Assessment and treatment of planning skills in adolescents with ADHD

Boyer, B.E.

Chapter 4
One-year follow-up of two CBTs for adolescents with ADHD

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Abstract

Objective. Long-term effects of two CBTs for adolescents with ADHD are explored: One aimed at improving planning skills (Plan My Life; PML), the other a solution focused therapy (SFT) without focusing on planning skills. In an RCT, adolescents with ADHD (n=159) were assigned to PML or SFT and improved significantly between pre- and posttest with large effect sizes (see **chapter 3**, p. 49), with marginal differences in favor of PML.
Methods. One-year follow-up data were gathered.
Results. Initial improvements remained stable or continued to improve from posttest to one-year follow-up. 26% of adolescents showed normalized functioning. However, no treatment differences were found.
Discussion. These results are consistent with the finding that treatment of ADHD improves long-term outcomes, but not to the point of normalization. Earlier found differences at three-month follow-up in favor of PML disappeared, indicating that focusing treatment on planning skills is not necessary for improvement or that a more prolonged planning-focused treatment is needed.

Introduction

In adolescence, the control and help of parents and teachers diminishes as compared to childhood, whereas the transition to secondary school increases the need for executive functioning and, in particular for planning skills (Evans et al., 2009). When adolescents with ADHD have planning problems, this can cause impairment in school, family- and social functioning (Abikoff et al., 2013). Because evidence-based nonpharmacological treatments for adolescents with ADHD are lacking (Evans, Owens, & Bunford, 2014), a cognitive behavioral treatment (CBT) was developed, focusing on planning skills: Plan My Life (PML; in Dutch Zelf Plannen; Kuin, Boyer, & Van der Oord, 2013; see **Appendix**, p. 151). In PML, every session a fixed, planning skills focused, subject and strategy is discussed and trained (e.g., a to-do list).

In a multi-site randomized clinical trial (RCT; *n*=16 sites, *n*=56 therapists, see **chapter 3**, p. 49), this treatment was compared to a control CBT, without the proposed active element of enhancing planning skills: a solution-focused treatment (SFT; Boyer, Kuin, Oberink, & Van der Oord, 2014). Both PML and SFT are individual, manualized treatments consisting of 8 adolescent sessions and 2 parental sessions. Whereas in PML every week planning skills are actively learned by discussing a fixed subject, in SFT the adolescent/parent chooses a problem that is discussed using fixed questions in a solution focused manner, to lead the adolescent to a solution for the problem. To reduce drop-out, motivational interviewing is integrated within both treatments.

Pre-, post- and three-month follow-up data were gathered in 159 adolescents with ADHD (12 to 17 years), with parent-rated ADHD symptoms and planning problems as primary outcomes. Results showed a significant improvement of primary outcomes as well as comorbid symptoms, functioning and impairment (with large Effect Sizes, ES) from pre- to posttest with maintenance of effects to three months after treatment on most measures (with exception of two neuropsychological measures). In addition, 15.2% of adolescents showed normalization of functioning at follow-up. Marginally significant treatment differences were found, in favor of PML: PML showed more reduction of parent-rated planning problems compared to SFT, and higher treatment satisfaction of parents and therapists (see **chapter 3**). Due to the lack of an adequate control-group like a waitlist or a treatment as usual group, effectiveness of both treatments could not be proven. However, if

treatment differences between PML and SFT three months after treatment, would persist or even improve further on the longer term, one could conclude that treatment aiming at planning skills is more effective than treatment that does not have this aim. The question therefore remains whether initial marginal benefits of PML over SFT remain on the longer term or improve even further.

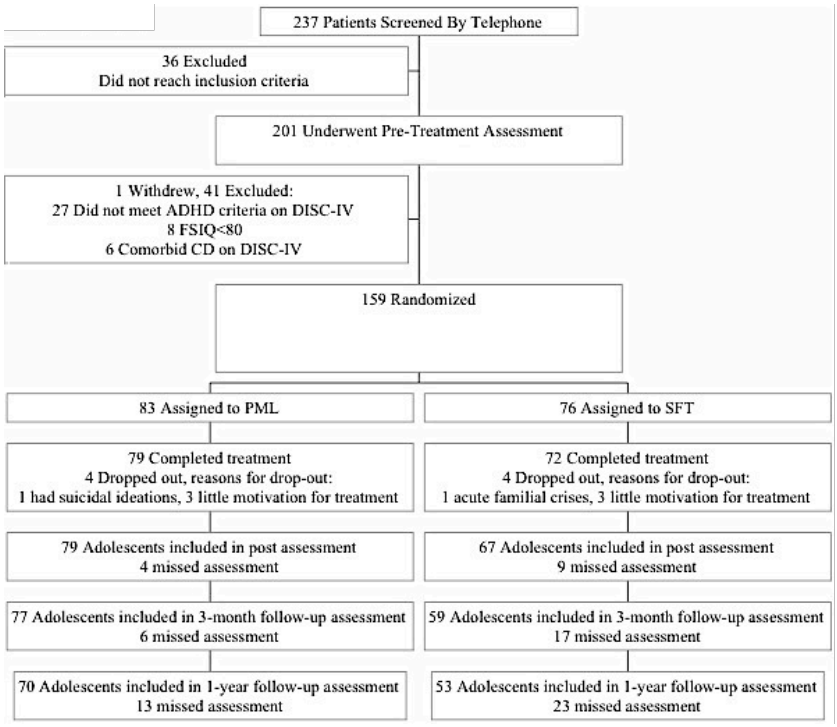
Even though the literature on long-term treatment effects in ADHD is sparse, especially in adolescents, systematic reviews on long-term treatment effects in children, adolescents and adults, show that without treatment, individuals with ADHD have poorer long-term outcomes compared with individuals without ADHD (Parker, Wales, Chalhoub, & Harpin, 2013; Shaw et al., 2012). Treatment for ADHD (especially treatment with medication or combined medication and behavioral treatment) improves outcomes to one year after treatment compared to untreated ADHD (or community care), although usually the outcomes do not improve to normal levels (Parker et al., 2013; Shaw et al., 2012). However at the longer term, naturalistic follow-ups in children with ADHD, like for example the Multimodal Treatment for ADHD study, show that these initial treatment differences dissipate (Molina et al., 2009; Parker et al., 2013).

RCTs specifically on the effects of planning- and organization-based treatments showed maintenance of initial improvements in children (Abikoff et al., 2013) and adults (Safren et al., 2010) with ADHD. Also, these treatments resulted in more gains than control treatments to at least nine months after treatment (Abikoff et al., 2013; Safren et al., 2010). However, no systematic RCTs have been conducted on long-term improvements of behavior following planning skills-based CBT in adolescents with ADHD. Aims of this study are 1) to determine whether improvements, from pretest to follow-up three months after treatment (FU1), are maintained or continue to improve until follow-up one year after treatment (FU2), 2) to determine the differences between both treatments at 1-year follow-up.

Methods

For a detailed description of the participants, measures, treatments, procedures, and treatment fidelity see **chapter 3**. After informed consent and pretest, adolescents were randomly assigned to either PML (n=83) or SFT (n=76), there were no baseline differences between both treatment groups. At baseline, 70.3% of adolescents had the inattentive subtype, 73.5% were

Figure 4.1. Flow chart.

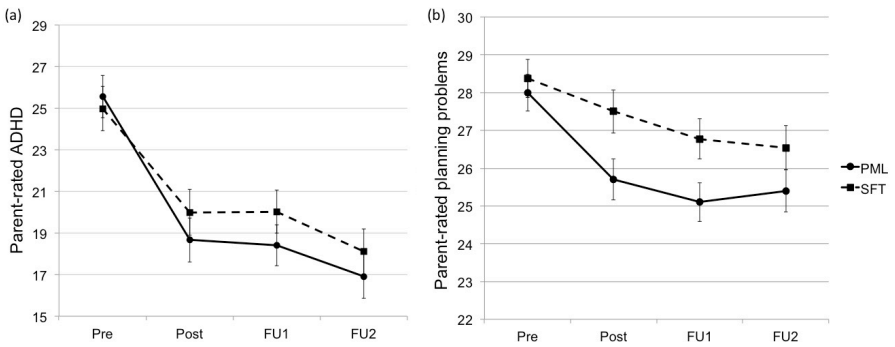


Note: ADHD, Attention Deficit Hyperactivity Disorder; CD, Conduct Disorder; DISC-IV, Diagnostic Interview Schedule for Children; FSIQ, Full Scale IQ; PML, Plan My Life; SFT, Solution-Focused Treatment.

boys and 78.1% used psychotropic medication next to CBT (adolescents were requested to keep medication stable during active treatment). Adherence was high in both treatments and no treatment contamination was found. PML showed significantly higher attendance rates than SFT at FU1 (three months after posttest) and again at FU2 (one year after posttest): parents filled in more questionnaires, $\chi^2(1)=11.40$, $p=.001$, $\varphi=-.27$ ($n_{total}=41$ missings at FU2), and more adolescents attended assessments when receiving PML, $\chi^2(1)=4.83$, $p=.03$, $\varphi=-.17$ ($n_{total}=36$ missings at FU2; see Figure 4.1). Also, participants who were retained at one-year follow up had shown less improvement in impairment from pretest to three-month follow-up in comparison to the group participants that did show up at FU2 assessment.

Outcomes were collected on five domains: 1) Parent-rated (primary) measures, 2) Neuropsychological measures, 3) Comorbid symptoms (adolescent

Figure 4.2: Mean values and standard errors of parent-rated ADHD (a) and parent rated planning problems (b) for both treatments from pretest to one-year follow-up.



ADHD, Attention Deficit Hyperactivity Disorder; PML: Plan My Life; Pre: pretest; Post: posttest; SFT: Solution-Focused Treatment; FU1: three-month follow-up; FU2: one-year follow-up.

as well as parent report), 4) General functioning (adolescent as well as parent report), 5) Teacher measures (which could not be analysed due to high rates of missing data). Parents were asked about the use of medication (yes/no), type (Methylphenidate [MPH]/Dexamphetamine) and dose of medication*. Normalization of functioning was measured with the Impairment Rating Scale (Fabiano et al., 2006). Partial eta squared ES (η_p^2) are reported: η_p^2=.01 is regarded a small, .06 a medium, and .14 a large ES (Cohen, 1988).

Results

Intent-to-treat analyses were conducted. On average the length of time between FU1 and FU2 was 8.57 months (*SD*=1.68). There were no differences between the two treatment groups in the number of adolescents who started (*n*=7) or stopped (*n*=6) medication (*p*=.80, φ=.10) or who changed medication dose (*n*=18, *p*=.46, φ=.09) between FU1 and FU2. Repeated measures analyses showed no within-group difference in MPH dose between FU1 and FU2 (*p*=.92, η_p^2=.00) nor between treatment-groups (*p*=.61, η_p^2=.00). Also, no differences emerged in the number of adolescents receiving additional non-pharmacological treatment between the two treatments between FU1 and FU2 (n_{PML}=15, n_{SFT}=14, *p*=.74, φ=.03). Additional treatment included: home-

* Because some adolescents only use MPH during the school-week, school-week average dose is calculated.

Table 4.1a: Results of repeated measures MANOVAs and univariate follow-up tests comparing treatment effects of PML and SFT from pretest to one-year follow-up.

	Time		Time × Treatment	
Domain	F	η_p^2	F	η_p^2
1. Parent-rated measures				
Omnibus	F(9, 149)=21.30***	.563	F(9, 149)=.98	.056
ADHD symptoms	F(3, 471)=52.54***	.251	F(3, 471)=1.15	.007
EF problems	F(3, 471)=28.48***	.154	F(3, 471)=1.61	.010
Planning problems	F(3, 471)=14.95***	.087	F(3, 471)=1.40	.009
2. Neuropsychological measures				
Omnibus	F(12, 146)=13.38***	.524	F(12, 146)=1.53	.112
Tower Test	F(3, 471)=41.95***	.211	F(3, 471)=.75	.005
Trail Making Test	F(3, 471)=.94	.006	F(3, 471)=1.19	.008
Key Search	F(3, 471)=32.44***	.171	F(3, 471)=1.18	.007
Zoo Map	F(3, 471)=1.80	.011	F(3, 471)=2.41	.015
3. Comorbid symptoms				
Omnibus	F(15, 143)=8.02***	.457	F(15, 143)=1.40	.128
Depression	F(3, 471)=13.94***	.082	F(3, 471)=1.16	.007
Anxiety	F(3, 471)=25.02***	.137	F(3, 471)=.85	.005
ODD/CD	F(3, 471)=12.88***	.076	F(3, 471)=1.47	.009
Internalizing	F(3, 471)=19.34***	.110	F(3, 471)=.83	.005
Externalizing	F(3, 471)=10.44***	.062	F(3, 471)=2.12	.013
4. General functioning				
Omnibus	F(15, 143)=6.09***	.390	F(15, 143)=1.23	.114
School attitude	F(3, 471)=6.09***	.037	F(3, 471)=1.59	.010
Homework problems	F(3, 471)=15.23***	.088	F(3, 471)=1.39	.009
Conflict (parent)	F(3, 471)=6.79***	.041	F(3, 471)=1.09	.007
Conflict (adolescent)	F(3, 471)=3.89**	.024	F(3, 471)=.19	.001
Overall impairment	F(3, 471)=15.94***	.092	F(3, 471)=.96	.006

ADHD: Attention Deficit Hyperactivity Disorder; EF: Executive Functioning; FU2: one-year follow-up; ODD/CD: Oppositional Defiant Disorder/Conduct Disorder; PML, Plan My Life; SFT, Solution Focused Treatment. η_p^2 effect size: .01 is small, .06 is medium, .14 is large. * p<0.05; ** p<0.01, *** p<0.001. † No longer significant when controlling for medication use, additional treatment or site. Please note that covariates 'medication use' and 'additional treatment' have missing values resulting in smaller sample sizes, respectively: n=135, n=134.)

work tutoring (n=12), follow-up psychologist sessions (n=8), both (n=3) or help for comorbid problems (n=6).

Missing data on adolescent and parent data were imputed using stochastic regression. Next, four separate repeated measure MANOVAs were con-

Table 4.1b: Time contrasts and time x treatment contrasts comparing treatment effects of PML and SFT from three-month to one-year follow-up.

	Time Contrasts		Time × Treatment Contrasts	
Domain	F	η_p^2	F	η_p^2
1. Parent-rated measures				
ADHD symptoms	F(1, 157)=7.07**†	.043	F(1, 157)=.10	.001
EF problems	F(1, 157)=3.00	.019	F(1, 157)=.13	.001
Planning problems	F(1, 157)=.01	.000	F(1, 157)=.43	.003
2. Neuropsychological measures				
Tower Test	F(1, 157)=.74	.040	F(1, 157)=.74	.001
Trail Making Test	F(1, 157)=.17	.001	F(1, 157)=.33	.006
Key Search	F(1, 157)=.46	.002	F(1, 157)=.50	.003
Zoo Map	F(1, 157)=1.64	.003	F(1, 157)=.20	.010
3. Comorbid symptoms				
Depression	F(1, 157)=.53	.003	F(1, 157)=.36	.002
Anxiety	F(1, 157)=.90	.006	F(1, 157)=2.49	.016
ODD/CD	F(1, 157)=1.62	.010	F(1, 157)=3.14	.020
Internalizing	F(1, 157)=6.41**†	.039	F(1, 157)=.00	.000
Externalizing	F(1, 157)=.14	.001	F(1, 157)=.97	.006
4. General functioning				
School attitude	F(1, 157)=4.67*†	.029	F(1, 157)=6.02*†	.037
Homework problems	F(1, 157)=.01	.000	F(1, 157)=.08	.000
Conflict (parent)	F(1, 157)=.77	.005	F(1, 157)=2.25	.014
Conflict (adolescent)	F(1, 157)=.37	.002	F(1, 157)=.46	.003
Overall impairment	F(1, 157)=3.39	.021	F(1, 157)=.03	.000

ADHD: Attention Deficit Hyperactivity Disorder; EF: Executive Functioning; FU1: three-month follow-up; FU2: one-year follow-up; ODD/CD: Oppositional Defiant Disorder/Conduct Disorder; PML: Plan My Life; SFT, Solution Focused Treatment. η_p^2 effect size: .01 is small, .06 is medium, .14 is large. * p<0.05; ** p<0.01, *** p<0.001; † No longer significant when controlling for medication use, additional treatment or site. Please note that covariates 'medication use' and 'additional treatment' have missing values resulting in smaller sample respectively: n=135, n=134.

ducted on four outcome domains, with time (pretest, posttest, FU1, FU2) as within variable and treatment (PLM, SFT) as between variable. Bonferroni correction was used, resulting in an alpha of .0125.

Omnibus tests showed significant within-group improvement over time, with large ES (η_p^2 range=.39–.56). On all outcome-measures, univariate analyses showed a significant within-group improvement over time, except for two neuropsychological measures. On 14 of 17 outcome measures, within-subject contrasts showed maintenance effects from FU1 to FU2. Results

Table 4.2a: Means and standard deviations of PML at pretest, posttest, three-month follow-up and one-year follow up.

	Pre		Post		FU1		FU2	
Domain	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Parent-rated ADHD and EF								
ADHD symptoms	25.56	9.48	18.66	9.64	18.41	9.76	16.91	9.80
EF problems	154.53	20.23	142.70	20.56	141.44	22.83	137.75	26.36
Planning problems	28.00	4.47	25.70	4.70	25.10	5.39	25.40	5.49
Neuropsychological measures								
Tower Test	17.89	2.80	18.54	3.13	19.97	3.91	20.57	3.89
Trail Making Test	−.91	2.31	−1.05	2.12	−1.34	2.06	−1.44	1.66
Key Search	.37	.28	.49	.33	.59	.44	.60	.41
Zoo Map	.11	.06	.14	.14	.12	.06	.10	.07
Comorbid symptoms								
Depression	10.10	6.51	8.92	6.82	7.68	5.10	8.47	5.60
Anxiety	27.03	19.42	20.49	16.17	18.86	14. 39	19.30	14.98
ODD/CD	6.77	5.29	5.84	5.49	4.74	4.30	4.57	4.19
Internalizing	10.47	6.97	8.53	6.38	7.03	6.69	8.34	6.64
Externalizing	11.31	7.43	9.46	6.27	9.21	6.78	8.95	6.44
General Functioning								
School attitude	158.74	20.30	158.16	22.62	161.83	21.35	161.54	22.01
Homework problems	46.90	11.63	42.52	11.42	42.29	12.10	42.46	12.90
Conflict (parent)	10.93	7.32	10.02	8.16	9.49	7.95	9.18	8.19
Conflict (adolescent)	9.25	8.01	8.57	7.69	8.16	7.95	7.48	7.23
Overall impairment	32.30	11.68	27.44	11.44	26.64	13.36	24.69	13.49

ADHD: Attention Deficit Hyperactivity Disorder; EF: Executive Functioning; FU1: three-month follow-up; FU2: one-year follow-up; ODD/CD: Oppositional Defiant Disorder/Conduct Disorder; PML: Plan My Life.

are shown in Table 4.1 and Table 4.2. The primary outcome, parent-rated ADHD-symptoms (see Figure 4.2a, p. 88), and also school attitude, further improved from FU1 to FU2 with small ES (respectively p=.01, η_p^2=.04; p=.03, η_p^2=.03). On the internalizing problems measure, a small significant relapse was found between FU1 and FU2 (p=.01, η_p^2=.04). However, when co-varying for medication use at FU2 (yes/no), receiving additional treatment after posttest (yes/no), or site-effects, maintenance effects remained but these additional beneficial effects from FU1 to FU2 were annulled.

There was a significant within-group improvement on the number of adolescents for whom impairment normalized from FU1 to FU2, $\chi^2(1)$=8.23,

Table 4.2b: Means and standard deviations of SFT at pretest, posttest, three-month follow-up and one-year follow up.

	Pre		Post		FU1		FU2	
Domain	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Parent-rated ADHD and EF								
DHD symptoms	24.97	9.16	19.99	9.69	20.02	8.21	18.10	9.40
EF problems	153.04	19.28	148.13	23.31	143.71	18.17	141.28	23.57
Planning problems	28.38	4.35	27.50	5.29	26.77	3.66	26.54	4.55
Neuropsychological measures								
Tower Test	17.29	2.50	18.69	3.17	19.98	3.40	20.76	3.06
Trail Making Test	−1.41	2.42	−1.09	2.57	−1.42	1.82	−1.17	1.35
Key Search	.39	.37	.50	.34	.71	.60	.67	.44
Zoo Map	.10	.05	.11	.06	.12	.08	.12	.07
Comorbid symptoms								
Depression	9.97	5.65	9.21	5.57	8.48	4.65	8.10	5.74
Anxiety	24.06	18.25	19.54	18.17	18.53	16.17	16.76	14.12
ODD/CD	6.47	4.98	5.99	5.78	4.55	3.80	5.58	6.15
Internalizing	10.53	8.57	9.36	8.67	6.47	5.64	7.82	9.09
Externalizing	10.39	7.35	10.40	7.89	8.21	6.16	8.79	6.60
General Functioning								
School attitude	157.50	16.01	158.41	17.48	158.86	16.58	163.52	13.65
Homework problems	49.89	12.37	46.77	11.87	43.67	11.65	43.30	10.72
Conflict (parent)	9.92	6.83	9.43	6.72	7.38	6.77	8.57	7.39
Conflict (adolescent)	8.63	7.02	7.57	6.99	6.90	6.90	6.93	6.44
Overall impairment	30.60	11.32	28.73	11.43	27.01	12.45	25.49	12.04

ADHD: Attention Deficit Hyperactivity Disorder; FU1: three-month follow-up; FU2: one-year follow-up; ODD/CD: Oppositional Defiant Disorder/Conduct Disorder; SFT: Solution Focused Treatment.

p=.004, φ=.30. This number increased from 15.2% at FU1 to 25.9% at FU2*.

Finally, and most importantly, there were no time × treatment interactions from pretest to FU2 (η_p^2 range=.06–.13). Also, the earlier found difference in favor of PML, on parent-rated planning problems at three-month follow-up, disappeared (see Figure 4.2b, p. 88). In addition, between treatment comparisons of all outcome measures separately at FU2, using independent t-tests, also failed to show any treatment differences.

* At all assessments data were missing.

Discussion

Overall, this study shows that initial improvements, from baseline to three months after treatment, were maintained to one year after treatment. Moreover, ADHD symptoms further declined and 26% of adolescents showed normalized functioning. Our findings 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 et al., 2013; Shaw et al., 2012). However, earlier found differences between both CBTs disappeared; indicating that focusing treatment on planning skills is not necessary for improvement of functioning in adolescents with ADHD.

Systematic review of the few studies that have investigated long-term treatment effects in children and adolescents (Parker et al., 2013), but also adults (Shaw et al., 2012) with ADHD found that, even though participants overall tend to improve during treatment (especially with medication and combined medication- and behavior treatment), initial treatment differences disappear and effect sizes decrease with time (Molina et al., 2009). Also in this study, nonspecific treatment effects could have caused the improvements over time, like for example attending treatment sessions, visiting a mental health care institute or therapist, working from a workbook, engaging in procedures directed at behavior change. Apart from non-specific treatment effects, both our treatments have motivational interviewing as a treatment mechanism. Motivational interviewing could cause the adolescents to persevere in trying to reach their treatment goals over time. Also, perhaps booster sessions or 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). However, due to absence of a control group this is speculative and studies on treatment mechanisms are needed to support this.

As our design lacked a non-treated ADHD comparison group, positive long-term effects may also be due to natural decline of ADHD symptoms in adolescence (Biederman, Mick, & Faraone, 2000). Also, in this study parents were highly educated, the age of initial diagnosis was higher than usual (M_{age}=12.5), and only a small percentage had a history of non-pharmacological treatment. Some might argue that this indicates a less impaired sample. Another limitation of this study is the lack of blinded outcome measures, due to high rates of missing teacher data. Further research, accounting for these limitations, is needed to prove effectiveness of these CBTs.

Nevertheless, systematic review shows that outcomes for children, adolescents and adults with ADHD when left untreated are often poor (Parker et al., 2013; Shaw et al., 2012), whereas adolescents in this RCT show improvements as compared to pretest. In sum, the maintenance of initial improvements at one-year follow-up, may show promise for the clinical utility of both CBT's for adolescents with ADHD.