

# Young age at school entry and attention-deficit hyperactivity disorder-related symptoms during primary school: results of a prospective cohort study conducted at German Rudolf Steiner Schools

Wendt J, Schmidt MF, König J, Patzlaff R, Huss M, Urschitz MS.

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## Abstract

### OBJECTIVES:

Young age at school entry (ASE) for students has been related to their impaired mental health in higher grades. To avoid the negative health consequences of young ASE, preschool examinations and individual school entry deferral for young children are routinely performed by some school authorities. We aimed to investigate whether ASE was associated with attention-deficit hyperactivity disorder (ADHD)-related symptoms in pupils attending schools using a selective school enrolment procedure.

### DESIGN:

Prospective open cohort study with baseline assessments at school entry and two follow-ups in the second and fourth grades.

### SETTING:

Up to 128 Rudolf Steiner Schools (Waldorf Schools) located within Germany.

### PARTICIPANTS:

Of the 3079 children from whom data were gathered in the second or fourth grade, 2671 children born between 1 July 2001 and 31 October 2002 (age at baseline: mean 6.7, min 5.91, max 7.24 years, 50% girls) were selected for analysis to avoid bias introduced by individuals at the edges of the ASE distribution.

### MAIN OUTCOME MEASURES:

ADHD-related symptoms were assessed at school entry and second and fourth grades by parent-reported and teacher-reported versions of the Strengths and Difficulties Questionnaire (Hyperactivity-Inattention Subscale).

### RESULTS:

The agreement between parent-reported and teacher-reported symptoms was poor (intra-class correlation: 0.41 and 0.44 in second and fourth grade assessments, respectively). Regarding teacher reports, ASE was negatively associated with ADHD-related symptoms in the second grade (regression coefficient  $\beta=-0.66$  per year,  $P=0.0006$ ) and fourth grade ( $\beta=-0.56$ ,  $P=0.0014$ ). Associations remained after adjusting for potential confounders and pre-existing symptoms at baseline. Regarding parent reports, associations were markedly weaker in both grades (second grade:  $\beta=-0.22$ ,  $P=0.12$ ; fourth grade:  $\beta=-0.09$ ,  $P=0.48$ ).

### CONCLUSIONS:

Using a prospective study design and comprehensive adjustment for confounding and baseline symptoms, we confirmed prior evidence of the association between young ASE and teacher-reported ADHD symptoms in primary school.