Supplement 1

More in-depth information on the different attention measures

Parent-rated attention problems. Parents, mostly mothers (88%), rated their children's attention problems at 6 and 8 years using the well-studied and validated attention problems scale of the German version of the Child Behavior Checklist (CBCL; Achenbach, 1991; Arbeitsgruppe Deutsche Child Behavior Checklist, 1998). At 6 years, the attention problems scale consisted of the following 10 age-appropriate items: "Acts too young for his/her age", "Can't concentrate**,** can't pay attention for long", "Can't sit still, restless, or hyperactive", "Confused or seems to be in a fog", "Daydreams or gets lost in thoughts", "Impulsive or acts without thinking", "Nervous, high-strung, or tense", "Nervous movements or twitching", "Poorly coordinated or clumsy", and "Stares blankly". At 8 years, this scale consisted of the same 10 items as the 6 years assessment plus one additional age-appropriate item: "Poor school work". At 26 years, parents (88% mothers) rated their offspring's attention problems using the German version of the Young Adult Behavior Checklist (YABCL; Achenbach, 1997; Arbeitsgruppe Kinder-, 2006). At 26 years, this scale consisted of the following 11 age-appropriate items: "Acts too young for his/her age", "Can't concentrate**,** can't pay attention for long", "Too dependent on others", "Daydreams or gets lost in thoughts", "Fails to finish things he/she should do", "Poor school or job performance", "Irresponsible behavior", "Passive or lacks initiative", "Impulsive or acts without thinking", "Has trouble making decisions", and "Underactive, slow moving, or lacks energy". At each assessment, items were rated on a scale from 0 *(not true)* to *2 (very/often true)* and then summed into a total score with higher scores indicating more attention problems.

Observer-rated attention span. At 6 and 8 years, psychologists rated the child's attention span using the German Tester's Rating of Child Behavior (TRCB; Jaekel, Wolke, & Bartmann, 2013; Wolke, 1996) during a cognitive assessment. Specifically, during the cognitive assessment, psychologists rated the adult's "Persistence in pursuing and solving a task" on a scale from 1 (*very low attention span*) to 9 (*very high attention span*). In addition, the whole research team (psychologist, assistant psychologist, and pediatrician) evaluated the child's overall attention span during the whole assessment day (i.e., Day Attention Rating (DAR)). The whole assessment day comprised several assessments including neurological assessments, motor tasks, interviews, mother-child interaction observations, and standardized tests. The DAR used the same nine-point rating scale and the

research team adapted a consensus model (i.e., deciding together on the specific attention span score). A mean nine-point attention span score was computed using the two TRCB and DAR ratings with higher scores indicating better attention span. At 26 years, the same procedure was followed as in childhood: Psychologists rated the adult's attention span using the German Tester's Rating of Adult Behavior (TRAB; Jaekel et al., 2013; Wolke, 2012), during a cognitive assessment and using the same nine-point rating scale. In addition, the DAR across the whole assessment day was done as well; however, in contrast to the child assessments, the DAR was performed by the psychologist alone. To assess the reliability of this observer-rating of attention span, at each of the three time points, interrater reliabilities were calculated (using between 30-55 participants, depending on the time point) by means of intraclass correlation coefficients (ICC). ICC's for attention span ranged from .54-.72 across the time points.

ADHD diagnoses. ADHD diagnoses at 6 and 8 years were made according to the structured and validated Mannheim Parent Interview (MEI; El-Faddagh, Laucht, Maras, Vöhringer, & Schmidt, 2004; Esser, Blanz, Geisel, & Laucht, 1989; Laucht, Esser, & Schmidt, 1997) that allows for a clinical DSM-IV diagnosis of ADHD. The MEI is a structured interview in which the psychologist inquires the parents about the severity and duration of the child's inattention, hyperactivity and impulsivity. Answers were rated on three-point scales ranging from 1 (*no symptoms*) to 3 (*strong symptoms*). Children received a diagnosis of predominantly inattention (ADHD-IA) when exhibiting strong symptoms of inattention, predominantly hyperactive/impulsive (ADHD-HI) when exhibiting strong symptoms of hyperactivity and/or impulsivity, and ADHD combined type (ADHD-C) when exhibiting strong symptoms of both inattention and hyperactivity/impulsivity. At 26 years, the presence of 18 ADHD symptoms according to the DSM-IV were assessed with the German version of the ADHD adult rating scale completed by parents (Kooij et al., 2005). This adult ADHD rating scale was based on the original DuPaul child ADHD rating scale (DuPaul, Power, Anastopoulos, & Reid, 1998) and considered a valid measure of ADHD and associated psychosocial impairment in adulthood (Kooij et al., 2005). Five complex items were reformulated into two single statements so that the questionnaire consisted of a total of 23 items (Kooij et al., 2005). The inattentive scale consisted of the following 11 items: "Has difficulty organizing tasks and activities", "Is forgetful in daily activities", "Loses things necessary for tasks or activities", "Has difficulty sustaining attention in tasks", "Avoids or is reluctant to engage in tasks requiring sustained mental effort", "Has difficulty following through on instructions",

“Fails to finish activities or work”, “Makes careless mistakes in work”, “Is easily distracted”, “Does not listen to what is being said”, and “Fails to give close attention to details in work”. The hyperactive/impulsive scale consisted of the following 12 items: “Feels restless”, “Has difficulty to relax in leisure time”, “Squirms in seat”, “Is ‘on the go’ or acts as if ‘driven by a motor’”, “Gets bored quickly”, “Fidgets with hands or feet”, “Talks excessively”, “Takes holidays or leisure time in busy and noisy environment”, “Leaves seat in situations where it is inappropriate”, “Interrupts or intrude on others”, “Blurts out answers before questions have been completed”, and “Has difficulty awaiting turn”. Items were rated on a scale from 0 *(rarely or never true)* to *3 (very often true).* According to guidelines by Kooij et al. (2005) adults exhibiting 4 out of 9 inattentive symptoms or 4 out of 9 hyperactivity/impulsivity symptoms ‘*often true*’ (score 2) or ‘*very often true*’ (score 3) are considered significantly impaired. These adults received a diagnosis of either predominantly inattention (ADHD-IA), predominantly hyperactive/impulsive (ADHD-HI) or ADHD combined type (ADHD-C).

References

Achenbach, T. M. (1991). *The manual for the Child Behavior Checklist 4-18 and 1991 Profile*. Burlington, VT: University of Vermont, Department of Psychiatry.

Achenbach, T. M. (1997). *Manual for the Young Adult Selt-Report and Young Adult Behavior Checklist*. Burlington, VT: University of Vermont, Department of Psychiatry.

Arbeitsgruppe Deutsche Child Behavior Checklist. (1998). *Elternfragebogen über das verhalten von kindern und jugendlichen: Deutsche bearbeitung der Child Behavior Checklist (CBCL/4-18). [Questionnaire for parents about the behavior of children and youth: German adaptation of the CBCL].* Köln, Germany: Arbeitsgruppe Kinder-, Jugend- und Familiendiagnostik.

Arbeitsgruppe Kinder-, J.-u. F. K. (2006). *Fragebogen über das verhalten junger erwachsener: YABCL 18-30. [Questionnaire about the behavior of young adults: YABCL 18-30].* Köln, Germany: Arbeitsgruppe Kinder-, Jugend- und Familiendiagnostik.

DuPaul, G. J., Power, T. J., Anastopoulos, A. D., & Reid, R. (1998). *ADHD Rating Scale-IV. Checklists, norms and clinical interpretation*. New York, NY: The Guilford Press.

El-Faddagh, M., Laucht, M., Maras, A., Vöhringer, L., & Schmidt, M. H. (2004). Association of dopamine D4 receptor (DRD4) gene with attention-deficit/hyperactivity disorder (ADHD) in a high-risk community sample: a longitudinal study from birth to 11 years of age. *Journal of Neural Transmission, 111*, 883-889.

Esser, G., Blanz, B., Geisel, B., & Laucht, M. (1989). *Mannheimer Elterninterview : Strukturiertes interview zur erfassung von kinderpsychiatrischen auffalligkeiten. [The Mannheim Parent Interview: A structured interview for the assessment of psychiatric symptoms in children].* Beltz, Germany: Weinheim.

Jaekel, J., Wolke, D., & Bartmann, P. (2013). Poor attention rather than hyperactivity/impulsivity predicts academic achievement in very preterm and full-term adolescents. *Psychological Medicine, 43*, 183-196.

Kooij, J. J. S., Buitelaar, J. K., Van den Oord, E. J., Furer, J. W., Rijnders, C. A. T., & Hodiamont, P. P. G. (2005). Internal and external validity of Attention-Deficit Hyperactivity Disorder in a population-based sample of adults. *Psychological Medicine, 35*, 817-827.

Laucht, M., Esser, G., & Schmidt, M. H. (1997). Developmental Outcome of Infants Born with Biological and Psychosocial Risks. *Journal of Child Psychology and Psychiatry, 38*, 843-853.

Wolke, D. (1996). *TRCB tester's rating of child behavior: Test construction and standardisation (In German).* Available from the author upon request.

Wolke, D. (2012). *TRAB tester's rating of adult behavior (in German)*: Available from the author upon request.