# Disruptive school peers and student outcomes

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## ABSTRACT

This paper estimates how peers' achievement gains are affected by the presence of potentially disruptive and emotionally sensitive children in the school-cohort. We exploit that some children move between schools and thus generate variation in peer composition in the receiving school-cohort. We identify three groups of potentially disruptive and emotionally sensitive children from detailed Danish register data: children with divorced parents, children with parents convicted of crime, and children with a psychiatric diagnosis. We find that adding potentially disruptive children lowers the academic achievement of peers by about 1.7–2.3% of a standard deviation.

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## 1. Introduction

During the last decade, a consensus has developed that all learners should be educated within the mainstream sector. Therefore, countries across the world strive to establish inclusive settings within the compulsory education system (see the review by European Agency for Development in Special Needs Education, 2013). It is imperative to foresee and understand the extent of potential consequences of this policy trend. Recent evidence suggests that inclusion of disadvantaged children in mainstream classrooms exert negative effects on the other learners (e.g. Carrell & Hoekstra, 2010; Cho, 2012; Diette, Uwaifo, & Oyelere, 2014; Figlio, 2007; Kristoffersen, 2013). One paper (Hanushek, Kain, & Rivkin, 2002) finds small positive but insignificant effects of sharing a classroom with a disabled student. Our paper adds to this sparse literature.

This study is concerned with the impact of the presence of potentially disruptive and emotionally sensitive children in one's school-cohort. We approximate disruptiveness by early student characteristics and quality of the home environment prior to school enrolment. Hence we do not rely on measures of current behavior that may be difficult to handle for simultaneity reasons. Our estimation strategy exploits children who move into the school-cohort and thus generate variation in peer composition. For this exercise, we rely on population-wide Danish register-based data that provide us with a panel of pupils and schools. Importantly these data allow us to control for prior student performance and school fixed effects.

Our main contributions are the following: Firstly, compared to the existing literature, we consider a broader group of disruptive and emotionally unstable children. Specifically, we look at children whose parents have divorced, whose parents have a criminal history, and who themselves have an early psychiatric diagnosis. This is appealing because

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disruptiveness may easily extend beyond children exposed to extreme and violent home environments as analyzed by Carrell and Hoekstra (2010). Fewer than 5% are exposed to domestic violence in their sample and effects of less problematic exposures may be just as interesting. Secondly, the availability of unique population wide individual level panel data allows us to improve upon the estimation strategy compared to much previous work. Like for instance Fletcher (2009) for children with emotional problems and Cho (2012) and Diette and Uwaifo Oyelere (2014) for English Language Learners (ELL), we employ a value added model which implies that our disruptiveness measure is only required to be exogenous with regards to changes in test scores, not with regards to levels of test scores. However, our strategy does not rely on variation in disruptive classmates within school-grade or within individual. Rather it explicitly exploits movements of supposedly disruptive or emotionally sensitive children across schools.

We first document that children with divorced or criminal parents or own psychiatric diagnoses have on average worse behavior than their classroom peers. Then we present evidence that receiving a potentially disruptive child can have negative consequences for peers in the receiving school-cohort, in the sense that it lowers their immediate academic achievement in reading by about 1.7–2.3% of a standard deviation. The strongest and most robust effects seem to come from children with a psychiatric diagnosis or whose parents have a criminal history, while children with divorced parents exert no significant effect on test scores of peers on average. However, when we allow disruptive boys and girls to have different effects, we find that a boy with divorced parents does seem to disrupt peers to an extent that is reflected in their test scores.

Our paper contributes not only to the literature on the effects of disadvantaged children in mainstream classrooms; we also speak to the literatures concerned with consequences of peer performance and characteristics more generally (see Epple and Romano (2011) and Sacerdote (2011) for overviews). Our study is, for example, related to two recent contributions by Lavy, Silva, and Weinhardt (2012) and Lavy, Paserman, and Schlosser (2012) that both document that a higher proportion of low-achieving peers is detrimental for pupil achievement.[1] It is also related to Black, Devereux, and Salvanes (2013) who is concerned with peers' background characteristics. They find evidence that the proportion of girls improves female (but not male) outcomes and that higher earnings among peers' fathers improve male outcomes. Lavy and Schlosser (2011) find positive effects of having a large fraction of girls in the classroom for *both* boys and girls. Other examples of this type of work are studies of the impact of school desegregation programs, where some studies find scattered and moderate effects of balancing the racial composition (Angrist & Lang, 2004; Hoxby & Weingarth, 2006), while others find substantial effects (Billings, Deming, & Rockoff, 2014).

The paper is structured as follows: Section 2 gives a brief overview of the institutional setting, Section 3 presents our data, Section 4 discusses our identification strategy, Section 5 describes our measures of disruptive children, Section 6 reports results, and Section 7 concludes.

## 2. Institutional setting

### 2.1. Elementary schools in Denmark

For the period relevant to our study education is compulsory from the calendar year the child turns 7 until the child has completed 9th grade.[2] Before the 1st grade there is an optional preschool year with a take-up of 83% in 2005 (UNI-C, 2012). After the completion of 9th grade the pupil can either enroll in high school or in vocational school. The preschool class, 1st to 9th grade as well as post-compulsory schooling are free of charge, as long as they are taken on public schools; private schools and boarding schools charge tuition fees.

In the preschool class, pupils are taught by a form teacher, but from 1st grade to 9th grade, pupils are taught by subject specific teachers. The same subject specific teacher follows the pupils through several grades. There are no general regulations as to the organization of teachers across grades. However, many schools are informally divided into age groups preschool-3rd grade, 4th–6th grade, and 7th–9th grade, and each teacher will typically specialize in their subject teaching within one age group. Classes consist in general of no more than 28 pupils. Each class has one or two main responsible teachers (typically the teachers in Danish and/or math), who cover the main part of their lectures during a number of school years. Most schools offer all grades up until grade 9 but there are some small schools that only offer a subset of these, often up until grade 6 or 7, the pupils then finish compulsory schooling at another school.

### 2.2. National Tests

Danish school children have not been systematically evaluated in the lower grades until 2010. Before 2010 the children were only systematically graded from 8th grade and they experienced their first exam at the end of 9th grade (at around age 16). After some years of poor performance in OECD's PISA-test (2000 and 2003), the parliament decided to introduce systematic nationwide testing throughout compulsory school.

The National Tests are IT-based, self-scoring and adaptive tests.[3] The test score is based on a precise measure of student ability rather than a count of the number of correct answers. Instead of giving all pupils the same questions and summing up the number of correct answers, the software calculates an ability measure after each question and then finds a question with a difficulty level that matches the contemporary measure of the pupil's ability level. After each question the software re-estimates a new ability level and the difficulty level of the next question is based on a RASCH-algorithm that ensures that the student is given questions that he or she has a 50% probability of answering correctly. Thus the final ability estimate is not a function of the number of correct answers but instead a function of the difficulty level of the questions

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[1] Imberman, Kugler, and Sacerdote (2012) and Hanushek, Kain, Markman, and Rivkin (2003) document significant effects of average peer quality.

[2] In 2009 the preschool year became compulsory, but the youngest cohort in this study started preschool in 2008.

[3] For details on the national tests, see Beuchert and Nandrup (2014).