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**An RCT of an online parenting program for parents of preschool-aged children with
ADHD symptoms**

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Abstract

Objective: This randomized control trial evaluated the efficacy of an online self-help program in a sample of parents of preschoolers with ADHD symptoms. **Method:** Parents were randomly assigned to the intervention group (n = 27) or the delayed intervention group (n = 26). Child behavior measures were completed by mothers, fathers, and teachers, and parenting measures were completed by mothers. **Results:** Intent-to-treat analyses indicated significant post-intervention improvements in mother-rated child hyperactivity/inattention, restlessness/impulsivity, defiance/aggression, social functioning, and teacher-rated prosocial behavior, as well as significant improvements in maternal over-reactivity, verbosity, laxness, positive parenting, parenting satisfaction, self-efficacy, stress, and depression. At 6-month follow-up, effects were maintained for maternal over-reactivity and verbosity, parenting satisfaction and self-efficacy, and parental stress and depression. **Conclusion:** This study provides evidence for the effectiveness of an online self-help parenting program in reducing preschool inattentive behavior difficulties, and in increasing parenting competence, satisfaction in the parenting role, and maternal well-being.

Keywords: Parenting, preschool, behavioral interventions

ADHD is a highly prevalent childhood disorder that can be observed as early as the preschool years. There are high rates of continuity in ADHD symptoms from preschool to school age, which are often associated with long-term impairments in social, emotional, and cognitive functioning (Barkley, 2014). ADHD is highly heritable and the interplay between genetic susceptibility and environmental risk is widely acknowledged (e.g., Thapar, Cooper, Eyre, & Langley, 2012).

Having a preschool-aged child with ADHD symptoms, defined as extreme and impairing levels of hyperactivity/inattention and restlessness/impulsivity, is known to be challenging for families, leading to parental stress and reduced feelings of parental competence (Deault, 2010). Evidence exists that parenting interventions for preschool ADHD symptoms are effective for reducing parenting stress, increasing parenting competence, and reducing child ADHD symptoms (Abikoff et al., 2014; Rogers, Cann, Cameron, Littlefield, & Lagioia, 2003; Sonuga-Barke, Daley, Thompson, Laver-Bradbury, & Weeks, 2001).

Evaluations of face-to-face parenting programs targeting preschool ADHD symptoms have demonstrated post-intervention effects for preschool hyperactivity/inattention (Abikoff et al., 2014; Azevedo, Seabra-Santos, Gaspar, & Homem, 2013a; Bor, Sanders, & Markie-Dadds, 2002; Jones, Daley, Hutchings, Bywater, & Eames, 2007; Sonuga-Barke et al., 2001; Webster-Stratton, Reid, & Beauchaine, 2011), dysfunctional parenting (i.e. laxness, verbosity, over-reactivity) (Azevedo et al., 2013a; Bor et al., 2002; Rogers et al., 2003), parental self-efficacy (Bor et al., 2002; Rogers et al., 2003), positive parenting practices (clear expectations, appropriate discipline; Abikoff et al., 2014), parenting satisfaction (Azevedo et al., 2013a; Bor et al., 2002; Rogers et al., 2003; Sonuga-Barke et al., 2001), and parental anxiety, depression and stress (Rogers et al., 2003). A few studies have reported maintenance of post-intervention effects including 15-week (Sonuga-Barke et al., 2001) to 9-month (Jones et al., 2007) intervention effects for child ADHD symptoms. Follow-up

intervention effects have also been found for parenting satisfaction (Sonuga-Barke et al., 2001) and positive parenting at 7-month follow-up (Abikoff et al., 2014). Bor et al. (2002) also obtained 12-months post-intervention effects for child inattentiveness, parenting satisfaction, parenting self-efficacy, and dysfunctional parenting (laxness, over-reactivity, verbosity), and Azevedo, Seabra-Santos, Gaspar, and Homem (2013b) reported maintenance of post-intervention effects at 9 months post-treatment for child ADHD symptoms, dysfunctional parenting (laxness, over-reactivity, verbosity), parenting competence and positive parenting, but neither of these studies had a control group at follow-up.

Group-based parenting interventions are currently recommended to help parents manage preschool children with ADHD symptoms (O'Brien & Daley, 2011; Williford & Shelton, 2014). However, the utility of group-based programs is limited due to the costs and resources involved, and logistical barriers such as lack of access to child care, and transport problems (O'Brien & Daley, 2011). The prevalence of ADHD creates a need for parenting interventions that exceed the availability of clinicians and resources (Daley, Jones, Hutchings, & Thompson, 2009). This argues for the need for evaluations of evidence-based self-help parenting programs targeting parents of hyperactive/inattentive pre-schoolers. There is one small scale study examining a workbook self-help version of the New Forest Parenting Programme (Daley & O'Brien, 2013) which found a reduction in preschool ADHD symptoms and an increase in parental competence, but long-term effects were not assessed. An online version of the Triple P-Positive Parenting Program has successfully targeted conduct problems in preschool children (Sanders, Baker, & Turner, 2012). However, there have been no evaluations of online parenting programs for parents of hyperactive/inattentive pre-schoolers. The present study addresses this gap by evaluating the efficacy of the online, self-help Triple P-Positive Parenting Program in this population.

This study also addresses several limitations of previous Triple P research of practitioner delivered interventions for preschool hyperactivity/inattention. For example, two studies (Bor et al., 2002; Rogers et al., 2003) evaluating the Triple P program in preschool samples used the Eyberg Child Behavior Inventory (ECBI; Eyberg & Ross, 1978) to measure preschool ADHD symptoms, which has been found not to discriminate between children with ADHD and oppositional defiant disorder (ODD; Weis, Lovejoy, & Lundahl, 2005). Other limitations in these studies were the lack of a control group at follow-up and the reliance on the mother as the sole informant of post-intervention child ADHD symptoms (Bor et al., 2002; Rogers et al., 2003), and a lack of follow-up assessment (Rogers et al., 2003).

Preschool children with ADHD symptoms often have social difficulties with peers (Barkley, 2014). Parental disciplinary practices, such as laxness, have been associated with lower rates of prosocial behavior at preschool in hyperactive pre-schoolers (Keown & Woodward, 2006). It is possible that when parenting program participation leads to reductions in dysfunctional parenting practices there may be associated improvements in the social behaviors of preschool children with hyperactivity. Two studies examining the efficacy of the Incredible Years on preschool ADHD symptoms support this possibility. The first study, which combined the Incredible Years with a school intervention, obtained mother reported improvements in social skills, such as social cooperation, social interaction, and social independence (McGoey, DuPaul, Eckert, Volpe, & Brakle, 2005). However, the sample included children who were taking medication, which may have confounded the findings. The second study reported improvements in observed and parent reported social competence. The parent report measure taps both positive social behaviors (e.g., sharing, helpful, resolves peer problems) and emotion regulation (e.g., controls temper, can calm down, thinks before acting) (Webster-Stratton et al., 2011), thus it was unclear whether the findings were specific to social behaviors.

Considering the high heritability and continuity rate of the disorder, it is likely that children with ADHD may have a parent with ADHD symptoms (Faraone, Biederman, & Mick, 2006). Several studies suggest that parental ADHD may be associated with attenuated improvements in child behavior and parenting following parent training. For example, Sonuga-Barke, Daley, and Thompson (2002) found that after parent training, children whose mothers had high levels of ADHD symptoms displayed no improvement in child ADHD symptoms. Another study by Chronis-Tuscano et al. (2011) found that mothers with higher ADHD symptoms reported less improvement in dysfunctional parenting (inconsistency and low involvement) following intervention than mothers with lower ADHD symptoms. On the basis of these findings, the current study examines the extent to which intervention effects (child ADHD, parenting behaviors) are affected by maternal ADHD symptoms.

The present study evaluated Triple P Online (TPOL; Turner & Sanders, 2011) in a sample of parents of preschool-aged children with ADHD symptoms. The primary hypothesis was that intervention group parents, compared with delayed intervention group parents, would report lower levels of child ADHD symptoms following intervention. Secondary hypotheses included a) improvements in prosocial behavior and social functioning; b) lower levels of parenting over-reactivity, laxness and verbosity and higher levels of positive parenting; c) lower levels of stress, depression and anxiety; and d) higher levels of parenting satisfaction and self-efficacy for the intervention group as compared with the delayed intervention group. Based on the high comorbidity between conduct problems and preschool ADHD symptoms (Daley et al., 2009), a post-intervention reduction in conduct problems was also hypothesized. The maintenance of the short-term effects for these child and parent variables was assessed at 6-month follow-up. Hypotheses for follow-up effects were not proposed due to the paucity of prior research for long-term maintenance effects. Finally, the question of whether, within the intervention group, mothers with higher levels of maternal

ADHD symptoms would report less improvement in child ADHD symptoms and parenting behaviors after participating in TPOL, was explored.

Method

Participants

Participants were 53 parents with a 3 to 4 year old child ($M = 4.0$ years) with elevated and impairing levels of ADHD symptoms. Mothers had a mean age of 35.4 years ($SD = 4.87$) and the 43 fathers who contributed study data had a mean age of 38.8 years ($SD = 6.65$). A third of all families had an annual income below NZ\$75,000 (approximately US\$50,000), another third over NZ\$100,000 (approximately US\$67,000), and just over half of the mothers had a university degree (55.7%). Seventeen families had a parent with clinically elevated levels of ADHD symptoms. The majority of the children were male (71.7%) and of New Zealand European ethnicity (79.2%).

Recruitment took place throughout New Zealand, between January 2013 and August 2014, through community outreach in early childhood education centres, childcare centres, organizations that work with young families, and media outlets. After initial contact, parents completed a 45-min telephone screening interview to inform parents and assess eligibility. Families were included if their child met the cut-off criteria on the Werry-Weiss-Peters (WWP) activity rating scale (≥ 14 ; Routh, 1978) and the Parental Account of Child Symptoms (PACS; ≥ 16 ; Taylor, Sandberg, Thorley, & Giles, 1991), and if their child was perceived to have impaired functioning due to hyperactive/inattentive behaviors.

In total, 140 families were screened for eligibility, excluding 74 cases. Reasons for exclusion included being below the cut-off score for ADHD symptoms ($n = 22$), no perceived impairment in functioning ($n = 13$), child outside the age range ($n = 9$), parent or child already receiving support for parenting and/or child behavior ($n = 9$), no interest in participating ($n = 9$), presence of a developmental disorder ($n = 4$), lack of time ($n = 4$), no

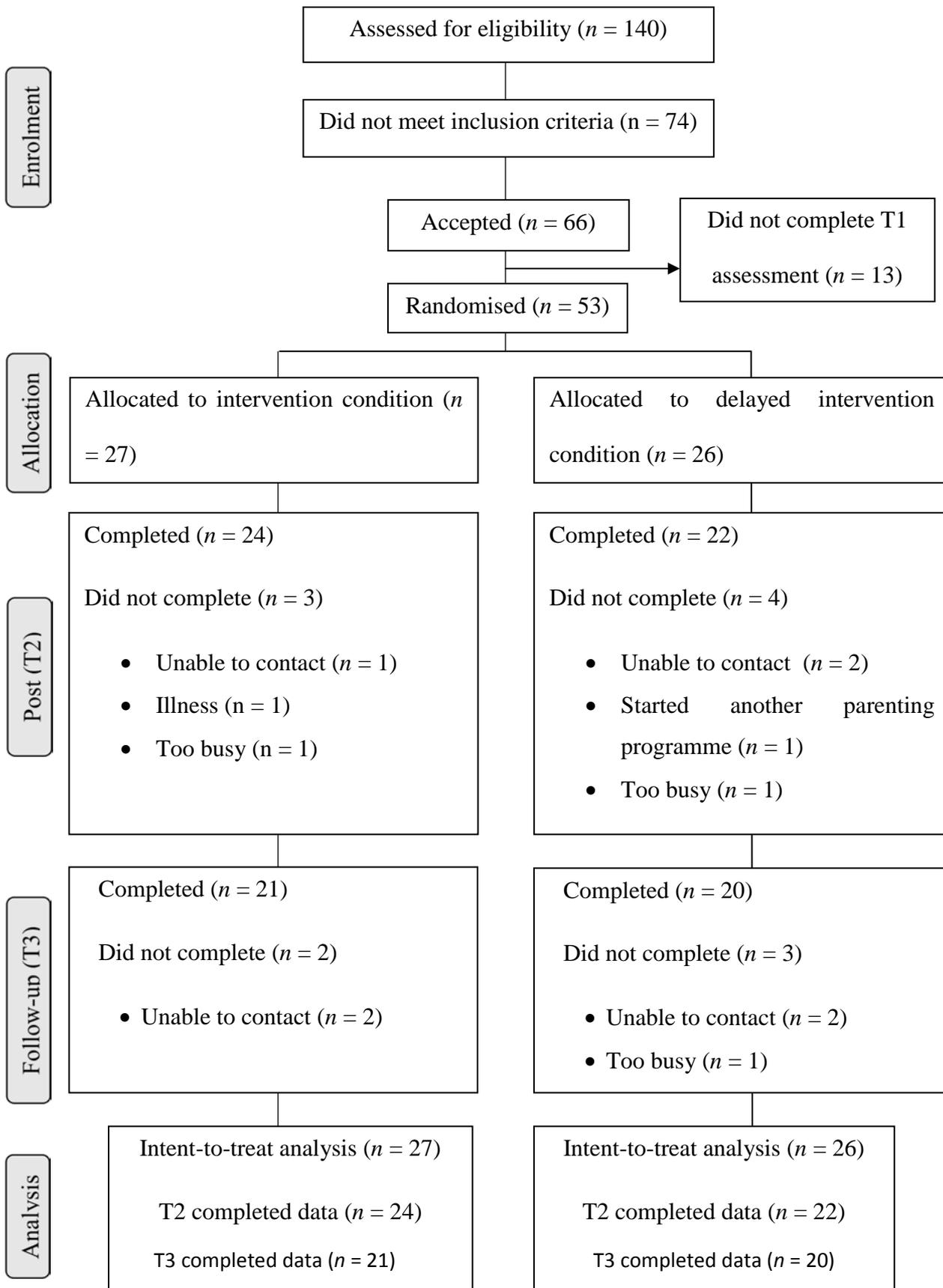


Figure 1. CONSORT diagram showing the participants' flow through each stage of the randomized controlled trial and reasons for drop out.

Internet access ($n = 2$), and interested in face-to-face support only ($n = 2$). Another 13 families failed to complete T1 assessment, leaving 53 participants in the study (see figure 1).

Measures

Mothers, fathers, and teachers completed measures of child behavior. In addition, mothers completed the two screening measures and measures of demographics, parenting behavior, parental adjustment, and consumer satisfaction with the program.

Screening measures. The WWP (Routh, 1978) has 22 items rated on a 3-point Likert type scale, which ask parents about their child's activity patterns in a range of daily settings. Good psychometric properties have been reported for the WWP in preschool samples, with an internal consistency of $\alpha = .88$ (Miller, Fee, & Netterville, 2004), and a test-retest reliability of .85 (Thompson et al., 2009). The reliability coefficient in the current study was $\alpha = .74$.

The PACS (Taylor et al., 1991) is a standardized semi-structured interview assessing child behaviors at home and was used to measure the child's ADHD symptoms. Parents were asked detailed questions regarding the frequency and severity of the child's ADHD symptoms over the previous 6 months (Taylor et al., 1991). Using operationalized criteria, the interviewer rated parental responses. In addition, parents were asked about the extent to which these behaviors were impairing the child's functioning. Responses were rated on a 4-point scale from no problem/no concern to serious problems/constant concern. Psychometric properties of PACS in preschool samples are good, with concurrent validity of .65 to .70 with the Strengths and Difficulties Questionnaire (SDQ) hyperactivity scale (Keown, 2011) and high the test-retest reliability ($r = .81$; Sonuga-Barke et al., 2001). Inter-rater reliability in the current sample ranged from .82 to 1.

Parental ADHD. The Adult ADHD Self-Report Scale (ASRS; Adler et al., 2006), which has high concurrent validity with the rater version of the measure, was used to assess

levels of ADHD symptoms in mothers and fathers. The ASRS contains 18 items based on Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM-IV; American Psychiatric Association, 1994) criteria with a 5-point scale measuring the frequency of the ADHD symptoms in adults. Scores of eight or higher in part A of the questionnaire are consistent with adult ADHD. In the current sample 17 parents met this criterion, ten of whom were in the intervention group ($n = 4$ mothers). In the current study Cronbach's alpha's were $\alpha = .89$ for mothers and $\alpha = .76$ for fathers.

Child behavior outcome variables. The Conners Early Childhood Behavior (Conners EC-BEH) scale (Conners, 2009) was used to assess hyperactive/inattentive, defiant/aggressive child behavior, and problematic social functioning of the child (e.g., difficulties with body language, social cues, or making friends, and poor social skills). The Conners Rating scales were chosen because they have been successfully used to examine differences between children with and without ADHD in both in preschool- and school-aged children (Dupaul, McGoey, Eckert, & VanBrakle, 2001) and to measure changes in ADHD symptoms (Abikoff et al., 2014) and in conduct problems (Webster-Stratton et al., 2011).

The Child Behavior Scale (CBS; Ladd & Profilet, 1996) is a teacher-report instrument containing 35 items measuring preschool aged children's behavior and peer relations in a school setting, but can also be used reliably with older children (Ladd, Herald-Brown, & Andrews, 2009). In the present study only ratings on the scales Prosocial with Peers (reliability $\alpha = .88$ to $.96$) and Asocial with Peers (reliability $\alpha = .84$ to $.86$) were obtained.

The SDQ (Goodman, 1997) was completed by each child's (pre)school teacher to obtain a rating of child behavior in an early childhood or school context, using the scales Hyperactivity and Peer problems. The internal consistency in the current study of the different scales across the three time points was good overall, ranging from $\alpha = .62$ for Peer problems to $\alpha = .94$ for Hyperactivity. At both T1 and T2 teacher ratings on the SDQ hyperactivity

scale were not significantly correlated with maternal ratings of hyperactivity/inattentiveness on the Connors EC-BEH ($r = .17$).

Parent outcome variables. The Parenting Scale (PS; Arnold, O’Leary, Wolff, & Acker, 1993) measures parental discipline practices, including laxness, over-reactivity, and verbosity. The Laxness scale taps permissive, inconsistent discipline; the Over-reactivity scale measures coercive, harsh discipline; and the Verbosity scale relates to lengthy or repetitive verbal responses to misbehavior. Reliability coefficients in the current sample ranged from $\alpha = .61$ to $.65$ for Verbosity, from $\alpha = .80$ to $.85$ for Over-reactivity, and from $\alpha = .83$ to $.85$ for Laxness.

The Authoritative Parenting scale of the Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson, Mandleco, Frost Olsen, & Hart, 2001) was used to assess positive parenting, which comprises four subscales (Warmth and Involvement; Reasoning and Induction; Democratic Participation; and Good Natured/Easy Going). The Authoritative Parenting scale was internally consistent across all assessments, ranging from $\alpha = .85$ to $.90$.

The Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995) contains 21 items assessing symptoms of depression, anxiety and stress in adults. Reliability coefficients in the present sample were between $\alpha = .87$ and $.88$ for Depression, between $\alpha = .72$ and $.85$ for Anxiety, and between $\alpha = .85$ and $.87$ for Stress.

The Parenting Sense of Competence (PSOC) scale (Johnston & Mash, 1989) assesses how competent parents feel about their parenting in terms of satisfaction and efficacy. The Satisfaction scale in the current study showed an internal consistency between $\alpha = .72$ and $.81$, with a range of $\alpha = .71$ to $.88$ for the Efficacy scale.

The Client Satisfaction Questionnaire (CSQ; Sanders, Markie-Dadds, Tully, & Bor, 2000) was adapted to collect satisfaction ratings and feedback on the use of the online Triple

P-Positive Parenting Program. In the current study the internal consistency was moderate, with $\alpha = .68$ for total satisfaction.

Procedure

Ethics approval was obtained and the trial was registered on the Australian New Zealand Clinical Trials Registry (ANZCTR; registration code: ACTRN12613000480785). Assessment took place at three time points: at pre-intervention (T1), post-intervention (T2; 3 months after T1), and at 6 months follow-up (T3). After T1 assessment, families were randomly allocated to the intervention or delayed intervention group. The delayed intervention group families received the intervention after T3 assessment. Each group received access to the program for 16 weeks and parents could complete the program at their own pace. No significant differences between the groups were found except for maternal age. Mothers in the intervention group were significantly older ($M = 37.19$, $SD = 4.11$) than were mothers in the delayed intervention group ($M = 33.46$, $SD = 4.93$; $t(51) = -2.99$, $p = .004$).

Intervention. TPOL is a self-directed, interactive positive parenting program delivered via the Internet. It is an adaption of Level 4 of the Triple P Positive Parenting Program (Sanders, 2008). TPOL consists of eight sequenced modules, and its features, such as audio-visual representation of information and interactive exercises, are designed to engage users, to increase knowledge, and to enhance parental self-regulation (Sanders, 2008). Two telephone consultations with a Triple P facilitator were added, to help parents to tailor the implementation of parenting strategies to their specific family situation, to problem-solve any parenting strategy implementation difficulties, and to increase the likelihood of program completion. Twenty-five percent of the consultations were checked for fidelity of implementation, which resulted in an inter-observer agreement of 96.6%.

Statistical analyses. A power analysis indicated that by assuming a power of .80 and an alpha of .05, the study needed a total N of 64 families (32 families per group) to detect a

large effect size. To evaluate the short term (T2) and six month follow-up (T3) intervention effects, differences between the intervention and delayed intervention groups were examined using a series of univariate analyses of covariance (ANCOVA), with pre-intervention data (T1) as covariates and T2/T3 scores as dependent variables. Maternal age was also included as a covariate in the ANCOVAs, given the significant between-group difference on this variable. The magnitude of the condition effects was expressed in Cohen's *d*, using the pooled pre-test data as covariates. Reliable and clinically significant change of the T2 and T3 intervention effects were calculated on the key parenting and child behavior measures, using two methods: chi square analyses of the proportion of participants moving from clinical to non-clinical range and chi-square analyses of the extent to which changes were unlikely to be due to chance – that is, through calculation of a reliable change index (RCI; Jacobson & Truax, 1991). Finally, within the intervention group, hierarchical multiple regression analyses were used to investigate the relationship between maternal ADHD symptoms and child ADHD and parenting scores at post-intervention and follow-up, controlling for pre-intervention levels of these behaviors.

Results

Participant Retention and Program Completion Rate

At post-intervention (T2), five families did not complete all questionnaires. Of these five families two could not be contacted, one family was too busy, one mother suffered a prolonged illness, and one family in the delayed intervention group started another parenting program. At 6-month follow-up (T3), another three families failed to complete the questionnaires, two of whom could not be contacted and one family was too busy. With regard to program completion, 55% ($n = 15$) of families completed all 8 modules, 15% ($n = 4$) completed 6-7 modules, 22% ($n = 6$) completed 3-5 modules, 4% ($n = 1$) completed 1-2 modules, and another 4% ($n = 1$) did not complete any modules. To increase generalizability,

preserve statistical power, and prevent bias induced by drop-outs, all analyses were based on the intent-to-treat (ITT) sample, with missing data imputed using expectation maximization (Gupta, 2011).

Short-Term Intervention Effects

Table 1 shows the descriptive statistics for each group for all the outcome variables. Intervention effects were found for hyperactivity/inattention, $F(1, 50) = 9.98, d = .52, p = .003$; restlessness/impulsivity, $F(1, 50) = 7.39, d = .48, p = .009$; social functioning, $F(1, 50) = 11.24, d = .47, p = .002$; and defiance/aggression, $F(1, 50) = 6.10, d = .45, p = .017$, with mothers in the intervention group reporting significantly greater improvements than mothers in the delayed intervention group. For teacher-reported social functioning, intervention group children showed significantly more prosocial behaviour, $F(1, 32) = 8.62, d = .79, p = .006$ in comparison with the delayed intervention children. In comparison with control group parents, greater reductions were reported in the intervention group for parenting over-reactivity, $F(1, 50) = 50.01, d = 1.11, p < .001$; verbosity, $F(1, 50) = 14.68, d = .63, p < .001$; and laxness, $F(1, 50) = 14.06, d = .64, p < .001$. Positive parenting in the intervention group had also improved significantly, $F(1, 50) = 9.36, d = .63, p = .004$ as compared with the delayed intervention group. In comparison with the control mothers, the intervention group mothers reported significantly greater reductions in stress, $F(1, 50) = 9.71, d = .76, p = .003$, and depression, $F(1, 50) = 7.60, d = .51, p = .008$, immediately after program completion. Intervention effects with large effect sizes were

Table 1. Short-Term and Six-Month Follow-up Intervention Effects for the Dependent Variables.

Measure	Intervention Group (<i>n</i> = 27)			Delayed Interv Group (<i>n</i> = 26)			Post-intervention univariate ANCOVA results for condition			Follow-up univariate ANCOVA results for condition		
	Pre <i>M (SD)</i>	Post <i>M (SD)</i>	Follow- up <i>M (SD)</i>	Pre <i>M (SD)</i>	Post <i>M (SD)</i>	Follow- up <i>M (SD)</i>	<i>F</i>	<i>p</i>	<i>d</i> [95% CI]	<i>F</i>	<i>p</i>	<i>d</i> [95% CI]
<i>Hyperactive child behaviors</i>												
Con Hyp/Inatt	73.52 (11.00)	62.04 (8.78)	63.25 (11.96)	74.65 (12.52)	69.33 (11.53)	67.11 (9.79)	9.98	.003	0.52 [-0.02, 1.05]	1.83	.182	0.23 [-0.30, 0.76]
Con Rest/Imp	74.88 (10.44)	62.83 (9.08)	64.71 (11.50)	76.65 (12.79)	70.24 (12.23)	69.28 (10.05)	7.39	.009	0.48 [-0.06, 1.01]	2.20	.145	0.23 [-0.30, 0.76]
Con-s Hyp/Inatt (father) ^a	65.82 (8.81)	60.67 (9.50)	60.92 (7.82)	68.96 (9.93)	67.61 (9.67)	65.19 (7.55)	3.70	.061	0.40 [-0.18, 0.97]	2.43	.127	0.12 [-0.45, 0.69]
SDQ Hyp (teacher) ^b	4.39 (3.68)	2.79 (2.03)	-	2.59 (3.18)	2.62 (2.86)	-	4.00	.054	0.46 [-0.19, 1.12]	-	-	--

Child conduct problems

Con Def/Aggr	77.40	66.91	69.08	79.31	73.81	71.94	6.10	.017	0.45	0.62	.436	0.09
	(11.28)	(11.55)	(9.70)	(10.72)	(9.26)	(9.70)			[-0.09, 0.98]			[-0.45, 0.62]
Con-s Def/Aggr	77.05	71.08	72.46	79.78	73.33	74.00	0.10	.750	-0.05	0.13	.718	-0.12
(father) ^a	(8.97)	(7.10)	(8.94)	(10.50)	(11.53)	(9.40)			[-0.62, 0.52]			[-0.69, 0.45]

Social child functioning

Parent-reported

Con SocFunct	61.89	55.22	57.17	63.62	63.19	61.22	11.24	.002	0.47	1.80	.186	0.18
	(13.51)	(11.09)	(9.85)	(12.51)	(11.22)	(11.83)			[-0.07,1.01]			[-0.36, 0.71]
Con-s SocFunct	66.43	62.82	61.46	66.30	64.06	63.06	0.19	.665	0.10	0.29	.596	0.12
(father) ^a	(12.98)	(12.61)	(12.14)	(14.71)	(11.10)	(12.23)			[-0.47,0.67]			[-0.45, 0.69]

Teacher-reported

SDQ Peer	1.56	0.52	-	1.47	1.38	-	3.13	.086	0.60	-	-	-
Problems ^b	(1.50)	(0.80)	-	(1.62)	(1.69)	-			[-0.07, 1.26]			-
CBS Prosocial ^b	7.88	10.11	-	9.81	9.16	-	8.62	.006	0.79	-	-	-
	(4.08)	(2.43)	-	(2.95)	(3.30)	-			[0.11, 1.46]			-

Dysfunctional parenting styles

PS Over-react	3.31	2.29	2.74	3.45	3.40	3.19	50.01	<.001	1.11	7.15	.010	0.36
	(0.99)	(0.54)	(0.69)	(0.70)	(0.62)	(0.68)			[0.54, 1.68]			[-0.18, 0.89]
PS Verbosity	3.49	2.76	2.71	3.75	3.60	3.30	14.68	<.001	0.63	6.71	.013	0.36
	(0.86)	(0.79)	(0.78)	(0.94)	(0.76)	(0.75)			[0.09, 1.18]			[-0.17, 0.90]
PS Laxness	2.84	2.23	2.25	2.90	2.84	2.51	14.06	<.001	0.64	1.78	.188	0.23
	(0.82)	(0.61)	(0.73)	(0.88)	(0.83)	(0.70)			[0.09, 1.18]			[-0.30, 0.76]

Positive parenting

PSDQ	57.66	62.96	83.17	58.96	58.43	81.57			0.63	1.40	.243	0.31
Authoritative	(8.17)	(7.37)	(11.27)	(10.14)	(8.37)	(7.16)	9.36	.004	[0.08,1.17]			[-0.22, 0.84]

Parental adjustment

DASS-21	4.14	3.01	1.64	4.85	5.00	5.60	1.58	.215	0.24	13.38	.001	0.61
Anxiety	(5.25)	(4.20)	(2.26)	(5.19)	(6.41)	(5.23)			[-0.29, 0.77]			[0.07, 1.16]
DASS-21 Stress	17.37	9.65	9.45	14.62	13.91	15.40	9.71	.003	0.76	12.05	.001	0.94
	(8.65)	(6.99)	(4.90)	(9.58)	(7.97)	(9.33)			[0.21, 1.31]			[0.38, 1.50]
DASS-21	8.44	3.53	2.84	7.92	6.96	6.27	7.60	.008	0.51	7.62	.020	0.51

Depression	(7.26)	(3.97)	(3.51)	(7.99)	(7.15)	(6.27)				[-0.03, 1.05]		[-0.03, 1.05]
<i>Parenting confidence</i>												
PSOC	21.19	28.37	29.09	21.69	22.57	24.50	20.48	<.001	1.02	17.69	<.001	0.82
Satisfaction	(5.85)	(4.70)	(4.94)	(6.31)	(5.36)	(4.31)			[0.46, 1.58]			[0.27, 1.38]
PSOC Self- efficacy	22.15 (4.58)	29.65 (4.83)	29.14 (5.89)	25.16 (4.49)	25.57 (4.54)	25.95 (4.77)	19.54	<.001	1.54	7.96	.007	1.35 [0.76, 1.93]

Note. CBS = Child Behavior Scale; Con = Conners Early Childhood Behavior scales; Con-s = Conners Early Childhood Behavior scales-short form; DASS = Depression Anxiety Stress Scales; PS = Parenting Scale; PSDQ = Parenting Styles and Dimensions Questionnaire; PSOC = Parenting Sense of Competence scale; SDQ = Strengths and Difficulties Questionnaire.

^a Intervention: *n*=22, Delayed intervention: *n*=23

^b Intervention: *n*=18, Delayed intervention: *n*=17

found for both PSOC scales, with $F(1, 50) = 20.48, d = 1.02, p < .001$, for parenting satisfaction, and $F(1, 50) = 19.54, d = 1.54, p < .001$, for parenting self-efficacy. There were no significant differences between the intervention and the delayed intervention group for father-reported hyperactivity/inattention, defiance/aggression, and social functioning, for teacher-reported hyperactivity and peer problems, and for mother-reported maternal anxiety.

Six Month Follow-Up Intervention Effects

Results of the analyses showed that significant differences between the intervention group and the delayed intervention group were maintained for maternal over-reactivity, $F(1, 50) = 7.15, d = .36, p = .010$, verbosity, $F(1, 50) = 6.71, d = .36, p = .013$; stress, $F(1, 50) = 12.05, d = .94, p = .001$; and depression, $F(1, 50) = 5.82, d = .51, p = .020$; parenting satisfaction, $F(1, 50) = 17.69, d = .82, p < .001$; and parenting self-efficacy, $F(1, 50) = 7.96, d = 1.35, p = .007$. At follow-up the difference between groups was significant for anxiety, $F(1, 50) = 13.38, d = .61, p = .001$, in contrast to the non-significant post-intervention difference in anxiety. Intervention effects were not maintained for mother-reported hyperactivity/ inattention, restlessness/impulsivity, defiance/aggression, social functioning, maternal laxness, and positive parenting. Although no condition effects were found for child ADHD symptoms, intra-group analysis revealed that within the intervention condition, the level of hyperactivity/inattention ($d = .89$) and restlessness/impulsivity ($d = .93$) was similar to T2 and significantly lower than T1.

At both post intervention and six-month follow-up, when between-group differences in maternal age were controlled for in the ANCOVAs, intervention effects remained unchanged.

Reliable and Clinically Significant Change

As illustrated in Table 2, at T2 significantly greater clinically reliable change was demonstrated for child restlessness/impulsivity and maternal over-reactivity for the intervention group as compared with the delayed intervention group.

Table 2. Clinical and Reliable Change at Post-Intervention.

Measure	Intervention		Delayed intervention		Clinical change		Reliable change	
	% (n/n)		% (n/n)		χ^2	<i>p</i>	χ^2	<i>p</i>
	Clinically improved	Reliably improved	Clinically improved	Reliably improved				
<i>Post-intervention</i>								
Con Hyp/Inatt	38.5 (10/26)	50.0 (13/26)	18.2 (4/22)	18.2 (4/22)	2.37	.124	5.27	.022
Con Rest/Imp	42.3 (11/26)	46.2 (12/26)	13.6 (3/22)	13.6 (3/22)	4.74	.029	5.87	.015
Con-s Hyp/Inatt (father)	38.1 (8/21)	23.1 (6/21)	22.7 (5/22)	18.2 (4/19)	0.63	.427	0.30	.583
PS Over-react	46.2 (12/26)	46.2 (12/26)	9.1 (2/22)	4.5 (2/22)	7.92	.005	10.45	.001
PS Verbosity	26.9 (7/26)	38.5 (10/26)	18.2 (4/22)	4.5 (2/22)	0.52	.473	7.76	.005
PS Laxness	26.9 (7/26)	26.9 (7/26)	13.6 (3/22)	13.6 (3/22)	1.28	.259	6.93	.008

Note. Con = Conners Early Childhood Behavior scales; Con-s = Conners Early Childhood Behavior scales-short form; Conners Early Childhood Behavior scales; Conners-s = Conners Early Childhood Behavior scales-short form; PS = Parenting Scale

Prediction of Child ADHD Symptoms and Parenting Outcomes

The results of the hierarchical multiple regressions revealed that when pre-intervention scores on maternal verbosity were controlled, maternal ADHD predicted scores on verbosity at T3. These findings indicate that mothers with higher scores on ADHD symptoms reported less long term reduction in verbose discipline practices (R^2 change = .17, $B = .42$, $p = .034$). Maternal ADHD symptoms did not significantly predict change in child ADHD symptoms at T2 or T3, or parenting behavior at T2. However, in the regressions for child ADHD symptoms when pre-intervention scores were controlled, a trend was detected for maternal ADHD symptoms to predict post-intervention scores on hyperactivity/inattention ($p = .090$) and restlessness/impulsivity ($p = .063$).

Consumer Satisfaction

Consumer satisfaction in the intervention group was high with $M = 44.63$ ($SD = 8.16$) on a scale range of 8 to 56.

Discussion

The current study is the first online self-help parenting program targeting preschool hyperactivity to demonstrate intervention effects for preschool hyperactivity/inattention. As hypothesized, significant short-term intervention effects were found for child hyperactivity/inattention and restlessness/impulsivity. Medium effect sizes were obtained and greater proportions of mothers and fathers in the intervention group achieved reliable and clinically significant change on child hyperactivity/inattention. Although no significant long term group differences were found for child ADHD symptoms, the short-term improvement by the intervention group was maintained at T3.

Hypothesized short-term intervention effects were also found for child social functioning and prosocial behavior. These results extend the findings of McGoey et al. (2005) by identifying intervention effects based on teacher ratings in a non-medicated sample,

compared with McGoey et al. (2005) who included pre-schoolers with and without medication and obtained mother reports only. As expected short-term intervention effects were found for child defiance/aggression supporting previous research with the online Triple P in a sample of young children with conduct problems (Sanders et al., 2012).

As predicted short-term intervention effects were also found for parental over-reactivity, laxness and verbosity, positive parenting, parenting satisfaction, parenting self-efficacy, stress and depression. At 6-months follow-up, post-intervention effects were maintained for maternal over-reactivity, verbosity, parenting satisfaction and self-efficacy, and parental stress and depression. Although no short-term intervention effect was detected for parental anxiety, significant condition effects were evident at follow-up. This effect was reflected by a steady decrease in levels of anxiety over time in the intervention group, with a reverse pattern apparent for the delayed intervention group.

The current intervention effects at follow-up for verbosity and over-reactivity provide stronger evidence for the long term effectiveness of a parenting intervention on these aspects of parenting in parents of children with preschool ADHD symptoms, compared with previous research with practitioner delivered programs that obtained similar findings but not did have a control group at follow-up (Azevedo et al. (2013a); Bor et al. (2002)). Although the intervention effects for parental laxness were maintained at the 6-month follow-up in the current study, these effects were not significant due to some delayed intervention group parents also reporting reductions in lax parenting behavior. However, the effect size for within-group changes for lax parenting (from pre-intervention to 6-month follow-up) was larger for the intervention group ($d = 0.75$) than for the delayed intervention group ($d = .49$).

Furthermore, the current findings for long term improvements in maternal stress and depression extend the work by Rogers et al. (2003) who evaluated practitioner delivered Triple P and found post-intervention reductions in these variables using the same measure.

Similarly, the current findings for the long term maintenance intervention effects for parenting satisfaction and self-efficacy extend results obtained by Bor et al. (2002), in a practitioner-led Triple P study that did not have a control group at follow-up. Overall, the results suggest the possibility that the parenting strategies learnt via an online program may help deal with the day to day stressors of parenting a preschool child with ADHD symptoms and feelings of low efficacy. The importance of the current findings for parenting confidence is underscored by the body of research demonstrating that parenting self-efficacy is positively related to parenting behaviors such as warmth and involvement and inversely related to negative parenting behaviors such as maladaptive disciplining (Jones & Prinz, 2005). It seems likely that parenting strategies taught by TPOL enabled skill mastery that enhanced parental self-efficacy (Tarver, Daley, and Sayal (2015). In the current study parenting confidence may also have been enhanced by the two telephone consultations with a qualified Triple P facilitator who was able to validate parents' approaches (Daley et al. (2014).

The finding in the current study for the influence of maternal ADHD on verbose parenting at follow-up is new and extends the work of Chronis-Tuscano et al. (2011) who found that mothers with higher levels of ADHD symptoms reported less post intervention improvement in dysfunctional parenting (inconsistency, low involvement). While there was a trend which indicated that maternal ADHD symptoms were associated with fewer reductions in child ADHD symptoms it is possible that the sample size of the current study provided insufficient power to detect significant findings for child ADHD symptoms and other parenting behaviors.

As suggested by Chronis-Tuscano et al. (2011) mothers with ADHD symptoms may need more repetition or a larger "dose" of treatment before meaningful change can be detected. Thus, these parents may benefit from longer access to an online program to revisit content. In the current study there were 6 intervention group fathers with elevated levels of

ADHD symptoms raising the possibility that the target child in these families was exposed to paternal over-reactive and permissive parenting that may have attenuated improvements in child behavior. However, this explanation could not be tested as fathers did not actively participate in the program, nor was data collected about fathers' parenting.

There are a number of limitations to the current study. First of all, the sample size of 53 was smaller than projected and was comprised of predominantly high socioeconomic status (SES) parents of New Zealand European ethnicity. A larger, more diverse sample may have provided greater power to detect long term condition effects for child ADHD symptoms and to generalize findings to families from different ethnic and SES backgrounds. Second, as 65% of all teacher data were missing at the final assessment, there were too few teacher reports to analyse whether intervention effects for hyperactive/inattentive behaviors and prosocial behaviors with peers were maintained. The high attrition rate was due to a low teacher response after children transitioned from preschool to primary school at follow-up. Third, all parenting measures were based on maternal reports, which raises the possibility of self-report bias. Independent assessments such as observations or father ratings of their partner's parenting could provide an objective measure of behavior and enable comparison of data from different sources. Fourth, the robustness of the study findings may have been increased by including independent outcome measures of ADHD. The teacher ratings obtained in the current study only partially addressed this gap, as the SDQ (Goodman, 1997) measure used is a screener and contains only five ADHD related items. The value of ratings by parents and teachers, however, should not be dismissed, given their unique knowledge about children's behavior and their own role as consumers (Pfiffner, 2014). Finally, the design of this study raises the possibility that parents in the delayed intervention condition may have anticipated change due to upcoming therapy.

Future research should include both parents in all aspects of the intervention and data collection to provide a better understanding of the effects of TPOL for preschool ADHD, for fathers separately from mothers (Frank, Keown, & Sanders, 2015). Including both parents would potentially increase teamwork in the implementation of parenting strategies and enhance the likelihood that improvements in child behavior are maintained over time. Future evaluations of TPOL could include other parenting variables shown to be related to preschool ADHD symptoms including lower levels of observed maternal warmth (Keown, 2011). Finally, to better understand the effectiveness of TPOL compared with practitioner delivery of the program, studies with three group designs are needed that compare TPOL with either group or individually administered face to face versions of Triple P and control groups.

The current study provides evidence for the effectiveness of an online self-help parenting program in decreasing child ADHD symptoms following intervention as well as increasing parenting competence, satisfaction in the parenting role and maternal well-being. These findings highlight the potential benefits of an online parenting program as an early intervention for preschool ADHD and for parents of these children.

Declaration of Conflicting Interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: The Triple P-Positive Parenting Program is owned by the University of Queensland (UQ). The University through its main technology transfer company UniQuest Pty Limited has licensed Triple P International Pty. Ltd. to disseminate the program worldwide. Royalties stemming from this dissemination activity are distributed to the Parenting and Family Support Centre, School of Psychology, UQ; Faculty of Health and Behavioural Sciences at UQ; and contributory authors. No author has any share or ownership in Triple P International Pty Ltd. Matthew Sanders is the founder and an author on various Triple P programs and a consultant to Triple P International.

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