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### Assessment and treatment of planning skills in adolescents with ADHD

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## **Chapter 7**

### **Summary and main findings**

## SUMMARY OF FINDINGS

Whereas planning skills of their typically developing (TD) peers go through major developments to secure an independent lifestyle (e.g., Blakemore & Choudhury, 2006), little is known about the planning skills of adolescents with ADHD. Therefore, the first aim of this thesis was to investigate how many adolescents with ADHD actually have planning problems, using multiple measures of planning and exploring DSM-IV subtype differences. In **chapter 2** (p. 29), adolescents with ADHD (both the combined and the inattentive DSM-IV subtype) were compared to a TD control group on three measures with different levels of ecological validity (i.e., the extent to which the results of controlled tests generalize to performance in naturalistic settings): two neuropsychological measures (Behavioral Assessment of the Dysexecutive Syndrome, BADS; Delis-Kaplan Executive Function System, D-KEFS) and one parent-rated questionnaire (Behavior Rating Inventory of Executive Function, BRIEF). Results showed little correlation between the measures used. There were no group differences on the D-KEFS (least ecologic validity), and longer completion times in the inattentive subtype than in the combined subtype and controls on the BADS (more ecologically valid neuropsychological measure). The most ecologically valid instrument, a parent-rated questionnaire, showed more planning problems in adolescents with ADHD (both subtypes) than in TD controls, with the combined subtype showing most problems on overall executive functioning. But also on the parent rated questionnaire only 55% of adolescents with ADHD showed planning deficits in the clinical range. We have found marginal indications for differences between the inattentive and combined subtype, with the DSM-IV combined subtype showing additional parent-rated executive functioning deficits in daily life, and the inattentive subtype needing more time to adequately plan on a neuropsychological measure. These findings suggest that not all adolescents with ADHD have planning deficits and that these deficits may not be visible on all measures. The discrepancy between parent-rated planning problems and neuropsychological measures may imply that assessment in a one-on-one testing situation that motivates the adolescents is less suitable for measuring planning skills.

Given the current situation in Dutch mental healthcare and to make implementation and dissemination of treatments for adolescents with ADHD possible, clinic-based treatments are needed. We developed two CBTs with elements of Motivational Interviewing (MI) to treat adolescents with ADHD;

one focusing on enhancement of planning skills (Plan My Life, PML, in Dutch Zelf Plannen: see **appendix**, p. 151) and one that does not (Solution Focused Treatment, SFT, in Dutch Zelf Oplossingen Bedenken). The second aim of this thesis was to investigate the effectiveness of these two new treatments for adolescents to three months after treatment and the specific contribution of incorporating planning skills into CBT. In **chapter 3** (p. 49) a multi-center randomized clinical trial (RCT) was described, in which 159 adolescents (12–17 years) with ADHD were randomly assigned to one of both treatments. Pre-, post and 3-month follow-up data were gathered on five domains: parent-rated ADHD, planning problems and executive functioning (primary outcomes), neuropsychological measures of planning, comorbid symptoms, general functioning, and teacher measures. Results showed that from pre- to post-treatment adolescents showed improvements on most measures with large effect sizes (only 5% drop-out), which were maintained until three months after treatment. Satisfaction rates of adolescents as well as parents were high for both treatments. However, only 15.2% of adolescents showed normalization of functioning at follow-up and only marginal differences between both treatments were found, in favor of PML; adolescents showed more improvement in parent-rated planning problems (primary outcome), and parents and therapists evaluated PML more positive than SFT.

To know whether direct effects of both CBTs and differences between both CBTs are lasting, the third aim of this thesis to investigate the effectiveness of these two new treatments for adolescents with ADHD on the longer term to one year after treatment. Therefore, in **chapter 4** (p. 83) one-year follow-up data were gathered of the RCT in **chapter 3**, to investigate long-term effects of PML and SFT for adolescents with ADHD ( $n=159$ ). Results showed that initial improvements (from pretest to three months after treatment) remained stable or continued to improve to one-year follow-up and one year after treatment 26% of adolescents showed normalized functioning. Nevertheless, initial treatment differences in favor of PML at three-month follow-up (**chapter 3**) dissipated, implying that focusing treatment on planning skills may not be necessary for improvement of functioning in adolescents with ADHD, or perhaps prolonged treatment is needed for planning aimed treatment like PML to be more effective than a treatment without such an aim (Sibley, Kuriyan, Evans, Waxmonsky, & Smith, 2014). Our results are consistent with the finding that treatment of ADHD improves outcomes to one year after treatment, but usually not to the point of normalization (Molina

et al., 2009; Parker, Wales, Chalhoub, & Harpin, 2013; Shaw et al., 2012).

Because ADHD is a heterogeneous disorder (Yoshimasu et al., 2012), it is unlikely for one treatment to fit all and increases the need for personalized treatment. Therefore, the fourth aim of this thesis was to investigate whether there are pre-treatment characteristics that moderate treatment-effects of PML and SFT in adolescents with ADHD. In **chapter 5** (p. 95) qualitative treatment-subgroup interactions were investigated, using the data of our RCT ( $n=159$ ; see **chapter 3**). When these qualitative treatment-subgroup interactions are present in the data of our RCT this means that for one subgroup of adolescents with ADHD, PML harvests more positive results than SFT, while for another subgroup the reverse is true. This would imply that which treatment is best differs across subgroups of patients. In **chapter 5** an innovative analyses technique was used (QUINT; Dusseldorp & Van Mechelen, 2014) to explore pre-treatment adolescent characteristics (i.e., gender, medication use, IQ, age, parental education, comorbid internalizing disorders like depression or anxiety, externalizing disorders like Oppositional Defiant Disorder or Conduct Disorder) as potential qualitative moderators of treatment effects from pretest to three-month follow-up. Outcome measures were differences between pretest and three-month follow-up on parent-rated ADHD symptoms and planning problems (primary measures of the RCT in **chapter 3**). In addition, qualitative interactions for therapeutic changes from pre- to posttest and from post- to follow-up test were explored separately. Results showed that, even though subgroups in both treatments followed different trajectories, and from posttest to three-month follow-up qualitative treatment-subgroup interactions were found, no qualitative subgroups were found in terms of the general evolution from pretest to three months after treatment. However, for the entire time span from pretest to follow-up a quantitative interaction did show up: adolescents with less depressive symptoms but more anxiety symptoms showed more improvement when receiving PML than when receiving SFT (but also showed elevated doses of methylphenidate), while for other adolescents the effects of both CBTs were comparable. This implies that there is no need for personalized treatment allocation with regard to the CBTs under study for adolescents with ADHD, but for a subgroup with comorbid anxiety symptoms but low depression PML appears the treatment of preference.

## MAIN FINDINGS

- \* According to their parents, 55% of adolescents with ADHD show planning problems in daily life. Adolescents with the DSM-IV combined subtype show additional EF problems, compared to the DSM-IV inattentive subtype.
- \* Assessment of planning skills using a neuropsychological measure (Zoo map test of the Behavioral Assessment of the Dysexecutive Syndrome) suggests that adolescents with the DSM-IV inattentive subtype of ADHD need more time to adequately plan.
- \* Planning deficits of adolescents with ADHD may not be visible on all measures. The discrepancy between parent-rated planning problems and neuropsychological measures imply that neuropsychological assessment in a one-on-one testing situation that motivates the adolescents is less suitable for measuring planning problems in daily life.
- \* Adolescents receiving PML or SFT showed improvements with large effect sizes from pre- to post-treatment on most measures of ADHD- and comorbid symptoms and associated impairment. Improvements were maintained until three months after treatment and 15.2% of adolescents showed normalization of functioning. Moreover, satisfaction rates of adolescents as well as parents were high for both treatments and only 5% of adolescents dropped out of treatment.
- \* Three months after treatment marginal differences were found in favor of PML: adolescents showed more improvement in parent-rated planning problems (primary outcome), and parents and therapists evaluated PML more positive than SFT.
- \* One year after receiving PML or SFT, initial improvements were maintained and 26% of adolescents showed normalized functioning. However, the marginal treatment differences in favor of PML that were found three months after treatment had disappeared one year after treatment.
- \* A specific subgroup of adolescents with ADHD, with comorbid anxiety symptoms but low depression, improved more from pretest to three months after treatment when receiving PML than when receiving SFT.