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BRIEF REPORT

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

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Abstract 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 a RCT, adolescents with ADHD ($n = 159$) were assigned to PML or SFT and improved significantly between pre- and posttest with large effect sizes Boyer et al (Eur Child Adolesc Psychiatry. doi:10.1007/s00787-014-0661-5), with marginal differences in favor of PML. One-year follow-up data were gathered. Initial improvements remained stable or continued to improve from posttest to 1-year follow-up. 25.9 % of adolescents showed normalized functioning. However, no treatment differences were found. 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 3-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.

Keywords ADHD · Adolescence · CBT · Treatment · Long-term effects · Planning

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 [1]. When adolescents with ADHD have planning problems, this can cause impairment in school, family- and social functioning [2]. Because evidence-based non-pharmacological treatments for adolescents with ADHD are lacking [3], a cognitive behavioural treatment (CBT) was developed, focusing on planning skills: Plan My Life (PML) [4]. 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 [1]), this treatment was compared to a control CBT, without the proposed active element of enhancing planning skills: a solution-focused treatment (SFT [5]). Both PML and SFT are individual, manualized treatments consisting of 8 adolescent sessions and 2 parental sessions. Whereas in PML planning skills are actively learned by discussing a fixed subject every week, 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.

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Pre-, post- and 3-month follow-up data were gathered in 159 adolescents with ADHD (12–17 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 3 months after treatment on most measures (with exception of two neuropsychological measures). In addition, 15.2 % of adolescents showed normalization of functioning at three-month 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 [1]. Due to the lack of an adequate control group such as a waitlist or a treatment-as-usual group, effectiveness of both treatments could not be proven. However, if treatment differences between PML and SFT 3 months after treatment, would persist or even improve further on the longer term, one could conclude that treatment aiming on 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 [6, 7]. Treatment for ADHD (especially treatment with medication or combined medication and behavioural 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 [6, 7]. However, at the longer term, naturalistic follow-ups in children with ADHD, like for example the multimodal treatment for ADHD study [8], show that these initial treatment differences dissipate [7, 8].

RCTs specifically on the effects of planning- and organization-based treatments showed maintenance of initial improvements in children [2] and adults [9] with ADHD. Also, these treatments resulted in more gains than control treatments to at least 9 months after treatment [2, 9]. However, no systematic RCTs have been conducted on long-term improvements of behaviour following planning skills-based CBT in adolescents with ADHD. The aims of this study are: (1) to determine whether improvements, from pretest to follow-up 3 months after treatment (FU1), are maintained or continue to improve until follow-up 1 year after treatment (FU2), (2) to determine the differences between both treatments at 1-year follow-up.

Methods

For a detailed description of the measures, treatments, procedures, and treatment fidelity see Boyer et al. [1]. 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 boys and 78.1 % used psychotropic medication next to CBT (adolescents were requested to keep medication stable during active treatment). For a more extensive description of the participants see Supplement 1. Adherence was high in both treatments and no treatment contamination was found. PML showed significantly higher attendance rates than SFT at FU1 (3 months after posttest) and again at FU2 (1 year after posttest): parents filled in more questionnaires, $\chi^2(1) = 11.40$, $p = .001$, $\phi = -0.27$ ($n_{\text{total}} = 41$ missings at FU2), and more adolescents attended assessments when receiving PML, $\chi^2(1) = 4.83$, $p = .03$, $\phi = -0.17$ ($n_{\text{total}} = 36$ missings at FU2). Also, participants who were retained at 1-year follow-up had shown less improvement in impairment from pretest to 3-month follow-up in comparison to the group participants that did show up at FU2 assessment.

Outcomes were collected on five domains (see Table 1 and S1): (1) Parent-rated (primary) measures, (2) neuropsychological measures, (3) comorbid symptoms (adolescent 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.[1] Normalization of functioning was measured with the Impairment Rating Scale [10]. Partial eta squared ES ($\eta\rho^2$) are reported: $\eta\rho^2 = 0.01$ is regarded a small, 0.06 a medium, and 0.14 a large ES [11].

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 ($p = 0.80$, $\phi = 0.10$) or who changed medication dose ($n = 18$; $p = 0.46$, $\phi = 0.09$) between FU1 and FU2. Repeated measures analyses showed no within-group difference in MPH dose between

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

Table 1 Results of repeated measures MANOVAs, univariate and within-subject contrast follow-up tests comparing treatment effects of PML and SFT

Domain	Pretest to FU2 analyses (MANOVA)				FU1 to FU2 contrast analyses			
	Time		Time*treatment		Time contrasts		Time*treatment contrasts	
	F	$\eta\rho^2$	*F*	$\eta\rho^2$	*F*	$\eta\rho^2$	*F*	$\eta\rho^2$
(1) Parent-rated measures								
Omnibus	$F(9, 149) = 21.30$***	0.563	$F(9, 149) = 0.980.056$					
ADHD symptoms[a]	$F(3, 471) = 52.54$***	0.251	$F(3, 471) = 1.150.007$		F(1, 157) = 7.07**[†]	0.043	F(1, 157) = 0.10	0.001
Executive functioning[a]	$F(3, 471) = 28.48$***	0.154	$F(3, 471) = 1.610.010$		F(1, 157) = 3.00	0.019	F(1, 157) = 0.13	0.001
Planning problems[a]	$F(3, 471) = 14.95$***	0.087	$F(3, 471) = 1.400.009$		F(1, 157) = 0.01	0.000	F(1, 157) = 0.43	0.003
(2) Neuropsychological tasks								
Omnibus	$F(12, 146) = 13.38$***	0.524	$F(12, 146) = 1.530.112$					
Tower test[c]	$F(3, 471) = 41.95$***	0.211	$F(3, 471) = 0.750.005$		F(1, 157) = 0.74	0.040	F(1, 157) = 0.74	0.001
Trail making test[c]	$F(3, 471) = 0.94$	0.006	$F(3, 471) = 1.190.008$		F(1, 157) = 0.17	0.001	F(1, 157) = 0.33	0.006
Key search[c]	$F(3, 471) = 32.44$***	0.171	$F(3, 471) = 1.180.007$		F(1, 157) = 0.46	0.002	F(1, 157) = 0.50	0.003
Zoo map[c]	$F(3, 471) = 1.80$	0.011	$F(3, 471) = 2.410.015$		F(1, 157) = 1.64	0.003	F(1, 157) = 0.20	0.010
(3) Comorbid symptoms								
Omnibus	$F(15, 143) = 8.02$***	0.457	$F(15, 143) = 1.40$	0.128				
Depression[b]	$F(3, 471) = 13.94$***	0.082	$F(3, 471) = 1.16$	0.007	F(1, 157) = 0.53	0.003	F(1, 157) = 0.36	0.002
Anxiety[b]	$F(3, 471) = 25.02$***	0.137	$F(3, 471) = 0.85$	0.005	F(1, 157) = 0.90	0.006	F(1, 157) = 2.49	0.016
ODD/CD[a]	$F(3, 471) = 12.88$***	0.076	$F(3, 471) = 1.47$	0.009	F(1, 157) = 1.62	0.010	F(1, 157) = 3.14	0.020
Internalizing problems[a]	$F(3, 471) = 19.34$***	0.110	$F(3, 471) = 0.83$	0.005	F(1, 157) = 6.41**[†]	0.039	F(1, 157) = 0.00	0.000
Externalizing problems[a]	$F(3, 471) = 10.44$***	0.062	$F(3, 471) = 2.12$	0.013	F(1, 157) = 0.14	0.001	F(1, 157) = 0.97	0.006
(4) General functioning								
Omnibus	$F(15, 143) = 6.09$***	0.390	$F(15, 143) = 1.23$	0.114				
School attitude[b]	$F(3, 471) = 6.09$***	0.037	$F(3, 471) = 1.59$	0.010	F(1, 157) = 4.67*[†]	0.029	F(1, 157) = 6.02*[†]	0.037
Homework problems[a]	$F(3, 471) = 15.23$***	0.088	$F(3, 471) = 1.39$	0.009	F(1, 157) = 0.01	0.000	F(1, 157) = 0.08	0.000
Parent-adolescent conflict[a]	$F(3, 471) = 6.79$***	0.041	$F(3, 471) = 1.09$	0.007	F(1, 157) = 0.77	0.005	F(1, 157) = 2.25	0.014
Parent-adolescent conflict[b]	$F(3, 471) = 3.89$**	0.024	$F(3, 471) = 0.19$	0.001	F(1, 157) = 0.37	0.002	F(1, 157) = 0.46	0.003
Overall impairment[a]	$F(3, 471) = 15.94$***	0.092	$F(3, 471) = 0.96$	0.006	F(1, 157) = 3.39	0.021	F(1, 157) = 0.03	0.000

$\eta\rho^2$ effect size: 0.01 is small, 0.06 is medium, 0.14 is large. Please note that covariates "medication use" and "additional treatment" have missing values resulting in smaller sample sizes, respectively: $n = 135$, $n = 134$

ADHD Attention deficit hyperactivity disorder, *FU1* 3-month follow-up, *FU2* 1-year follow-up, *ODD/CD* oppositional defiant disorder/conduct disorder

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

[†] No longer significant when controlling for medication use, additional treatment or site

[a] Parent report, [b] adolescent report, [c] neuropsychological measure

FU1 and FU2 ($p = 0.92$, $\eta p^2 = 0.00$) nor between treatment-groups ($p = 0.61$, $\eta p^2 = .00$). Also, no differences emerged in the number of adolescents receiving additional non-pharmacological treatment between the two treatments between FU1 and FU2 ($n_{PML} = 15$, $n_{SFT} = 14$, $p = 0.74$, $\phi = 0.03$). Additional treatment included: homework 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 conducted 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 0.0125.

Omnibus tests showed significant within-group improvement over time, with large ES ($\eta\rho^2$ range = 0.39–0.56). 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 are shown in Table 1.

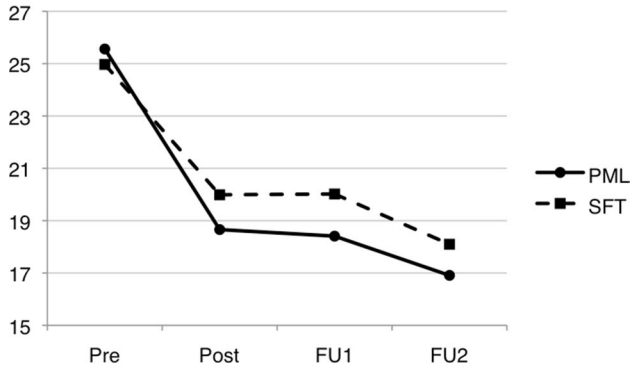

Fig. 1 Evolution of parent-rated ADHD for both treatments from pretest to 1-year follow-up. *PML* Plan My Life, *Pre* pretest, *Post* posttest, *SFT* Solution-Focused Treatment, *FU1* 3-month follow-up, *FU2* 1-year follow-up

The primary outcome, parent-rated ADHD symptoms (Fig. 1), and also school attitude, further improved from FU1 to FU2 with small ES (respectively $p = 0.01$, $\eta\rho^2 = 0.04$; $p = 0.03$, $\eta\rho^2 = 0.03$). On the internalizing problems measure, a small significant relapse was found between FU1 and FU2 ($p = 0.01$, $\eta\rho^2 = 0.04$). 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, $\chi^2(1) = 8.23$, $p = 0.004$, $\phi = 0.30$. This number increased from 15.2 % at FU1 to 25.9 % at FU2.[2]

Finally, and most importantly, there were no time × treatment interactions from pretest to FU2 ($\eta\rho^2$ range = 0.06–0.13). In addition, between treatment comparisons of all outcome measures separately at FU2, using independent *t* tests, also failed to show any treatment differences.

Discussion

Overall, this study shows that initial improvements, from baseline to 3 months after treatment, were maintained to 1 year after treatment. Moreover, ADHD symptoms further declined and 25.9 % of adolescents showed normalized functioning. Our findings are consistent with the finding that treatment of ADHD improves outcomes to 1 year after treatment, but usually not to the point of normalization [6–8]. 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 [7], but also adults [6] with ADHD found that, even though participants overall tend to improve during treatment (especially with medication and combined medication- and behaviour treatment), initial treatment differences disappear and effect sizes decrease with time [8]. Also in this study, non-specific 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 behaviour 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 [12]. 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 [13]. 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 [6, 7], whereas adolescents in this RCT show improvements as compared to pretest. In summary, the maintenance of initial improvements at 1-year follow-up, may show promise for the clinical utility of both CBTs for adolescents with ADHD.

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Compliance with ethical standards

Conflict of interest Bianca E. Boyer is co-developer and author of the manuals 'Plan My Life' and 'Solution Focused Treatment': she receives royalties for the sales of both interventions. Saskia van der

[2] At all assessments data were missing.

Oord has been a paid consultant for Janssen Pharmaceuticals in the development of a serious game "Healseeker": aimed at training cognitive functions. Also, she is co-developer and author of the manuals 'Plan My Life' and 'Solution Focused Treatment'. However, she has no financial interest in the sales of the interventions. She has received speaker's fees from MEDICE and Shire. Other authors declare no conflict of interest.

References

1. Boyer BE, Geurts HM, Prins PJM, Van der Oord S (2014) Two novel CBTs for adolescents with ADHD: the value of planning skills. Eur Child Adolesc Psychiatry 24:1075–1090
2. Abikoff H, Gallagher R, Wells KC et al (2013) Remediating organizational functioning in children with ADHD: immediate and long-term effects from a randomized controlled trial. J Consult Clin Psychol 81:113–128
3. Evans SW, Owens JS, Bunford N (2013) Evidence-based psychosocial treatments for children and adolescents with attention-deficit/hyperactivity disorder. J Clin Child Adolesc 0:1–25
4. Kuin M, Boyer BE, Van der Oord S (2013) Zelf Plannen [Plan My Life]. Uitgeverij Lannoo-Campus, Houten
5. Boyer BE, Kuin M, Van der Oord S (2014) Zelf Oplossingen Bedenken [Solution-Focused Treatment]. Uitgeverij Lannoo-Campus, Houten
6. Shaw M, Hodgkins P, Caci H et al (2012) A systematic review and analysis of long-term outcomes in attention deficit hyperactivity disorder: effects of treatment and non-treatment. BMC Med. doi:10.1186/1741-7015-10-99
7. Parker J, Wales G, Chalhoub N et al (2013) The long-term outcomes of interventions for the management of attention-deficit hyperactivity disorder in children and adolescents: a systematic review of randomized controlled trials. Psychol Res Behav Manag 6:87–99
8. Molina BSG, Hinshaw SP, Swanson JM et al (2009) The MTA at 8 years: prospective follow-up of children treated for combined-type ADHD in a multisite study. J Am Acad Child Adolesc Psychiatry 48:484–500
9. Safren SA, Sprich S, Mimiaga MJ et al (2010) Cognitive behavioral therapy vs relaxation with educational support for medication-treated adults with ADHD and persistent symptoms: a randomized controlled trial. JAMA 304:875–880
10. Fabiano GA, Pelham WE, Waschbusch DA et al (2006) A practical measure of impairment: psychometric properties of the impairment rating scale in samples of children with attention deficit hyperactivity disorder and two school-based samples. J Clin Child Adolesc 35:369–385
11. Cohen J (1988) Statistical power analysis for the behavioral sciences, 2nd edn. Academic Press, New York
12. Sibley MH, Kuriyan AB, Evans SW et al (2014) Pharmacological and psychosocial treatments for adolescents with ADHD: an updated systematic review of the literature. Clin Psychol Rev. doi:10.1016/j.cpr.2014.02.001
13. Biederman J, Mick E, Faraone SV (2000) Age-dependent decline of symptoms of attention deficit hyperactivity disorder: impact of remission definition and symptom type. Am J Psychiatry 157:816–818