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ORIGINAL PAPER

A Cost-effectiveness Analysis of *Caring in Chaos*—A Volunteer-delivered Parent Training Program in Denmark

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Abstract

Parental competence and child functioning may be enhanced through behavioral parent training (BPT). However, conducting BPT is associated with substantial costs, and availability is often limited. This study assesses the cost-effectiveness of a BPT program in Denmark, *Caring in Chaos* (CiC), delivered by skilled volunteers (CiC trainers). Parents of three-nine-year-old children with ADHD or similar difficulties were recruited and randomized into treatment ($n = 80$ children, $N = 160$ parents) or waitlist control ($n = 81$ children, $N = 162$ parents). Parenting competence and child functioning were assessed using the Parenting Sense of Competence Scale (PSOC) and the Home Situations Questionnaire (HSQ) at baseline and four-month follow-up. Costs for providers included non-recurrent costs, set-up costs, and running costs, and costs for participants were assessed by time use. The total recurrent cost per family is $1,178 (PPP adjusted, 2015) (8,601 DKK, 2015), and the average time use by families is 34.96 h (SD = 11.55). From a provider perspective, CiC is cost effective with a 90% probability, if providers are willing to pay $2,230 (16,287 DKK) or $5,579 (40,744 DKK) per SD gain in PSOC or HSQ, respectively. From a participant perspective, CiC is time effective with a 90% probability, if participants are willing to spend 67 or 165 h per SD gain in PSOC or HSQ, respectively. Overall, our findings suggest that the cost-effectiveness of volunteer-delivered BPT, such as CiC, compares favorably with the cost-effectiveness of BPT programs delivered by professionals.

Keywords Cost-effectiveness · Behavioral parent training · Volunteers · Randomized controlled trial · ADHD

Highlights

- Skilled volunteers may be a cost-effective alternative to delivering behavioral parent training.
- The probability of cost-effectiveness is highest for parental competences.
- Future studies would benefit from including instruments that allow for the estimation of QALYs.

If left untreated, ADHD and other similar disruptive behavior in children can have considerable negative consequences in childhood, adolescence, and adulthood. Children exhibiting disruptive behavior are more likely than other children to have poor educational outcomes and to experience conflicts with their peers (Arnold et al. 2020; Currie and Stabile 2006; Nijmeijer et al. 2008; Shaw et al. 2012). Adults diagnosed with ADHD in childhood have a 10–14% lower probability of employment and a 33% reduction in earnings compared to their (undiagnosed) siblings (Fletcher 2014). Adults with ADHD are also more likely to use illegal substances and be involved in criminal activity (Sonuga-Barke et al. 2013). Families with a child with ADHD experience more conflicts and higher levels of parenting stress (DuPaul et al. 2001). Furthermore, ADHD in children is associated with increased disturbances in family and marital functioning, disrupted parent–child relationships, and reduced parenting self-efficacy (Johnston and Mash 2001).

The annual incremental costs of ADHD in the US range from $155 billion to $289 billion (USD, 2015), costs stemming mainly from productivity and income losses but

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also from the health care and educational sectors (Doshi et al. 2012). In the UK, preschoolers who were rated as hyperactive by their parents had 17.6 times higher service use costs per annum than the non-hyperactive controls (Chorozoglou et al. 2015). The costs of ADHD in Denmark are ~3.0 billion Danish kroner (DKK; $435 million) a year, corresponding to 160,000 DKK ($23,300) per person with ADHD (Daley et al. 2015) (all costs are given in 2015 prices).

Most clinician-administered behavioral parent training (BPT) programs improve parental competence and reduce functional impairment of children with ADHD or similar disruptive behavior (Chacko et al. 2015; Charach et al. 2013; Chronis et al. 2004). Though associated with substantial costs, the BPT programs are generally found to be cost-effective (Charles et al. 2011; Edwards et al. 2007; Honeycutt et al. 2015; O'Neill et al. 2013; Sampaio et al. 2016, 2018a; Stevens 2014). Hence, wide-spread availability of BPT programs should have a positive influence on both costs and outcomes associated with ADHD, especially in a country like Denmark with steeply increasing ADHD prevalence rates (Due et al. 2014). However, availability of and access to BPT programs is often limited (Koerting et al. 2013; Setyawan et al. 2018), for which reason there is a pressing need to expand service delivery (Chacko and Scavenius 2017).

One novel way of expanding service delivery is through the use of skilled volunteers. The use of volunteers for promoting mental and emotional well-being has been encouraged by the US Surgeon General, who emphasized access to volunteer-based support groups as a measure for improving mental health (Surgeon General 2014). Gardner et al. (2006) showed that a parenting intervention delivered in a community-based voluntary-sector organization was effective in reducing children's behavioral problems and enhancing parenting skills. Chacko and Scavenius (2017) showed that the Danish BPT program *Caring in Chaos* (CiC), delivered by skilled volunteers (CiC trainers), resulted in significant improvements in parenting behavior, parenting competence, parental stress, parental depressive symptoms and child functional impairment, while having no significant effect on child ADHD symptoms. The CiC program is a common-elements BPT program, focusing on psychoeducation, positive behavior and tools for managing conflict prevention (Chorpita and Daleiden 2009; Garland et al. 2008). It was developed by the Danish ADHD Association, a non-governmental advocacy organization, funded through members' fees, donations, and grants, which aims at improving the conditions for people with ADHD and their families.

This economic evaluation is a follow-up of the CiC-randomized controlled trial (Chacko and Scavenius 2017). The principal aim was to investigate the cost-effectiveness of CiC, thereby providing economic evidence on the trade-off between benefits for parents and children and costs for providers. In addition, we investigate the trade-off between benefits and time-related costs for parents by analyzing the time-effectiveness of the program. For the program to be successful, parents must consider participation worthwhile. Parents must therefore weigh the expected gain of BPT against the amount of time they are willing to spend on BPT. Similarly, policy makers who want to provide a new BPT program, and therefore need to weigh pros and cons of different programs, should consider not only the monetary cost of a program, but also its expected workload for participants. It was hypothesized that delivery of BPT by volunteers with previous skills relevant for BPT, e.g., education, social work, or health, would constitute a cost-effective alternative to BPT programs delivered by professionals.

Method

Participants

The main trial recruited participating parents to CiC via advertisements in Danish local and national newspapers, via the Danish ADHD Association's webpage and newsletter, and via banners on all Danish elementary schools' internal webpages (Chacko and Scavenius 2017). Parents signed up for the course of their own initiative by answering and submitting an online questionnaire. On registration, the parents registered the name of one child in the family between the age of three and nine with ADHD or similar behavioral difficulties (the "identified child").

Table 1 presents summary characteristics by treatment status for both the participants and the "identified children" at the baseline. As expected, given randomized allocation, Table 1 shows few significant differences in the demographic characteristics of the families across groups. Except for a larger share of caregivers with 9–10 years of schooling in the control group, all characteristics are balanced across the treatment and the control groups. With Bonferroni correction for multiple comparisons, there are no statistical differences between groups.

Procedure

Inclusion in the main trial required availability of two adults during training—typically both biological parents, or a parent and a stepparent. However, grandparents, aunts and uncles, and friends of the parent(s) could also participate, as long as both participants were involved in the upbringing of the child, thereby enabling participants to engage fully in discussing the course material and to encourage one another

Table 1 Participant, household, and child characteristics by treatment group status

	Treatment group	Control group	p value for equality across groups
Proportion of female participants	0.56	0.56	0.80
Participants' average age	42	42	0.72
Proportion of biological parents	0.83	0.84	0.72
Proportion of households in which participants live together	0.75	0.75	0.96
Proportion of households with more than one child	0.85	0.86	0.80
Proportion of households with other children with ADHD	0.18	0.09	0.10
Proportion of participants above clinical cutoff of ADHD[a]	0.27	0.28	0.94
Proportion of employed participants	0.84	0.80	0.46
Proportion of unemployed participants	0.04	0.07	0.29
Proportion of participants with other employment status	0.02	0.13	0.88
Proportion of participants with 9–10 years of schooling	0.01	0.08	0.01*
Proportion of participants with 10–12 years of schooling	0.43	0.45	0.71
Proportion of participants with 13–15 years of schooling	0.40	0.35	0.43
Proportion of participants with 15–17 years of schooling	0.12	0.08	0.41
Proportion of participants with 18–20 years of schooling	0.03	0.01	0.22
Number of participants	160	162	
Proportion of male children	0.83	0.75	0.27
Child's age	7.1	7.0	0.54
Proportion of children with ADHD diagnosis	0.71	0.68	0.65
Age when child diagnosed with ADHD	6.1	6.2	0.79
Proportion of children with other diagnosis	0.29	0.28	0.96
Child's behavior indicator (parents' evaluation)	0.5	0.5	0.97
Number of children	80	81	

[a]Parents are defined as having ADHD according to their answers in the ASRS questionnaire

*$p < 0.01$

to use the exercises and tools at home (Chacko and Scavenius 2017).

Treatment was offered in 12 cities across Denmark, where participants were randomized to the treatment ($N = 160$; two adults for each identified child, $n = 80$), or waitlist control ($N = 162$; two adults for each identified child, $n = 81$). Between three and seven couples participated at each location. Parental consent was obtained before randomization. In the main trial, data were collected at baseline, post-treatment assessment, immediately after training (81% response rate), and at a four-month follow-up assessment (71% response rate). Here we use the baseline and four-month follow-up assessments to calculate cost-effectiveness.

As shown in Chacko and Scavenius (2017), there were some differences in demographic characteristics ($p < 0.05$) between respondents and non-respondents. Assessed individuals were more likely also to attend training sessions, to be biological parents of the child, and to live together, and were less likely to report having another child with ADHD, and more likely to be employed, compared to unassessed individuals. However, there were no differences in baseline scores on any outcome measures between the participants who completed the assessments and those who did not.

The Intervention

Details on the CiC BPT program are given in Chacko and Scavenius (2017). Here we provide a brief overview of the program as context with a focus on resources used. CiC is a manual-based program, developed by the Danish ADHD Association in 2011, for parents of children from ages three-nine who have either been diagnosed with ADHD or have similar difficulties. It is structured around a schedule of 12 weekly sessions on weekday evenings for small groups of parents. Each session lasts 2.5 h, except the first and the last, which each include an additional hour to allow for greetings and farewells. To avoid distractions during the training, couples participated without their children. The ADHD Association offered practical and economic support in finding and hiring a childminder to avoid cancellations or dropouts. Participation was free, and parents were offered a snack or light meal during the course.

The program schedule and the training manual build on research in BPT and the Danish ADHD Association's

experience with these families' problems. The focus in CiC is on three core elements: psychoeducation, positive behavior, and tools for conflict prevention. Parents learn how ADHD affects child development, and they learn to notice, praise, and emphasize the child's positive behavior rather than correcting and emphasizing antisocial or aggressive behavior. Moreover, parents learn and practice child-rearing tools for preventing and handling conflicts, including explicit communication, visual planning, predictable daily routines, and the use of mild-to-moderate consequences (e.g., time-outs) or rewards.

While the content of CiC thus reflects common social-learning principles of other evidence-based BPT, such as Triple P (Positive Parenting Program) or the Incredible Years, one novel element of CiC is that all the trainers are volunteers. The purpose of this approach was to reduce the costs associated with professional-delivered BPT programs and to increase the availability of BPT programs to parents.

CiC Trainers

The volunteers who functioned as CiC trainers were recruited through both the Danish ADHD Association network and advertisements in Danish national newspapers. The aspiring CiC trainers were required to have training or experience, from education or work, in a field relevant to the core elements of CiC, such as teaching, social work, or health care. Retirees with relevant previous experience were also considered eligible. Furthermore, the advertisements emphasized that either teaching experience or previous knowledge of ADHD was an advantage. The recruitment process resulted in 260 applicants.

To conduct the randomized trial, the ADHD Association educated 48 CiC trainers out of the 260 applicants. Although most of the selectees were teachers or psychologists, ADHD coaches, pedagogues, and nurses were also selected. The CiC trainers were motivated either by professional development or by personal experiences. Indeed, many have an older child with ADHD and were motivated by the idea of being able to help other people in circumstances similar to what their own had formerly been.

The trainers were educated in the CiC program over three consecutive weekends, with the education focusing on general knowledge about ADHD (taught by an MD), the content of the manual, and the role of a trainer (taught by a psychologist, consultants from the ADHD Association, and a trainer from the CiC pilot project). In addition to these professional educators, group leaders from the ADHD Association helped with the educating of the CiC trainers. Toward the end of this education, the CiC trainers had to role-play parts of the course material for their peers, the educators, and the group leaders, all of whom evaluated their performance.

Measures

Monetary costs and time use

This study examines direct monetary costs from the program provider's perspective, in this case the Danish ADHD Association, and the cost in hours from the participants' perspective. Hence, we do not include any opportunity costs (e.g., lost labor income by parents or volunteers) and indirect benefits (e.g., savings in public health, social care, and special education sectors).

The data on monetary costs were obtained retrospectively from the Danish ADHD Association. We collected three types of costs: First, Non-recurrent initial costs, including costs associated with CiC program development. Second, CiC setup costs, including costs associated with recruiting and educating the 24 volunteer trainers necessary for conducting the program with 12 groups of parents. Third, CiC running costs, including costs associated with program delivery to parents, such as venue rental, volunteers' mileage, child minding services, and supervision. The latter cover costs associated with one pair of supervisors from the ADHD association who attended one CiC session for each of the CiC groups to give feedback to the CiC trainers on their performance and to enhance fidelity.

The sum of setup and running costs is the relevant recurrent cost if we, conservatively, assume that CiC trainers only participate in one round of the program. According to the ADHD Association, 96% of CiC trainers ($N = 46$) reported being willing to repeat the program immediately post treatment. Thus, retaining volunteers has not constituted an obstacle to the program's sustainability.

In addition to provider cost from the ADHD Association, we also analyzed time-use costs from the participants' perspective. As the program was offered on weekday evenings and the ADHD Association paid for child-minding services, the primary cost of participation was time related. To determine families' cost in time, we added commuting time (from their home to the training site) to time spent on training for each of the 12 sessions, corrected for no-shows when both parents failed to participate. As shown in Chacko and Scavenius (2017), average attendance was 9.47 (SD = 4.00), equivalent to 77% (SD = 29%), of the 12 sessions. We calculated commuting time between the home address and the training site, using the fastest means of transportation (walking or by car) in Google Maps. Couples actual means of transportation is unknown to us, and therefore, we disregard costs for, for instance, fuel and public transport. Hence, our measure constitutes a lower boundary for the actual commuting costs.

Outcomes

In the main trial, the effects of CiC were measured on parenting behavior, parenting competences, parenting stress, parenting depression, child ADHD symptoms, and child functional impairment (Chacko and Scavenius 2017). In this cost analysis, we focus on two core outcomes of BPT: parental sense of competence and child functional impairment, measured using the Parenting Sense of Competence Scale (PSOC; Johnston and Mash 1989) and the Home Situations Questionnaire (HSQ; Altepeter and Breen 1989). The explicit goal of CiC is to provide parents with tools to handle their child's behavioral difficulties, improvements being reflected by improvements in the PSOC and the HSQ. Moreover, CiC has statistically significant positive effects on these scores, which makes them relevant for cost analysis (as the control group is on a waitlist at zero cost, not intervening would be more cost effective than CiC, if effects were not significantly positive).

The PSOC is a validated measure of parental competence that focuses on two dimensions: satisfaction (nine questions) and efficacy (seven questions). All of the 16 questions are answered on a Likert-scale ranging from strongly agree (1) to strongly disagree (6). The satisfaction section examines the parent's anxiety, motivation, and frustration, while the efficacy section examines the parent's competence, capability levels, and problem-solving abilities in their parental role. The total score across the 16 items gives the parent's total value of his or her parental competence.

The HSQ measures parents' impression of their child's functional impairment and evaluates the child's behavior at home in 16 areas (e.g., during mealtimes or when getting dressed). Each area is rated on a scale from 0 (not a significant problem) to 1 (significant problem). Total scores range from 0 to 16, with higher scores equating to greater impairment. To facilitate the interpretation of our results, we have reversed the scale, so that higher HSQ scores are better.

Data Analysis

The data analysis is carried out in six steps. First, we estimate the effect of treatment from an OLS regression, controlling for baseline outcomes. In particular, we estimate the regression $Y_{it} = \beta + \alpha \times Y_{it-1} + \rho \times \mathrm{CiC}_i + \varepsilon_{it}$, where Y_{it} is the outcome of individual i at time t (the outcome at four-month follow-up), Y_{it-1} is the baseline outcome of individual i, CiC is an indicator of treatment, and ε_{it} is the unmodeled error term. The parameter estimate of ρ is the effect of treatment on outcome Y (i.e., PSOC or HSQ). This regression model is different from the multiple-imputation regression model in Chacko and Scavenius (2017); here we apply the computationally faster OLS regression to bootstrap cost-effectiveness. Qualitatively, however, the two regression models estimate similar treatment effects.

Studies of cost-effectiveness frequently denominate the effect of an intervention in terms of quality-adjusted life years (QALYs) to facilitate comparability across different outcomes and interventions. Moreover, QALYs have the advantage of having inherent value for money credentials, meaning there are established willingness-to-pay values for a gained QALY (Glick et al. 2014). Preference-based utility measures capture health-related quality of life based on individuals' preferences and hence allow for the calculation of quality-of-life weights for different health states (Drummond et al. 2015). However, when the CiC intervention was carried out (in 2013) no measure existed that allowed for the estimation of QALYs to be used in children below the age of seven (Sampaio et al. 2018b).

Overall, few previous studies have estimated QALYs in a BPT context. Simkiss et al. (2013) used the SF-12 to estimate QALY of The Family Links Nurturing Programme for parents and Ulfsdotter et al. (2015) used a parent proxy Visual Analog Scale and the GHQ-12 to estimate the QALY gains of the universal ABC program in children and parents, respectively. As no measure that allows the estimation of QALYs in either parents or children is available to us, we instead present the effect of CiC in terms of Cohen's d effect sizes (ES) to allow for cross-study comparison, where ES is the effect of CiC on outcome Y divided by the total sample standard deviation (SD) of that outcome at baseline, i.e., ES $= \rho$/SD. ES is the typical cross-study measure of effects n systematic reviews of BPT.

Second, to determine the incremental cost of treatment, we estimate the regression $C_f = \gamma + \delta \times \mathrm{CiC}_f + \varepsilon_f$, where C_f is the cost of participation in CiC for family f. The parameter estimate of δ is the average cost of treatment in the sample. To estimate the average time use of participating in CiC, we simply replace C_f with the time use of family f.

The cost of CiC was measured in Danish Kroner (DKK). To compare the cost-effectiveness of CiC to other BPT programs, we convert DKK to Purchasing Power Parity-adjusted dollars (PPP), using the 2015 exchange rates (1 PPP-adjusted USD = 7.303 DKK). The PPP exchange rate adjusts for the slightly higher price level in Denmark compared to the USA (the simple 2015 exchange rate: 1 USD = 6.526 DKK), i.e., the PPP equalizes the purchasing power between the two countries to reflect expected costs in the USA.

Third, we divide the incremental cost of treatment (i.e., the estimate of δ from the second regression) with the effect size of treatment (i.e., ES from the first regression), hereby obtaining the cost of treatment per SD increase in the outcome; in other words, the cost of CiC scaled to a gain of one ES in the outcome (δ/ES).

Fourth, we apply a four-step bootstrap procedure (Glick et al. 2014) to determine the statistical uncertainty of the estimates of δ, ES, and δ/ES. In the first step, we randomly draw 80 treated and 81 control families from our sample, using random sampling with replacement. In the second step, we estimate the incremental cost (δ), effect of treatment (ρ), and total sample standard deviation of the outcome at baseline (SD) from this new bootstrap sample. In the third step, we calculate the effect size (ES $= \rho$/SD) and the estimated cost-to-effect ratio (δ/ES), and in the fourth step we save three bootstrapped statistics: cost, effect size, and cost-to-effect ratios. We repeat this procedure 10,000 times, building a dataset of $b = 10{,}000$ statistics of δ_b, ES_b, and δ_b/ES_b. From these three sampling distributions, we calculate standard errors, p values, and bias-corrected confidence intervals (Campbell and Torgerson 1999) of the original observed δ, ES, and δ/ES.

Fifth, we plot each pair of effect size and incremental cost (ES_b; δ_b) in the cost-effectiveness plane. Each quadrant of this plane illustrates the uncertainty of the cost-effectiveness of CiC in repeated samples: The intervention is more effective and expensive than no intervention if $ES_b > 0$ and $\delta_b > 0$; the intervention is less effective and more expensive than no intervention if $ES_b < 0$ and $\delta_b > 0$; the intervention is less effective and expensive than no intervention if $ES_b < 0$ and $\delta_b < 0$; and the intervention is more effective and less expensive than no intervention if $ES_b > 0$ and $\delta_b < 0$.

Sixth, we illustrate the probability that the cost-to-effect ratio is smaller than a given value; that is, we draw the cumulative distribution of the 10,000 statistics of δ_b/ES_b. On the y axis, the cumulative distribution shows the probability that δ/ES will take a value lower than a given value on the x axis. This cumulative distribution is the cost-effectiveness acceptability curve, showing the probability that the intervention is cost effective (y axis) at different willingness-to-pay values (x axis). For example, if a provider is willing to pay 1,000 dollars per ES (i.e., δ/ES ≤ \$1,000), the cost-effectiveness acceptability curve will display the probability of being within budget, accounting for uncertainty in both costs and effects in a repeated sample. The cost-effectiveness acceptability curve can therefore guide providers on their choice of BPT, given their willingness to pay for an increase in Y.

Results

Effect on Outcomes

As the focus of this study is cost effectiveness, we only briefly report results on the treatment effect. Parental competence, measured by PSOC, increased by ES = 0.69 standard deviations more in the treatment group than in the control group (bootstrapped SE = 0.14; p value < 0.001; 95% CI [0.44, 0.98] and PSOC point = ρ = 6.71). Similarly, the effect size for HSQ was ES = −0.36 standard deviations (bootstrapped SE = 0.12; p value = 0.002; 95% CI [−0.60, −0.13] and HSQ points = ρ = −1.66).

Provider's Cost and Cost-effectiveness

Costs of delivering CiC are listed in Table 2. The initial development costs were \$91,916 (671,265 DKK). The setup cost of training the 24 volunteers was, and the cost of running the 12 groups was \$67,648 (494,034 DKK). The recurrent cost per treated child, including both the setup and running costs of CiC, is \$1,178 (8,601 DKK) per child.

As explained in the "Method" section, we exclude the opportunity costs incurred by volunteers in the main analysis of this study, as opportunity costs do not constitute a tangible cost to delivering CiC. However, as volunteers are key to the cost-effectiveness of CiC, we briefly discuss the value of their time here. On average, volunteers spent 46.5 h on being trained as CiC trainers and an additional 49.5 h delivering the program (both figures include traveling time). Evaluated at an average teacher salary, opportunity costs were \$2,905 (21,215 DKK) per volunteer. Including opportunity costs, the recurrent cost per child would increase from \$1,178 (8,601 DKK) to \$2,049 (14,966 DKK). Including volunteers' opportunity costs would therefore increase the total cost of delivering the program by 73%.

The cost-effectiveness ratio (δ/ES) gives the cost (setup and running costs per family) per ES improvement in the PSOC. In the actual sample, the cost-effectiveness ratio is \$1,178/0.69 = \$1,707 (12,465 DKK), with a bootstrapped 95% confidence interval [1,215; 2,641]. This means that the Danish ADHD Association paid \$1,707 per ES in PSOC, and if they were to repeat CiC, they should expect to pay between \$1,215 and \$2,641 per ES in 95% of the repetitions. The cost-effectiveness plane in Fig. 1 depicts this uncertainty together with the actual ES (0.69) and actual recurrent cost (\$1,178). As both costs and ESs are positive for all repetitions, all cost and ES pairs fall within the northeast quadrant. The associated cost-effectiveness acceptability curve (Fig. 2) illustrates the share of repetitions, where the cost per ES is smaller than a given value; that is, the probability that CiC will be cost-effective, given a provider's willingness-to-pay for one ES in PSOC.

From the cost-effectiveness acceptability curve, we infer that CiC will be cost-effective with a 90% probability, if a provider is willing to pay at least \$2,230 (16,287 DKK) per family for one ES in PSOC score. This means that 90% of the 10,000 bootstrap samples have a cost-effectiveness ratio lower than \$2,230, suggesting that a provider who is willing

Table 2 Total costs and costs per child of the CiC program (12 sessions and 12 locations) (DKK, 2015 and USD, 2015)

	Mean unit cost[a]	Mean units[a]	Total cost—DKK	Total cost USD[b]
Non-recurrent initial costs				
Program development	594 DKK/h	697 h	414,114	56,705
Meetings and administration	594 DKK/h	433 h	257,152	35,212
Subtotal			671,265	91,916
CiC setup costs[c]				
Advertisements for recruitment of volunteers			15,857	2,171
Expert educators' salaries	10,000 DKK/consultant	2 consultants	20,000	2,739
Three consultants from the ADHD association	594 DKK/h	22,5 h/consultant	40,162	5,499
Volunteers' milage	2,05 DKK/km	133 km/volunteer/training session	19,631	2,688
Educator's milage (five educators: three consultants and two experts)	2,05 DKK/km	132 km/educator/training session	3,198	438
Venue rental and refreshments	1,225 DKK/participant	26 participants/training session	95,186	13,034
Subtotal			194,034	26,569
CiC running costs[d]				
Advertisements for recruitment of parents			15,853	2,171
Volunteers' mileage	2,05 DKK/km	103 km/volunteer/CiC session	60,642	8,304
Child minding service	135 DKK/h	1233 h	166,397	22,785
Supervision and counseling	594 DKK/h	103 h	61,142	8,372
Venue rental	2500 DKK/location	12 locations	30,000	4,108
Refreshments	80 DKK/person/CiC session	14 persons/CiC-session	160,000	21,909
Subtotal			494,034	67,648
Total			1,359,334	186,134
Total cost per child			16,992	2,327
Total recurrent cost per child[e]			8,601	1,178
Total recurrent group running costs per child[f]			6,175	846

[a]Due to variation in unit costs across locations and rounding, mean unit costs multiplied by mean units does not always equate to total costs

[b]Total cost in PPP-adjusted 2015 US-dollars

[c]Costs associated with training of volunteers

[d]Costs associated with training of parents

[e](CiC setup cost + CiC running costs)/80

[f](CiC running costs)/80

to pay \$2,230 (per family for one ES in PSOC) will be within budget with a 90% probability. If a provider is willing to pay less, e.g., \$1,953 (14,261 DKK), or more, e.g., \$2,431 (17,756 DKK), per family, the probability of cost-effectiveness falls to 75% or increases to 95%, respectively.

Similarly, for children's HSQ-scores (Fig. 3) the incremental cost-effectiveness ratio is \$1,178/0.36 = \$3,272 (23,892 DKK) in the actual sample, with a bootstrapped 95% confidence interval [1,964; 9,008]. From the associated cost-effectiveness acceptability curve in Fig. 4, we estimate that CiC is cost effective with a probability of 90%, if a provider is willing to pay \$5,579 (40,744 DKK) per family for one ES in HSQ. This probability falls to 75%, if the willingness to pay for one ES in HSQ is \$4,153 (30,329 DKK) per family, and it rises to 95%, if a provider is willing to pay at least \$6,972 (50,913 DKK) for one ES in HSQ.

Although direct, one-to-one comparison across studies is difficult, as, for instance, outcome measures, participants, approaches to calculating costs and follow-up periods vary, Table 3 compares our results to three other BPT trials. These trials were chosen mainly for pragmatic reasons—information on effect sizes for either a child- or a parent-related outcome (or both), as well as information on costs, were reported. Furthermore, the trials applied a similar design (i.e., wait-list control group) and the children had similar ages and behavioral problems as the children in CiC. To increase comparability, we have recalculated average cost-effectiveness, as the cost of program provision in PPP-adjusted 2015 US-dollars per effect size. As two adults (parents) are treated per identified child in CiC, we calculate costs both per treated child and per adult participant (in the three comparison trials, only one parent per identified child is trained). The results show that the program provision costs per child of CiC are lower than those of similar programs. Moreover, CiC is at least as cost-effective (per child) as these programs in terms of parental competence. However, the evidence is mixed as regards the cost-effectiveness (per child) of CiC in terms of child behavior; CiC is more cost-effective than one of the reported trials, but less cost-effective than the two other reported trials. Considering cost

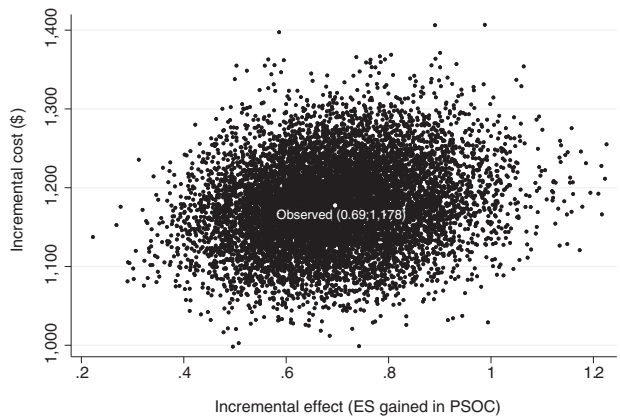

Fig. 1 Cost-effectiveness plane for recurrent cost and Parenting Sense of Competence Scale (PSOC)

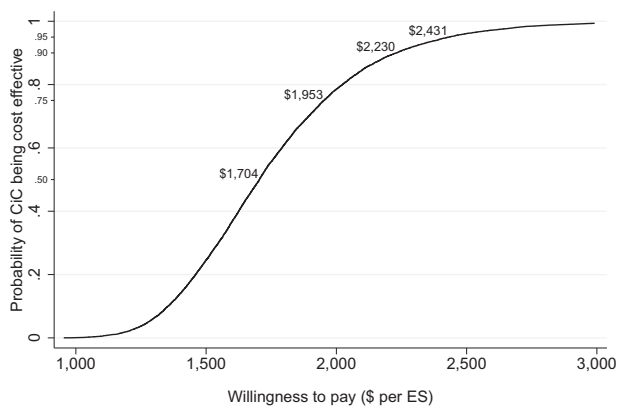

Fig. 2 Cost-effectiveness acceptability curve for recurrent costs and parental sense of competence (PSOC)

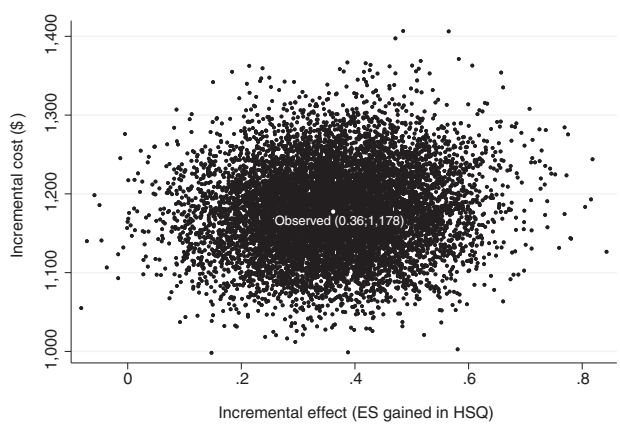

Fig. 3 Cost-effectiveness plane for recurrent costs and child functional impairment (HSQ)

per participant, CiC is considerably more cost-effective than the comparison trials, with the cost-effectiveness being as low as $1,636 for one ES in HSQ and $854 for one ES in PSOC.

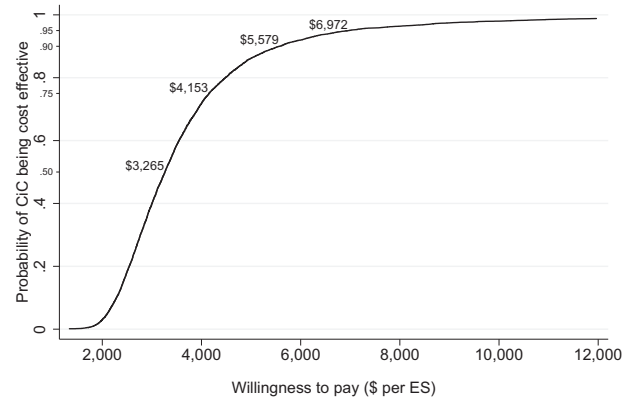

Fig. 4 Cost-effectiveness acceptability curve for recurrent costs and child functional impairment (HSQ)

We know little about decision-makers' willingness to pay for CiC, but data from the Ministry of Children and Social affairs (2016) and the Ministry of Social affairs and the Interior (2017, 2018, 2019) show that, on average, municipalities spent $3,938–$4,366 (mean $4,117) for a 12-week BPT program in the years 2016–2019. Decision-makers in Danish municipalities are therefore willing to pay $4,117, on average, for 12 weeks of BPT. Keeping in mind that participants' characteristics and problem severity in these municipal BPT programs are unknown to us, we can calculate threshold effect sizes, where CiC is cost-effective compared to municipal BPT. For example, there is a 50% chance that CiC is more effective than municipal BPT if the effect of municipal BPT on parental competences is 2.41 ES (1,704 = 4,117/2.41), and there is a 90% change that CiC is more cost-effective than municipal BPT if the effect of municipal BPT on parental competencies is 1.85 ES (2,230 = 4,117/1.85). Similarly, there is a 50% chance that CiC is more effective than municipal BPT if the effect of municipal BPT on child functional behavior is 1.26 ES (3,265 = 4,117/1.26), and there is a 90% change that CiC is more cost-effective than municipal BPT if the effect of municipal BPT on child functional behavior is 0.74 ES (5,579 = 4,117/0.74). These back-of-the-envelope calculations suggest that the effect of municipal BPT in Denmark must be large, or even very large, to be more cost-effective than CiC (Cohen 1988).

Participants' Time-use and "Time-effectiveness"

Maximum participation time in CiC training is 32 h, if families attend all sessions (2½ h per session, except the first and the final sessions, which were 3½ h each). Average commuting time in the sample was 25.47 min (one-way), so that the average total time spent on both participation and commuting for all 12 sessions is 42.19 h per family if they attend all sessions. Corrected for actual attendance (see

Table 3 Effect sizes for child behavior and parental stress outcomes, costs for program provision, and cost-effectiveness estimates in four trials

Studies (main trial; cost-effectiveness analysis)	ES—child functional behavior	ES—parental competences	Costs of program provision per child (year of costs)	Costs of program provision per participant (year of costs)	Costs in $[a]	Cost-effectiveness of child behavior ($/ES)	Cost-effectiveness of parental competence ($/ES)
(Little et al. 2012; Edwards et al. 2016)	0.37[b]	0.43[c]	£1,571 (2009)	£1,571 (2009)	2,157	5,829	5,015
(Mcgilloway et al. 2011; O'Neill et al. 2013)	0.70[b]	n.a.	€1,463 (2008)	€1,463 (2008)	1,458	2,083	n.a.
(Hutchings et al. 2007; Edwards et al. 2007)	0.89[b]	0.95[c]	£1,934 (2003)	£1,934 (2003)	2,754	3,094	2,899
This study (per identified child)	0.36[d]	0.69[e]	DKK 8,601 (2015)	DKK 4,301 (2015)	1,178	3,272	1,707

[a]Costs have been converted to 2015 PPP-adjusted US-dollars using OECD purchasing power parities (OECD 2019)

[b]Effect size from the Eyberg Child Behavior Inventory—Intensity Scale

[c]Effect size from the Arnold and O'Leary Parenting Scale (Arnold et al. 1993)

[d]Effect size from the Home Situations Questionnaire

[e]Effect size from the Parenting Sense of Competence Scale

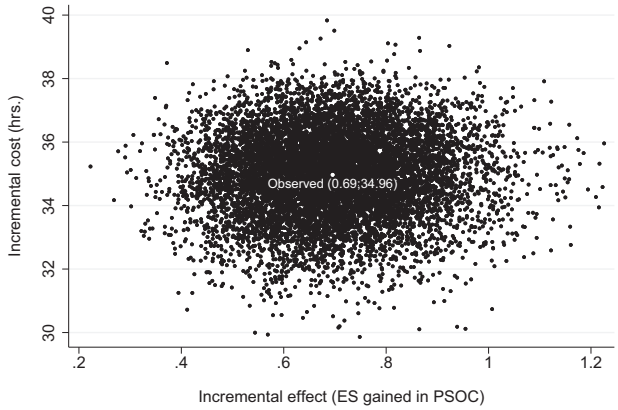

Fig. 5 Time-effectiveness plane for participants' time and parental sense of competence (PSOC)

"Method" section), the average time spent on training was 34.96 h (SD = 11.55) in the treatment group and zero hours in the waitlist group.

The time-effectiveness ratio (δ/ES) gives the cost in terms of participants' time use per ES in an outcome. The cost-effectiveness plane in Fig. 5 shows the time-effectiveness ratio for PSOC in the actual sample, 34.96/0.69 = 50.64 h, with a bootstrapped 95% confidence interval [35.58; 78.66]. This means that families in the actual trial, on average, spent 50.64 h per ES in PSOC, and if we were to repeat CiC families should expect to spend, on average, between 35.58 and 78.66 h per ES in 95% of the repetitions. The associated time-effectiveness acceptability curve (Fig. 6) illustrates the probability that CiC is time-effective in the 10,000 bootstrap sample, given families' willingness-to-pay (in time) for one ES in PSOC.

From the time-effectiveness acceptability curve, we infer that CiC is time-effective with a 90% probability, if the family is willing to invest at least 67 h for every ES in PSOC. For example, if a family is willing to spend 67 h for every ES in PSOC, they have a 90% chance of being within that limit in a repetition of CiC. If the family is willing to invest only, for instance, 58 h for every ES in PSOC, the probability of CIC's cost-effectiveness falls to 75%, but if they are willing to invest 73 h for every ES the probability of cost-effectiveness increases to 95%.

For children's HSQ scores, the estimated time-effectiveness ratio is 34.96/0.36 = 96.79, with a bootstrapped 95% confidence interval [58.48; 268.42], as shown in the time-effectiveness plane in Fig. 7. From the associated time-effectiveness acceptability curve in Fig. 8, we estimate that CiC is time effective with a probability of 90%, if the family is willing to spend 165 h per ES in HSQ. This probability falls to 75% if the willingness-to-pay threshold for every ES in HSQ is 123 h, and it increases to 95% if the family is willing to invest at least 208 h per ES in HSQ.

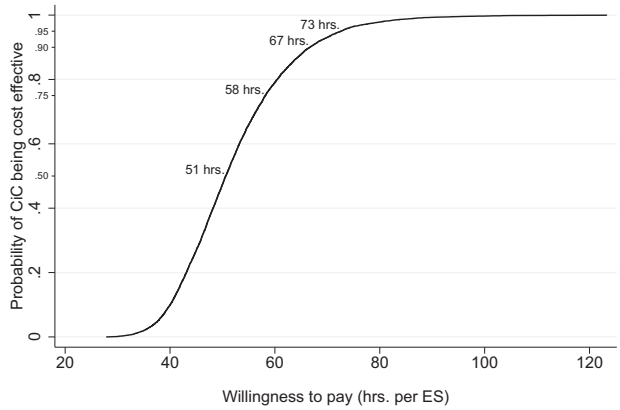

Fig. 6 Time-effectiveness acceptability curve for participants' time and parenting competences (PSOC)

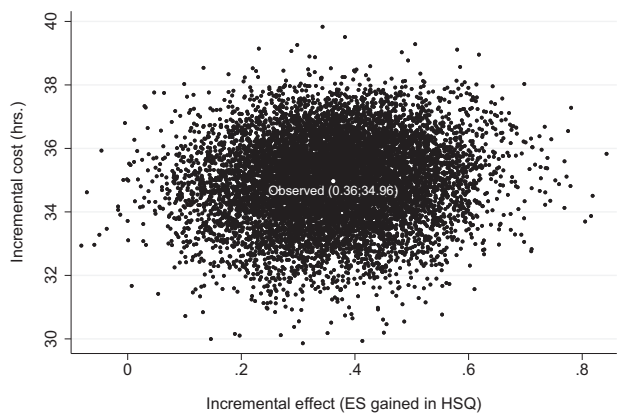

Fig. 7 Time-effectiveness plane for participants' time and child functional impairment (HSQ)

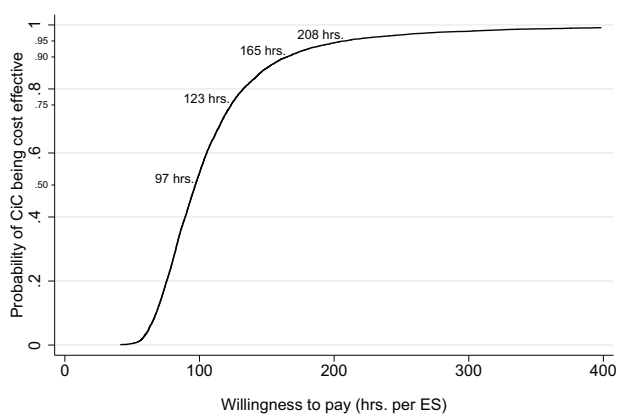

Fig. 8 Time-effectiveness acceptability curve for participants' time and child functional impairment (HSQ)

Discussion

The number of children diagnosed with ADHD—which has been shown to have considerable negative consequences for affected individuals, their families, and society—is rapidly increasing in many developed countries (Currie and Stabile 2006; Daley et al. 2015; Due et al. 2014; Johnston and Mash 2001). BPT programs that teach parents of children with ADHD how to manage their child's difficulties have been shown to influence positively both the affected children and their parents. The rapidly increasing number of diagnosed children makes it highly likely that widespread availability of BPT programs should have a positive influence on both costs and outcomes associated with ADHD. One way of increasing availability and reducing the costs of providing BPT is to use skilled volunteers as trainers.

Cost-effectiveness analysis compares the cost of a BPT to its effects, and can thus guide policy makers in choosing between BPT programs. "Cost-effectiveness analysis is of most use in situations where a decision-maker, operating with a given budget, is considering a limited range of options within a given field" (Drummond et al. 2015, p. 7). This analysis contributes to the literature on cost-effectiveness in the field of BPT programs (Charles et al. 2011; Sampaio et al. 2018b) by evaluating the cost-effectiveness of a BPT program in Denmark delivered by skilled volunteers. Moreover, we contribute to the literature on cost-effectiveness by investigating the program's time-effectiveness from the parents' perspective.

Our results show that parental competence and child functional behavior increased significantly among CiC participants from baseline to the four-month follow-up. Although direct comparison among studies is difficult due to, for instance, differences across samples and context, the results indicate that the effect of CiC is comparable to other BPT programs previously evaluated as to their effect on the PSOC-scale (Gardner et al. 2006; Trillingsgaard et al. 2014). Effect sizes for the HSQ scale were generally somewhat smaller than those reported in the literature (Canu and Bearman 2011; Danforth et al. 2006; Eichelberger et al. 2016). The larger effect of CiC for parents can potentially be due to peer-to-peer support. Many CiC trainers have personal experience with ADHD, as many CiC trainers are parents of children with ADHD. Hence, CiC contains an element of peer-to-peer support, which has previously been shown to be effective in mental health services (Repper and Carter 2011).

Our results further indicate that the costs of using skilled volunteers compare favorably to those of using professional trainers. Although direct comparison across studies is problematic, as approaches to calculating costs vary, our results indicate that the costs of delivering CiC compare favorably to the costs of three BPT programs delivered by professionals (Edwards et al. 2007, 2016; O'Neill et al. 2013).

As hypothesized, our results on cost-effectiveness indicate that CiC may be a cost-effective alternative for improving parental competence, compared to other BPT programs. This is due to the effect of CiC on parental competence being comparable to those in other studies,

while the costs are lower. The results on cost-effectiveness in terms of the child's functional behavior, however, are mixed. CiC is less cost-effective than two out of the three trials to which we compare it because the effect of CiC on child functional behavior is modest compared to the effect in the other two trials. In CiC, however, parents participate as couples, so for each treated child, two parents (or similar) are treated, whereas only one parent per child is treated in the comparison trials. Hence, if costs are recalculated per participant, CiC is substantially more cost-effective for both parental competence and child behavior.

Furthermore, given the high cost of municipal BPT in Denmark (Ministry of Social affairs and the Interior 2017, 2018, 2019), CiC is potentially a cost effective alternative in the Danish context. Back-of-the-envelope calculations suggest that CiC has a 90% chance of being cost effective even with large or very large effects of Danish municipal BPT.

Our results have practical implications as they can guide policy makers when choosing between various BPT programs. If the policy makers' objective is mainly to improve child behavior, our results imply that they can potentially do so in a more cost-effective way by choosing an intervention other than CiC. However, if the main objective is to increase parental competence, our results imply that CiC is likely to provide more value for money than comparable interventions.

Finally, the analysis of the time-effectiveness of the program investigates the trade-off between expected benefits of training and the expected time that parents will spend on training (e.g., intensity of training schedule, commuting time, or dropout from BPT). This analysis provides information on how much time parents should be willing to spend on CiC for a gain in parental competence and child behavior. As this approach is novel, it is not yet possible to compare the time-effectiveness of CiC to that of other studies. However, time-effectiveness studies can potentially inform parents and BPT providers about the trade-off between the effectiveness of training and time spent on training. For example, if a parent is willing to spend 50 h for a standard deviation gain in parenting competences, what is the probability that the BPT program will deliver this gain?

In light of the rapidly expanding prevalence of ADHD and the limited availability of and access to evidence-based BPT programs taught by professionals, our results indicate that delivery of BPT by skilled volunteers constitutes a cost-effective alternative to BPT programs delivered by professionals, particularly in relation to the cost-effectiveness for parental competence.

Limitations

Our study has a number of limitations that should be kept in mind when interpreting the findings. First, the children in our study have not all been diagnosed with ADHD. Hence, given the smaller room for improvement, effect sizes may be lower in our context than in comparable studies. Indeed, previous studies have found that parental programs tend to be more cost-effective for children with more severe behavioral problems (Edwards et al. 2007). On the other hand, volunteer delivery may be sufficient for this sample of children with mild-moderate symptoms of ADHD, but not for samples with more severe symptoms. Second, due to data limitations we can investigate the monetary cost-effectiveness only from a narrow program-provider perspective. We cannot investigate savings or increased costs that may have been incurred in other sectors, for example in the health-care sector, social services, or schools, as a result of the program (O'Neill et al. 2013). Nor can we account for indirect costs or benefits related to decreased or increased productivity of parents. As we cannot account for such costs or benefits, the cost-effectiveness of CiC may be over- or underestimated. Moreover, when calculating costs we have assumed that no volunteers are willing to repeat the program, in spite of information from the ADHD association indicating otherwise. The total recurrent cost per child reported here is therefore probably a conservative estimate of the cost of providing CiC. Third, as the long-term effects of CiC have not yet been evaluated it remains unclear whether the program's positive effects will persist over time. Early interventions may result in long-term economic gains for reasons such as better adult labor market performance, reduced educational or health care costs, or reductions in criminal activity (Bonin et al. 2011; Nystrand et al. 2019, 2020; O'Neill et al. 2013). Hence, if CiC has positive long-term effects in adulthood, the long-term economic benefits of the program may potentially be much larger than this short-term study indicates. Fourth, this study would have benefitted from the inclusion of a preference-based instrument that would have allowed for the estimation of QALYs, to allow for the comparison of cost effectiveness estimates across interventions as well as to established willingness-to-pay values. Moreover, most similar studies on cost-effectiveness use the Child Behavior Inventory and the Parenting Scale to measure the effect of BPT (Edwards et al. 2007, 2016; O'Neill et al. 2013; Sampaio et al. 2018b), while this study uses PSOC and HSQ. Hence, although we calculate effect sizes, our ability to make comparisons across programs is limited and comparisons should thus be interpreted with caution.

Fifth, the volunteer CiC trainers in this study all have experience from, for instance, education or work that makes them qualified as trainers. This high level of volunteer qualifications may limit the generalizability of our findings to countries or counties where it is possible to recruit high-skilled volunteers. According to data from the Program for the International Assessment of Adult Competencies

(PIAAC), high-skilled volunteers are most frequently found in the USA, Norway, and Canada, where 60–80% of high-skilled adults do voluntary work, and Australia, Denmark, Finland, Sweden, Ireland, Germany, England, The Netherlands, Belgium, and Estonia, where 40–60% of high-skilled adults do voluntary work (Grotlüschen 2018). These percentages do not speak to the particular skills of CiC trainers, but they do suggest that the general skill level of volunteers in Denmark is comparable to that of several other countries.

Despite these limitations, our study contributes to the sparse knowledge on cost-effectiveness of BPT. Although comparisons across programs are difficult, CiC costs compare favorably to those of similar programs while obtaining similar effects on outcomes. Therefore, even though more research and more comparable data are necessary to draw more definitive conclusions, our findings suggest that volunteer-based BPT, such as CiC, constitute valuable alternatives to professional-based BPT programs. Future studies should consider including preference-based instruments as outcome measures to allow for the estimation of QALYs.

Author Contributions C.S. designed and executed the study, analyzed the data, and contributed to the writing of the study, A.A. contributed to the design, analyzed the cost data, and wrote the study, E.A.S. contributed to the design and assisted with the analysis of the cost data.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were carried out in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individuals participating in the study.

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References

Altepeter, T. S., & Breen, M. J. (1989). The home situations questionnaire (HSQ) and the school situations questionnaire (SSQ): normative data and an evaluation of psychometric properties. *Journal of Psychoeducational Assessment*, *7*, 312–322. https://doi.org/10.1177/073428298900700404.

Arnold, D. S., O'Leary, S. G., Wolff, L. S., & Acker, M. M. (1993). The parenting scale: a measure of dysfunctional parenting in discipline situations. *Psychological Assessment*, *5*, 137–144. https://doi.org/10.1037/1040-3590.5.2.137.

Arnold, L. E., Hodgkins, P., Kahle, J., Madhoo, M., & Kewley, G. (2020). Long-term outcomes of ADHD: academic achievment and performance. *Journal of Attention Disorders*, *24*, 73–85. https://doi.org/10.1177/1087054714566076.

Bonin, E., Stevens, M., Beecham, J., Byford, S., & Parsonage, M. (2011). Costs and longer-term savings of parenting programmes for the prevention of persistent conduct disorder: a modelling study. *BMC Public Health*, *11*, 803. https://doi.org/10.1186/1471-2458-11-803.

Campbell, M. K., & Torgerson, D. J. (1999). Bootstrapping: estimating confidence intervals for cost-effectiveness ratios. *QJM*, *92*, 177–182. https://doi.org/10.1093/qjmed/92.3.177.

Canu, W. H., & Bearman, S. K. (2011). Community-clinic-based parent intervention addressing noncompliance in children with attention-deficit/hyperactivity disorder. *Cognitive and Behavioral Practice*, *18*, 491–501. https://doi.org/10.1016/j.cbpra.2010.07.005.

Chacko, A., Alan, C., Uderman, J., Cornwell, M. Anderson, L. & Chimiklis, A. (2015). Training parents of children with ADHD. In P. Barkley (Ed.), *Attention deficit hyperactivity disorder—a handbook for diagnosis and treatment*. New York: The Guilford Press.

Chacko, A., & Scavenius, C. (2017). Bending the curve: a community-based behavioral parent training model to address ADHD-related concerns in the voluntary sector in Denmark. *Journal of Abnormal Child Psychology*, *46*, 505–517. https://doi.org/10.1007/s10802-017-0310-9.

Charach, A., Carson, P., Fox, S., Ali, M. U., Beckett, J., & Lim, C. G. (2013). Interventions for preschool children at high risk for ADHD: a comparative effectiveness review. *Pediatrics*, *131*, e1584–e1604. https://doi.org/10.1542/peds.2012-0974.

Charles, J. M., Bywater, T., & Edwards, R. T. (2011). Parenting interventions: a systematic review of the economic evidence. *Child: Care, Health and Development*, *37*, 462–474. https://doi.org/10.1111/j.1365-2214.2011.01217.x.

Chorpita, B. F., & Daleiden, E. L. (2009). Mapping evidence-based treatments for children and adolescents: Application of the distillation and matching model to 615 treatments from 322 randomized trials. *Journal of Consulting and Clinical Psychology*, *77*, 566–579. https://doi.org/10.1037/a0014565.

Chorozoglou, M., Smith, E., Koerting, J., Thompson, M. J., Sayal, K., & Sonuga-Barke, E. J. S. (2015). Preschool hyperactivity is associated with long-term economic burden: evidence from a longitudinal health economic analysis of costs incurred across childhood, adolescence and young adulthood. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *56*, 966–975. https://doi.org/10.1111/jcpp.12437.

Chronis, A. M., Chacko, A., Fabiano, G. A., Wymbs, B. T., & Pelham, Jr., W. E. (2004). Enhancements to the behavioral parent training paradigm for families of children with ADHD: review and future directions. *Clinical Child & Family Psychology Review*, *7*, 1–27.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. 2nd ed. Hillsdale, NJ: Erlbaum.

Currie, J., & Stabile, M. (2006). Child mental health and human capital accumulation: the case of ADHD. *Journal of Health Economics*, *25*, 1094–1118. https://doi.org/10.1016/j.jhealeco.2006.03.001.

Daley, D., Jacobsen, R. H., Lange, A.-M., Sørensen, A., & Walldorf, J. (2015). Costing adult attention deficit hyperactivity disorder. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198745556.001.0001.

Danforth, J. S., Harvey, E., Ulaszek, W. R., & McKee, T. E. (2006). The outcome of group parent training for families of children with attention-deficit hyperactivity disorder and defiant/aggressive behavior. *Journal of Behavior Therapy and Experimental Psychiatry*, *37*, 188–205. https://doi.org/10.1016/J.JBTEP.2005.05.009.

Doshi, J. A., Hodgkins, P., Kahle, J., Sikirica, V., Cangelosi, M. J., Setyawan, J., Erder, M. H., & Neumann, P. J. (2012). Economic

impact of childhood and adult attention-deficit/hyperactivity disorder in the United States. *Journal of the American Academy of Child & Adolescent Psychiatry*, *51*, 990–1002. https://doi.org/10.1016/j.jaac.2012.07.008.

Drummond, M. F., Sculpher, M. J., Claxton, K., Stoddart, G. L. & Torrance, G. W. (2015). *Methods for the economic evaluation of health care programmes*. 4th ed. Oxford: Oxford University Press.

Due, P., Diderichsen, F., Meilstrup, C., Nordentoft, M., Obel, C., & Sandbæk, A. (2014). *Børn og unges mentale helbred—Forekomst af psykiske symptomer og lidelser og mulige forebyggelsesindsatser* Copenhagen: Vidensråd for Forebyggelse.

DuPaul, G. J., McGoey, K. E., Eckert, T. L., & VanBrakle, J. (2001). Preschool children with attention-deficit/hyperactivity disorder: impairments in behavioral, social, and school functioning. *Journal of the American Academy of Child & Adolescent Psychiatry*, *40*, 508–515. https://doi.org/10.1097/00004583-200105000-00009.

Edwards, R. T., Ceilleachair, A., Bywater, T., Hughes, D. A., & Hutchings, J. (2007). Parenting programme for parents of children at risk of developing conduct disorder: cost effectiveness analysis. *British Medical Journal*, *334*, 682–685.

Edwards, R. T., Jones, C., Berry, V., Charles, J., Linck, P., Bywater, T., & Hutchings, J. (2016). Incredible Years parenting programme: cost-effectiveness and implementation. *Journal of Children's Services*, *11*, 54–72. https://doi.org/10.1108/JCS-02-2015-0005.

Eichelberger, I., Plück, J., Hautmann, C., Hanisch, C., & Döpfner, M. (2016). Effectiveness of the prevention program for externalizing problem behavior (PEP) in preschoolers with severe and no or mild ADHD symptoms. *PEP in Preschool Children with ADHD Zeitschrift für Kinder-und Jugendpsychiatrie und Psychotherapie*, *44*, 231–239. https://doi.org/10.1024/1422-4917/a000425.

Fletcher, J. M. (2014). The effects of childhood ADHD on adult labor market outcomea. *Health Economics*, *23*, 159–181.

Gardner, F., Burton, J., & Klimes, I. (2006). Randomised controlled trial of a parenting intervention in the voluntary sector for reducing child conduct problems: outcomes and mechanisms of change. *Journal of Child Psychology and Psychiatry*, *47*, 1123–1132. https://doi.org/10.1111/j.1469-7610.2006.01668.x.

Garland, A. F., Hawley, K. M., Brookman-Frazee, L., & Hurlburt, M. S. (2008). Identifying common elements of evidence-based psychosocial treatments for children's disruptive behavior problems. *Journal of the American Academy of Child and Adolescent Psychiatry*, *47*(5), 505–514. https://doi.org/10.1097/CHI.0b013e31816765c2.

Grotlüschen, A. (2018). The narrative of 'equality of chances' as an approach to interpreting PIAAC results on perceived political efficacy, social trust and volunteering and the quest for political literacy. *European Journal for Research on the Education and Learning of Adults*, *9*(1), 109–125.

Glick, H. A., Doshi, J. A., Sonnad, S. S., & Polsky, D. (2014). Economic evaluation in clinical trials New York, NY: Oxford University Press. https://doi.org/10.1093/med/9780199685028.001.0001.

Honeycutt, A. A., Khavjou, O. A., Jones, D. J., Cuellar, J., & Forehand, R. L. (2015). Helping the noncompliant child: an assessment of program costs and cost-effectiveness. *Journal of Child and Family Studies*, *24*, 499–504. https://doi.org/10.1007/s10826-013-9862-7.

Hutchings, J., Bywater, T., Daley, D., Gardner, F., Whitaker, C., & Jones, K. (2007). Parenting intervention in Sure Start services for children at risk of developing conduct disorder: pragmatic randomised controlled trial. *BMJ,* 334–678. https://doi.org/10.1136/bmj.39126.620799.55.

Johnston, C., & Mash, E. J. (1989). A measure of parenting satisfaction and efficacy. *Journal of Clinical Child Psychology*, *18*, 167–176.

Johnston, C., & Mash, E. J. (2001). Families of children with attention-deficit/hyperactivity disorder: review and recommendations for future research. *Clinical Child & Family Psychology Review*, *4*, 183–207.

Koerting, J., Smith, E., Knowles, M. M., Latter, S., Elsey, H., McCann, D. C., Thompson, M., & Sonuga-Bark, E. J. (2013). Barriers to, and facilitators of, parenting programmes for childhood behaviour problems: a qualitative synthesis of studies of parents' and professionals' perceptions. *European Child and Adolescent Psychiatry*, *22*, 653–670. https://doi.org/10.1007/s00787-013-0401-2.

Little, M., Berry, V. L., Morpeth, L., Blower, S., Axford, N., Taylor, R., Bywater, T., Lehtonen, M., & Tobin, K. (2012). The impact of three evidence-based programmes delivered in public systems in Birmingham, UK. *International Journal of Conflict and Violence*, *6*, 260–272. https://doi.org/10.4119/UNIBI/ijcv.263.

Mcgilloway, S., Mhaille, G. N., Bywater, T., Furlong, M., Leckey, Y., Kelly, P., Comiskey, C., & Donnelly, M. (2011). A parenting intervention for childhood behavioral problems: a randomized controlled trial in disadvantaged community-based settings. *Journal of Consulting and Clinical Psychology*, *80*, 116–127. https://doi.org/10.1037/a0026304.

Ministry of Children and Social affairs. (2016). *Socialpolitisk Redegørelse 2016*. Copenhagen: Ministry of Children and Social affairs.

Ministry of Social affairs and the Interior. (2017). *Socialpolitisk Redegørelse 2017*. Copenhagen: Ministry of Social affairs and the Interior.

Ministry of Social affairs and the Interior. (2018). *Socialpolitisk Redegørelse 2018*. Copenhagen: Ministry of Social affairs and the Interior.

Ministry of Social affairs and the Interior. (2019). *Socialpolitisk Redegørelse 2019*. Copenhagen: Ministry of Social affairs and the Interior.

Nijmeijer, J. S., Minderaa, R. B., Buitelaar, J. K., Mulligan, A., Hartman, C. A., & Hoekstra, P. J. (2008). Attention-deficit/hyperactivity disorder and social dysfunctioning. *Clinical Psychology Review*, *28*, 692–708. https://doi.org/10.1016/j.cpr.2007.10.003.

Nystrand, C., Feldman, I., Enebrink, P., & Sampaio, F. (2019). Cost-effectiveness analysis of parenting interventions for the prevention of behaviour problems in children. *PLoS ONE*, *14*(12), e0225503. https://doi.org/10.1371/journal.pone.0225503.

Nystrand, C., Hultkrantz, L., Vimefall, E., & Feldman, I. (2020). Economic return on investment of parent training programmes for the prevention of child externalising behaviour problems. administration and policy in mental health and mental. *Health Services Research*, *47*, 300–315. https://doi.org/10.1007/s10488-019-00984-5.

O'Neill, D., McGilloway, S., Donnelly, M., Bywater, T., & Kelly, P. (2013). A cost-effectiveness analysis of the Incredible Years parenting programme in reducing childhood health inequalities. *The European Journal of Health Economics*, *14*, 85–94. https://doi.org/10.1007/s10198-011-0342-y.

OECD (2019). Purchasing power parities (PPP) (indicator). https://doi.org/10.1787/1290ee5a-en.

Repper, J., & Carter, T. (2011). A review of the literature on peer support in mental health services. *Journal of Mental Health*, *20*, 392–411. https://doi.org/10.3109/09638237.2011.583947.

Sampaio, F., Barendregt, J. J., Feldman, I., Lee, Y. Y., Sawyer, M. G., Dadds, M. R., Scott, J. G., & Mihalopoulos, C. (2018). Population cost-effectiveness of the Triple P parenting programme for the treatment of conduct disorder: an economic modelling study. *European Child & Adolescent Psychiatry*, *27*, 933–944. https://doi.org/10.1007/s00787-017-1100-1.

Sampaio, F., Enebrink, P., Mihalopoulos, C., & Feldman, I. (2016). Cost-effectiveness of four parenting programs and bibliotherapy for parents of children with conduct problems. *The Journal of Mental Health Policy and Economics*, *19*, 201–212.

Sampaio, F., Feldman, I., Richards-Jones, S. & Mihalopoulos, C. (2018b). Economic benefits of sustained investments in parenting. In M. Sanders & A. Moravska (Eds.) *Handbook of parenting and child development across the lifespan*. Cham: Springer.

Setyawan, J., Fridman, M., Grebla, R., Harpin, V., Korst, L. M., & Quintero, J. (2018). Variation in presentation, diagnosis, and management of children and adolescents with ADHD across European Countries. *Journal of Attention Disorders*, *22*, 911–923. https://doi.org/10.1177/1087054715597410.

Shaw, M., Hodgkins, P., Caci, H., Young, S., Kahle, J., Woods, A. G., & Arnold, L. E. (2012). A systematic review and analysis of long-term outcomes in attention deficit hyperactivity disorder: effects of treatment and non-treatment. *BMC Medicine*, *10*, 99. https://doi.org/10.1186/1741-7015-10-99.

Simkiss, D. E., Snooks, H. A., Stallard, N., Kimani, P. K., Sewell, B., Fitzsimmons, D., Anthony, R., Winstanley, S., Wilson, L., Philips, C. J., & Stewart-Brown, S. (2013). Effectiveness and cost-effectiveness of a universal parenting skills programme in deprived communities: multicentre randomised controlled trial. *BMJ Open*, *2013*(3), e002851. https://doi.org/10.1136/bmjopen-2013-002851.

Sonuga-Barke, E. J. S., Brandeis, D., Cortese, S., Daley, D., Ferrin, M., Holtmann, M., & Sergeant, J. (2013). Nonpharmacological interventions for ADHD: systematic review and meta-analyses of randomized controlled trials of dietary and psychological treatments. *American Journal of Psychiatry*, *170*, 275–289. https://doi.org/10.1176/appi.ajp.2012.12070991.

Stevens, M. (2014). The cost-effectiveness of UK parenting programmes for preventing children's behaviour problems—a review of the evidence. *Child & Family Social Work*, *19*, 109–118. https://doi.org/10.1111/j.1365-2206.2012.00888.x.

Surgeon General. (2014). *Mental and emotional well-being*. Washington DC: National Prevention Council.

Trillingsgaard, T., Trillingsgaard, A., & Webster-Stratton, C. (2014). Assessing the effectiveness of the 'Incredible Years® parent training' to parents of young children with ADHD symptoms—a preliminary report. *Scandinavian Journal of Psychology*, *55*, 538–545. https://doi.org/10.1111/sjop.12155.

Ulfsdotter, M., Lindberg, L., & Månsdotter, A. (2015). A cost-effectiveness analysis of the Swedish Univeral Parenting Program All Children in Focus. *PLoS ONE*, *10*(12), e0145201. https://doi.org/10.1371/journal.pone.0145201.