds with very small estimated discontinuities in enrollment rates around these cutoffs.¹⁴ For each oversubscribed high school z , we then define the subsample of 10th graders whose middle school is located within eight kilometers of z .¹⁵ 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.

¹⁴From the 105 estimated cutoffs, we exclude 21 with estimated discontinuities in enrollment 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 of adjacent selectivity level.

¹⁵We use this criterion to maximize our first stage results because Fack, Grenet and He (2019) provide evidence that geographical proximity is a strong driver of student preferences over high schools. In addition, 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 kilometers of their middle school. The results are robust with respect to longer or smaller distance criteria when constructing the working sample.

3.3 Empirical Approach

To estimate the effects of a more selective 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):

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

where $f_i - f_z$ measures the distance in points between school z 's admission threshold and student i 's middle school GPA. 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 cutoff dummies, ω_z , and 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 more selective high school on the outcome Y_i . The standard errors are clustered at the individual level, and, 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, Cattaneo and Titiunik (2014) to choose an optimal bandwidth around admission thresholds, which is 5.19 points. Finally, we use a triangular kernel centered 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.

Because we study the effects on a relatively large number of potentially correlated outcomes, we use a stepwise multiple testing procedure that controls for familywise error rate. In particular, we use the procedure in algorithms 4.1 and 4.2 of Romano and Wolf (2005) to account for testing several hypotheses simultaneously; this 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). The result tables indicate whether the coefficients remain significant at a level of 1, 5, or 10 percent after using this procedure.

In our context, the mapping from eligibility to enrollment is not one-to-one because students may not effectively enroll 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 enrollment in a given selective high school is instrumented with eligibility for enrollment in this high school (Hahn, Todd and der Klaauw, 2001). Note that these results should be interpreted cautiously because IV requires that the exclusion restriction and monotonicity hold.¹⁶ Eligibility for a more selective school increases enrollment 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 factor in that the estimated effects on mental health appear mostly after high school, and thus do not reflect the mere short-term effect of enrolling (or failing to enroll) in a preferred school. 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 A1 provides descriptive statistics for the students in our working sample. For the sake of comparison, the table includes three samples: all students completing 10th grade in Norway between 2006 and 2010, students completing 10th 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 specialize more often in the general

¹⁶Violations of the monotonicity assumption are unlikely in our setting because this would mean that students eligible to enroll in a more selective school are less likely to enroll in the more selective school compared with the lower-ranked school (see subsection 4.1).

education track compared with the average student in Norway. In addition, these students have better-off peers with higher middle school GPAs. They are also more likely to graduate from high school and enroll 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 10th grade in Norway. There are also no differences in the use primary health care services or likelihood of being diagnosed or treated by GPs for mental health problems.

In section 4, we present the results for the RD sample, and, in addition, separately by the level of school selectivity, where schools with high (low) selectivity levels are schools whose admission threshold fell in the top (bottom) half of the distribution of cutoffs by city and year.

3.4 Tests of Identifying Assumptions

Students just above and below the cutoffs differ in their eligibility to enroll in a more selective 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 Cutoff. One threat to identification would be that students willing to enroll 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 A2 presents the results when implementing the density tests suggested in McCrary (2008) on the full sample and separately by selectivity level. 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 A2 reports the results of estimating model (2) using student baseline characteristics such as gender,

nationality, and parental background as dependent variables.¹⁷ 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 over-subscribed high school. This is shown in Figure A3 in the Appendix including 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 in that school admission cutoffs are *ex ante* impossible to predict precisely or manipulate. First, the GPA scores can take decimal values implying that the admission cutoffs can take a large number of possible values. Second, on average, school admission thresholds vary by 3.4 points from one year to the next, and they are jointly determined by the preferences and middle school GPAs of all 10th graders in Hordaland or Oslo, which are unknown at the time of application.

Note that the results reported in Table A2 and Figure A3 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 more selective 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 enrollment in a more selective high school on student education and health.

4 Empirical Results

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

¹⁷When estimating model (2) for balancing tests, we include a full set of cutoff/year dummies as control variables but do not control for student baseline characteristics.

4.1 First Stage Results

Figure 1 presents our first stage results, that is, the effect of eligibility for enrollment in a more selective school on actual enrollment 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 cutoff dummies (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 enrollment in a more selective high school on actual enrollment, and its standard error. There is one figure for each sample under consideration: the whole sample (Panel a), students located around the admission thresholds of schools with above-median selectivity level (Panel b), and students located around the admission thresholds of schools with below-median selectivity level (Panel c). The three figures depict a significant increase in enrollment probability at the cutoffs. More precisely, the figures show that the enrollment probability of students is close to 2% below admission cutoffs, and increases by about eight percentage points for students scoring just above the cutoffs.¹⁸ This indicates that a significant share of students wants to attend a more selective school when offered this opportunity, and student willingness to attend more selective schools is somewhat higher for schools with higher selectivity levels.¹⁹ The estimates for α in model (2) in Column (1) in Table 1 confirm these results.

Monotonicity in High School Choice. When we rank the high schools within city and cohorts in our sample by their admission score, on average the thresholds for admissions to different high schools vary by 2-GPA points. To understand how the gradual increase across the school cutoffs within each city and cohort allows to identify the effect of admission to more selective high school, we re-estimate two versions of the first stage model. Within each cohort and city, we rank all high schools by their admission score. Then, we first re-assign to each high school z the admission score of the high school with threshold immediately *lower* to that of high school z , denote it the threshold

¹⁸Note that one reason why the enrollment 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.

¹⁹Recall that we do not know individual student preferences, hence many students could have preferences for other programs or school locations, explaining why enrollment is not increasing even more at the threshold.

$z - 1$. Thus, all students eligible to high school z would have also been eligible to high school $z - 1$, and if the rank in terms of schools' demand is reflected into higher thresholds of admissions, then the enrolment rate for high school z should be continuous around the cutoff of high school $z - 1$. Second, we also assign high school z the admission threshold of the high school with the immediately *higher*, that is, the threshold of high school $z + 1$; and, the marginal student eligible to enroll in high school z would have a middle school GPA too low to be eligible to high school $z + 1$.

Our results for this "placebo" first stage are presented in Table A3. The estimates in Panel A show discontinuities of 2 percentage points in the probability of enrolment at the cutoff, that is are smaller than those in Column (1) of Table 1. This small discontinuity is consistent with students' preferring other programs or school locations beyond the high school with the highest threshold the student is eligible to. Panel B of Table A3 shows no discontinuity in the probability of enrolment in the high school with the threshold just *higher* than z 's high school.²⁰

4.2 Educational Outcomes

Figure 2 and Figure 3 present the estimated effects of eligibility for enrollment in a more selective school on the subsequent education of students. We focus on two outcomes: high school graduation in the general track and enrollment 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 most selective high schools (Panel b). Figure 3 exhibits no average impact on enrollment in higher education (Panel a). However, there is an increase of 2.9 percentage points for the most selective high schools (Panel b). Columns (2) and (3) in Table 1 confirm these results. Note that the main findings remain significant after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

Our finding that eligibility for enrollment in a more selective school has positive effects on student educational outcomes differs from previous studies showing that elite school attendance

²⁰We note that the sample sizes are smaller than those in Table 1 because the re-assignment of threshold described above implies that, within each cohort and city, observations around high schools with the lowest (Panel A) and the highest (Panel B) are dropped because they are excluded in the re-assignment.

in the US does not affect educational outcomes (see e.g., Abdulkadiroğlu, Angrist and Pathak, 2014; Abdulkadiroğlu et al., 2017; Dobbie and Fryer Jr, 2014)). However, it is in line with Pop-Eleches and Urquiola (2013) and Jackson (2013) who also consider nonelite settings and document the positive effects of attending more selective schools. To understand in our setting how the distribution of admission thresholds compares to the test score distribution after middle school in the areas of interest we study, Figure A1 plots the density of both GPA and admissions cutoffs; on average the cutoffs are located around the 63rd percentile of the GPA distribution. We note that the results that the eligibility for enrollment in a more selective school significantly affects high school completion and enrollment 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 nonelite 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, Ly and Maurin, 2020).

Columns (1) and (2) in Table A4 in the Appendix present the IV estimates, where we rescale the intention-to-treat estimates by the probability of enrollment in a selective high school upon gaining eligibility for enrolment. Panel A shows that enrollment in a more selective high school increases the probability of high school graduation and enrollment in higher education by 28 and 19 percentage points, respectively. While these estimates are large, the results are quite imprecise, and we cannot rule out quite modest effects.

4.3 Health Outcomes

Next, we analyze the impacts of eligibility for enrollment in a more selective 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 issue (i.e., ICPC-02 codes beginning with a “P” as described in Appendix B) and visits for other health assessments or treatments.²¹ 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 problem during GP or ER visits (Panel a). Individuals gaining access to high schools with above-median selectivity levels (Panel b) drive this fall. The estimates in Columns (4)–(7) in Table 1 present the corresponding point estimates for α in model (2). As shown, the estimated effect on mental health is stronger in the post high school period (see Table A5).²²

In Table 2, 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 problems, and create four categories: anxiety or depression symptoms and diseases, substance use, hyperkinetic disorders, and other psychological symptoms or disorders (see Table A6 for the classification of mental health conditions).²³ 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.

We then turn to more serious health conditions. We do not find any impacts on behavioral or severe mental health problems for the three samples studied (all sample, and higher and lower

²¹We note that it is possible that there are multiple symptoms and/or diagnoses during a visit to GP or ER.

²²Columns (3) and (4) in Table A4 in the Appendix present the corresponding IV estimates, carrying with them the same cautiousness in interpretation as discussed for educational outcomes. Enrollment in a more selective 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 percentage points.

²³We bundle anxiety and depression together given the possibility of co-diagnoses and common treatments for both conditions (see, e.g., Pratt, Brody and Gu (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).

selectivity high schools). In particular, Table A7 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).

There are different explanations for our estimated impacts on mental health. More selective schools could have an incapacitation effect if, for example, students have to study longer hours in more selective 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 (Columns (4) and (5) of Table 1). Alternatively, our effects could reflect differences across schools in the availability or quality of school nurses.²⁴ 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 A4 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 more selective 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 A5), providing suggestive evidence that our effects do not reflect the mere short-term effect of enrolling (or failing to enroll) in a preferred school. Overall, our results do not seem driven by incapacitation effects, differences in the supply of health services, nor do they seem to link to a short-term feeling of success or failure. Rather, our results suggest that a more selective schooling environment is

²⁴As discussed in Section 2.3, school nurses are employed by municipalities not by schools.

protective of mental health. It is still possible that students perceive a more selective high school environment as more stressful, but our results suggest that the positive aspects of a more selective environment outweigh any potential increase in school pressure.

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 functional forms, to alternative bandwidths, 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 A8 we check that our main findings are robust to excluding these control variables, or to selecting a smaller set of control variables. Table A8 presents estimates for five outcomes: high school enrollment, high school graduation, enrollment in higher education, the probability of visits to GP/ER, and the probability of mental health diagnosis or treatment. For each outcome in Table A8, 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, Chernozhukov and Hansen (2013). The point estimates remain nearly unchanged relative to our baseline results.

In addition, the estimates reported in Table A9 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 A9 presents the results with alternative functional forms for each of the five main outcomes. For each of the outcomes in Table A9, 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 neighborhood of the optimal bandwidth (i.e., the bandwidth that minimizes the mean square 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 A10 we show that our main results are similar relaxing this restriction and excluding just observations with a GPA exactly equal to the admission threshold.

Lastly, we turn our attention to see if a particular city is driving our main results. Table A11 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 health and education outcomes, 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 enrollment in a more selective school improves the ability level of peers, increasing peer average middle school GPA by 4.4% of a standard deviation.²⁵ 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 selectivity distribution (Panels B and C). However, eligibility to enroll in a more selective school increases the share of female peers for the top half of the selectivity distribution 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 selectivity levels.

Next, we explore how eligibility for enrollment 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 enroll in a more selective 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 of highly selective high schools (Panel B); instead, schools in the bottom half of the selectivity distribution (Panel C) appear to drive this program substitution.

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 enroll in a more selective 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 selectivity distribution. Eligibility to enroll in a more selective high school also decreases

²⁵For 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.

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 nonteaching staff (Column (5)).

Lastly, we consider variations in teacher characteristics. In particular, we study whether eligibility to enroll in a more selective 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, enrollment in a more selective high school not only directly affects the characteristics of the peers with whom students interact but also the types of programs in which students enroll, 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 selectivity distribution and motivate the next section where we use these variations to explore the most likely mechanism 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 selective 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 analyze 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 restrict the analysis to three outcomes of interest: high school graduation, student enrollment in higher education and the probability of diagnosis or treatment of students by GPs or ERs for psychological conditions. 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 nonteaching staff, and student probability of enrolling in the general track. For each admission threshold z and each school input m , we estimate our standard RD model described in the previous section:

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

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 and each admission threshold, we obtain the estimated parameters $\widehat{\alpha}_{m,z}$, which indicate the magnitude of the variation in the school input m around the admission threshold z . For each school input separately, we then divide the sample depending on whether the estimated effect on the input under consideration is above or below the median estimated effect, $\widetilde{\alpha}_{m,z}$.

For each outcome and school input, we then estimate our basic RD model separately on subsamples characterized by the magnitude of the change in the school input under consideration at the thresholds. We use this heterogeneity analysis to respond to the following question: do larger changes in peer characteristics or teacher characteristics or in other school features coincide with greater estimated effects on student education and 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 varies at the thresholds. Along all the dimensions we consider, the average change at the threshold in the input under consideration is significantly different for schools with a below- or above-median change. For example, for one group of schools, eligibility for enrollment in a more selective 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 enrollment in a more selective 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 enrollment 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 enrollment in higher education. Finally, for the probability of diagnosis or treatment by a GP for psychological symptoms or diseases (Panel d of Figure 6), we identify significant differences in the estimated effects depending on the changes in the proportion of female teachers.

Overall, our heterogeneity analysis suggests that both changes in peers and teacher characteristics are probably important to explain the observed positive impacts of attending on educational outcomes on a more selective high school, while for health changes in the characteristics of teachers seem to be more important. Although the impacts on health are detected after high school and our analysis suggests that teachers play a role on such outcome, but this is consistent with more time to detect impacts on (mental) health outcomes.²⁶

Note that this analysis is only descriptive and that we should not interpret the findings as causal effects. The estimates do not survive adjustment for multiple hypothesis testing. Moreover, despite including many school-level inputs, this analysis does not exclude alternative mechanisms such as changes in student ambitions or confidence in the future that are unobserved.

²⁶See also Almond, Currie and Duque (2018) who review the impacts of childhood circumstances on adult outcomes.

6 Conclusion

This paper provides new insights into the relationship between the selectivity of the 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 Norwegian cities, where the assignment of middle school students to high school is 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 enroll in more or less selective high schools. The direction of the effect on health and education outcomes is theoretically ambiguous. On the one hand, a selective school environment might be a stressful experience for marginal students and increase their (mental) health problems. On the other hand, a more selective 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 enrollment in a more selective school significantly improves school outcomes, increasing the likelihood of both high school completion and enrollment in higher education. In addition, we document that the eligibility to enroll in a more selective 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 issues. These estimated effects on education and mental health appear driven by access to schools in the top half of the selectivity distribution.

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 age of teachers coincide with larger estimated effects on enrollment in higher education, and that larger changes in the share of female teachers coincide with larger estimated effects on student mental health. Overall, this analysis suggests that both changes in peers and teacher characteristics could be important for explaining the effects of a more

selective school environment for a student's subsequent education and health.

Besides complementing the existing literature on the effects of school selectivity on educational outcomes, we provide new knowledge on the relationship between school selectivity and mental health, and demonstrate that access to more selective schools decreases the risk of mental health problems. While a selective school environment might still be a stressful experience for marginal students, our results suggest that the positive effects of enrolling in a more selective school outweigh this extra pressure over the long term. However, there are still open questions for future research: will these improvements be materialized in different labor market outcomes? Are there any impacts on unobservables such as aspirations and noncognitive skills? By identifying effects along a wide interval of the admission cutoff scores, our results are relevant for the impacts of school selectivity in the context of nonelite schools, that are available in most European countries.

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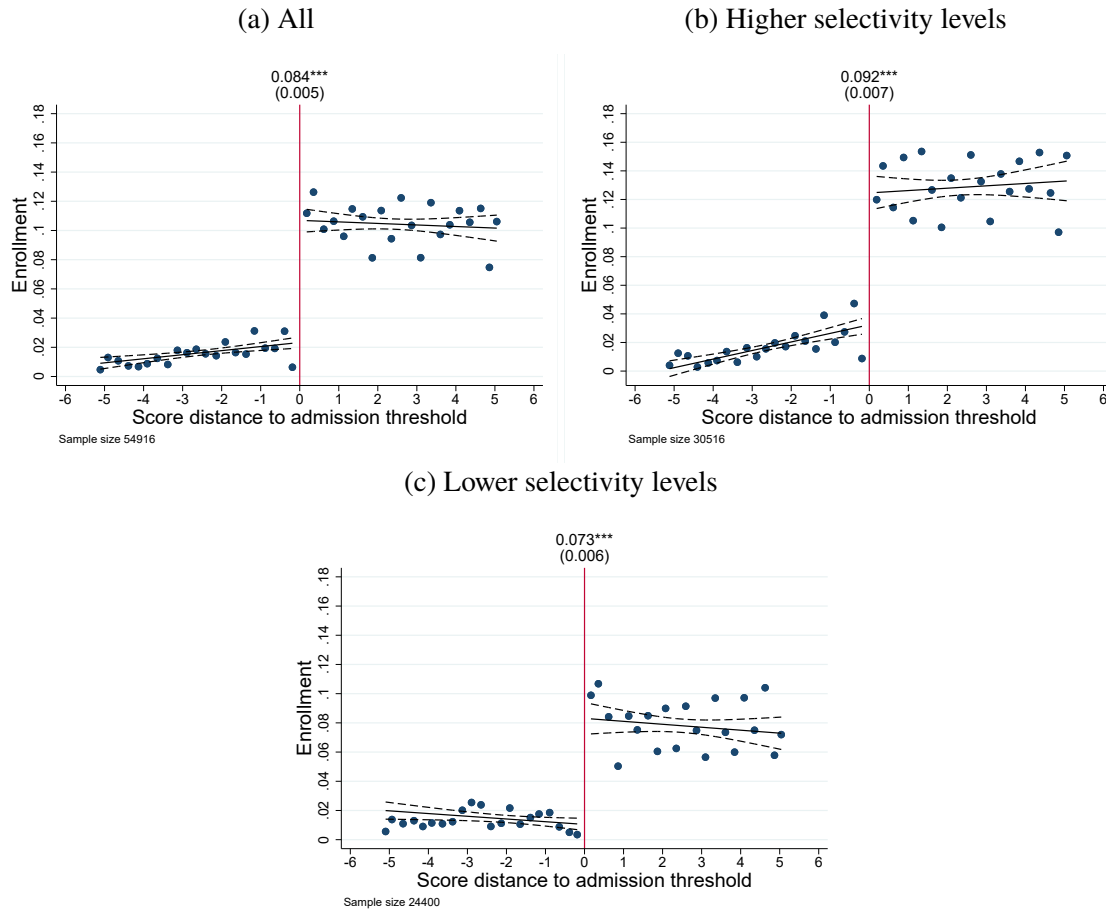
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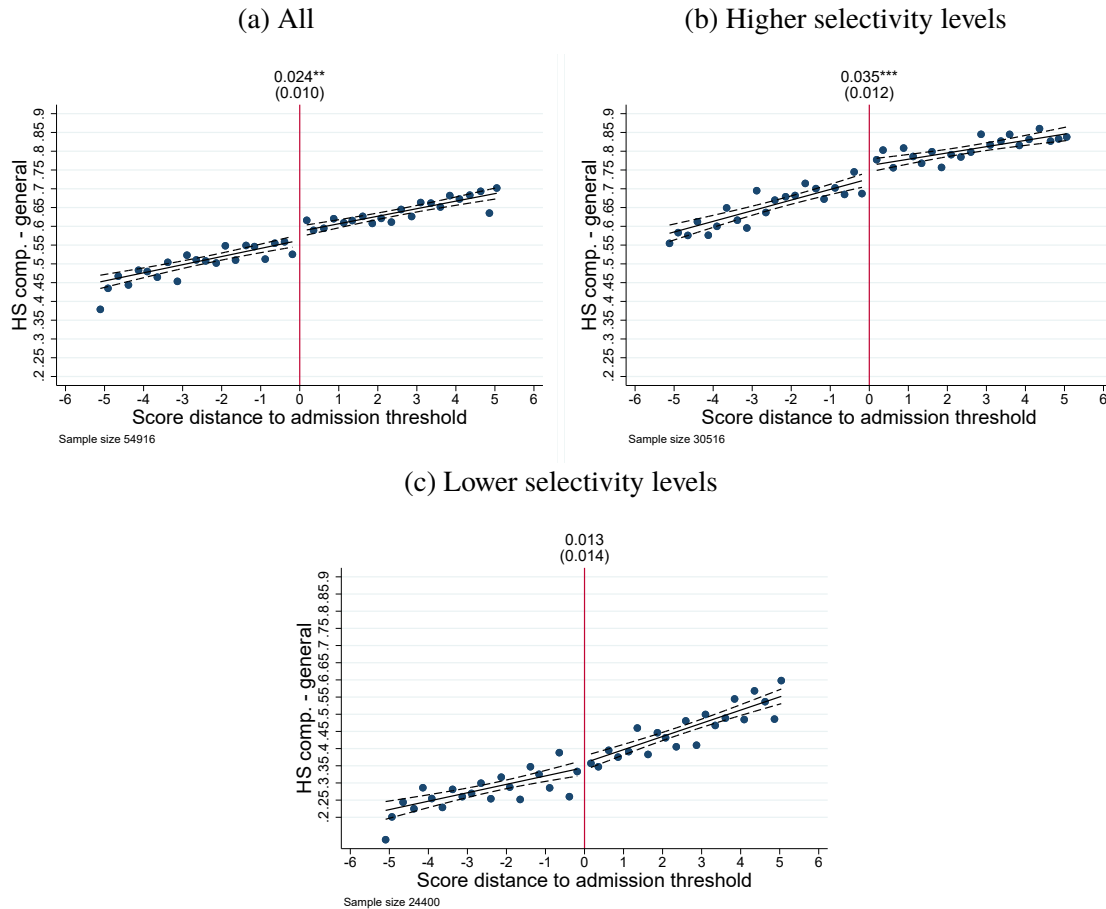
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Figure 1 – Enrollment probability



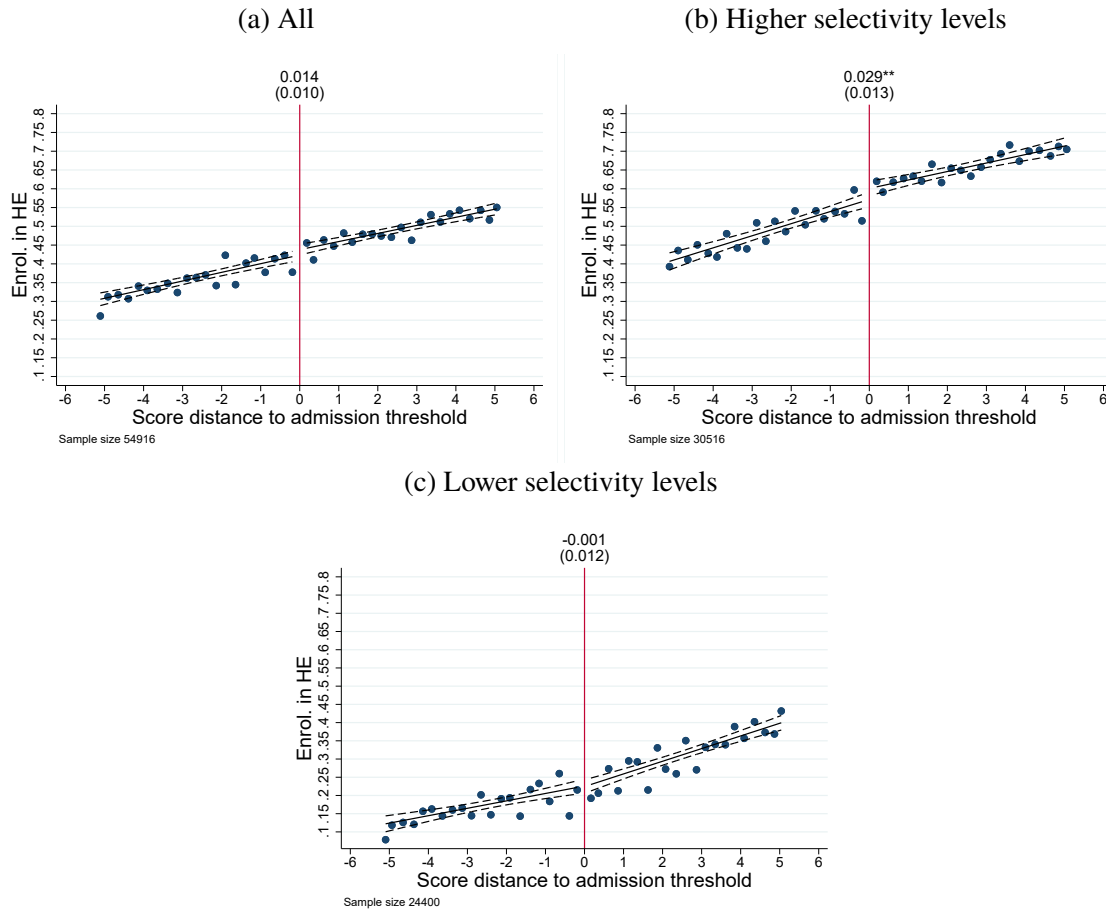
NOTE: These figures plot the point estimates of α from equation (2) using a linear trend specification and triangular weights. The standard errors for the point estimates are clustered at individual level. The dashed lines are 95 percent confidence intervals. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 2 – High School Graduation



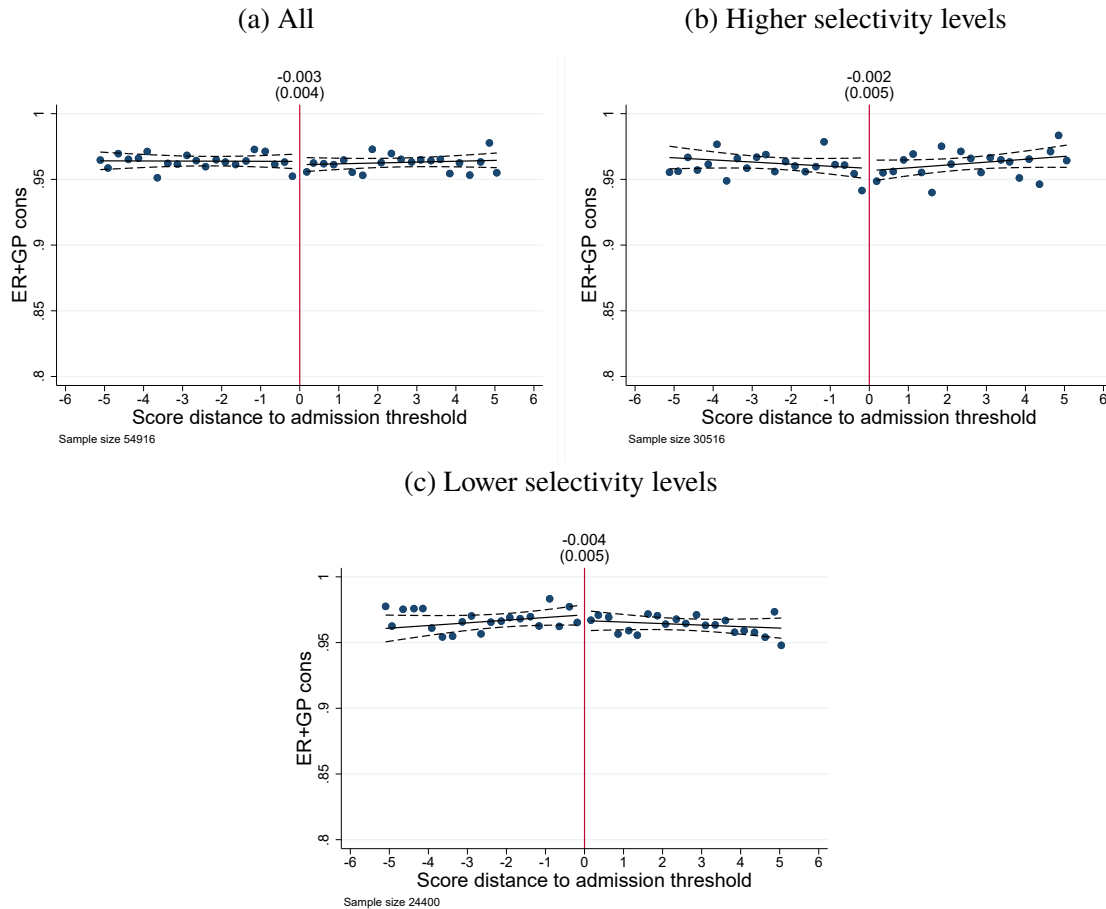
NOTE: These figures plot the point estimates of α from equation (2) using a linear trend specification and triangular weights. The standard errors for the point estimates are clustered at individual level. The dashed lines are 95 percent confidence intervals. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 3 – Enrollment in Higher Education



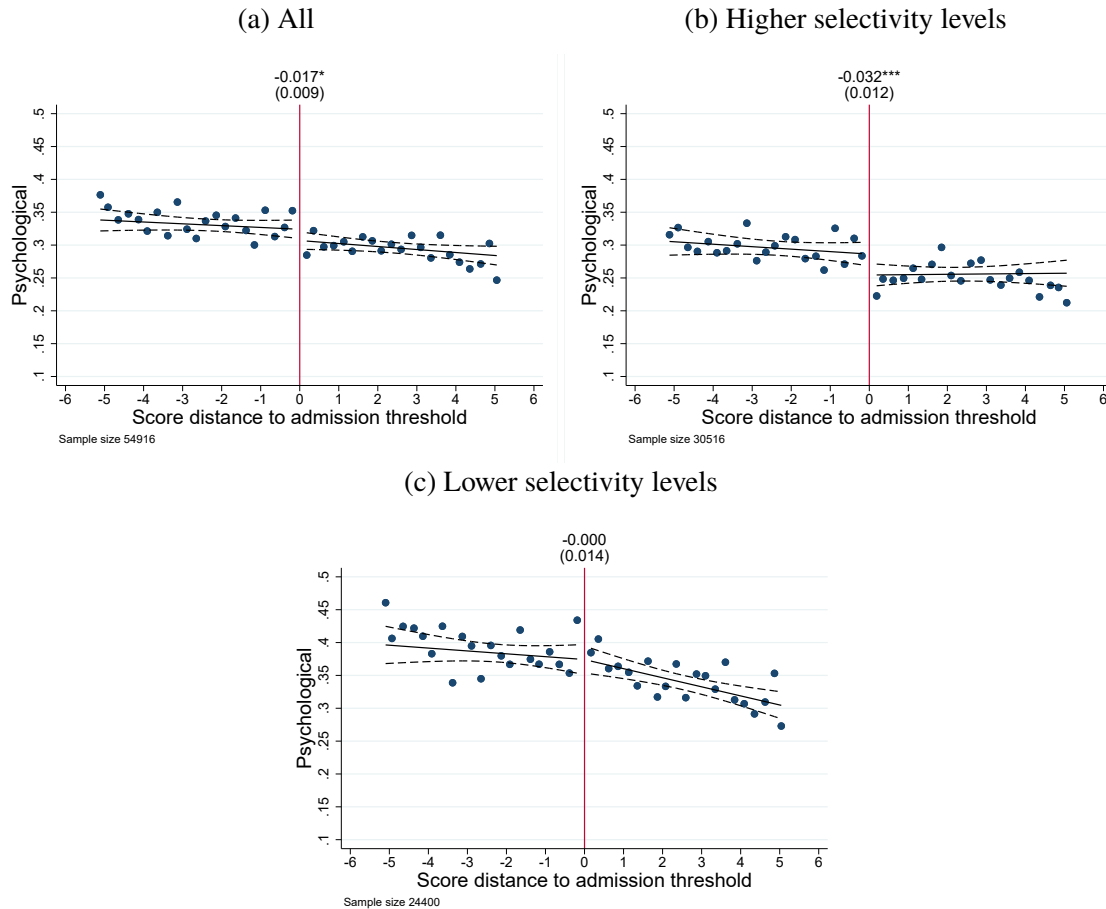
NOTE: These figures plot the point estimates of α from equation (2) using a linear trend specification and triangular weights. The standard errors for the point estimates are clustered at individual level. The dashed lines are 95 percent confidence intervals. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure 4 – Probability of Consulting with a GP or an ER



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 individual level. The dashed lines are 95 percent confidence intervals. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

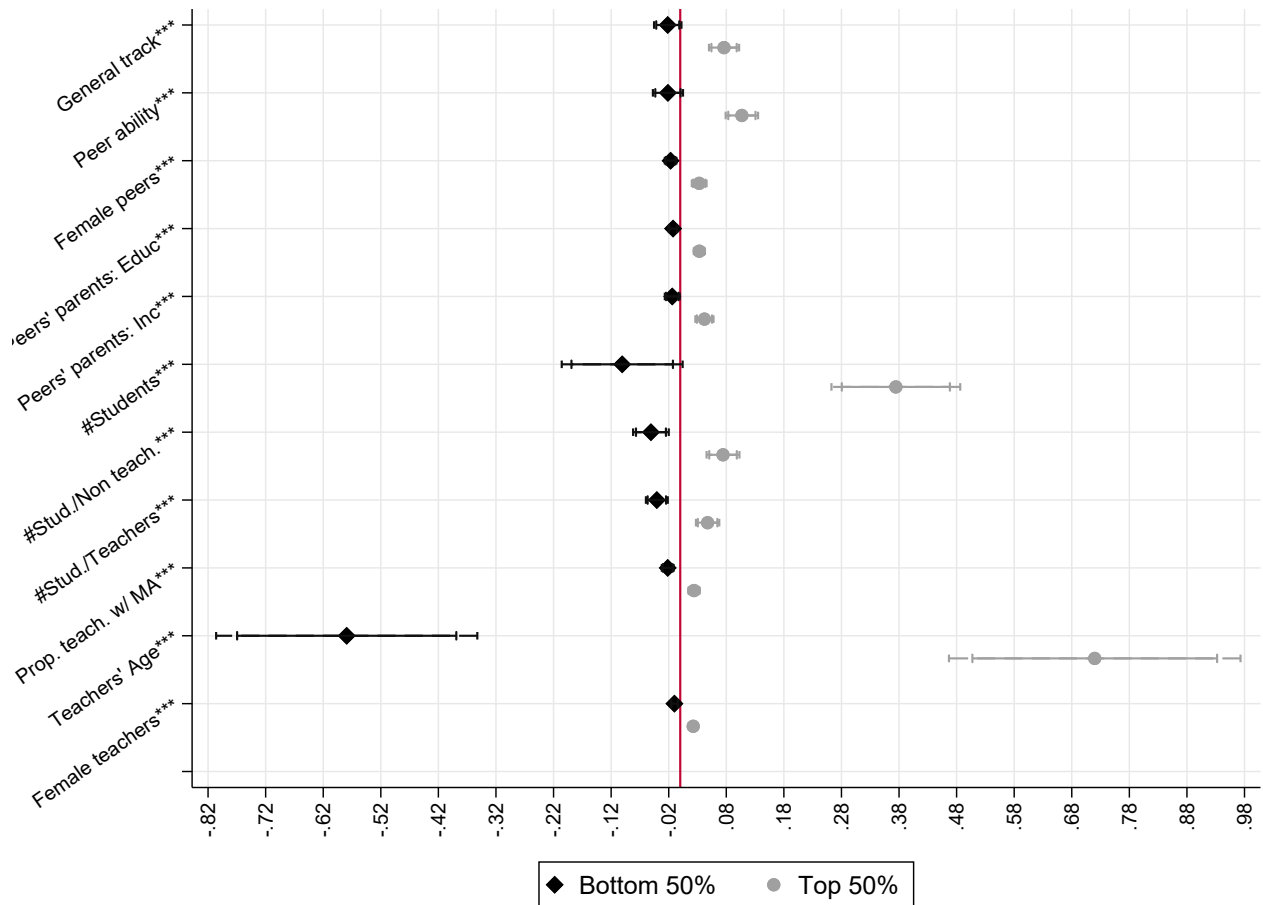
Figure 5 – Probability of being Diagnosed or Treated for a Mental Health Issue



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 individual level. The dashed lines are 95 percent confidence intervals. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

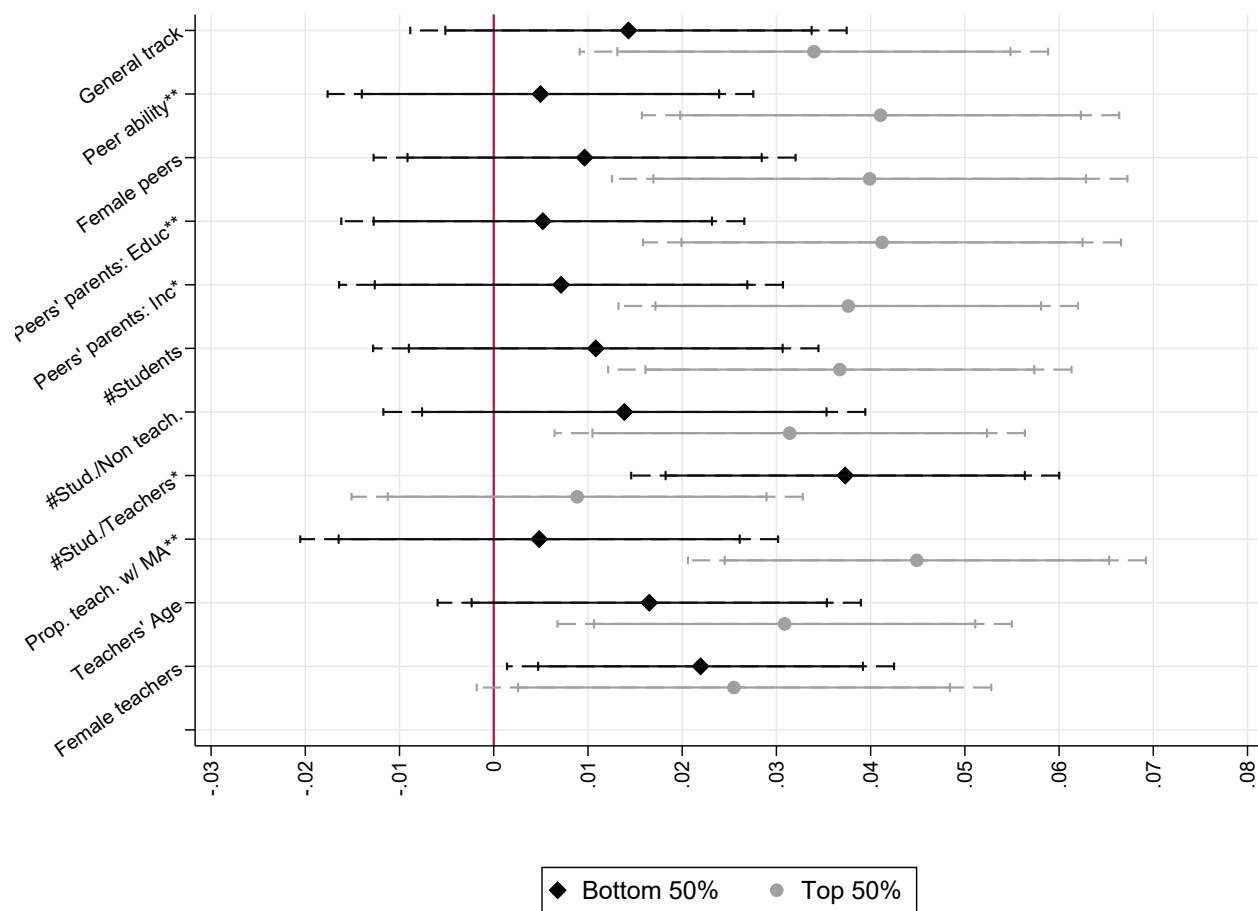
Figure 6 – Heterogeneity of Selective School Effects by Changes in School Characteristics

(a) Changes in School Characteristics at the Thresholds



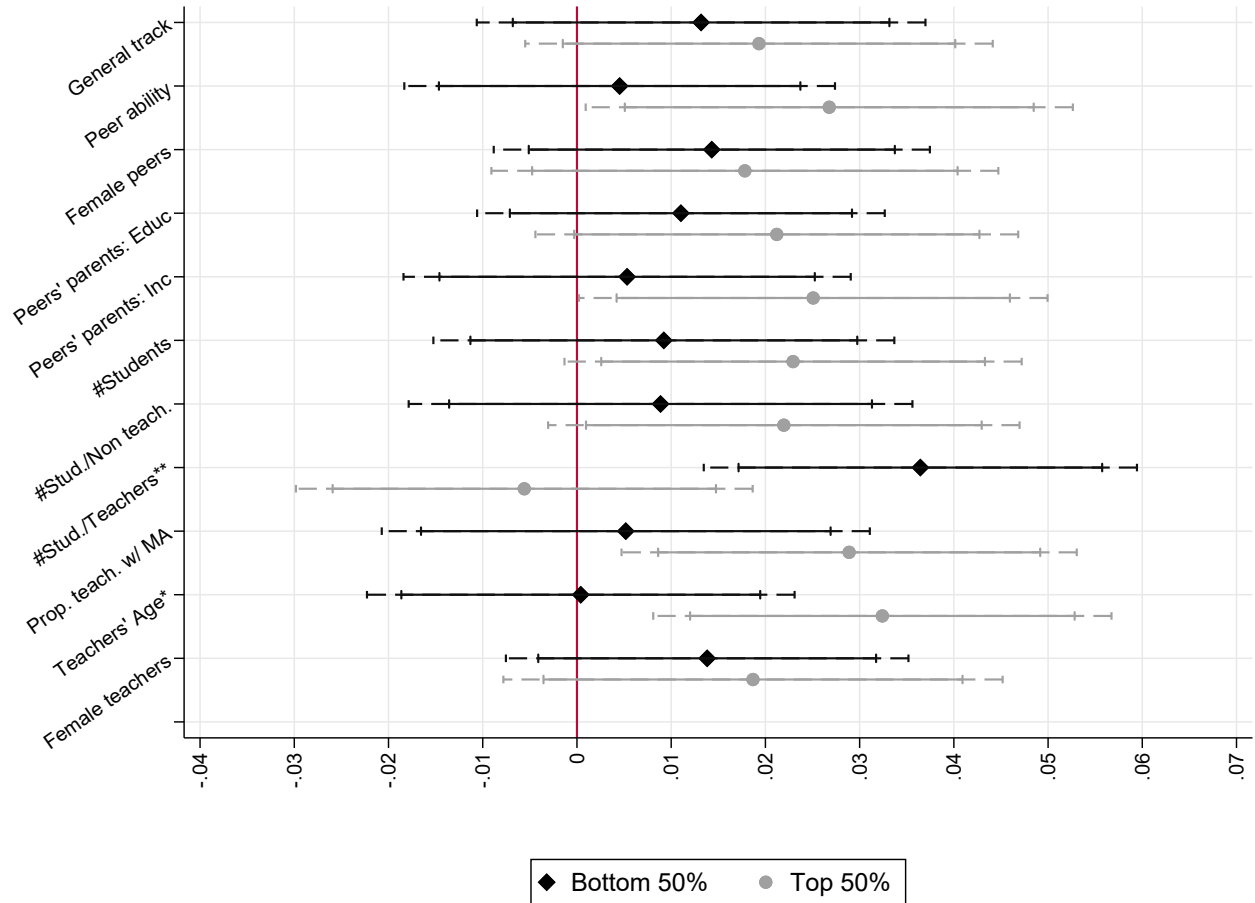
NOTE: Asterisks refer to the results of tests of the null hypothesis of no difference in the changes in inputs above or below the median estimated parameter where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All estimates are statistically different at the 5% level after accounting for multiple hypothesis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

(b) Changes in School Characteristics and High School Graduation



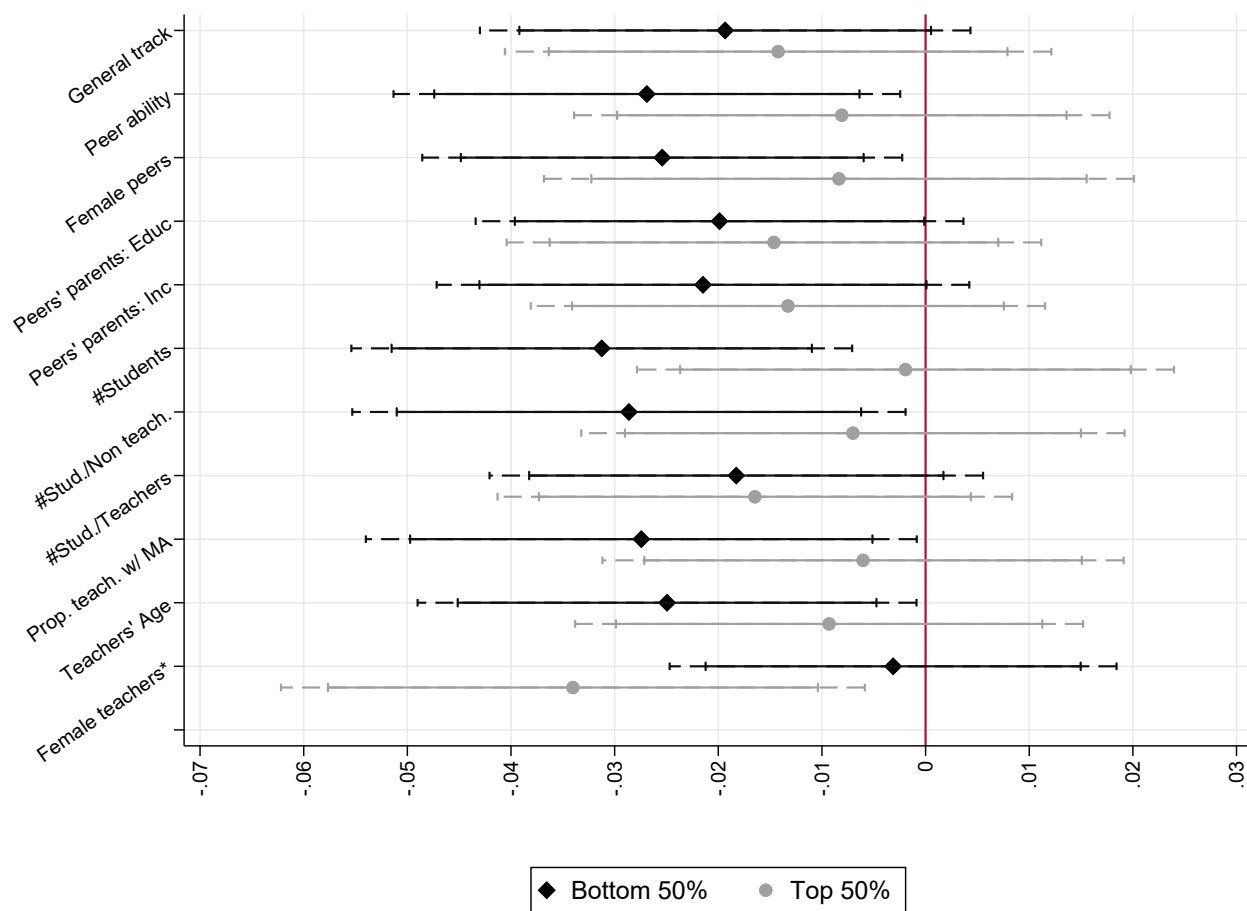
NOTE: Asterisks refer to the results of tests of the null hypothesis of no difference in the changes in inputs above or below the median estimated parameter where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Joint tests of the estimates are no longer statistically different at the 10% (or lower) level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

(c) Changes in School Characteristics and Enrollment in Higher Education



NOTE: Asterisks refer to the results of tests of the null hypothesis of no difference in the changes in inputs above or below the median estimated parameter where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Joint tests of the estimates 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 Issues



NOTE: Asterisks refer to the results of tests of the null hypothesis of no difference in the changes in inputs above or below the median estimated parameter where *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Joint tests of the estimates 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 – High School Selectivity, Education, and Health

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	First stage enrollment	High School graduation	Enrollment in HE	GP - ER cons.	Nb. of GP - ER cons.	Mental health issue	Other health issue
Panel A: All							
Eligibility	0.083*** (0.005)+++	0.023*** (0.009)++	0.016* (0.009)	-0.003 (0.004)	-0.343 (0.359)	-0.017* (0.009)	-0.004 (0.004)
Control mean	.021	.542	.402	.964	17.7	.327	.962
N	54916	54916	54916	54916	54916	54916	54916
Panel B: Higher selectivity Levels							
Eligibility	0.091*** (0.007)+++	0.031*** (0.011)+	0.026** (0.012)+	-0.003 (0.005)	-0.738 (0.457)	-0.032*** (0.011)+++	-0.004 (0.005)
Control mean	.027	.696	.539	.961	16.6	.291	.960
N	30516	30516	30516	30516	30516	30516	30516
Panel C: Lower selectivity Levels							
Eligibility	0.073*** (0.006)+++	0.015 (0.013)	0.004 (0.011)	-0.005 (0.005)	0.185 (0.555)	0.002 (0.014)	-0.006 (0.005)
Control mean	.013	.321	.206	.969	19.2	.380	.965
N	24400	24400	24400	24400	24400	24400	24400

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 individual level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; +++ $p < 0.01$, ++ $p < 0.05$, + $p < 0.1$ after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

Table 2 – High School Selectivity and Mental Health Diagnoses and Treatments

	(1) Depression/Anxiety	(2) Subs. abuse	(3) ADHD	(4) Other psy.
<i>Panel A: All</i>				
Eligibility	-0.015* (0.008)	0.001 (0.004)	-0.004 (0.003)	-0.008 (0.007)
Control mean	.233	.0514	.0334	.153
N	54916	54916	54916	54916
<i>Panel B: Higher Selectivity Levels</i>				
Eligibility	-0.028*** (0.010)+++	-0.001 (0.005)	-0.006 (0.004)	-0.013 (0.009)
Control mean	.211	.0384	.024	.134
N	30516	30516	30516	30516
<i>Panel C: Lower Selectivity Levels</i>				
Eligibility	0.002 (0.013)	0.004 (0.008)	-0.001 (0.006)	-0.001 (0.011)
Control mean	.264	.0701	.0468	.18
N	24400	24400	24400	24400

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 individual level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; +++ $p < 0.01$, ++ $p < 0.05$, + $p < 0.1$ after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

Table 3 – Characteristics of High School Peers

	(1) Peers' av. MS GPA	(2) Prop. of female peers	(3) Parents of Peers Av. inc. (log)	(4) Education
<i>Panel A: All</i>				
Eligibility	0.044*** (0.010)+++	0.006 (0.004)	0.016*** (0.005)+++	0.011*** (0.003)+++
Control mean	.0644	.463	13.5	.481
N	54916	54916	54916	54916
<i>Panel B: Higher Selectivity Levels</i>				
Eligibility	0.039*** (0.012)+++	0.012*** (0.004)+++	0.011 (0.007)	0.007 (0.004)
Control mean	.353	.496	13.8	.568
N	30516	30516	30516	30516
<i>Panel C: Lower Selectivity Levels</i>				
Eligibility	0.046*** (0.015)+++	0.000 (0.007)	0.018*** (0.007)+++	0.015*** (0.005)+++
Control mean	-.349	.416	13.1	.357
N	24400	24400	24400	24400

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 individual level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; +++ $p < 0.01$, ++ $p < 0.05$, + $p < 0.1$ after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

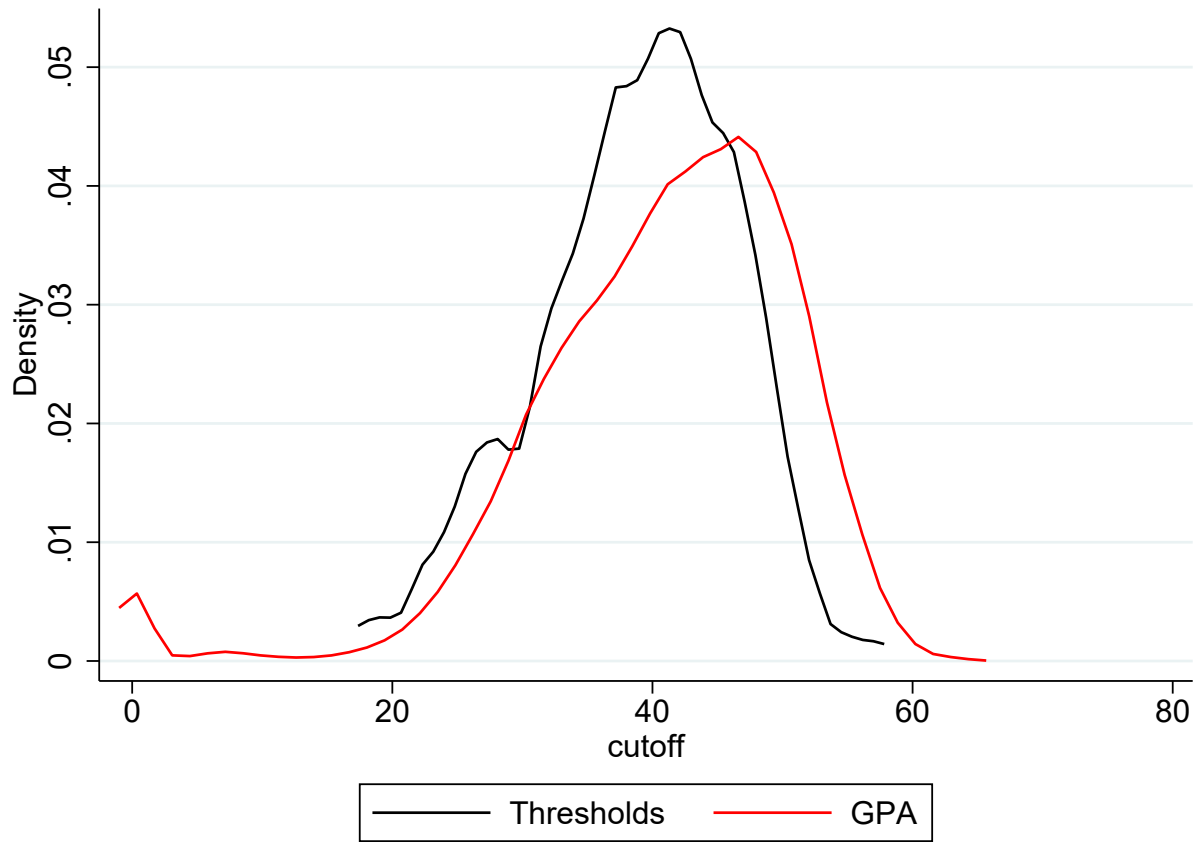
Table 4 – High School Education and Characteristics of High Schools Attended

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	General track	Vocational track	#Stud. own program	#Stud. /teachers	#Stud. /non-teacher	Share teachers w. masters	Teachers' mean age	Share female teachers
Panel A: All								
Eligibility	0.022** (0.009)**	-0.018** (0.008)**	4.757*** (1.153)***	-0.475* (0.280)	0.189 (0.348)	-0.001 (0.003)	0.049 (0.089)	0.005** (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: Higher Selectivity Levels								
Eligibility	0.007 (0.012)	-0.002 (0.010)	3.032* (1.671)	-0.539 (0.351)	-0.142 (0.430)	-0.007 (0.005)	0.104 (0.124)	0.005 (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: Lower Selectivity Levels								
Eligibility	0.042*** (0.014)***	-0.041*** (0.013)***	6.890*** (1.481)***	-0.450 (0.530)	0.569 (0.552)	0.006 (0.005)	-0.024 (0.124)	0.006 (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

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 individual level) in parentheses. *** p<0.01, ** p<0.05, * p<0.1; +++ p<0.01, ++ p<0.05, + p<0.1 after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

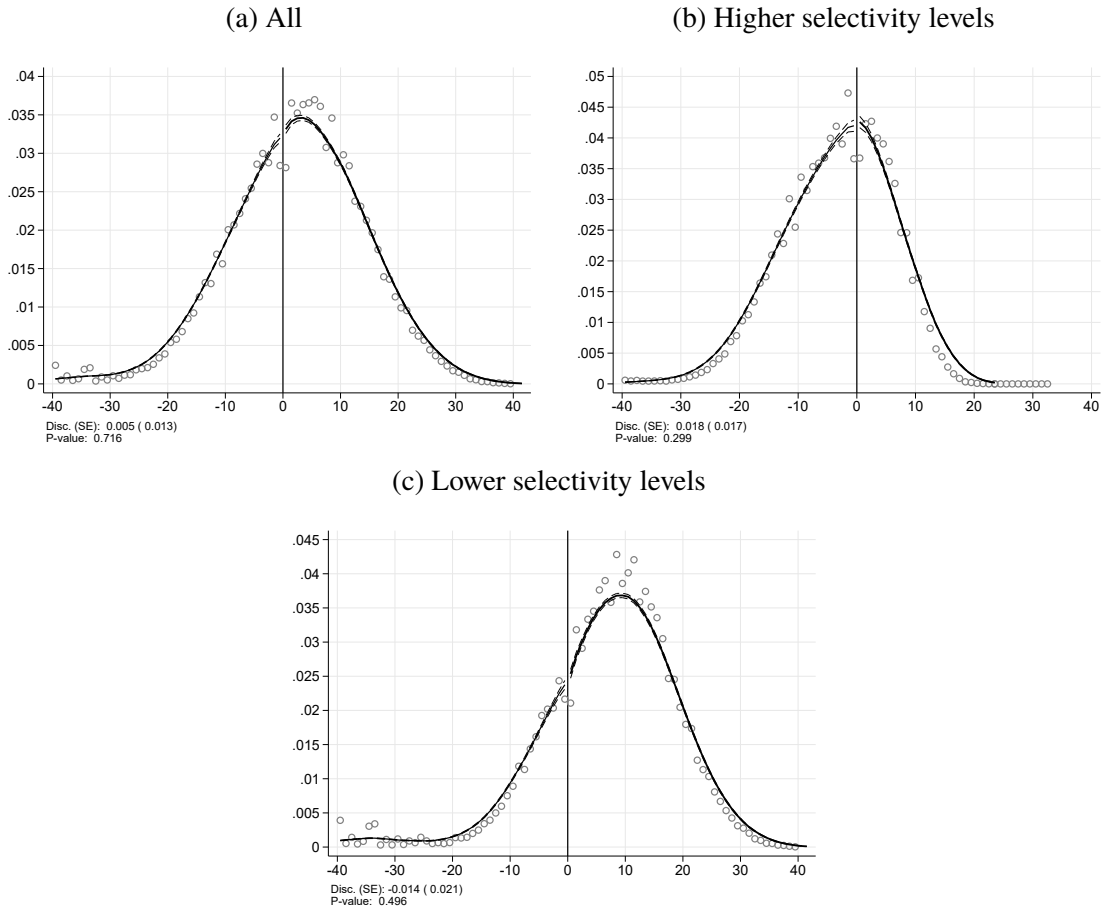
Appendix A

Figure A1 – Distribution of High School Admission Thresholds and Middle School GPA



NOTE: This figure presents for the distribution of middle school GPA in the cities of Oslo and Bergen (red line) and the distribution of the admission thresholds in the selective high schools in our sample (black line) for the period studied.

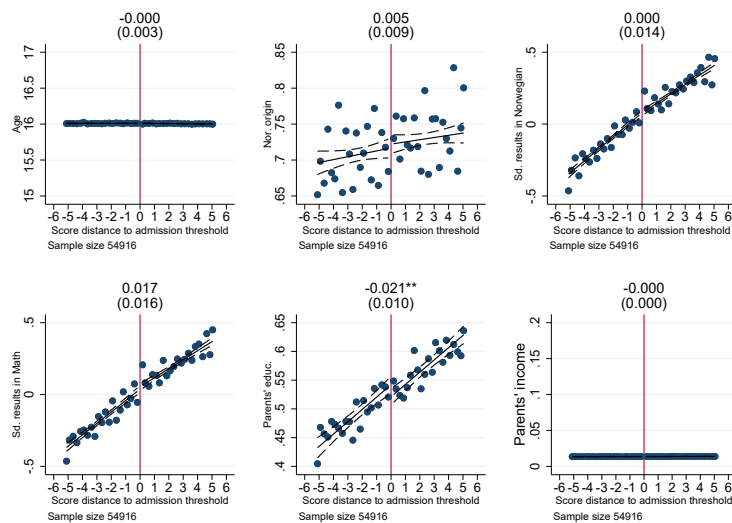
Figure A2 – Density of Observations around Admission Cutoffs



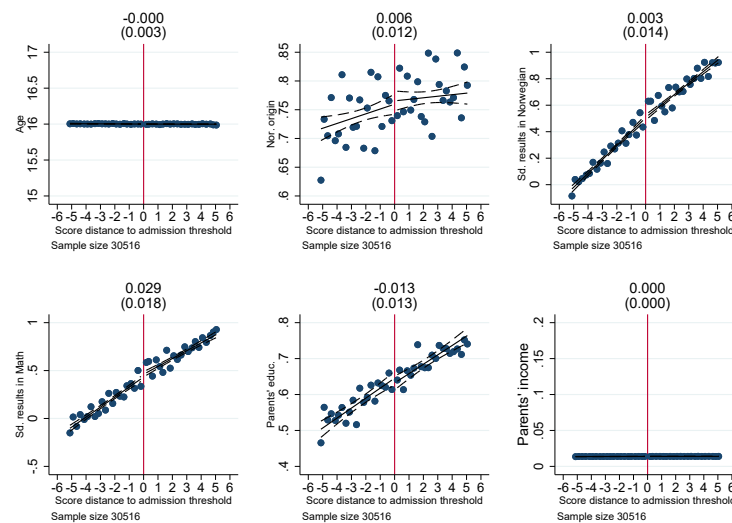
NOTE: These figures present nonparametric estimates of the density of observations on either side of the cutoff score following McCrary (2008). Each circle shows the average frequency of students per bin of the running variable. The solid lines represent estimated density functions, and the dashed lines are the 95 percent confidence intervals around it. The bottom right of each figure includes the estimated discontinuity for the density at the cutoff (standard errors in parentheses).

Figure A3 – Balancing of Covariates

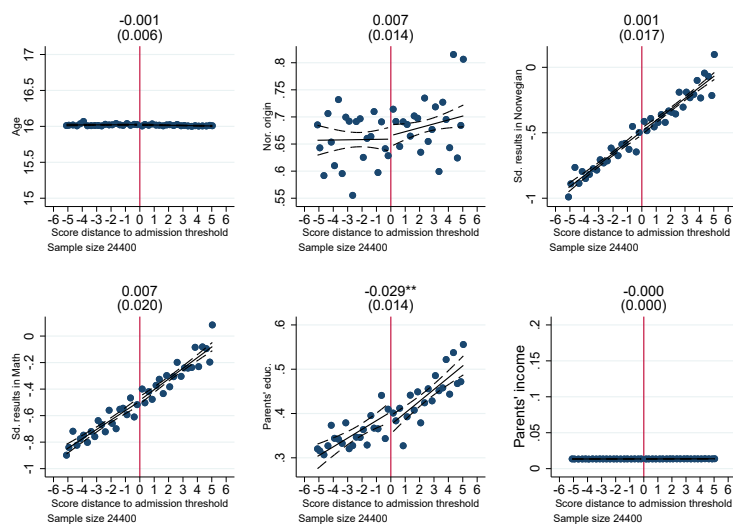
(a) All



(b) Higher selectivity levels



(c) Lower selectivity levels



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 individual level. The dashed lines are 95 percent confidence intervals. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure A4 – Prevalence of Mental Health Diagnoses and Treatments

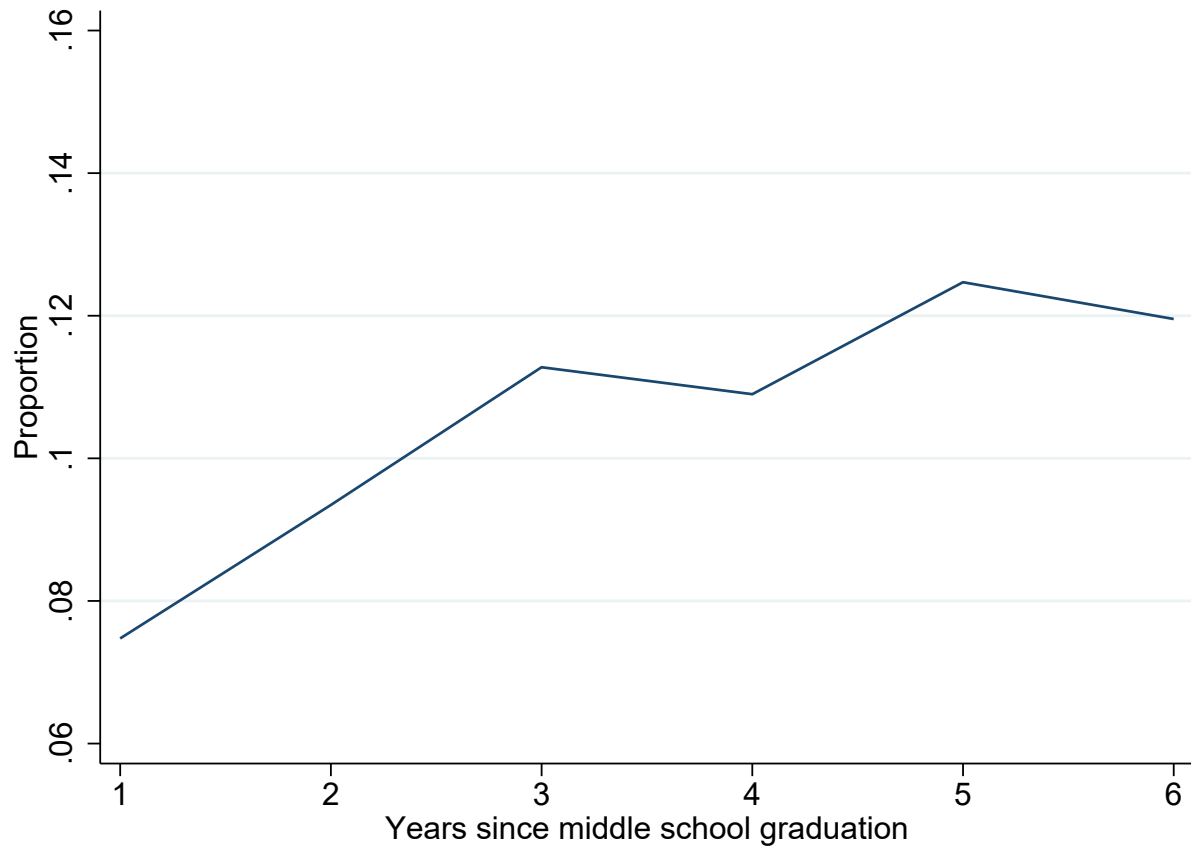
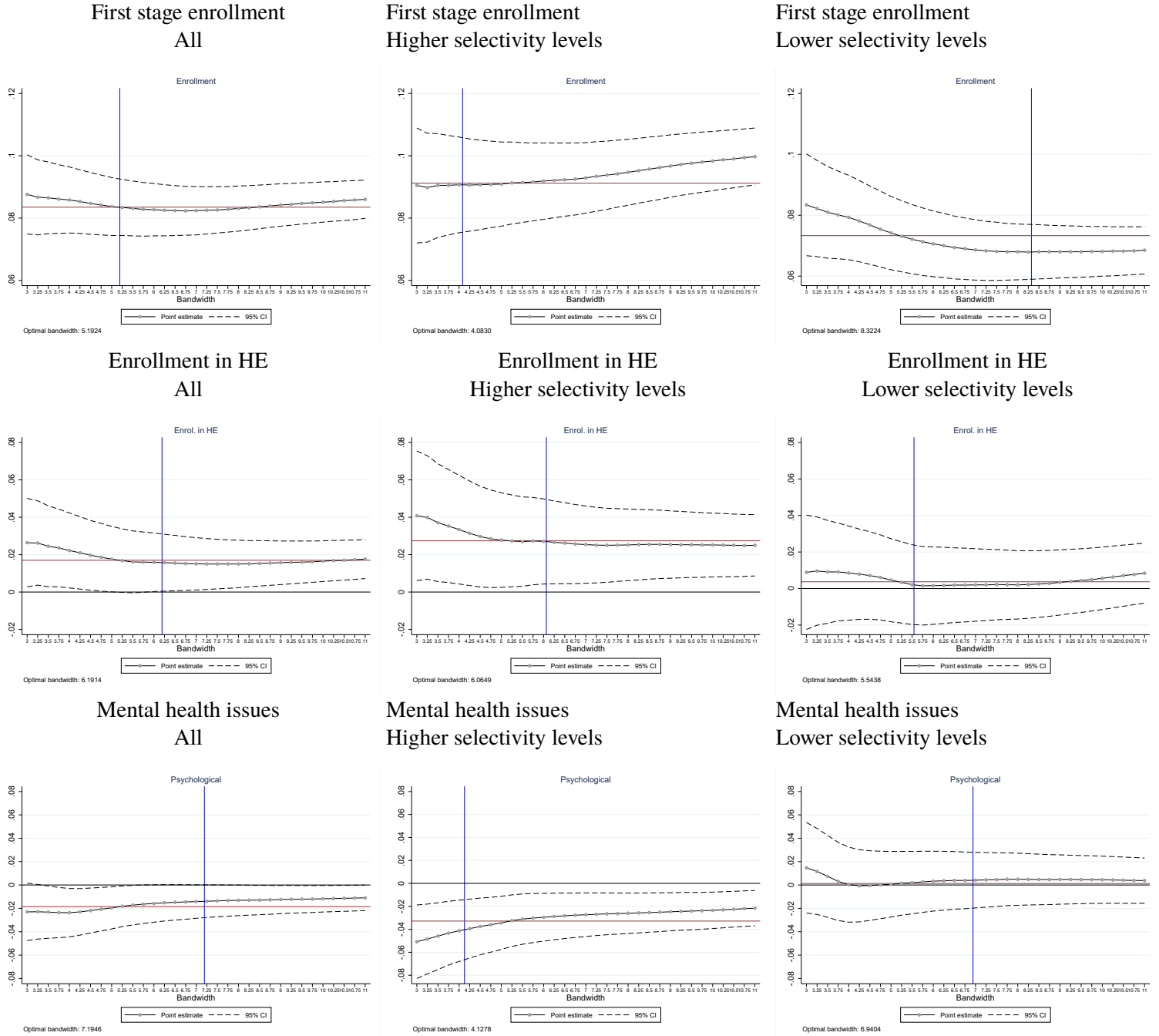


Figure A5 – Robustness to Bandwidth Selection



NOTE: Each point reports α from equation (2) with varying bandwidths. The solid red line represents the point estimates from a global linear specification with triangular weights. The vertical blue line shows the optimal bandwidth. The dashed lines are 95 percent confidence intervals.

Table A1 – Descriptive Statistics

	(1) All Mean	(2) SD	(3) Bergen area & Oslo Mean	(4) SD	(5) RD Sample Mean	(6) SD
Female	0.486	0.500	0.486	0.500	0.476	0.499
Age	16.078	0.906	16.038	0.649	16.008	0.154
Norwegian origin	0.827	0.378	0.793	0.405	0.734	0.442
Sd. results in Norwegian	0.000	0.987	0.112	0.965	0.081	0.858
Sd. results in Math	-0.000	0.985	0.074	0.982	0.054	0.916
Parental Background						
Parents' educ.	0.429	0.495	0.460	0.498	0.516	0.500
Parents' income	1018.177	1052.238	1091.964	1648.111	1159.468	1355.331
School Environment						
General studies	0.398	0.489	0.462	0.499	0.541	0.498
Vocational studies	0.509	0.500	0.475	0.499	0.405	0.491
#Students/Teacher	13.021	17.246	13.117	14.509	14.862	16.794
#Students/Non-Teacher	20.701	15.225	19.922	13.803	21.084	16.145
Share Teachers with Masters	0.308	0.206	0.276	0.232	0.253	0.253
Teachers age	48.308	4.031	48.122	4.379	47.470	4.628
Sh Female Teachers	0.508	0.125	0.499	0.133	0.518	0.132
#Stud own Program	53.859	71.566	55.685	64.991	71.757	71.139
Peers' Characteristics						
Peers' mean MS GPA	-0.010	0.693	0.104	0.703	0.134	0.715
Prop of female peers	0.461	0.285	0.462	0.277	0.472	0.251
Av Inc of Peers' parents	973147.298	345181.207	1039018.858	406465.607	1128266.195	447111.263
Education of Peers' parents	0.405	0.219	0.432	0.230	0.485	0.225
Mental Health of Peers' parents	0.243	0.090	0.243	0.086	0.248	0.078
Education						
HS graduation	0.615	0.487	0.634	0.482	0.657	0.475
Enrollment in HE	0.381	0.486	0.394	0.489	0.423	0.494
General Health						
Any GP - ER cons. since middle school	0.975	0.155	0.970	0.170	0.966	0.181
Nb. of GP - ER cons. since middle school	20.654	21.987	18.980	20.955	17.672	19.398
Any cons. due physical health problems since middle school	0.973	0.163	0.968	0.177	0.963	0.188
Any cons. due mental health problems since middle school	0.320	0.466	0.326	0.469	0.314	0.464
Mental Health Disorders						
Depression/Anxiety	0.220	0.414	0.232	0.422	0.223	0.416
Substance Use	0.053	0.223	0.057	0.232	0.052	0.222
ADHD	0.041	0.199	0.035	0.185	0.031	0.174
Other Psychological	0.155	0.361	0.153	0.360	0.143	0.350
N	312267		41306		19932	

NOTE: Means and (standard deviations) of background, school environment, education, and health during the period studied between the end and up to six years after completing middle school (i.e., 10th graders completing middle school between 2006 and 2010). The table includes three samples: all students completing the 10th grade in Norway between 2006 and 2010, students completing the 10th 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 (RD) sample.

Table A2 – Balancing tests

	(1) Female	(2) Age	(3) Nor. origin	(4) Sd. results in Norwegian	(5) Sd. results in Math	(6) Parents' educ.	(7) Parents' Income (log)
Panel A: All							
Eligibility	0.015 (0.010)	0.000 (0.003)	-0.002 (0.008)	-0.006 (0.008)	0.014 (0.011)	-0.020** (0.009)+	-0.018 (0.019)
Control mean	.451	16	.713	-.00739	-.0467	.532	13.8
N	54916	54916	54916	54916	54916	54916	54916
Panel B: Higher Selectivity Levels							
Eligibility	0.021 (0.013)	-0.000 (0.003)	0.003 (0.011)	-0.009 (0.010)	0.020 (0.015)	-0.015 (0.012)	0.004 (0.023)
Control mean	.486	16	.748	.391	.316	.622	13.9
N	30516	30516	30516	30516	30516	30516	30516
Panel C: Lower Selectivity Levels							
Eligibility	0.006 (0.015)	-0.000 (0.006)	-0.007 (0.013)	-0.003 (0.012)	0.005 (0.016)	-0.026* (0.014)	-0.043 (0.029)
Control mean	.4	16	.664	-.582	-.577	.4	13.7
N	24400	24400	24400	24400	24400	24400	24400

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 individual level) in parentheses. *** p<0.01, ** p<0.05, * p<0.1; +++ p<0.01, ++ p<0.05, + p<0.1 after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

Table A3 – Placebo First Stage Estimates: Alternative Thresholds

Sample	(1) All	(2) Higher selectivity	(3) Lower selectivity
<i>Panel A: Eligibility to high school z based on $z - 1$ threshold</i>			
Eligibility	0.020*** (0.004)	0.014*** (0.005)	0.028*** (0.005)
Control Mean	.015	.016	.014
N	44521	25894	18627
<i>Panel B: Eligibility to high school z based on $z + 1$ threshold</i>			
Eligibility	-0.001 (0.007)	0.016 (0.010)	-0.016* (0.009)
Control Mean	.060	.065	.053
N	21815	12035	9780

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 individual level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A4 – Local Average Treatment Effects

	(1) High School Graduation	(2) Enrollment in HE	(3) GR - ER cons.	(4) Mental health issue
<i>Panel A: All</i>				
Enrollment	0.280*** (0.103)+++	0.191* (0.104) ⁺	-0.041 (0.044)	-0.208* (0.107) ⁺
N	54916	54916	54916	54916
<i>Panel B: Higher selectivity Levels</i>				
Enrollment	0.348*** (0.127)+++	0.292** (0.139) ⁺⁺	-0.032 (0.057)	-0.356*** (0.129)+++
N	30516	30516	30516	30516
<i>Panel C: Lower selectivity Levels</i>				
Enrollment	0.208 (0.176)	0.055 (0.155)	-0.064 (0.071)	0.025 (0.191)
N	24400	24400	24400	24400

NOTE: This table reports the point estimates when instrumenting enrollment in a higher-ranked school by eligibility for enrollment, using a linear trend specification and triangular weights. Clustered standard errors (at individual level) in parentheses. *** p<0.01, ** p<0.05, * p<0.1; +++ p<0.01, ++ p<0.05, + p<0.1 after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

Table A5 – Reduced Form Estimates: Mental Health Impacts During and After High School Years

	(1) High School Years	(2) Post-High School Years
<i>Panel A: All</i>		
Eligibility (α)	0.004 (0.007)	-0.018** (0.008) ⁺⁺
Control Mean	.182	.239
N	54916	54916
P-Value: HA: $\alpha_{col1} < \alpha_{col2}$	0.008	
<i>Panel B: Higher Levels of Selectivity</i>		
Eligibility (α)	-0.006 (0.009)	-0.027*** (0.010) ⁺⁺
Control Mean	.155	.211
N	30516	30516
P-Value: HA: $\alpha_{col1} < \alpha_{col2}$	0.036	
<i>Panel C: Lower Levels Selectivity</i>		
Eligibility (α)	0.018 (0.012)	-0.006 (0.013)
Control Mean	.220	.279
N	24400	24400
P-Value: HA: $\alpha_{col1} < \alpha_{col2}$	0.048	

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 individual level) in parentheses. *** p<0.01, ** p<0.05, * p<0.1; +++ p<0.01, ++ p<0.05, + p<0.1 after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

Table A6 – Classification of Mental Health Conditions

Mental Health Condition Grouping	
Anxiety	P01 Feeling anxious/nervous/tense P02 Acute stress reaction P06 Sleep disturbance P74 Anxiety disorder/anxiety state
Depression	P03 Feeling depressed P76 Depressive disorder P77 Suicide/suicide attempt
Substance Use	P15 Chronic alcohol abuse P16 Acute alcohol abuse P17 Tobacco abuse P18 Medication abuse P19 Drug abuse
Hyperkinetic Disorders	P81 Hyperkinetic disorder
Other	P04 Feeling/behaving irritable/angry P07 Sexual desire reduced P08 Sexual fulfilment reduced P09 Sexual preference concern P10 Stammering/stuttering/tic P11 Eating problem in child P12 Bedwetting/enuresis P13 Encopresis/bowel training problem P20 Memory disturbance P22 Child behaviour symptom/complaint P23 Adolescent behav. Symptom/complt. P24 Specific learning problem P25 Phase of life problem adult P27 Fear of mental disorder P28 Limited function/disability (p) P29 Psychological symptom/complt other P70 Dementia P71 Organic psychosis other P72 Schizophrenia P73 Affective psychosis P75 Somatization disorder P78 Neuraesthesia/surmenage P79 Phobia/compulsive disorder P80 Personality disorder P82 Post-traumatic stress disorder P85 Mental retardation P86 Anorexia nervosa/bulimia P98 Psychosis NOS/other P99 Psychological disorders, other

NOTE: This table presents the grouping of mental health problems based on the ICPC-02 diagnoses.

Table A7 – Reduced Form Estimates: Risky Behaviors

	(1) Teenage Childbearing	(2) Any Cause	(3) Hospitalizations Mental Health	(4) Substance Use	(5) Injuries
Panel A: All					
Eligibility	0.001 (0.005)	0.001 (0.010)	-0.002 (0.003)	-0.001 (0.002)	0.002 (0.009)
Control Mean	.026	.553	.031	.010	.324
N	25561	54916	54916	54916	54916
Panel B: Higher Selectivity Levels					
Eligibility	0.001 (0.004)	0.002 (0.013)	-0.002 (0.004)	-0.001 (0.002)	0.004 (0.012)
Control Mean	.009	.525	.024	.006	.303
N	15575	30516	30516	30516	30516
Panel C: Lower Selectivity Levels					
Eligibility	-0.000 (0.010)	-0.001 (0.014)	-0.003 (0.006)	0.000 (0.003)	-0.000 (0.014)
Control Mean	.055	.593	.040	.014	.354
N	9986	24400	24400	24400	24400

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 individual level) in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A8 – Robustness Checks: Controls

First stage enrollment		High School Graduation		Enrollment in HE		GR - ER cons.		Mental health issue	
No controls	Double Lasso	No controls	Double Lasso	No controls	Double Lasso	No controls	Double Lasso	No controls	Double Lasso
Panel A: All									
Eligibility	0.083*** (0.005)	0.082*** (0.005)	0.024*** (0.009)	0.017** (0.009)	0.015* (0.009)	-0.003 (0.004)	-0.003 (0.004)	-0.016* (0.009)	-0.018** (0.009)
Panel B: Higher Selectivity Levels									
Eligibility	0.090*** (0.007)	0.091*** (0.007)	0.033*** (0.011)	0.029** (0.013)	0.025** (0.012)	-0.002 (0.005)	-0.002 (0.005)	-0.031*** (0.012)	-0.032*** (0.011)
Panel C: Lower Selectivity Levels									
Eligibility	0.073*** (0.006)	0.070*** (0.006)	0.015 (0.013)	0.004 (0.012)	0.001 (0.011)	-0.004 (0.005)	-0.005 (0.005)	0.001 (0.014)	-0.000 (0.014)

NOTE: In this table, for each outcome presented, the first column reports estimates of model (2) without any control variable for the predetermined individual characteristics. The second column provides the point estimates of α where the relevant control variables are selected using the double lasso procedure in Belloni, Chernozhukov and Hansen (2013). Clustered standard errors (at individual level) in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A9 – Robustness Checks: Functional Forms

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	First stage enrollment			High School Graduation			Enrollment in HE			GR - ER cons.			Mental health issue	
	Cutoffs trends	Optimal	Local linear	Cutoffs trends	Optimal	Local linear	Cutoffs trends	Optimal	Local linear	Cutoffs trends	Optimal	Local linear	Cutoffs trends	Optimal
Panel A: All														
Eligibility	0.084*** (0.005)	0.083*** (0.005)	0.084*** (0.005)	0.025*** (0.009)	0.023*** (0.009)	0.024*** (0.011)	0.017* (0.009)	0.016* (0.009)	0.014 (0.011)	-0.004 (0.004)	-0.003 (0.004)	-0.019** (0.009)	-0.017* (0.009)	-0.017* (0.010)
<i>Degree of opt. poly.</i>		1		1	1			1		1			1	
Panel B: Higher selectivity Levels														
Eligibility	0.091*** (0.007)	0.091*** (0.007)	0.092*** (0.007)	0.033*** (0.012)	0.054*** (0.018)	0.035*** (0.013)	0.027** (0.013)	0.026** (0.012)	0.029** (0.014)	-0.003 (0.005)	-0.002 (0.006)	-0.033*** (0.012)	-0.052*** (0.018)	-0.032*** (0.013)
<i>Degree of opt. poly.</i>		1		2	2			1		1			2	
Panel C: Lower selectivity Levels														
Eligibility	0.073*** (0.006)	0.089*** (0.010)	0.073*** (0.006)	0.015 (0.013)	0.015 (0.013)	0.013 (0.015)	0.004 (0.011)	0.004 (0.011)	-0.001 (0.014)	-0.005 (0.005)	-0.004 (0.006)	0.001 (0.014)	0.036 (0.033)	-0.000 (0.016)
<i>Degree of opt. poly.</i>		2		1	1			1		1			3	

NOTE: In this table, for each outcome presented, the first column reports estimates of model (2) controlling for cutoff-specific trends. The second column provides the point estimates of α where the polynomial is obtained from a bins test (i.e., estimating models with a full set of score dummies together with the different parametric trends for order 1 to 4 polynomials, and where the recommended polynomial is the specification in which the set of bin dummies are jointly insignificant). The third column reports point estimates of α using local linear estimations. All estimates include triangular weights. *** p<0.01, ** p<0.05, * p<0.1.

Table A10 – High School Selectivity, Education, and Health: Exclude Observations with Score equal to Admission Thresholds.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	First stage enrollment	High School graduation	Enrollment in HE	GP - ER cons.	Nb. of GP - ER cons.	Mental health issue	Other health issue
Panel A: All							
Eligibility	0.085*** (0.004)+++	0.026*** (0.008)+++	0.014* (0.008) ⁺	-0.005 (0.003)	-0.372 (0.343)	-0.015* (0.008) ⁺	-0.006 (0.004)
Control mean	.021	.542	.403	.964	17.7	.327	.962
N	57657	57657	57657	57657	57657	57657	57657
Panel B: Higher selectivity Levels							
Eligibility	0.096*** (0.006)+++	0.032*** (0.011)+++	0.016 (0.012)	-0.003 (0.005)	-0.828* (0.462)	-0.035*** (0.011)+++	-0.003 (0.005)
Control mean	.0269	.695	.543	.962	16.7	.293	.96
N	32915	32915	32915	32915	32915	32915	32915
Panel C: Lower selectivity Levels							
Eligibility	0.071*** (0.006)+++	0.021* (0.012) ⁺	0.013 (0.010)	-0.008* (0.005) ⁺	0.263 (0.507)	0.007 (0.013)	-0.010** (0.005) ⁺⁺
Control mean	.0119	.306	.188	.969	19.2	.378	.965
N	24742	24742	24742	24742	24742	24742	24742

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 individual level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; +++ $p < 0.01$, ++ $p < 0.05$, + $p < 0.1$ after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

Table A11 – Robustness Checks: Analysis by City

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
First stage enrollment	Oslo	Bergen	Oslo	Bergen	Oslo	Bergen	Oslo	Bergen	Mental health issue
	Bergen	Oslo	Bergen	Oslo	Bergen	Oslo	Bergen	Oslo	
Panel A: All									
Eligibility	0.099*** (0.007)+++	0.066*** (0.006)+++	0.022** (0.011)+	0.024* (0.013)	0.015 (0.011)	0.018 (0.014)	-0.003 (0.005)	-0.004 (0.006)	-0.015 (0.011)
Control mean	0.029	0.013	0.547	0.537	0.352	0.455	0.966	0.962	0.334
N	28516	26400	28516	26400	28516	26400	28516	26400	26400
Panel B: Higher selectivity Levels									
Eligibility	0.107*** (0.011)+++	0.075*** (0.008)+++	0.030** (0.015)+	0.035** (0.017)+	0.025 (0.017)	0.030* (0.018)	-0.002 (0.007)	-0.004 (0.008)	-0.028* (0.015)
Control mean	.040	.014	.718	.676	.498	.577	.960	.963	.282
N	14809	15707	14809	15707	14809	15707	14809	15707	15707
Panel C: Lower selectivity Levels									
Eligibility	0.090*** (0.009)+++	0.052*** (0.008)+++	0.016 (0.017)	0.012 (0.020)	0.005 (0.014)	0.002 (0.019)	-0.005 (0.007)	-0.004 (0.008)	-0.001 (0.018)
Control mean	.015	.012	.336	.302	.172	.249	.974	.961	.398
N	13707	10693	13707	10693	13707	10693	13707	10693	10693

NOTE: This table reports the point estimates of α from equation (2) using a linear trend specification and triangular weights. Equation (2) estimated separately for students located in Hordaland (Bergen) or Oslo. 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 individual level) in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; +++ $p < 0.01$, ++ $p < 0.05$, + $p < 0.1$ after accounting for multiple hypothesis testing using the procedure described in Romano and Wolf (2005).

Appendix B

ICPC-2 – English
International Classification of
Primary Care – 2nd Edition
Wonca International
Classification Committee
(WICC)



Process codes

-30	Medical Exam/Eval-Complete
-31	Medical Examination/Health Evaluation- Partial/Pre-op check
-32	Sensitivity Test
-33	Microbiological/Immunological Test
-34	Blood Test
-35	Urine Test
-36	Faeces Test
-37	Histological/Exfoliative Cytology
-38	Other Laboratory Test NEC
-39	Physical Function Test
-40	Diagnostic Endoscopy
-41	Diagnostic Radiology/Imaging
-42	Electrical Tracings
-43	Other Diagnostic Procedures
-44	Preventive Immunisations/Medications
-45	Observe/Educate/Advice/Diet
-46	Consult with Primary Care Provider
-47	Consultation with Specialist
-48	Clarification/Discuss Patient's RFE
-49	Other Preventive Procedures
-50	Medicat-Script/Reqst/Renew/Inject
-51	Incise/Drain/Flush/Aspirate
-52	Excise/Remove/Biopsy/Destruction/ Debride
-53	Instrument/Catheter/Intubate/Dilate
-54	Repair/Fixate-Suture/Cast/Prosthetic
-55	Local Injection/Infiltration
-56	Dress/Press/Compress/Tamponade
-57	Physical Medicine/Rehabilitation
-58	Therapeutic Counselling/Listening
-59	Other Therapeutic Procedure NEC
-60	Results Tests/Procedures
-61	Results Exam/Test/Record
-62	Administrative Procedure
-63	Follow-up Encounter Unspecified
-64	Encounter Initiated by Provider
-65	Encounter Initiated third person
-66	Refer to Other Provider (EXCL. M.D.)
-67	Referral to Physician/Specialist/ Clinic/Hospital
-68	Other Referrals NEC
-69	Other Reason for Encounter NEC

General and
Unspecified

A

A01	Pain general/multiple sites
A02	Chills
A03	Fever
A04	Weakness/tiredness general
A05	Feeling ill
A06	Fainting/syncope
A07	Coma
A08	Swelling
A09	Sweating problem
A10	Bleeding/haemorrhage NOS
A11	Chest pain NOS
A13	Concern/fear medical treatment
A16	Irritable infant
A18	Concern about appearance
A20	Euthanasia request/discussion
A21	Risk factor for malignancy
A23	Risk factor NOS
A25	Fear of death/dying
A26	Fear of cancer NOS
A27	Fear of other disease NOS
A28	Limited function/disability NOS
A29	General symptom/complaint other
A70	Tuberculosis
A71	Measles
A72	Chickenpox
A73	Malaria
A74	Rubella
A75	Infectious mononucleosis
A76	Viral exanthem other
A77	Viral disease other/NOS
A78	Infectious disease other/NOS
A79	Malignancy NOS
A80	Trauma/injury NOS
A81	Multiple trauma/injuries
A82	Secondary effect of trauma
A84	Poisoning by medical agent
A85	Adverse effect medical agent
A86	Toxic effect non-medicinal substance
A87	Complication of medical treatment
A88	Adverse effect physical factor
A89	Effect prosthetic device
A90	Congenital anomaly OS/multiple
A91	Abnormal result investigation NOS
A92	Allergy/allergic reaction NOS
A93	Premature newborn
A94	Perinatal morbidity other
A95	Perinatal mortality
A96	Death
A97	No disease
A98	Health maintenance/prevention
A99	General disease NOS

Blood, Blood Forming
Organs and Immune
Mechanism

B

B02	Lymph gland(s) enlarged/painful
B04	Blood symptom/complaint
B25	Fear of aids/HIV
B26	Fear cancer blood/lymph
B27	Fear blood/lymph disease other
B28	Limited function/disability
B29	Sympt/compl lymph/immune other
B70	Lymphadenitis acute
B71	Lymphadenitis non-specific
B72	Hodgkin's disease/lymphoma
B73	Leukaemia
B74	Malignant neoplasm blood other
B75	Benign/unspecified neoplasm blood
B76	Ruptured spleen traumatic
B77	Injury blood/lymph/spleen other
B78	Hereditary haemolytic anaemia
B79	Congen.anom. blood/lymph other
B80	Iron deficiency anaemia
B81	Anaemia, Vitamin B12/folate def.
B82	Anaemia other/unspecified
B83	Purpura/coagulation defect
B84	Unexplained abnormal white cells
B87	Splenomegaly
B90	HIV-infection/aids
B99	Blood/lymph/spleen disease other

PROCESS CODES

SYMPTOMS/COMPLAINTS

INFECTIONS

NEOPLASMS

INJURIES

CONGENITAL ANOMALIES

OTHER DIAGNOSES

Digestive

D

D01	Abdominal pain/cramps general
D02	Abdominal pain epigastric
D03	Heartburn
D04	Rectal/anal pain
D05	Perianal itching
D06	Abdominal pain localized other
D07	Dyspepsia/indigestion
D08	Flatulence/gas/belching
D09	Nausea
D10	Vomiting
D11	Diarrhoea
D12	Constipation
D13	Jaundice
D14	Haematemesis/vomiting blood
D15	Melaena
D16	Rectal bleeding
D17	Incontinence of bowel
D18	Change faeces/bowel movements
D19	Teeth/gum symptom/complaint
D20	Mouth/tongue/lip symptom/compl.
D21	Swallowing problem
D23	Hepatomegaly
D24	Abdominal mass NOS
D25	Abdominal distension
D26	Fear of cancer of digestive system
D27	Fear of digestive disease other
D28	Limited function/disability (d)
D29	Digestive symptom/complaint other
D70	Gastrointestinal infection
D71	Mumps
D72	Viral hepatitis
D73	Gastroenteritis presumed infection
D74	Malignant neoplasm stomach
D75	Malignant neoplasm colon/rectum
D76	Malignant neoplasm pancreas
D77	Malig. neoplasm digest other/NOS
D78	Neoplasm digest benign/uncertain
D79	Foreign body digestive system
D80	Injury digestive system other
D81	Congen. anomaly digestive system
D82	Teeth/gum disease
D83	Mouth/tongue/lip disease
D84	Oesophagus disease
D85	Duodenal ulcer
D86	Peptic ulcer other
D87	Stomach function disorder
D88	Appendicitis
D89	Inguinal hernia
D90	Hiatus hernia
D91	Abdominal hernia other
D92	Diverticular disease
D93	Irritable bowel syndrome
D94	Chronic enteritis/ulcerative colitis
D95	Anal fissure/perianal abscess
D96	Worms/other parasites
D97	Liver disease NOS
D98	Cholecystitis/cholelithiasis
D99	Disease digestive system, other

Eye

F

F01	Eye pain
F02	Red eye
F03	Eye discharge
F04	Visual floaters/spots
F05	Visual disturbance other
F13	Eye sensation abnormal
F14	Eye movements abnormal
F15	Eye appearance abnormal
F16	Eyelid symptom/complaint
F17	Glasses symptom/complaint
F18	Contact lens symptom/complaint
F27	Fear of eye disease
F28	Limited function/disability (f)
F29	Eye symptom/complaint other
F70	Conjunctivitis infectious
F71	Conjunctivitis allergic
F72	Blepharitis/stye/chalazion
F73	Eye infection/inflammation other
F74	Neoplasm of eye/adnexa
F75	Confusion/haemorrhage eye
F76	Foreign body in eye
F79	Injury eye other
F80	Blocked lacrimal duct of infant
F81	Congenital anomaly eye other
F82	Detached retina
F83	Retinopathy
F84	Macular degeneration
F85	Corneal ulcer
F86	Trachoma
F91	Refractive error
F92	Cataract
F93	Glaucoma
F94	Blindness
F95	Strabismus
F99	Eye/adnexa disease, other

Ear

H

H01	Ear pain/earache
H02	Hearing complaint
H03	Tinnitus, ringing/buzzing ear
H04	Ear discharge
H05	Bleeding ear
H13	Plugged feeling ear
H15	Concern with appearance of ears
H27	Fear of ear disease
H28	Limited function/disability ear
H29	Ear symptom/complaint other
H70	Otitis externa
H71	Acute otitis media/myringitis
H72	Serous otitis media
H73	Eustachian salpingitis
H74	Chronic otitis media
H75	Neoplasm of ear
H76	Foreign body in ear
H77	Perforation ear drum
H78	Superficial injury of ear
H79	Ear injury other
H80	Congenital anomaly of ear
H81	Excessive ear wax
H82	Vertiginous syndrome
H83	Otosclerosis
H84	Presbycusis
H85	Acoustic trauma
H86	Deafness
H99	Ear/mastoid disease, other

Cardiovascular

K

K01	Heart pain
K02	Pressure/tightness of heart
K03	Cardiovascular pain NOS
K04	Palpitations/awareness of heart
K05	Irregular heartbeat other
K06	Prominent veins
K07	Swollen ankles/oedema
K22	Risk factor cardiovascular disease
K24	Fear of heart disease
K25	Fear of hypertension
K27	Fear cardiovascular disease other
K28	Limited function/disability (k)
K29	Cardiovascular sympt./compl. other
K70	Infection of circulatory system
K71	Rheumatic fever/heart disease
K72	Neoplasm cardiovascular
K73	Congenital anomaly cardiovascular
K74	Ischaemic heart disease w. angina
K75	Acute myocardial infarction
K76	Ischaemic heart disease w/o angina
K77	Heart failure
K78	Atrial fibrillation/flutter
K79	Paroxysmal tachycardia
K80	Cardiac arrhythmia NOS
K81	Heart/arterial murmur NOS
K82	Pulmonary heart disease
K83	Heart valve disease NOS
K84	Heart disease other
K85	Elevated blood pressure
K86	Hypertension uncomplicated
K87	Hypertension complicated
K88	Postural hypotension
K89	Transient cerebral ischaemia
K90	Stroke/cerebrovascular accident
K91	Cerebrovascular disease
K92	Atherosclerosis/PVD
K93	Pulmonary embolism
K94	Phlebitis/thrombophlebitis
K95	Varicose veins of leg
K96	Haemorrhoids
K99	Cardiovascular disease other

Musculoskeletal

L

L01	Neck symptom/complain
L02	Back symptom/complaint
L03	Low back symptom/complaint
L04	Chest symptom/complaint
L05	Flank/axilla symptom/complaint
L07	Jaw symptom/complaint
L08	Shoulder symptom/complaint
L09	Arm symptom/complaint
L10	Elbow symptom/complaint
L11	Wrist symptom/complaint
L12	Hand/finger symptom/complaint
L13	Hip symptom/complaint
L14	Leg/thigh symptom/complaint
L15	Knee symptom/complaint
L16	Ankle symptom/complaint
L17	Foot/toe symptom/complaint
L18	Muscle pain
L19	Muscle symptom/complaint NOS
L20	Joint symptom/complaint NOS
L26	Fear of cancer musculoskeletal
L27	Fear musculoskeletal disease other
L28	Limited function/disability (l)
L29	Sympt/compl. Musculoskeletal other
L70	Infections musculoskeletal system
L71	Malignant neoplasm musculoskeletal
L72	Fracture: radius/ulna
L73	Fracture: tibia/fibula
L74	Fracture: hand/foot bone
L75	Fracture: femur
L76	Fracture: other
L77	Sprain/strain of ankle
L78	Sprain/strain of knee
L79	Sprain/strain of joint NOS
L80	Dislocation/subluxation
L81	Injury musculoskeletal NOS
L82	Congenital anomaly musculoskeletal
L83	Neck syndrome
L84	Back syndrome w/o radiating pain
L85	Acquired deformity of spine
L86	Back syndrome with radiating pain
L87	Bursitis/tendinitis/synovitis NOS
L88	Rheumatoid/seropositive arthritis
L89	Osteoarthritis of hip
L90	Osteoarthritis of knee
L91	Osteoarthritis other
L92	Shoulder syndrome
L93	Tennis elbow
L94	Osteochondrosis
L95	Osteoporosis
L96	Acute internal damage knee
L97	Neoplasm benign/unspec musculo.
L98	Acquired deformity of limb
L99	Musculoskeletal disease, other

Neurological

N

N01	Headache
N03	Pain face
N04	Restless legs
N05	Tingling fingers/feet/toes
N06	Sensation disturbance other
N07	Convulsion/seizure
N08	Abnormal involuntary movements
N16	Disturbance of smell/taste
N17	Vertigo/dizziness
N18	Paralysis/weakness
N19	Speech disorder
N26	Fear cancer neurological system
N27	Fear of neurological disease other
N28	Limited function/disability (n)
N29	Neurological symptom/compl. other
N70	Poliomyelitis
N71	Meningitis/encephalitis
N72	Tetanus
N73	Neurological infection other
N74	Malignant neoplasm nervous system
N75	Benign neoplasm nervous system
N76	Neoplasm nervous system unspec.
N79	Concussion
N80	Head injury other
N81	Injury nervous system other
N85	Congenital anomaly neurological
N86	Multiple sclerosis
N87	Parkinsonism
N88	Epilepsy
N89	Migraine
N90	Cluster headache
N91	Facial paralysis/bell's palsy
N92	Trigeminal neuralgia
N93	Carpal tunnel syndrome
N94	Peripheral neuritis/neuropathy
N95	Tension headache
N99	Neurological disease, other

Psychological	P	Skin	S	Urological	U	X75	Malignant neoplasm cervix			
P01	Feeling anxious/nervous/tense	S01	Pain/tenderness of skin	U01	Dysuria/painful urination	X76	Malignant neoplasm breast female			
P02	Acute stress reaction	S02	Pruritus	U02	Urinary frequency/urgency	X77	Malignant neoplasm genital other (f)			
P03	Feeling depressed	S03	Warts	U04	Incontinence urine	X78	Fibromyoma uterus			
P04	Feeling/behaving irritable/angry	S04	Lump/swelling localized	U05	Urination problems other	X79	Benign neoplasm breast female			
P05	Senility, feeling/behaving old	S05	Lumps/swellings generalized	U06	Haematuria	X80	Benign neoplasm female genital			
P06	Sleep disturbance	S06	Rash localized	U07	Urine symptom/complaint other	X81	Genital neoplasm oth/unspecified (f)			
P07	Sexual desire reduced	S07	Rash generalized	U08	Urinary retention	X82	Injury genital female			
P08	Sexual fulfilment reduced	S08	Skin colour change	U13	Bladder symptom/complaint other	X83	Congenital anomaly genital female			
P09	Sexual preference concern	S09	Infected finger/toe	U14	Kidney symptom/complaint	X84	Vaginitis/vulvitis NOS			
P10	Stammering/stuttering/tic	S10	Boil/carbuncle	U26	Fear of cancer of urinary system	X85	Cervical disease NOS			
P11	Eating problem in child	S11	Skin infection post-traumatic	U27	Fear of urinary disease other	X86	Abnormal cervix smear			
P12	Bedwetting/enuresis	S12	Insect bite/stung	U28	Limited function/disability urinary	X87	Uterovaginal prolapse			
P13	Encopresis/bowel training problem	S13	Animal/human bite	U29	Urinary symptom/complaint other	X88	Fibrocystic disease breast			
P15	Chronic alcohol abuse	S14	Burn/scald	U70	Pyelonephritis/pyelitis	X89	Premenstrual tension syndrome			
P16	Acute alcohol abuse	S15	Foreign body in skin	U71	Cystitis/urinary infection other	X90	Genital herpes female			
P17	Tobacco abuse	S16	Bruise/contusion	U72	Urethritis	X91	Condylomata acuminata female			
P18	Medication abuse	S17	Abrasion/scratch/blister	U75	Malignant neoplasm of kidney	X92	Chlamydia infection genital (f)			
P19	Drug abuse	S18	Laceration/cut	U76	Malignant neoplasm of bladder	X99	Genital disease female, other			
P20	Memory disturbance	S19	Skin injury other	U77	Malignant neoplasm urinary other	Male Genital				
P22	Child behaviour symptom/complaint	S20	Corn/callosity	U78	Benign neoplasm urinary tract	Y01	Pain in penis			
P23	Adolescent behav. Symptom/complt.	S21	Skin texture symptom/complaint	U79	Neoplasm urinary tract NOS	Y02	Pain in testis/scrotum			
P24	Specific learning problem	S22	Nail symptom/complaint	U80	Injury urinary tract	Y03	Urethral discharge			
P25	Phase of life problem adult	S23	Hair loss/baldness	U85	Congenital anomaly urinary tract	Y04	Penis symptom/complaint other			
P27	Fear of mental disorder	S24	Hair/scalp symptom/complaint	U88	Glomerulonephritis/nephrosis	Y05	Scrotum/testis sympt/complt. other			
P28	Limited function/disability (p)	S26	Fear of cancer of skin	U90	Osthostatic albumin./proteinuria	Y06	Prostate symptom/complaint			
P29	Psychological symptom/complt other	S27	Fear of skin disease other	U95	Urinary calculus	Y07	Impotence NOS			
P70	Dementia	S28	Limited function/disability (s)	U98	Abnormal urine test NOS	Y08	Sexual function sympt./complt.(m)			
P71	Organic psychosis other	S29	Skin symptom/complaint other	U99	Urinary disease, other	Y10	Infertility/subfertility male			
P72	Schizophrenia	S70	Herpes zoster	Pregnancy, Childbearing, Family Planning		Y13	Sterilization male			
P73	Affective psychosis	S71	Herpes simplex		W	Y14	Family planning male other			
P74	Anxiety disorder/anxiety state	S72	Scabies/other acariasis			Y16	Breast symptom/complaint male			
P75	Somatization disorder	S73	Pediculosis/skin infestation other			Y24	Fear of sexual dysfunction male			
P76	Depressive disorder	S74	Dermatophytosis			Y25	Fear sexually transmitted dis. male			
P77	Suicide/suicide attempt	S75	Moniiasis/candidiasis skin			Y26	Fear of genital cancer male			
P78	Neuraesthesia/surmenage	S76	Skin infection other			Y27	Fear of genital disease male other			
P79	Phobia/compulsive disorder	S77	Malignant neoplasm of skin			Y28	Limited function/disability (y)			
P80	Personality disorder	S78	Lipoma			Y29	Genital sympt./complt.male other			
P81	Hyperkinetic disorder	S79	Neoplasm skin benign/unspecified			Y70	Syphilis male			
P82	Post-traumatic stress disorder	S80	Solar keratosis/sunburn			Y71	Gonorrhoea male			
P85	Mental retardation	S81	Haemangioma/lymphangioma			Y72	Genital herpes male			
P86	Anorexia nervosa/bulimia	S82	Naevus/mole			Y73	Prostatitis/seminal vesiculitis			
P98	Psychosis NOS/other	S83	Congenital skin anomaly other			Y74	Orchitis/epididymitis			
P99	Psychological disorders, other	S84	Impetigo			Y75	Balanitis			
Respiratory		S85	Pilonidal cyst/fistula			Y76	Condylomata acuminata male			
R01	Pain respiratory system	S86	Dermatitis seborrhoec			Y77	Malignant neoplasm prostate			
R02	Shortness of breath/dyspnoea	S87	Dermatitis/atopic eczema			Y78	Malign neoplasm male genital other			
R03	Wheezing	S88	Dermatitis contact/allergic			Y79	Benign/unspec. neoplasm gen. (m)			
R04	Breathing problem, other	S89	Diaper rash			X80	Injury male genital			
R05	Cough	S90	Pityriasis rosea			Y81	Phimosis/redundant prepuce			
R06	Nose bleed/epistaxis	S91	Psoriasis			Y82	Hypospadias			
R07	Sneezing/nasal congestion	S92	Sweat gland disease			Y83	Undescended testicle			
R08	Nose symptom/complaint other	S93	Sebaceous cyst			Y84	Congenital genl anomaly (m) other			
R09	Sinus symptom/complaint	S94	Ingrowing nail			Y85	Benign prostatic hypertrophy			
R21	Throat symptom/complaint	S95	Molluscum contagiosum			Y86	Hydrocoele			
R23	Voice symptom/complaint	S96	Acne			Y99	Genital disease male, other			
R24	Haemoptysis	S97	Chronic ulcer skin			Social Problems		Z		
R25	Sputum/phlegm abnormal	S98	Urticaria			Z01	Poverty/financial problem			
R26	Fear of cancer respiratory system	S99	Skin disease, other			Z02	Food/water problem			
R27	Fear of respiratory disease, other	Endocrine/Metabolic and Nutritional				Z03	Housing/neighbourhood problem			
R28	Limited function/disability (r)		T			Z04	Social cultural problem			
R29	Respiratory symptom/complaint oth.					Z05	Work problem			
R71	Whooping cough					Z06	Unemployment problem			
R72	Strep throat					Z07	Education problem			
R73	Boil/abscess nose					Z08	Social welfare problem			
R74	Upper respiratory infection acute					Z09	Legal problem			
R75	Sinusitis acute/chronic					Z10	Health care system problem			
R76	Tonsillitis acute					Z11	Compliance/being ill problem			
R77	Laryngitis/tracheitis acute					Z12	Relationship problem with partner			
R78	Acute bronchitis/bronchiolitis					Z13	Partner's behaviour problem			
R79	Chronic bronchitis					Z14	Partner illness problem			
R80	Influenza					Z15	Loss/death of partner problem			
R81	Pneumonia					Z16	Relationship problem with child			
R82	Pleurisy/pleural effusion					Z18	Illness problem with child			
R83	Respiratory infection other					Z19	Loss/death of child problem			
R84	Malignant neoplasm bronchus/lung					Z20	Relationship prob. parent/family			
R85	Malinant neoplasm respiratory, other					Z21	Behaviour problem parent/family			
R86	Benign neoplasm respiratory					Z22	Illness problem parent/family			
R87	Foreign body nose/larynx/bronch					Z23	Loss/death parent/family member			
R88	Injury respiratory other					Z24	Relationship problem friend			
R89	Congenital anomaly respiratory					Z25	Assault/harmful event problem			
R90	Hypertrophy tonsils/adenoïds					Z27	Fear of a social problem			
R92	Neoplasm respiratory unspecified					Z28	Limited function/disability (z)			
R95	Chronic obstructive pulmonory dis					Z29	Social problem NOS			
R96	Asthma	Female Genital				Abbreviations				
R97	Allergic rhinitis	X01	Genital pain female		X	Anom	anomaly			
R98	Hyperventilation syndrome	X02	Menstrual pain			behav.	behaviour			
R99	Respiratory disease other	X03	Intermenstrual pain			bronch.	bronchus			
PROCESS CODES		X04	Painful intercourse female			complicat.	complication			
SYMPTOMS/COMPLAINTS		X05	Menstruation absent/scanty			congen.	congenital			
INFECTIONS		X06	Menstruation excessive			dis.	disease			
NEOPLASMS		X07	Menstruation irregular/frequent			eval.	evaluation			
INJURIES		X08	Intermenstrual bleeding			exam.	examination			
CONGENITAL ANOMALIES		X09	Premenstrual symptom/complaint			gen.	genital			
OTHER DIAGNOSES		X10	Postponement of menstruation			malig.	malignant			
		X11	Menopausal symptom/complaint			metab.	metabolic			
		X12	Postmenopausal bleeding			musculo.	musculoskeletal			
		X13	Postcoital bleeding			NEC	not elsewhere classified			
		X14	Vaginal discharge			NOS	not otherwise specified			
		X15	Vaginal symptom/complaint other			nutrit.	nutrition			
		X16	Vulval symptom/complaint			oth	other			
		X17	Pelvis symptom/complaint female			preg.	pregnancy			
		X18	Breast pain female			prob.	problem			
		X19	Breast lump/mass female			RFE	reason for encounter			
		X20	Nipple symptom/complaint female			sympt.	symptom			
		X21	Breast symptom/complt. female other			unspec.	unspecified			
		X22	Concern breast appearance female			w	with			
		X23	Fear sexually transmitted disease (f)			w/o	without			
		X24	Fear of sexual dysfunction female							
		X25	Fear of genital cancer female							
		X26	Fear of breast cancer female							
		X27	Fear genital/breast disease other (f)							
		X28	Limited function/disability (x)							
		X29	Genital symptom/complt female oth.							
		X70	Syphilis female							
		X71	Gonorrhoea female							
		X72	Genital candidiasis female							
		X73	Genital trichomoniasis female							
		X74	Pelvic inflammatory disease							