Children's Relative Age in Class and Stimulant Drug Use for ADHD:

A Danish Nationwide Study

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Conflict of interest
The project was funded by the University of Southern Denmark. Jesper Hallas has participated in research projects funded by Novartis with grants paid to the institution where he was employed. Jesper Hallas and Sonia Hernández-Díaz have consulted for Novartis for unrelated matters. The remaining authors have no relationships to disclose.

Background
Attention-deficit/hyperactivity disorder (ADHD) is one of the most commonly diagnosed mental conditions in children. Over the past two decades, an increasing number of children worldwide have been diagnosed with the condition and use of stimulant drugs as a therapeutic option has risen dramatically. Recent studies have demonstrated that the youngest children in a class are up to twice as likely as their older classmates to be prescribed stimulants for ADHD.

Objectives
To investigate whether younger age in class is associated with an increased risk of being prescribed stimulants for ADHD among school-aged children in Denmark.

Methods
For all children in Denmark, we obtained data from The Danish National Prescription Registry and the Danish Student Registry between July 1, 2000 and June 31, 2012. We estimated the prevalence proportion ratio (PPR) of receiving stimulant prescriptions between the youngest children in class (born in October-December) and the oldest in class (born in January-March). PPRs were stratified by study year, children's grade level, and gender. The main analysis was restricted to children in 1st through 6th grade (7-12 years), who started school on their age assigned grade level.

Results
We identified 932,032 eligible children for the main analysis, of which 161,116 (17.3%) were relatively young in class and 246,596 (26.5%) relatively old. Overall, 40% of those relatively young were delayed in school, i.e. did not attend school at their age assigned grade level, and were thus excluded from the main analyses. Over the study period, annual prevalence proportion of stimulant use from age 7 to age 12 increased from 0.13 to 1.03 per 1,000 children among those relatively young and from 0.15 to 1.47 per 1,000 children among those relatively old in class. The average PPR over the entire study period, comparing the relatively youngest with the relatively oldest, was 1.08 (95%CI, 1.04-1.12). When including children not on their age assigned grade level, i.e. classifying children based on their age assigned school grade, the PPR was 1.09 (1.06-1.12).

Conclusions
Contrary to previous studies, we observed almost no relative age-effect on ADHD use among children in Denmark. This may be explained by a high proportion of relatively young children with delayed school entry, which may effectively serve as an alternative to investigating immature children for an ADHD diagnosis.

Figure 1

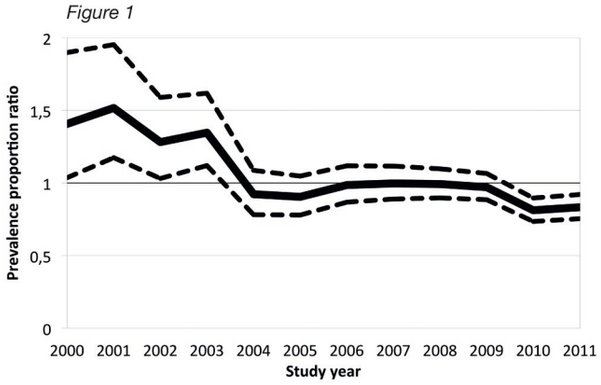

Figure 1: Prevalence proportion ratios of stimulant drug use, comparing the youngest (born October-December) with the oldest (born January-March) children in class, according to study year.