Academic selection, relative achievement and hospital contacts due to mental health and adjustment issues in England.

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Abstract

Recent studies have suggested that attending a high-achieving school is a risk factor for adjustment problems amongst young people, leading to increased rates of mental ill-health and alcohol/drug misuse. This paper presents new evidence on this matter from England, exploring whether attending a school with high achieving peers is associated with use of hospital services related to mental health issues and associated adjustment issues. We typically find null – or otherwise very small – effects. No evidence emerges that young people attending England's academically selective grammar schools are more likely to use hospital services due to mental health or adjustment issues than their equally able peers attending a lower-achieving school. A similar finding holds for comparisons between selective and comprehensive education areas in England more broadly. Our results provide little evidence that attending a high-achieving school is a significant risk factor for serious mental health problems and adjustment issues.

Key Words: Adjustment problems; mental health; risky health behaviours; grammar schools; academic selection; relative achievement.

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1. Introduction

Young people with high levels of academic achievement at the end of primary school are an important group. They have developed the platform needed to succeed at school and gain the later lifetime benefits that this brings. Yet many challenges still stand in their way. The transition into secondary school is a notoriously tricky period (Rice et al., 2015), with adolescence being a time of rapid social, biological and emotional change (Christie & Viner, 2005). Previous research has noted how "gifted" children – including high academic achievers – face certain difficulties not experienced by other groups (Eren et al., 2018). For instance, some high achievers hold themselves to unrealistically high standards which they then struggle to meet (Fernández-García et al., 2023). This may be compounded by the high expectations others hold for them, such as parents, teachers and friends (Luthar et al., 2020). The presence of high-stakes examinations may make such matters worse (Beck et al., 2023). It has also been suggested that high achievers may be more susceptible to certain negative emotions (e.g. rumination) than other groups (Karpinski et al., 2018). This has made mental health a key concern with respect to high-achieving children.

Yet mental health issues are not the only potential challenge facing this group. Prior research has discussed how high-achieving children sometimes struggle when interacting with their peers, including difficulties "fitting in" (Schall et al., 2016), being the subject of bullying (Bergold et al., 2020) and facing peer pressure. This could then lead them to engage in risky health behaviours, such as excessive drinking, drug use or entering sexual relationships. Such actions may also have serious long-run consequences.

Young people who are high academic achievers are also more likely to attend academically selective secondary schools. While education researchers have long been interested in how selective schools (and school systems) are related to young people's academic outcomes, less attention has been paid to how they are related to young people's mental health and behaviours. Yet recent studies have argued that "*youth in high-achieving schools are…an 'at risk group', largely because of strong, ongoing pressures to achieve*" (Luthar et al., 2020a, p135). It has hence been suggested they may be at particular risk of suffering "adjustment problems", including anxiety, depression, and other mental illness, potentially also leading to drug and alcohol misuse (Luthar et al., 2020b).

The overarching aim of this paper is to provide new evidence on what is currently a small but growing literature into how attending a high-achieving, academically selective school is linked to mental health concerns and risky health behaviours. While previous research has

focused upon differences in academic and labour market outcomes between selective and comprehensive school systems (Burgess et al., 2020), few studies have considered the potential wider benefits (or losses) associated with academic selection in England. Our analysis also considers how children's *relative* achievement at school (in comparison to their school peers) may be linked to contact with healthcare services, contributing to the psychological literature into "big fish little pond" effects (Marsh et al., 2008) and the economics literature into ordinal rank effects (Murphy & Weinhardt, 2020).

Why attending a high-achieving school might be a risk factor for mental health problems and adjustment issues?

Figure 1 presents a framework for understanding why mental health issues - and associated adjustment problems - may be elevated amongst high-achieving children. This is adapted from Luthar et al. (2020), who built the framework upon "*contemporary theories on both resilience and ecological influences on children's development*" (Luthar et al., 2020 p.986).

<< Figure 1 >>

The starting point of this framework is a "frame of reference" model (Moller et al., 2011). This posits that young people develop views about their own attitudes, knowledge and competencies by comparing themselves to others around them. That is, they develop views of their abilities relative to their peers. High achievers hence focus upon their academic achievements relative to other pupils in their school. In terms of academically selective education, high-achieving young people will be surrounded by equally (or higher) achieving peers.

This, as shown in Figure 1, has two direct consequences. First, by constantly comparing themselves to others, high achievers feel under pressure to "be the best". They may then overextend themselves, striving to maintain their position as one of the highest academic achievers within their school. This then potentially leads to excessive levels of stress, and onto what Luthar et al. (2020) describe as "adjustment problems" - encompassing both mental health issues (anxiety, depression) and risky health behaviours (e.g. alcohol use, substance abuse).

The second direct consequent is that these regular comparisons to others may impact their self-concept, self-worth and self-esteem. A long line of psychological research has discussed such "big fish little pond" effects (Marsh et al., 2008), illustrating how young people's academic abilities relative to others in their school impacts their self-concept and other

emotions (Holm et al., 2020). Their health behaviours may then change as a result. Indeed, low self-esteem has been shown to correlate with mental health issues such as anxiety and depression (Sowislo & Orth, 2013), and with associated risky health behaviours such as alcohol and drug abuse (Candito, 2003).

Following Luther et al. (2020), the framework in Figure 1 also recognises the important role played by "influential proximal relationships" (parents, teachers and school peers). These individuals may have an indirect effect upon the mental health and behaviours of young people by putting further pressure on them to "be the best". For instance, parents and teachers may develop unrealistically high expectations of high achieving children – particularly when they attend an academically selective school - which then leads these children to overextend. This may be exacerbated in high-stakes settings, such as in the build-up to examinations that have important consequences for either the child or their school (Jerrim, 2020). There may also be competition amongst school peers, again leading to increased pressure, overextension and on to future health problems.

Yet, as Figure 1 illustrates, the relationship that high-achieving children have with others may also directly impact their health behaviours. Parents are, for instance, key role models. If they engage in risky health behaviours (e.g. alcohol and substance use) their offspring may be more likely to as well (Windle, 1996). Similarly, if a young person's peer group drinks alcohol or takes drugs, they may feel peer-pressured into doing the same. Alternatively, high-achieving children could become a target for bullies, with this known to have a negative impact on mental health (Källmén & Hallgren, 2021).

Prior research

A small number of studies have considered either the link between selective schooling and health outcomes, or how a child's achievement relative to their peers (so called big fish little pond effects) is related to mental ill-health and associated behavioural issues. Luthar & Kumar (2018) argue that young people attending high-achieving schools have higher levels of drug and alcohol use and behavioural problems than the average across the population, suggesting this is related to family dynamics, peer relationships and academic pressures at school. Drawing upon evidence from the United States, Coley et al. (2018) found that attending a school with a more affluent intake (and thus also higher levels of achievement) is associated with greater levels of intoxication and drug use, but lower levels of anxiety and depressive symptoms. This is consistent with the work of Lund et al. (2017) from Norway, who found

school affluence to be associated with a greater risk of alcohol abuse. The Social Mobility Commission (2024) have also found that that drug and alcohol use are more common among children from families in high socio-economic groups than those in low socio-economic groups in England. Kiessling & Norris (2023) report that children with lower levels of achievement relative to their school peers are slightly more likely to experience mental health issues. This in turn suggests that, ceteris paribus, mental health outcomes will be worse amongst equally able children when they attend a higher achieving school. Reviewing the relevant literature and theoretical underpinnings, Ebbert et al. (2018, p.31) argue that young people attending high-achieving schools "*are at significantly elevated risk, compared to national norms, for serious problems of maladjustment including internalizing and externalizing symptoms as well as substance use*". Yet, in contrast to the theoretical framework of Luthar et al. (2020), Butikofer et al. (2023, p. 2,580) report that enrolment in a high-achieving school "*decreases the probability of diagnosis of treatment of psychological conditions*". The findings of Jerrim & Sims (2020) are also at odds with the theoretical implications of the framework of Luthar et al. (2020). When investigating the link between attending a high-achieving grammar school in England or Northern Ireland and young people's subsequent mental health outcomes, they find null effects.

The present study

Although the aforementioned studies have provided important insights into the risky health behaviours and mental health outcomes linked to academic selection, clear gaps in the evidence base remain. This includes only limited evidence examining the link between attendance at a high-achieving school and subsequent problematic health outcomes, with inconsistent findings across the few studies that do exist. This paper hence seeks to fill these gaps by addressing three research questions.

Our analysis begins by considering whether pupils that attend academically selective secondary schools are more likely to receive hospital treatment for a set of adjustment issues than pupils attending lower-achieving non-selective schools. As noted by Luthar et al. (2020), and illustrated in Figure 1, many drivers of potential mental health and adjustment issues amongst high-achieving children are likely to be exacerbated in academically competitive environments. For instance, in selective schools, young people's frame of reference will be other equally (or higher) achieving pupils. This will lead them into making more negative social/academic comparisons, which may impact their self-confidence and put more pressure on their shoulders. It could also lead to greater competition amongst children within the school,

and with higher academic expectations set by teachers. Indeed, previous research has suggested that attendance at academically selective schools may have a negative impact on children's mental wellbeing (Wu & Zhang, 2023).

England is an interesting context to consider this issue further, as academically selective and comprehensive schooling systems co-exist in different parts of the country. Across most of England it is not permissible to allocate school places based upon children's academic ability or potential. Yet a small number of geographic areas have retained England's academically selective "grammar school" system, where children must pass an admissions test to enter a specific school. These schools are hence characterised by their high-achieving intakes and, consequently, the high academic standards they expect. There has however been little research considering the mental health outcomes and adjustment problems of grammar school pupils. Our third research question hence explores this issue by investigating whether grammar school pupils are more or less likely to be hospitalised due to mental health issues and risky health behaviours than equally high-achieving children in non-selective (comprehensive) schools:

- *Research question 1. What is the prevalence of mental health and risky health behaviours that result in hospitalisation amongst young people that attend a selective (grammar) school? How does this compare to equally high-achieving pupils who attend a comprehensive school?*

Of course, within academically selective school systems, some young people will not enter a high achieving school, and thus will be surrounded by relatively lower achieving peers instead. From a policy perspective, what therefore arguably matters most is not the impact of attending a high achieving school, but rather the aggregate difference between young people living in selective and comprehensive education areas (rather than just the subset that attend an academically selective school). In other words, one should also be interested in differences in hospital contacts related to mental health issues (and associated risky health behaviours) across these different *school systems* (selective versus comprehensive). Our second research question addresses this issue by asking:

- *Research question 2. Do hospital contacts due to mental health issues and risky health behaviours differ across comprehensive and selective school systems in England?*

Finally, a key component of the framework developed by Luthar et al. (2020) – as illustrated in Figure 1 – is that adjustment problems (and associated health issues) develop amongst high-achieving children because they continually compare themselves to their school

peers. This, in-turn, suggests that it is young people's academic achievement *relative* to others in their school that encourages them into risky health behaviours. For instance, a high-achieving pupil may feel greater academic pressure when they are surrounded by equally or even higher attaining peers, which may have negative implications for their mental health. This is thus perhaps the key mechanism underpinning why mental health issues and adjustment problems may be elevated amongst young people that attend academically selective (and thus high achieving) schools. Prior research on this issue is however extremely limited, though with one recent study claiming that "*increasing a student's* [academic] *rank by one standard deviation* [in comparison to their school peers] *improves their mental health by approx. 6% of a standard deviation*" (Kiessling & Norris, 2023). We thus conclude by contributing further evidence on this matter:

- *RQ3. How is relative academic achievement in school linked to risky health behaviours and selected mental health outcomes?*

2. Data

Overview

We use data from the Education and Child Health Insights from Linked Data (ECHILD). This has linked information from Health Episode Statistics (HES) in England to the National Pupil Database (NPD)[2]. It includes data on all contacts young people have made with inpatient and outpatient hospital services up until 2021. Over 90% of individuals in the NPD have been matched to their hospital records. The UCL Institute of Education ethics committee granted ethical approval to conduct this research (REC1821) using the Office for National Statistics (ONS) Secure Research Service (SRS). Our analytic sample comprises of three school cohorts born between September 2000 and August 2003.

Contact with hospital services

International Classification of Diseases (ICD-10) codes have been recorded for each contact the young person made with hospital services. Multiple ICD-10 codes may be assigned to a single contact if it cuts across multiple categories. To form our outcome measure(s), we start by drawing upon the Child and Adolescent Mental Health Disorders Classification System (Zima et al., 2020) which classifies ICD-10 codes into thirty mental health disorder groups. We focus upon a subset of these disorders, while also combining some others together to ensure cell sizes are sufficient large. These are supplemented with a small number of additional ICD-

[2] See Ramzan et al. (2023: Appendix 2) for further details on the linkage procedures used.

10 codes relevant to our outcomes of interest (see Appendix A for the full set of ICD-10 codes used to form our outcome measures). Our focus is hence upon hospital contacts related to:

(a) Alcohol or drug misuse
(b) Eating disorders
(c) Self-harm
(d) Personality disorders (e.g. bipolar, conduct disorders, obsessive-compulsive disorder)
(e) Mental health issues (e.g. anxiety, depression)
(f) Any of the above plus other related miscellaneous diagnoses (e.g. sleeping disorders)

The information available thus captures severe health outcomes, in that the young person will have been in contact with hospital services for some form or diagnosis/treatment. A limitation is that less severe health issues - including contacts made with General Practitioners and problems that go untreated – cannot be observed.

Measurement of selective and comprehensive education areas in England

While in most parts of England schools are not permitted to use test scores or other markers of academic ability as part of school admissions procedures, a few academically selective areas remain. In these areas, 10-year-olds can sit a secondary school admissions test. If they obtain a sufficiently high score, they are then able to attend an academically selective grammar school. Only 163 grammar schools in England remain (out of 3,500 secondary schools in total) and – as Jerrim & Sims (2019, Figure 1) illustrate – are geographically clustered within certain parts of the country.

Within our analysis, we define selective education areas as any local education authority (LEA) where more than 20% of secondary school pupils attends a grammar school. There are 11 LEAs where this criterion is met: Trafford, Buckinghamshire, Slough, Kent, Torbay, Medway, Wirral, Southend-on-Sea, Sutton, Lincolnshire and Bexley. These are hence the most academically selective areas in England, where the grammar school system remains buoyant. A total of 127,332 pupils across our three cohorts live within one of these academically selective LEAs.

In contrast, there are many other LEAs in England where virtually no young person attends a grammar school (and with no such school within a realistically commutable distance). Within our analysis we focus upon 69 LEAs where less than 1% of young people attend a

grammar school[3]. These form the comprehensive education areas in our analysis, where prior academic achievement / academic "potential" is not used as a criterion for entry into secondary schools. In total, 599,727 pupils across our three cohorts live in one of these comprehensive LEAs.

Measurement of academically selective schools in England

Rather than focus on difference across selective and comprehensive education systems, our first research question is interested in attendance at an academically selective – and thus high achieving – secondary school. This is operationalised as attending one of England's 163 grammar schools, with the ECHILD database including a variable indicating whether each child attends such a school. Across our three cohorts, a total of 55,738 pupils attends a grammar school[4]. Our comparison group for grammar school pupils are those attending a non-selective (comprehensive) school and living in one of the 69 comprehensive education areas in England (as discussed above). We further discuss the formation of our comparison group for grammar school pupils in the methodology section below.

Measurement of academic achievement

The primary measure of academic achievement used – as one of our most important statistical controls – is young people's performance in England's Key Stage 2 Statutory Assessment Tests (SATs). These are national examinations taken at the end of primary school (age 10/11) – taken the term before young people enter secondary school – and play a prominent role in school accountability (Jerrim, 2021). They are taken by all state school pupils in England, with scores thus available for young people living in both selective and comprehensive education areas. Scores on the Key Stage 2 tests have been shown to correlate with performance on grammar school entrance tests; Allen et al (2017) report Pearson correlations around 0.6 to 0.7 between the Key Stage 2 and 11+ (grammar school entrance) test

[3] Just 0.2% of children in total across these LEAs attend a grammar school. The 69 comprehensive LEAs are Barnsley, Bath and North East Somerset, Bedford , Blackburn with Darwen , Blackpool , Bolton , Brighton and Hove , Bristol, City of , Bury , Cambridgeshire , Central Bedfordshire , Cheshire East , County Durham , Coventry , Cumbria , Darlington , Derby , Derbyshire , Doncaster , East Riding of Yorkshire , Gateshead , Hackney , Halton , Hammersmith and Fulham , Hampshire , Hartlepool , Herefordshire, County of , Hertfordshire , Isle of Wight , Isles Of Scilly , Kingston upon Hull, City of , Lambeth , Leeds , Leicester , Leicestershire , Luton , Middlesbrough , Newcastle upon Tyne , Newham , Norfolk , North Northamptonshire , North Somerset , North Tyneside , Northumberland , Nottingham , Oldham , Oxfordshire , Portsmouth , Pre-LGR 2021 Northamptonshire , Redcar and Cleveland , Rotherham , Sefton , Sheffield , Somerset , South Gloucestershire , South Tyneside , St. Helens , Stockton-on-Tees , Suffolk , Sunderland , Swindon , Tameside , Tower Hamlets , Wakefield , West Berkshire , West Sussex , Westminster , Wigan and York.

[4] Note that young people not living within one of our selective LEAs can still attend a grammar school, as they can cross over an LEA boundary to attend such a school. Moreover, our definition of selective LEAs has focused just on the 11 most selective areas.

in Kent. As part of the Key Stage 2 tests, young people sit around four hours of test material over a four-day period, with this designed to capture their abilities in English and mathematics. A limitation is that these tests are typically only taken by pupils within state schools, and not those being educated within the independent sector (where there may be more funding for support systems designed to help pupils cope better with academic pressures). We construct our measure of prior academic achievement by first standardising pupils scores to mean zero and standard deviation one within their school cohort for each subject, and then take the average across the subjects.

Measurement of relative achievement within schools

To address our final research question, we require a measure of children's academic abilities *relative* to their secondary school peers. Our approach follows Loyalka et al. (2018) with this measure defined as:

$$Rel_{ij} = \frac{\sum_{i\neq 1}^{N} KS_j - KS_i}{N-1} \quad (4)$$

Where:

Rel_{ij} = The Key Stage 2 score of pupil i in comparison to their peers in school j.

KS_j = The average (mean) Key Stage 2 score of pupils in school j.

KS_i = The Key Stage 2 score of pupil i.

N = Number of pupils in the school.

Note that, in our analysis of the association between children's relative achievement and hospital contacts we make use of the full sample, and do not make any restriction on whether young people live within selective or comprehensive education areas (or whether they attend an academically selective school or not).

Measurement of socioeconomic status

Two variables are used to construct a socio-economic status index: eligibility for Free School Meals (FSM) – an indicator of low family income - and the Income Deprivation Affecting Children Index (IDACI) decile based upon the child's home postcode (the proportion of children living in income-deprived families in the local area). A two-parameter item-response theory (IRT) model is used to combine this information into a socio-economic status scale, using annual FSM indicators and IDACI deciles measured at three time-points. Further details are available in Jerrim (2024).

3. Methodology

Research question 1

To address research question 1, we must construct a comparison group for pupils that attend a selective grammar school. Following Jerrim & Sims (2019) and Lu et al. (2023) our comparison group is formed of pupils attending a comprehensive school living within one of the 69 comprehensive education areas in England (as defined in the Data section above).

One potential issue is that this comparison group will include – on average – young people with lower levels of prior academic achievement than their peers attending grammar schools. To ensure we do not erroneously draw comparisons between high-achieving grammar school pupils and lower-achieving comprehensive school pupils, we restrict the latter to those with Key Stage 2 scores above the 15th percentile of the grammar school distribution (which is approximately 0.6 standard deviations above the national Key Stage 2 mean). This, in essence, enforces "common support" between grammar and comprehensive school pupils in the sample in terms of their prior achievement.

Table 1 provides descriptive information about grammar school pupils and our comparison group within comprehensive schools. In terms of pupil background, those attending grammar schools are less likely to be eligible for free school meals and tend to come from more advantaged socio-economic backgrounds. At the school level, the bottom half of Table 1 illustrates how those attending grammar schools will tend to be surrounded by higher achieving, more socio-economically advantaged peers. Their school is also more likely to have been judged as "Outstanding" by Ofsted.

<< Table 1 >>

The following logistic regression model is then estimated to further control for differences in the characteristics of grammar and comprehensive school pupils:

$$\frac{\pi_{ij}}{(1-\pi_{ij})} = \alpha + \beta.Grammar_{ij} + \gamma.KS\_Scores_{ij} + \vartheta.D_{ij} + \delta.P_{ij} + \theta.S_{ij} \quad (2)$$

Where:

π_{ij} = The probability of hospital admission due to mental health issues or risky health behaviours.

$Grammar_{ij}$ = Whether the young person attends a grammar school.

KS_Scores_{ij} = Scores on the Key Stage 1 and Key Stage 2 tests.

D_{ij} = A vector of background characteristics, including gender, socio-economic background and ethnicity.

P_{ij} = Whether the child had contact with hospital services due to mental health issues or risky health behaviours during Year 5 or Year 6 (before entering into secondary school).

S_{ij} = A vector of school-level controls, including average socio-economic status of pupils, percent of pupils that are male and percent of pupils of White ethnicity.

i = Pupil i.

j = School j.

The β parameter from equation (2) captures the difference in hospital contacts between pupils attending selective (grammar) and non-selective (comprehensive) schools in England, amongst those with similar levels of prior achievement, number of hospital contacts before entering secondary school and demographic characteristics. It thus reflects whether attendance at an academically selective secondary school is associated with a higher rate of hospital contacts due to risky health behaviours. Several specifications of this model are estimated to examine how adding each set of controls impacts the results. Standard errors are clustered at the school level. In Appendix B we test the robustness of our findings to including in the analysis all pupils living within comprehensive education areas (rather than restricting this group to only those pupils in comprehensive areas that achieve Key Stage 2 scores above the 15th percentile of the grammar school distribution). In Appendix C we test the robustness of our findings to using an alternative analytic approach (propensity score matching) instead. Our substantive conclusions remain unchanged.

Estimates are presented as odds ratios. Given that our outcome measures are rare, the estimated odds ratios will closely approximate the risk ratio (Ranganathan et al., 2015). For ease of explanation, we hence interpret estimates as the risk of grammar school pupils making a hospital contact relative to the risk of comprehensive pupils making a hospital contact.

Research question 2

A similar analytic approach is used to address research question 2. Now, however, we will draw comparisons across ***all*** children living in selective and comprehensive education areas (and not just focus on higher-achievers / those attending grammar schools). This part of our analysis hence includes all young people that live in selective and comprehensive education areas. Table 2 compares the characteristics of these two groups. The distribution of pupil

characteristics is very similar in terms of gender, ethnicity, prior achievement and language, though with those living in selective areas being slightly less likely to come from disadvantaged socioeconomic backgrounds. Schools in selective parts of England also have slightly higher levels of prior achievement, and more likely to be judged as Outstanding by Ofsted. However, overall, differences across the two groups are relatively minor.

<< Table 2 >>

The following logistic regression model is then estimated:

$$\frac{\pi_{ij}}{(1-\pi_{ij})} = \alpha + \beta.Selective_{ij} + \gamma.KS\_Scores_{ij} + \vartheta.D_{ij} + \delta.P_{ij} + \theta.S_{ij} \quad (3)$$

Where:

$Selective_{ij}$ = A binary variable coded 1 if the young person lives in a selective education area and zero if they live in a comprehensive area.

All other variables are measured as under equation (2) above.

The β parameter from this model captures the difference in the hospital contact rate amongst young people living within selective and comprehensive education areas in England. Multiple specifications are estimated to examine how the addition of controls impacts the results. Odds ratios greater than one will indicate that young people living in selective education areas are more likely to make contact with hospitals due to mental health issues or risky health behaviours than those living in comprehensive education areas. Standard errors are again clustered at the school level. We also examine the robustness of findings to using propensity score matching instead.

Research question 3

Our final research question considers how pupil's academic achievement relative to their school peers is related to hospital admissions, over and above their absolute academic abilities. This is important, as it is such comparisons relative to school peers that are thought to be a key mechanism underpinning the risks faced by young people attending high-achieving schools (Luthar et al., 2020). Our analytic approach broadly follows the extensive psychological literature into the presence of "big fish little pond" effects and has similarities to the recent literature from economics into the effects of ordinal rank (Marsh et al., 2008; Murphy & Weinhardt, 2020). The logistic regression model we estimate is specified:

$$\frac{\pi_{ij}}{(1-\pi_{ij})} = \alpha + \beta.Rel_{ij} + \gamma.Ab_{ij} + \delta.P_{ij} + \tau.Sch_{j} + \varepsilon_{ij} \quad (4)$$

π_{ij} = The probability of hospital admission due to mental health issues or risky health behaviours.

Rel_{ij} = Children's academic achievement relative to their school peers, as defined in equation (1) within the Data section.

Ab_{ij} = The absolute Key Stage 2 scores of the student (including quadratic and cubic terms).

P_{ij} = A vector of pupil level characteristics, including gender, ethnicity and our socio-economic status scale.

Sch_j = A vector of school characteristics, including the school average of the socio-economic status scale, OFSTED school inspection rating and gender composition[5].

ε_{ij} = Random error term.

i = Student i.

j = School j. Standard errors are clustered at the school level.

The β parameter from equation (4) captures the link between young people's academic achievement relative to their school peers and the odds of hospital treatment stemming from mental ill-health or risky health behaviours. Odds ratios greater than one will indicate that children who are higher achieving than their school peers are at greater risk of requiring hospital treatment, over and above their absolute level of academic ability and other demographic and school characteristics. In Appendix D we test the robustness of our findings to using a different measure of relative achievement (based upon ordinal rank) instead.

4. Results

Research question 1. Grammar versus comprehensive school pupils

Table 3 panel (a) begins by presenting the hospital contact rate for mental health and associated risky health behaviours for grammar school pupils and our comprehensive comparison group. Figures refer to rates per 1,000 children.

[5] Rather than include school level controls, the economics literature into the effects of ordinal rank typically includes school fixed effects into the model. This is not possible here die to the fact our outcome measure is binary and relatively rare. Hence, were school fixed effects included, there would be almost no variation in the outcome measures within schools left to exploit.

<< Table 3 >>

In contrast to the framework of Luthar et al. (2020a), hospital contacts related to mental health and adjustment issues tend to be slightly *lower* amongst young people attending a high-achieving grammar school than in the comparison group. For instance, between Year 7 (age 11) and Year 13 (age 18) around 31 per 1,000 grammar school pupils will have contact with hospital services related to mental health or adjustment issues, compared to 39 per 1,000 of their comprehensive peers. Similar findings emerge if one focuses on specific issues such as self-harm (rates of ≈22 per 1,000 grammar school pupils compared to ≈28 per 1,000 comprehensive pupils) or incidents related to alcohol/drug consumption (≈13 per 1,000 grammar pupils compared to ≈18 per 1,000 comprehensive pupils). The only clear exception is with respect to eating disorders, where the rate across grammar and comprehensive school pupils is equal (4.2 per 1,000 children). Together, Table 3 panel (a) fails to provide any evidence that attending a high-achieving grammar school is indeed a risk factor for serious mental health and adjustment problems. If anything, the opposite may hold true.

These results are formalised in Table 4, where we present estimates from our logistic regression models. This focuses on any hospital contacts made due to mental health or adjustment problems during secondary school, with analogous estimates for more specific outcomes (e.g. contacts due to self-harm or due to alcohol / drug misuse) provided in Appendix E. Estimates are presented as odds ratios with accompanying 95% confidence intervals. Values less than one indicate that the hospital contact rate is *lower* amongst pupils that attend high-achieving grammar schools as compared to the comprehensive school comparison group.

<< Table 4 >>

Model M0 does not include any controls, and thus simply confirms the descriptive results from Table 3; the risk of making contact with hospital due to mental health and associated adjustment issues is around 20% lower amongst grammar school pupils than those attending comprehensive schools. The addition of prior achievement controls (Key Stage 1 and Key Stage 2 scores) in model M1 does little to change this result.

However, once pupil demographic characteristics have been controlled in model M2, the difference in hospital contacts amongst grammar and comprehensive school pupils has all but disappeared. The odds ratio sits very close to one, and is not statistically significant at conventional thresholds. This continues to hold across all remaining model specifications (M3 to M6), with estimates largely insensitive to whether additional controls are added for prior

hospital contacts and various school characteristics. Similar findings also emerge from our robustness tests, including when we expand the composition of our comparison group (to include all pupils in comprehensive schools and not just those with high levels of prior achievement) and to using propensity score matching instead. Our results thus point towards null effects, with no evidence that attending a high-achieving school is either a risk or protective factor for hospital contacts linked to serious mental health issues and associated adjustment problems.

Research question 2. Selective versus comprehensive education areas

Panel (b) of Table 3 provides an initial descriptive comparison of hospital contact rates across young people living within academically selective and comprehensive education areas. While the contact rate is slightly lower amongst young people living in selective parts of England, most differences are relatively small. For instance, between ages 11 and 20, ≈66 in every 1,000 children living in a selective area in England had contact with a hospital for a mental health or adjustment issue, which is slightly below the rate in comprehensive areas (≈72 in every 1,000 children). In general, though, these initial descriptive statistics suggest that differences across selective and comprehensive systems are relatively small.

The results presented in Table 5 – based upon our logistic regression models – confirm this result. These estimates refer to contacts made with hospitals for any of the mental health or adjustment problems we focus upon, with those for specific issues (e.g. self-harm; eating disorders) provided in Appendix F. Figures below one indicate lower hospital contact rates in selective areas than comprehensive areas.

<< Table 5 >>

Consistent with our discussion of Table 3 panel (b), pupils living in selective areas make fewer contacts with hospitals due to mental health or adjustment issues during adolescence, though the difference is relatively small. In our baseline specification without any controls, the risk of such a contact is around 12% lower amongst teenagers living in academically selective parts of England. Our inclusion of controls for prior academic achievement (M1) and demographic background (M2) reduces this to an 8% lower risk, with the results then largely unchanged throughout the remaining model specifications. Thus, although the difference between comprehensive and selective areas is statistically significant – mostly due to the large sample size – the magnitude of any difference is small. Our overall conclusion is therefore that there is little to distinguish selective and comprehensive school

systems with respect to their relationship with serious mental health outcomes and associated adjustment problems.

Research question 3. Relative achievement at school

Table 6 turns to our analysis of how children's academic achievement relative to their school peers is associated with hospital contacts related to mental health and adjustment issues. Recall from the framework of Luthar et al (2020a) – and depicted in Figure 1 – that young people's relative position in relation to their school peers is thought to be a key mechanism driving the development of such problems, particularly amongst those in high-achieving schools.

<< Table 6 >>

The results from model M1 illustrate the change in the odds of a hospital contact per each standard deviation increase in young people's prior achievement *relative* to their school peers (over and above their absolute scores on the Key Stage 2 test). This suggests a positive association, with children higher achieving than their school peers being 25% more likely to make contact with a hospital due to mental health issues or adjustment problems. However, once pupil demographics have been controlled, the odds ratio falls below one (0.92), indicating each standard deviation increase in achievement relative to their school peers is linked to a 8% *decrease* in the risk of a hospital contact. Then, after the characteristics of the school intake has been taken into account (model M4), the odds ratio is essentially one and not statistically significant at conventional thresholds (95% confidence interval for the odds ratio spans between 0.96 and 1.05). The addition of school Ofsted rating as an extra control does little to change this result. Consequently, our analysis of the link between relative achievement at school and hospital contacts due to mental health and adjustment issues has also produced null effects.

5. Conclusions

Recent studies from the United States have claimed that young people attending high-achieving schools are an "at risk" group (Luthar et al., 2020a). It has been suggested that the academically competitive environment in these schools may lead young people to suffer "adjustment problems", including elevated levels of drug/alcohol use and mental ill-health. Yet the empirical evidence on this matter is surprisingly limited. This paper has sought to present new insights into this matter using large scale administrative data from England. As comprehensive and selective education systems co-exist in different parts of the country,

England is perhaps the ideal setting to explore the pros and cons of attending a high-achieving school, as well as selective versus comprehensive systems more generally. We have also explored how young people's academic achievement relative to their school peers is related to serious mental health and behavioural issues during adolescence. This is important, as such relative comparisons are thought to be one of the key mechanisms underpinning the "risk" associated with attending a high-achieving school.

Our findings are largely a story of null – or otherwise very small – effects. No evidence emerges that young people attending one of England's academically selective grammar schools are more likely to use hospital services due to mental ill-health or associated behavioural issue than their equally able peers attending a lower-achieving school. Indeed, if anything, their contacts with hospitals due to such reasons may be slightly lower. A similar finding holds with respect to comparisons between selective and comprehensive systems more broadly. Likewise, no evidence emerges of a link between young people's relative academic achievement at school and hospital contacts related to mental ill-health and associated behavioural issues.

How do these findings relate to the existing literature? Our null effects are to some extent at odds with the theoretical framework suggested by Luthar et al. (2020a), in that no evidence emerges of teenagers attending a high-achieving school having an elevated risk of adjustment problems that lead to serious health issues. However, other previous studies have also failed to find the hypothesised negative link between adjustment problems and attendance at a high-achieving school. For instance, recent evidence from Norway has directly contradicted this claim, finding that attending a higher-achieving school may actually be a protective factor for young people's mental health (Butikofer et al., 2023). Likewise, when exploring less extreme mental health outcomes using survey data from England and Northern Ireland, Jerrim & Sims (2020) failed to find any evidence that rates were raised amongst those attending higher achieving, academically selective schools. Together with the results of this study, evidence that attending a high-achieving school is a risk factor for mental ill-health and associated risky health behaviours is actually rather limited. Additionally, our null findings could be due to academic pressure being relatively high in England's non-selective state schools, due to this country's high-stakes accountability and exam regime.

The following limitations should be noted however when interpreting our results. First, our analysis has focused on extreme health outcomes in the form of hospital admissions. The data do not allow us to capture more moderate mental health and behavioural issues, including contacts made with primary care services (e.g. General Practitioners in England) or problems

that go undiagnosed. While the work of Jerrim & Sims (2020) replicates our mostly small or null findings when investigating less severe outcomes using survey data, further large-scale quantitative research in this area is needed. Second, while our analysis has included rich controls for several of the factors driving selection into high-achieving schools (most notably prior achievement), a selection upon observables assumption must still be invoked if one were to interpret the findings in terms of cause and effect. It may thus be prudent to interpret our estimates as capturing conditional associations, given that there may be some confounding characteristics we have not been able to control.

Our results nevertheless have some important implications for education policy and school choice. One argument often made against academic selection – which naturally produces a group of higher-achieving schools – is that it may harm young people's mental health. The findings presented in this paper – and other large-scale quantitative studies in the literature – do not support this view. Thus, while there are arguments to be made against between-school academic selection, those based upon possible mental health and behavioural adjustment problems do not seem to have a firm evidence base.

Similarly, some parents may have concerns about sending their child to a high-achieving selective school due to the impact that this may have upon their behavioural adjustment and mental health. Our results demonstrate, however, that there is no evidence that attendance at such schools is associated with higher rates of serious health issues of this nature. As such, parents should be advised that sending their child to a high-achieving or academically selective school is unlikely to directly lead to such serious health problems.

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Table 1. The characteristics of pupils attending grammar and comprehensive schools in England.

		Comprehensive school	Grammar school
Pupil characteristics	% White ethnicity	85%	71%
	% Male	50%	51%
	% EAL	10%	19%
	Average Key Stage 2 scores	0.98	0.99
	% of time FSM eligible	8%	3%
	Socio-economic status scale	0.33	0.49
School characteristics	School average Key Stage 2 scores	0.05	0.98
	School average of socio-economic scale	0.13	0.49
	% of school that are male	51%	51%
	School rated Outstanding by OFSTED	26%	82%
	School rated Good by OFSTED	52%	16%
	School rated RI/Inadequate by OFSTED	21%	2%
	N	**168,407**	**55,783**

Notes: Sample in comprehensive schools restricted to children with Key Stage scores above the 15th percentile of the grammar school distribution (which is around 0.6 standard deviations above the national mean). Comprehensive refers to pupils living in comprehensive education areas in England and who achieve a Key Stage 2 score above the 15th percentile of the grammar school distribution. Grammar school refers to pupils that attend one of England's grammar schools. Key Stage 2 scores and the socio-economic status scale have been standardised to mean zero and standard deviation one.

Table 2. The characteristics of pupils living in selective and comprehensive education areas in England

		Comprehensive area	Selective area
Pupil characteristics	% White ethnicity	84%	83%
	% Male	52%	52%
	% EAL	11%	11%
	Average Key Stage 2 scores	-0.03	0.09
	% of time FSM eligible	17%	13%
	Socio-economic status scale	0.00	0.07
School characteristics	School average Key Stage 2 scores	-0.04	0.07
	School average of socio-economic scale	0.00	0.07
	% of school that are male	52%	52%
	School rated Outstanding by OFSTED	22%	33%
	School rated Good by OFSTED	52%	50%
	School rated RI/Inadequate by OFSTED	26%	18%
	N	**599,727**	**127,332**

Notes: Comprehensive areas refer to England's local education authorities where there is no grammar school within commutable distance, and in which almost no pupil attends a grammar school. Selective areas refer to the 11 local education authorities in England where at least 20% of pupils attend a grammar school. Key Stage 2 scores and the socio-economic status scale have been standardised to mean zero and standard deviation one.

Table 3. Unconditional outcomes (rates per 1,000 children)

(a) Grammar versus comprehensive schools

	Comprehensive	Grammar
Any relevant contact up to age 20	54.1	43.0
Any relevant contact between Year 7 and 13	39.1	30.7
Contact due to mental health issue	37.2	29.8
Contact due to self-harm	28.1	21.7
Contact due to alcohol or drugs	17.6	13.1
Contact due to eating disorder	4.2	4.2
Contact due to personality disorder	4.6	4.2
Contact due to pregnancy	14.2	3.6
Contact due to other related outcome	2.4	1.8

(b) Selective versus comprehensive education areas

	Comprehensive	Selective
Any relevant contact up to age 20	71.9	66.1
Contact due to mental health issue	49.3	47.1
Any relevant contact between Year 7 and 13	52.1	46.0
Contact due to pregnancy	45.8	41.2
Contact due to self-harm	34.9	29.7
Contact due to alcohol or drugs	25.1	22.1
Contact due to personality disorder	6.2	6.6
Contact due to other related outcome	3.6	3.3
Contact due to eating disorder	3.5	3.2

Notes: Figures refer to rates per 1,000 children. In panel (a), the sample in comprehensive schools has been restricted to children with Key Stage scores above the 15th percentile of the grammar school distribution (which is around 0.6 standard deviations above the national Key Stage 2 mean). Grammar school refers to pupils that attend one of England's grammar schools. In panel (b), comprehensive areas refer to England's local education authorities where there is no grammar school within commutable distance, and in which almost no pupil attends a grammar school. Selective areas refer to the 11 local education authorities in England where at least 20% of pupils attend a grammar school.

Table 4. Logistic regression model estimates of the association between attending a high-achieving grammar school and hospital contacts related to mental health and associated behavioural issues.

	Odds ratio	Lower CI	Upper CI	N
M0. Unconditional	0.78	0.71	0.86	219,619
M1. Achievement controls added	0.80	0.73	0.89	219,619
M2. Student background controls added	0.98	0.92	1.06	219,619
M3. Prior hospital contacts added	0.99	0.92	1.06	219,619
M4. School gender & socioeconomic status added	0.94	0.87	1.01	219,619
M5. Ofsted rating added	0.97	0.90	1.06	219,619
M6. School average achievement added	1.05	0.92	1.20	219,619

Notes: Odds ratios less than one indicate that pupils attending grammar schools are *less* likely to make contact with hospital for mental health and associated adjustment issues than pupils at comprehensive schools. Lower and Upper CI refers to the estimated 95% confidence interval for the odds ratio. Our preferred model specification is M3. N = Number of observations.

Table 5. Logistic regression model estimates of the difference in hospital contacts related to mental health and associated behavioural issues between children living in selective and comprehensive education areas.

	Odds ratio	Lower CI	Upper CI	N
M0. Unconditional	0.88	0.83	0.92	693,121
M1. Achievement controls added	0.90	0.86	0.95	693,121
M2. Student background controls added	0.92	0.88	0.96	693,121
M3. Prior hospital contacts added	0.92	0.88	0.96	693,121
M4. School gender & socioeconomic status added	0.93	0.89	0.96	693,121
M5. Ofsted rating added	0.93	0.89	0.97	693,121
M6. School average achievement added	0.93	0.89	0.97	693,121

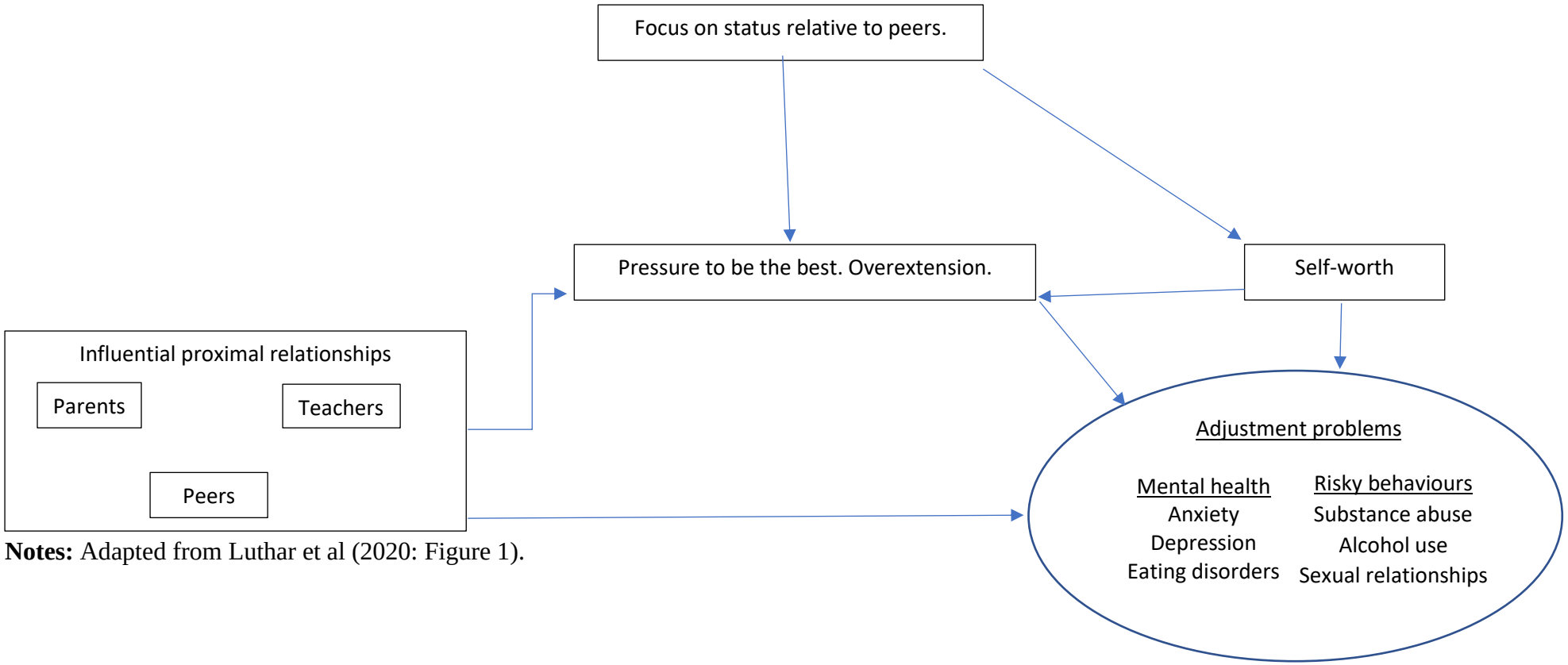
Notes: Odds ratios less than one indicate that pupils living in selective education areas are *less* likely to make contact with hospital for mental health and associated adjustment issues than pupils living in comprehensive education areas. Lower and Upper CI refers to the estimated 95% confidence interval for the odds ratio. Our preferred model specification is M3. N = Number of observations.

Table 6. Logistic regression model estimates of the association between relative academic achievement and hospital contacts due to mental health issues and associated risky behaviours

	Odds ratio	Lower CI	Upper CI	N
M0. Unconditional	0.83	0.82	0.84	1,309,820
M1. Achievement controls added	1.25	1.19	1.30	1,309,820
M2. Student background controls added	0.92	0.89	0.96	1,309,820
M3. Prior hospital contacts added	0.92	0.89	0.96	1,309,820
M4. School gender & socioeconomic status added	1.01	0.96	1.05	1,309,820
M5. Ofsted rating added	0.98	0.93	1.03	1,309,820

Notes: Estimates reflect a one standard deviation increase in children's achievement in the Key Stage 2 tests relative to their school peers, conditional upon the other variables controlled in the model. Odds ratios greater than one indicate that young people have greater risk of making contact with hospitals when they have higher levels of relative achievement (i.e. are higher achieving than their school peers). Lower and Upper CI refers to the estimated 95% confidence interval for the odds ratio. Our preferred model specification is M3. N = Number of observations.

Figure 1. A framework for elevated adjustment problems amongst children within academically selective schools



Notes: Adapted from Luthar et al (2020: Figure 1).