

Efficacy of Parent–Child Interaction Therapy With Chinese ADHD Children: Randomized Controlled Trial

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Abstract

Purpose: This study aimed to evaluate the efficacy of Parent-Child Interaction Therapy (PCIT) in Chinese children with attention-deficit/hyperactivity disorder (ADHD) or ADHD features. **Methods:** This study adopted a randomized controlled trial design without blinding. Participants were randomized into either the intervention group ($n = 32$) and offered PCIT by trained PCIT practitioners or the waitlist control group ($n = 32$) and offered PCIT after the intervention group had completed treatment. Parent participants were requested to complete questionnaires on their children's behavior and their parental stress. PCIT practitioners observed parent–child interactions according to a coding system. **Results:** Analysis was by intention to treat. The results indicated a significant decrease in child behavior and attention problems, parental stress, and negative parenting practices and an increase in positive parenting practices in the intervention group at postintervention ($p \leq .002$ in all cases). **Conclusion:** This study provided promising evidence on the effectiveness of PCIT in Chinese children with ADHD or ADHD features.

Keywords

ADHD, intervention, parent training

According to the *Diagnostic and Statistical Manual of Mental Disorders, 5th edition* (American Psychiatric Association, 2013), attention-deficit/hyperactivity disorder (ADHD) is characterized by a pattern of behavior across settings that can cause functional impairment in different settings. The symptoms can be classified into two categories, namely, inattention and hyperactivity/impulsivity. Barkley (1997) claimed that there were deficits in behavioral inhibition, working memory, motivation regulation, and motor control among those with ADHD. Although ADHD begins in childhood, it is estimated that 50%–80% might carry this disorder into adolescence (Barkley, 2004).

In terms of treatment, Barkley (2004) pointed out that no single treatment could address all the difficulties experienced by children with ADHD, but parent training in effective behavior management and classroom behavior and academic interventions were effective strategies (Barkley, 2002). According to the National Institute for Health and Care Excellence (NICE, 2013), parent training programs should be considered as first-line treatment for preschool children. For school-aged children, drug treatment should be the first-line treatment, but it should be part of a comprehensive treatment program and parents should be offered parent training programs as well. The American Academy of Pediatrics (2011) also recommended parent- or teacher-administered behavior therapy as the first-line treatment for preschool-aged children. The literature consistently

indicates that parent training should be one of the treatment components to be included for intervention for children with ADHD.

There are various studies on the effectiveness of parent training programs for children with ADHD. For example, Herbert, Harvey, Roberts, Wichowski, and Lugo-Candelas (2013) found that parent training was effective in reducing inattention, hyperactivity, oppositional behavior, and emotional lability in preschool children, using a randomized controlled trial (RCT) design. Loren et al. (2015) also found that an eight-session behavior parent training program was effective in reducing overall impairment and improving parent–child relationship among primary school children. There was no control group in this study. Chronis, Jones, and Raggi (2006) reported that in a review of 28 published studies, parent training was found to

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result in improvement in parent rating of problem behaviors and observed parent–child interactions and a decrease in parental stress among families with children with ADHD.

Parent–Child Interaction Therapy (PCIT)

PCIT is based on social learning and attachment theories (Hood & Eyberg, 2003). It adopts live coaching for parents and includes two treatment phases, child-directed interaction (CDI) and parent-directed interaction (PDI). In CDI, parents are taught skills to enhance their parent–child relationship and increase their positive parenting practices. Specifically, parents are taught the PRIDE skills, an acronym for praising their child for positive behaviors, reflecting their child’s speech, imitating their child’s play, describing their child’s appropriate behaviors, and being enthusiastic. Furthermore, parents are taught to reduce the use of commands, questions, and criticisms. To achieve CDI mastery, parents need to use 10 labeled praises, 10 reflective statements, 10 behavior descriptions, and less than 3 commands/questions/criticisms within a 5-minute period. After achieving CDI mastery, parents can start the PDI phase where they are taught how to give effective commands and a time out sequence that increases behavioral compliance (Wagner & McNeil, 2008).

The evidence base of PCIT has been demonstrated in meta-analytic studies (e.g., Thomas & Zimmer-Gembeck, 2007). However, there are fewer studies demonstrating the effectiveness of PCIT in children with ADHD. Wagner and McNeil (2008) reviewed the results of PCIT studies in which some children with ADHD were included. Among the 14 studies reviewed, the percentage of children with ADHD in the studies ranged from 41% to 100%. The results indicated that there was a reduction in ADHD symptomatology, and the effects were maintained at follow-up (6 months–3 years; Wagner & McNeil, 2008). They concluded that PCIT might be effective for preschool children with ADHD (Wagner & McNeil, 2008). In an RCT study, Matos, Bauermeister, and Bernal (2009) found that PCIT was effective in reducing hyperactivity, inattention, aggressive, and oppositional-defiant behavior in Puerto Rican preschool children with ADHD, parenting stress in their parents, and increase in the use of positive parenting strategies in parents.

The Hong Kong Situation

In a 2008 study on adolescents based on the Youth and Parent versions of the Diagnostic Interview Schedule for Children–Version 4 and using the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* criteria, the prevalence rate of ADHD among Hong Kong adolescents was 3.9% (P. W. L. Leung et al., 2008). In an earlier study (P. W. L. Leung et al., 1996), the prevalence rate of hyperactivity as attention-deficit disorder with hyperactivity (*DSM-III* definition) among Hong Kong primary school boys was 6.1%. However, there was limited information on the prevalence of ADHD among preschool children in Hong Kong. The statistics

of the Hong Kong Child Assessment Service, a government service which provides assessment and interim support for children aged 0 to 12 years, indicated that among those diagnosed with ADHD (*DSM-IV* criteria), about 17–18% were younger than 6 years old (Keung, Chan, & Lee, 2006). It should be noted that these studies employed different diagnostic criteria.

In terms of treatment, it was found that the combination of medication (methylphenidate) and behavior treatment for parents and children was more effective than medication alone (So, Leung, & Hung, 2008) for a group of primary school children with a diagnosis of ADHD (combined type) according to *DSM-IV* criteria. In a small-scale pilot study on children aged 5 to 10 years old diagnosed with ADHD based on *DSM-IV-TR* criteria, it was found that the Level 4 Group Positive Parenting Program (Triple P; Sanders, 1999) was effective in reducing child behavior problems and increasing parental efficacy (Au et al., 2014).

There is limited information on the effectiveness of parent training programs for parents of preschool/lower primary children with ADHD. Wagner and McNeil (2008) argued that parenting training programs could be useful for young children, as there was evidence of association between maladaptive parenting practices and child behavior problems among young children with ADHD. Furthermore, early intervention during preschool/primary years before the escalation of initial problems might be more advantageous than intervention during later years (Webster-Stratton & Taylor, 2001). Among preschool children in Hong Kong, it was found that Triple P was effective in reducing child behavior problems and dysfunctional parenting practices for families with preschool children (C. M. Leung, Sanders, Leung, Mak, & Lau, 2003) and families with preschool children with developmental disability (C. M. Leung, Fan, & Sanders, 2013). PCIT was also found to be effective with Hong Kong Chinese families with preschool/lower primary children in terms of reduction in child behavior problems, negative parenting practices, parenting stress, and increase in positive parenting practices (C. M. Leung, Tsang, Heung, & Yiu, 2009; C. M. Leung, Tsang, Sin, & Choi, 2014).

The Present Study

As PCIT has been found to be effective with Hong Kong Chinese preschool/lower primary children, and Puerto Rican children with ADHD, the present study aimed to examine the efficacy of PCIT with Hong Kong Chinese preschool/lower primary children with ADHD, using an RCT design. Based on previous literature on PCIT, it was hypothesized that:

1. Compared to the control group, the PCIT group would report lower child behavior problems at postintervention.
2. Compared to the control group, the PCIT group would report lower parental stress at postintervention.
3. Compared to the control group, the PCIT group would report reduced use of inappropriate parenting practices

(commands, questions, criticisms, and corporal punishment) at postintervention.

4. Compared to the control group, the PCIT group would report more use of positive parenting practices (labelled praises, behavior descriptions, and reflections) at postintervention.

Method

Design and Setting

This study adopted a parallel RCT design with allocation ratio 1:1, without blinding. The intervention was conducted in nine social service centers/nursery schools of a service provider organization in Hong Kong, with convenient locations for accessibility by parents and children.

Participants

The inclusion criteria were: (i) the child was aged 2 to 7 years old at the time of enrollment; (ii) the child was diagnosed with ADHD or diagnosed as having ADHD features by professionals such as clinical psychologists and medical practitioners; (iii) the child was living with the caregiver service recipient or the child was residing with caregiver during the first 6 weeks of PCIT treatment with caregiver having liberal visitation to practice the skills in subsequent weeks; (iv) the score on child behavior was above the cutoff score on the Eyberg Child Behavior Inventory (Intensity and Problem scale) and/or the score on parenting stress was above the 85th percentile on any subscale of the Parenting Stress Index; and (v) the parent experienced difficulties managing the child, as demonstrated through a 15-minute behavioral observation using the Dyadic Parent-Child Interaction Coding System—Third Edition (DPICS-III). The exclusion criteria included (i) parents with difficulties consistently attending treatment; (ii) contraindications in the child for PCIT treatment (e.g., Autism Spectrum Disorder, psychosis, etc.); (iii) contraindications in the caregiver for PCIT treatment (e.g., active chemical dependency, psychosis, severe intellectual disability, etc.); and (iv) child having been a victim of sexual abuse with the caregiver as the alleged perpetrator or with a nonoffending caregiver who did not support/believe the sexual-abuse allegations. The participants were recruited from July 2013 to January 2015.

In the C. M. Leung, Tsang, Sin, and Choi (2014) study, large effect sizes were found. According to Cohen (1992), for a large effect size, the sample size required was 26 per arm. In this study, the participants included 64 parent-child dyads. There were 32 dyads in the intervention group who were offered PCIT, and there were 32 dyads in the waitlist control group who were offered PCIT after the intervention group had completed treatment. The treatment outcomes for those in the waitlist control group who were later offered treatment were not reported in the present study.

Measures

Both intervention and control group participants were requested to complete a set of questionnaires in Chinese. In addition, both groups were assessed on their parent-child interaction by PCIT practitioners. The intervention group participants completed the questionnaires/assessment at three time points, preintervention, postintervention, and 3 months after program completion (follow-up). The control group participants completed the questionnaires/assessment at two time points, with a 3- to 5-month interval. The primary outcomes were child behavior problems, and the secondary outcomes were parental stress and practices.

Eyberg Child Behavior Inventory (ECBI; Eyberg & Pinchus, 1999): This is a 36-item scale on disruptive behavior (e.g., noncompliance and temper tantrums), with two scales, Intensity and Problem. The ECBI-Intensity measures the frequency of problem behaviors on a 7-point scale, and the ECBI-Problem Scale measures whether parents find the behaviors problematic (*yes* = 1, *no* = 0). Higher scores indicate a higher frequency of disruptive behavior and parental concern. The Chinese version of the ECBI is validated by C. M. Leung, Chan, Pang, and Cheng (2003) with good reliability (.94 and .93) for both scales. The clinical cutoff for the ECBI-Intensity is 131 and that for the ECBI-Problem is 15.

Child Behavior Checklist (CBCL; P. W. L. Leung et al., 2006): This scale consists of 120 items on problem behavior to be completed by parents. There are eight syndrome scales (Withdrawal, Somatic Complaints, Anxious/Depressed, Social Problems, Thought Problems, Attention Problems, Delinquent Problems, and Aggressive Behavior) together with Total Problems Score, Internalizing Problems Score, and Externalizing Problems Score. It is validated with Chinese children and adolescents in Hong Kong (P. W. L. Leung et al., 2006). In this study, Attention Problems was reported together with Internalizing Problems and Externalizing Problems scores, as measures of child behavior and attention problems.

Parenting Stress Index, Short Form (PSI; Abidin, 1990): This scale consists of 36 questions measuring three factors of parenting stress: parental distress, a measure of an impaired sense of parental competence and depression; parent-child dysfunctional interaction, a measure of dissatisfaction with the parent-child interaction; and difficult child, a measure of behavioral problems of the child. A total score can be calculated, with a higher score representing a higher level of parenting stress. The Chinese version of this scale is validated by Lam (1999) with an overall reliability of .89 (Lam, 1999). However, currently there is no Hong Kong norm for the PSI.

Depression, Anxiety and Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995): This is a 21-item

self-report instrument measuring the negative emotions of depression, anxiety, and stress. The scale is validated with Hong Kong Chinese participants aged 18 or older (Taouk, Lovibond, & Laube, 2001). There are three subscales (depression, anxiety, stress), each containing 7 items. Participants indicate on a 4-point Likert-type scale (*did not apply to me at all* = 0; *applied to me to some degree, or some of the time* = 1; *applied to me to a considerable degree, or a good part of the time* = 2; *applied to me very much, or most of the time* = 3) how much each statement applies to them over the past week.

Dyadic Parent–Child Interaction Coding System: Abbreviated Version (3rd Edition) (DPICS-III; Eyberg, Nelson, Duke, & Boggs, 2005)—The DPICS-III assesses the quality of parent–child interactions through observation of parent–child dyads in a clinical setting. The DPICS-III categories used in this study include Behavioral Description (BD), Reflective Statement (RF), Labelled Praise (LP), and Command/Question/Negative Talk (C/Q/NTA). BD, RF, and LP are summed up to form a variable on DPICS-positive practices. The Chinese version of the DPICS-III is translated by PCIT practitioners and reviewed by two local PCIT trainers and their project supervisor. The interrater reliability estimates (κ) for BD, RF, LP, and C/Q/NTA are from .80 to 1.00.

Corporal punishment: Participants reported the frequency of the use of corporal punishment in the last 7 days.

Demographic information: Participants were requested to provide information on the target child's age, sex, schooling, the participant's age, sex, educational attainment, occupation, marital status, family type, household income, and social welfare status.

Procedures

The PCIT service was advertised through the website of the service provider organization and leaflets to clients, nongovernmental social service organizations, schools, and government services for children and families. Recruitment was through participant self-referral or referral by the above-described organizations/services. Upon enrollment and participant consent, the PCIT practitioner who enrolled the participant sent the name of the participant to the project supervisor who randomly assigned the participant to either intervention or control group using random numbers generated by a random number table.

The intervention group participants were requested to complete the questionnaires before (preintervention), immediately after the program (postintervention), and 3 months (follow-up) after intervention on site in the center where the service was offered. The control group participants completed the questionnaires within a 3- to 5-month interval (preintervention and postintervention) on site in the center where they were to receive service after the intervention group had completed the

intervention. All participants were assessed on DPICS-III by trained PCIT practitioners in the same sessions where they completed the questionnaires. There was no follow-up assessment for the control group, as the control group was a waitlist control group and the control group participants were offered PCIT services after the intervention group participants had completed treatment. The postintervention data were collected between October 2013 and April 2015. The follow-up assessment for the intervention group was collected between January 2014 and June 2015. This study was approved by the ethics committee of The Hong Kong Polytechnic University.

The Intervention

The treatment (PCIT) was delivered in nine social service centers and nursery schools. As described previously, the treatment consisted of two phases, CDI and PDI. The treatment progress was guided by practitioners' rating of parent–child interaction using DPICS-III. Treatment was conducted once per week with each session lasting for about 1 hour. Parent participants were given homework to practice the skills learnt with their children at home every week. Each session began with a review of the homework and family situation. This was then followed by a 5-minute observation of the parent–child interaction to assess the participants' mastery of the skills taught. Then the practitioners coached participants in their skills to manage their children on-site, using audio equipment behind one-way mirrors. The number of treatment sessions offered depended on the participants' mastery of the skills. Once participants met the CDI mastery criteria (10 labelled praises, 10 reflective statements, 10 behavior descriptions, and less than 3 commands/questions/criticisms within a 5-min period), they moved to the PDI phase. Treatment ended when the participants had mastered the required skills. The treatment was conducted in Cantonese by six trained PCIT practitioners (registered social workers with tertiary qualifications) who have received qualification training from the PCIT program in the United States or from Hong Kong PCIT trainers certified by the PCIT program in the United States. The practitioners received regular supervision from PCIT trainers, and they were required to adhere to the PCIT protocol. One on-site fidelity check on protocol adherence during PCIT delivery by PCIT trainers was conducted for each case.

The control group participants were not offered any services during the time when the intervention group was receiving treatment. However, they were free to participate in non-PCIT services and programs offered in community and government services.

Data Analysis

Analysis was by intention to treat. Missing data were estimated using multiple imputation (five imputations). The main analysis used was multiple regression. The independent variables were group status and preintervention scores, and the dependent variables were the postintervention scores. Effect sizes

were calculated using Cohen’s *d*, based on pooled multiple imputation results. Both adjusted and unadjusted effect sizes were calculated.

Reliable change is defined as a statistically reliable magnitude of change which is calculated as the difference between preintervention and postintervention scores over standard error of difference (Jacobson & Truax, 1991). To examine the proportion of participants in intervention and control groups who could achieve reliable change (*achieved* = 1; *not achieved* = 0), chi-square tests were used.

To investigate whether intervention group participants could maintain their gains 3 months after intervention, repeated measures analysis of variance was used.

Results

The Sample

Among the 32 intervention group participants, two dropped out before the completion of the program due to a health problem in one case and a busy schedule in another case. There were 31 intervention group participants and 32 control group participants with complete postintervention data. All intervention group members completed the postintervention questionnaires (*n* = 32), but one of the participants who dropped out did not attend the session for observation of the parent–child interaction, and the DPICS-III measures of this participant was missing. There were 19 intervention group participants with complete follow-up questionnaire data, among which there were 18 participants with complete follow-up DPICS-III measures. The flow of participants is shown in Figure 1.

Among the intervention group participants, 25 completed PCIT treatment successfully (postintervention ECBI-Intensity scores below the cutoff and achievement of CDI mastery or both CDI and PDI mastery), with a success rate of 78.13%. Among seven unsuccessful cases, two cases terminated the treatment before completion as described above, while five cases completed the treatment content according to the PCIT protocol but failed to achieve postintervention ECBI-Intensity scores cutoff criteria and/or CDI/PDI mastery. Among the intervention group participants, the mean total number of sessions attended was 16.69 sessions (*SD*: 5.26; range: 5–26). Participants who achieved CDI mastery would move on to PDI sessions according to their own individual progress. The mean number of CDI sessions was 6.84 sessions (*SD*: 3.10; range: 1–17). The mean number of PDI sessions was 6.16 sessions (*SD*: 3.10; range: 0–15).

There was no significant difference in demographic characteristics and preintervention measures between the intervention and the control group participants. The demographic characteristics are shown in Table 1. The preintervention, postintervention, and follow-up scores; reliability; and unadjusted effect sizes are shown in Table 2. All reliability estimates were above .70 except preintervention CBCL-Attention Problems, follow-up CBCL-Attention Problems, and follow-up ECBI-Intensity.

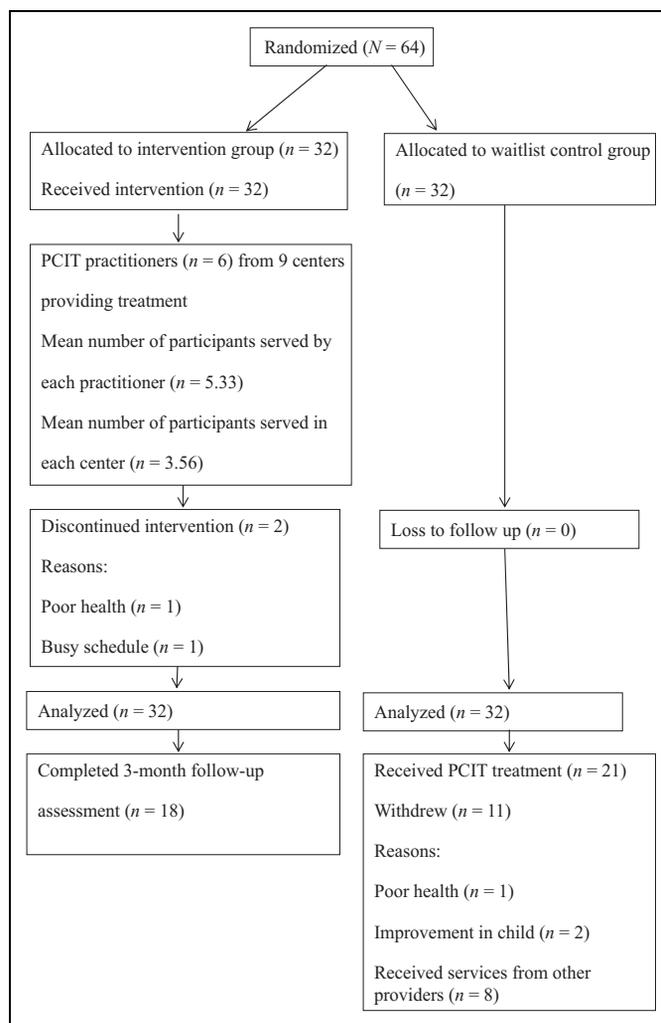


Figure 1. Flow of participants.

Intention-To-Treat Analysis

Hypothesis 1 on child behavior problems was supported. The regression result was significant for postintervention ECBI-Intensity, $F(2, 61) = 56.60, p < .001$, adjusted $R^2 = .64$. Group status was a significant predictor for postintervention ECBI-Intensity, $t = 8.59, b = 43.49, p < .001$, adjusted $d = 2.91$, 95% confidence interval (CI): [2.17, 3.57]. The regression result was also significant for postintervention ECBI-Problem, $F(2, 61) = 19.62, p < .001$, adjusted $R^2 = .37$. Group status was a significant predictor for postintervention ECBI-Problem ($t = 5.11, b = 10.02, p < .001$, adjusted $d = 3.31$, 95% CI [2.51, 4.01]). Similarly, the regression result was significant for CBCL-Attention Problems, $F(2, 61) = 20.11, p < .001$, adjusted $R^2 = .38$. Group status was a significant predictor for CBCL-Attention Problems ($t = 3.31, b = 1.51, p = .002$, adjusted $d = 1.23$, 95% CI [0.68, 1.75]). The regression result for CBCL-Internalizing Problems was also significant, $F(2, 61) = 35.94, p < .001$, adjusted $R^2 = .53$. Group status was a significant predictor for postintervention CBCL-Internalizing Problems ($t = 4.63, b = 8.18, p < .001$, adjusted $d = 1.41$, 95%

Table 1. Sociodemographic Characteristics of Participants.

Sociodemographic Characteristics	Intervention Group (n = 32)	Control Group (n = 32)	Significance
	n (%)	n (%)	
Target child—male	28 (87.5%)	25 (78.1%)	$\chi^2(1) = 0.99, p = .320$
Target child—female	4 (12.5%)	7 (21.9%)	
Target child with confirmed ADHD	14 (43.8%)	10 (31.3%)	$\chi^2(1) = 1.07, p = .302$
Target child with ADHD features	18 (56.3%)	22 (68.8%)	$\chi^2(1) = 1.07, p = .302$
Target child with developmental delay	0 (0%)	2 (6.3%)	$\chi^2(1) = 2.07, p = .492$
Target child with language delay	3 (9.4%)	3 (9.4%)	$\chi^2(1) = 0, p = 1.000$
Target child with dyslexia	1 (3.1%)	0 (0%)	$\chi^2(1) = 1.02, p = .313$
Target child with oppositional defiant disorder symptoms	1 (3.1%)	3 (9.4%)	$\chi^2(1) = 1.07, p = .302$
Target child with other special education needs	1 (3.1%)	0 (0%)	$\chi^2(1) = 1.02, p = .313$
Target child on medication	4 (12.5%)	2 (6.3%)	$\chi^2(1) = 0.74, p = .391$
Education level of target child—nursery/kindergarten	24 (75.0%)	21 (65.6%)	$\chi^2(1) = 0.67, p = .412$
Education level of target child—primary	8 (25.0%)	11 (34.4%)	
Marital status—married/ de facto	28 (87.5%)	27 (84.4%)	$\chi^2(1) = 0.13, p = .719$
Marital status—single/separated/ divorced	4 (12.5%)	5 (15.6%)	
Family type—nuclear	21 (65.6%)	23 (71.9%)	$\chi^2(2) = 0.42, p = .809$
Family type—extended	7 (21.9%)	5 (15.6%)	
Family type—single parent	4 (12.5%)	4 (12.5%)	
Relationship of participant with child—mother	29 (90.6%)	28 (87.5%)	$\chi^2(1) = 0.16, p = .689$
Relationship of participant with child—father	3 (9.4%)	4 (12.5%)	
Participant in employment	13 (40.6%)	14 (43.8%)	$\chi^2(1) = 0.06, p = .800$
Participant not in employment	19 (59.4%)	18 (56.3%)	
Education level of participants – more than 9 years	21 (65.6%)	25 (78.1%)	$\chi^2(1) = 1.24, p = .266$
Education level of participants—9 years or less	11 (34.4%)	7 (21.9%)	
Family monthly income—HK\$20,000 or above	14 (43.8%)	12 (37.5%)	$\chi^2(1) = 0.26, p = .611$
Family monthly income—HK\$19,999 or below	18 (56.3%)	20 (62.5%)	
Social welfare status—no	30 (93.8%)	26 (81.3%)	$\chi^2(1) = 2.29, p = .131$
Social welfare status—yes	2 (6.3%)	6 (18.8%)	
	Mean (SD)	Mean (SD)	
Age of target child (years)	5.51 (1.29)	5.43 (1.31)	$t(62) = 0.18, p = .859$
Age of participant (years)	37.52 (4.34)	37.13 (5.27)	$t(62) = 0.33, p = .743$

CI [0.84, 1.94]). Finally, the regression result for CBCL-Externalizing Problems was also significant, $F(2, 61) = 36.88, p < .001$, adjusted $R^2 = .53$. Group status was a significant predictor for postintervention CBCL-Externalizing Problems ($t = 5.15, b = 8.62, p < .001$, adjusted $d = 1.32$, 95% CI [0.76, 1.84]). In all cases, the intervention group reported lower child behavior problem scores than the control group at postintervention, in terms of ECBI-Intensity, ECBI-Problem, CBCL-Attention Problems, CBCL-Internalizing Problems, and CBCL-Externalizing Problems, indicating lower child behavior problems in the intervention group at postintervention.

Hypothesis 2 on parental stress was supported. The regression result was significant for postintervention PSI total scores, $F(2, 61) = 48.86, p < .001$, adjusted $R^2 = .60$. Group status was a significant predictor for postintervention PSI total scores ($t = 5.97, b = 23.40, p < .001$, adjusted $d = 1.90$, 95% CI [1.28, 2.46]). The regression result was also significant for postintervention DASS-21 scores, $F(2, 61) = 59.07, p < .001$, adjusted $R^2 = .65$. Group status was a significant predictor for postintervention DASS-21 scores ($t = 3.56, b = 8.19, p = .001$, adjusted $d = 0.98$, 95% CI [0.45, 1.48]).

In all cases, the intervention group reported lower parental stress scores than the control group at postintervention, in terms of PSI total scores and DASS-21 scores, indicating lower parental stress in the intervention group at postintervention.

Hypotheses 3 and 4 on parenting practices were supported. In terms of positive parenting practices, the regression result¹ was significant for postintervention DPICS-positive practices, $F(2, 61) = 40.62-52.01, p < .001$, adjusted $R^2 = .56-.62$. Group status was a significant predictor for postintervention DPICS-positive practices ($t = 9.22, b = 23.46, p < .001$, adjusted $d = 9.90$, 95% CI [7.99, 11.51]). In terms of negative parenting practices, the regression result was significant for postintervention DPICS-C/Q/NTA, $F(2, 61) = 49.70-53.65, p < .001$, adjusted $R^2 = .61-.63$. Group status was a significant predictor for postintervention DPICS-C/Q/NTA scores ($t = 8.91, b = 12.74, p < .001$, adjusted $d = 4.43$, 95% CI [3.46, 5.26]). For postintervention corporal punishment, the regression result was significant, $F(2, 61) = 23.29, p < .001$, adjusted $R^2 = .41$. Group status was a significant predictor for postintervention corporal punishment ($t = 4.33, b = 1.46, p < .001$, adjusted $d = 2.10$, 95% CI [1.46, 2.68]). The

Table 2. Mean and Standard Deviation of Preintervention, Postintervention, and Follow-up Scores, Reliability and Unadjusted Effect Sizes.

Measures	Intervention Group (n = 32)		Control Group (n = 32)		Reliability	Significance (Preintervention Scores)	Unadjusted Effect Size [95% CI] (Postintervention Scores)
	Mean	SD	Mean	SD			
Preintervention ECBI-Intensity	165.06	24.32	166.53	20.04	.85	$t(62) = 0.26, p = .793$	1.76 [1.16, 2.31]
Postintervention ECBI-Intensity	114.81	30.34	159.31	18.93	.95		
Follow-up ECBI-Intensity	121.59	44.25			.68		
Preintervention ECBI-Problem	18.84	8.50	20.50	7.34	.91	$t(62) = 0.83, p = .407$	1.28 [0.73, 1.80]
Postintervention ECBI-Problem	8.78	9.07	19.44	7.47	.95		
Follow-up ECBI-Problem	7.66	14.02			.79		
Preintervention CBCL-Attention Problems	5.88	1.79	5.91	1.61	.51	$t(62) = 0.07, p = .942$	0.70 [0.18, 1.19]
Postintervention CBCL-Attention Problems	3.88	2.32	5.41	2.06	.78		
Follow-up CBCL-Attention Problems	3.84	3.57			.43		
Preintervention CBCL-Internalizing Problems	20.06	8.78	21.00	11.38	.89	$t(62) = 0.37, p = .713$	0.94 [0.41, 1.44]
Postintervention CBCL-Internalizing Problems	11.69	7.86	20.44	10.60	.91		
Follow-up CBCL-Internalizing Problems	12.26	11.34			.80		
Preintervention CBCL-Externalizing Problems	27.88	8.55	27.03	7.88	.88	$t(62) = 0.41, p = .683$	0.89 [0.36, 1.39]
Post-intervention CBCL-Externalizing Problems	16.94	9.91	24.94	7.94	.93		
Follow-up CBCL-Externalizing Problems	19.40	13.98			.82		
Preintervention PSI-total	115.72	16.14	123.75	17.91	.91	$t(62) = 1.88, p = .064$	1.50 [0.93, 2.03]
Postintervention PSI-total	95.22	20.18	124.34	18.62	.96		
Follow-up PSI-total	92.59	23.54			.85		
Preintervention DASS-total	19.53	17.71	23.38	16.33	.96	$t(62) = 1.02, p = .312$	0.76 [0.25, 1.26]
Postintervention DASS-total	12.94	11.47	24.00	16.94	.97		
Follow-up DASS-total	9.68	11.73			.87		
Preintervention DPICS-Positive	3.43	4.91	2.69	2.78	NA	$t(62) = 0.75, p = .454$	2.35 [1.69, 2.95]
Postintervention DPICS-Positive	25.66	14.36	2.03	2.74	NA		
Follow-up DPICS-Positive	31.42	5.13			NA		
Preintervention DPICS-C/Q/NTA	14.72	10.02	16.25	9.62	NA	$t(62) = 0.62, p = .535$	2.08 [1.45, 2.66]
Postintervention DPICS-C/Q/NTA	1.30	2.74	14.03	8.33	NA		
Follow-up DPICS-C/Q/NTA	1.31	2.31			NA		
Preintervention Corporal Punishment	1.31	1.75	1.88	2.09	NA	$t(62) = 1.17, p = .248$	1.10 [0.56, 1.61]
Postintervention Corporal Punishment	0.13	0.34	1.81	2.15	NA		
Follow-up Corporal Punishment	0.00	0.00			NA		

Note. ECBI = Eyberg Child Behavior Inventory; CBCL = Child Behavior Checklist; PSI = Parenting Stress Index; DASS = Depression, Anxiety and Stress Scale; DPICS = Dyadic Parent-Child Interaction Coding System; C/Q/NTA = Command/Question/Negative Talk.

intervention group reported less frequent use of negative parenting practices and corporal punishment than the control group at postintervention. The intervention group also reported more frequent use of positive parenting practices such as reflection, behavioral description, and labeled praise than the control group at postintervention.

Reliable changes were computed for measures with published test-retest reliability information for the calculation of standard error of difference. Chi-square test results were significant for ECBI-Intensity, $\chi^2(1) = 33.36, p < .001$, ECBI-Problem, $\chi^2(1) = 22.76, p < .001$, CBCL-Attention Problems, $\chi^2(1) = 7.75, p = .005$, CBCL-Internalizing Problems, $\chi^2(1) = 5.38, p = .020$, CBCL-Externalizing Problems, $\chi^2(1) = 11.98, p = .001$, and PSI total scores, $\chi^2(1) = 14.77, p < .001$. In all cases, a higher percentage of intervention group participants were able to achieve reliable change in child behavior and parenting stress than control group participants. The details are in Table 3.

As there were approximately 40% of participants with missing follow-up data, R.J.A. Little's chi square statistics was used

to examine whether the data were missing completely at random, $\chi^2(9) = 12.38, p = .193$. As the p value was greater than .05, it could be assumed that the data were missing completely at random. Missing follow-up values were estimated using preintervention and postintervention values.² There was one participant without postintervention DPICS scores, and this participant was excluded in the analysis, as it was not meaningful to use estimated postintervention scores to estimate follow-up scores.

For child behavior, the results were significant for ECBI-Intensity, $F(2, 60) = 11.67-58.54, p < .001, \eta_p^2 = .280-.593$, as well as ECBI-Problem, $F(2, 60) = 8.62-36.95, p < .001, \eta_p^2 = .223-.552$. In both cases, the postintervention and follow-up scores were significantly lower than the preintervention scores, but there was no difference between the postintervention and follow-up scores. The results were also significant for CBCL-Attention Problems, $F(2, 60) = 3.35-17.80, p = .042- < .001, \eta_p^2 = .100-.375$, CBCL-Internalizing Problems, $F(2, 60) = 11.69-24.42, p < .001, \eta_p^2 = .280-.449$, as

Table 3. Achievement of Reliable Change.

Measures	Achievement of Reliable Change	Intervention Group (N = 32)		Control Group (N = 32)	
		n	%	n	%
ECBI-Intensity	Achieved	29	90.6	6	18.8
	Did not achieve	3	9.4	26	81.3
ECBI-Problem	Achieved	24	75.0	5	15.6
	Did not achieve	8	25.0	27	84.4
PSI-total	Achieved	12	37.5	0	0.0
	Did not achieve	20	62.5	32	100.0
CBCL-Attention Problems	Achieved	19	59.4	8	25.0
	Did not achieve	13	40.6	24	75.0
CBCL-Internalizing Problems	Achieved	9	28.1	2	6.3
	Did not achieve	23	71.9	30	93.8
CBCL-Externalizing Problems	Achieved	17	53.1	4	12.5
	Did not achieve	15	46.9	28	87.5

Note. ECBI = Eyberg Child Behavior Inventory; CBCL = Child Behavior Checklist; PSI = Parenting Stress Index.

well as CBCL-Externalizing Problems, $F(2, 60) = 10.23-15.71$, $p < .001$, $\eta_p^2 = .254-.344$. For both CBCL-Internalizing Problems and CBCL-Externalizing Problems, the postintervention and follow-up scores were significantly lower than the preintervention scores, but there was no difference between the postintervention and follow-up scores. In the case of CBCL-Attention Problems, the postintervention scores were significantly lower than the preintervention scores, but there was no difference between the follow-up scores and preintervention/postintervention scores. The program gains appeared to be maintained 3 months after program completion in terms of decrease in child behavior problems.

For parental stress, the results were significant for PSI total scores, $F(2, 60) = 11.11-17.56$, $p < .001$, $\eta_p^2 = .270-.369$, as well as DASS-21 scores, $F(2, 60) = 4.36-10.31$, $p = .017-.001$, $\eta_p^2 = .127-.256$. For PSI total scores, the postintervention and follow-up scores were significantly lower than the preintervention scores, but there was no difference between the postintervention and follow-up scores. For DASS-21 scores, the postintervention scores were significantly lower than the preintervention scores, but there was no difference between the follow-up scores and preintervention/postintervention scores. The program gains appeared to be maintained 3 months after program completion in terms of decrease in parental stress.

In terms of parenting practices, the results were significant for DPICS-positive practices, $F(2, 60) = 84.67-111.17$, $p < .001$, $\eta_p^2 = .738-.787$, as well as DPICS-C/Q/NTA scores, $F(2, 60) = 51.80-58.06$, $p < .001$, $\eta_p^2 = .633-.659$. For corporal punishment, the results were significant, $F(2, 60) = 16.42$, $p < .001$, $\eta_p^2 = .354$. For DPICS-positive practices, the postintervention and follow-up scores were significantly higher than the preintervention scores, but there was no difference between the postintervention and the follow-up scores. For DPICS-C/Q/NTA scores and corporal punishment, the postintervention and follow-up scores were significantly lower than

the preintervention scores, but there was no difference between the postintervention and the follow-up scores. The program gains appeared to be maintained 3 months after program completion in terms of increase in the use of positive parenting practices and decrease in the use of negative parenting practices.

Participants With Complete Data

As all participants provided complete data on parent-report questionnaires (ECBI-Intensity, ECBI-Problem, CBCL-Attention Problems, CBCL-Internalizing Problems, CBCL-Externalizing Problems, PSI total scores, DASS-21 scores, and frequency of corporal punishment), no separate analyses were conducted for comparison of postintervention scores and achievement of reliable change between intervention and control group participants.

In terms of parenting practices, the regression result was significant for postintervention DPICS-positive practices, $F(2, 60) = 50.91$, $p < .001$, adjusted $R^2 = .62$. Group status was a significant predictor for postintervention DPICS-positive practices ($t = 9.72$, $b = 24.01$, $p < .001$). The regression result was significant for postintervention DPICS-C/Q/NTA, $F(2, 60) = 50.29$, $p < .001$, adjusted $R^2 = .61$. Group status was a significant predictor for postintervention DPICS-C/Q/NTA scores ($t = 8.98$, $b = 12.45$, $p < .001$). Intervention group participants attained higher postintervention DPICS-positive practices scores and lower DPICS-C/Q/NTA scores than control group participants.

In terms of follow-up results, for child behavior, the results were significant for ECBI-Intensity, $F(2, 36) = 70.77$, $p < .001$, $\eta_p^2 = .797$, as well as ECBI-Problem, $F(2, 36) = 28.28$, $p < .001$, $\eta_p^2 = .611$. In both cases, the postintervention and follow-up scores were significantly lower than the preintervention scores, but there was no difference between the postintervention and the follow-up scores. The results were also significant for CBCL-Attention Problems, $F(2, 36) = 20.94$, $p < .001$, $\eta_p^2 = .538$, CBCL-Internalizing Problems, $F(2, 36) = 21.31$, $p < .001$, $\eta_p^2 = .542$, as well as CBCL-Externalizing Problems, $F(2, 36) = 35.36$, $p < .001$, $\eta_p^2 = .663$. In all cases, the postintervention and follow-up scores were significantly lower than the preintervention scores, but there was no difference between the postintervention and follow-up scores. The program gains appeared to be maintained 3 months after program completion in terms of decrease in child behavior problems.

For parental stress, the results were significant for PSI total scores, $F(2, 36) = 12.39$, $p < .001$, $\eta_p^2 = .408$, as well as DASS-21 scores, $F(2, 36) = 5.07$, $p = .011$, $\eta_p^2 = .220$. For PSI total scores, the postintervention and follow-up scores were significantly lower than the preintervention scores, but there was no difference between the postintervention and follow-up scores. For DASS-21 scores, there was no significant difference in scores in any pairs of time points. The program gains appeared to be maintained 3 months after program completion in terms of decrease in parental stress.

In terms of parenting practices, the results were significant for DPICS-positive practices, $F(2, 34) = 125.21, p < .001, \eta_p^2 = .880$, as well as DPICS-C/Q/NTA scores, $F(2, 34) = 38.29, p < .001, \eta_p^2 = .693$. For corporal punishment, the results were significant, $F(2, 60) = 16.42, p < .001, \eta_p^2 = .354$. For DPICS-positive practices, the postintervention and follow-up scores were significantly higher than the preintervention scores, but there was no difference between the postintervention and the follow-up scores. For DPICS-C/Q/NTA scores and corporal punishment, the postintervention and follow-up scores were significantly lower than the preintervention scores, but there was no difference between the postintervention and the follow-up scores. The program gains appeared to be maintained 3 months after program completion in terms of increase in the use of positive parenting practices and decrease in the use of negative parenting practices.

Discussion and Application to Practice

The results of the study provided promising evidence on the effectiveness of the PCIT with children with ADHD or ADHD features. There was a decrease in child behavior and attention problems, parental stress and negative parenting practices as well as an increase in the use of positive parenting practices. The program gains appeared to be maintained 3 months after program completion. The results were consistent with the C. M. Leung et al. (2014) study on Chinese children and other studies on PCIT with children with ADHD (e.g., Matos, Bauermeister, & Bernal, 2009) where there was a decrease in child behavior problems and attention problems, decrease in parental stress and inappropriate parenting practices, and an increase in positive parenting practices.

The effect sizes were large in the majority of outcome variables (adjusted effect sizes >1 in all but one case), and this provided evidence on the robustness of the change in outcome variables. The results were consistent with the large effect sizes as reported by Thomas and Zimmer-Gembeck (2007). The results also compared well with the effect sizes (Cohen's $h = 0.54-0.79$) reported in the So et al.'s (2008) study using combined methylphenidate and behavior training for Chinese primary school children with ADHD as well as the medium to large effect sizes (0.50–0.94) reported in the Au et al. (2014) study on Triple P with Chinese primary school children with ADHD. However, in the present study, it was not possible to investigate the effect of PCIT in combination with medication, as only 9.4% of the target children were on medication.

While the importance of parent training as an integral component for treatment of young children with ADHD is well documented in non-Chinese communities (e.g., Barkley, 2002; NICE, 2013), the current study on Chinese is a significant enrichment of evidence on cross-cultural applications of PCIT. The results not only provide further evidence on the transportability of parent training programs (Gardner, Montgomery, & Knerr, 2015) but also the application of these programs to children with developmental disabilities in different cultural groups. With the encouraging results from the present

study and the results of Matos et al. (2009), other non-English-speaking communities can consider the option of adopting PCIT to support families and children in need.

This study contributes to PCIT research and service development in a number of aspects. First, the results of the present RCT study provide additional robust evidence on the usefulness of PCIT with children aged 2 to 7 with ADHD or ADHD features and their parents. Second, the successful engagement of Chinese parents for help seeking at such an early stage after case diagnoses breaks the traditional belief that Chinese families tend to deny and postpone professional intervention because of stigma. The study shows that if the services are promoted and delivered by established nonprofit social services agencies, and that the staff responsible for recruitment and intake could properly engage the parent applicants and referrers and show that the intervention will target at outcomes addressing their parenting concerns, and that the program will be systematic, comprehensive, and delivered by professionals who command their confidence even at intake, they will be willing to try and stay on the program. The special physical facilities required by the PCIT approach also served to assure the parents of the agency's expertise in successful delivery of the program. All these helped to enhance the parent participants' motivation to try and benefit from this venture. Third, the fact that a target number of parents allocated into the waitlist control group stayed on and completed multiple waves of data collection showed that the staff was able to help them understand and appreciate the stringent requirements of the research and enlist their support, participation, and patience. This indicates that aside from clinical skills, it is important that social services staff can communicate effectively with potential service users to encourage their timely and committed help seeking. Similarly, the intervention group participants' cooperative completion of 3-month follow-up data collection indicated the service users' acceptance of the need to support research to enhance services. Finally, engaging parents to seek treatment which addresses dyads instead of individuals as units of intervention introduced them to the important systems perspective in understanding and managing challenges, like having a child with congenital problems affecting behavior and emotions. Such a perspective will help parents to understand the multiple causes of observed behaviors in any family member and open them for multiple channels of intervention like single or cross-generational interventions. The realistic and dynamic understanding will be useful for any families when they sail through the developmental challenges of the child and, indeed, the family. These good practices provide a useful key to engage Chinese known to be reluctant in help seeking. This might even economize the team's deployment of professional resources to focus on services delivery and enhancement.

In the process of implementing this project and referencing recent literature on PCIT, the PCIT practitioners also identified two promising clinical approaches in working with the parents. Coaching in parenting work, as proposed by Barnett et al. (2015), can be more acceptable than directive instructions to parents. The responsive feedback in the coaching process is

considered one of the key factors for successful intervention. In coaching, parents are engaged and encouraged by praise on their efforts toward a goal they own, assured on skills they have applied, and reminded on the rationale behind the treatment and specific skills. The PCIT practitioner's observation and feedback on the child's behavior changes generated from the parents' improved management approaches can serve to enhance the parents' understanding of their child and help the parents regain a sense of efficacy and optimism in parenting. The coaching process is a promising technique that advances parent training from mere transmission of knowledge to an enhancement of parents' perceived competence and positive perception of their children. The use of coaching in parent training therefore warrants further exploration.

While some parents took their own initiative to seek help from PCIT and were ready to learn and improve, quite a number of parents were referred by social, educational, or medical services (approximately 28% in the total sample). Some had challenging family or personal backgrounds, and some had different experiences of the services they received before. All these might have affected their attitudes and motivation in participation in PCIT. Recent studies indicated that PCIT practitioners who were trained in motivational interviewing (Chaffin et al., 2009) successfully applied some of the engagement skills (e.g., "change talk") and found them useful in rebuilding the motivation of such parents to optimize their benefits from PCIT. Motivational interviewing has been introduced into Hong Kong for some years and this can certainly be an option for continuing education for PCIT practitioners in Hong Kong. Further studies on the impact of motivational interviewing on treatment completion and treatment effectiveness can also shed more light on strategies to enhance treatment compliance and effectiveness.

There were some limitations in the present study. First, the follow-up results included the intervention group only, and the follow-up results could not be confidently attributed to the intervention. As the control group was a waitlist control group, service had to be rendered to them upon the completion of treatment of the intervention group. Second, the outcome measures included parent report of child behavior and practitioner observation of parent-child interaction, but we did not have information on the children's behavior in school. The effect of PCIT on children's classroom behavior could not be ascertained. Third, though there was regular supervision of PCIT practitioners and all were instructed to adhere to the protocol, there was only one independent fidelity check per case. Fourth, as the control group was not offered any service while the intervention group was receiving service, the possibility of placebo effect could not be ruled out. Finally, DPICS assessment was not blinded as the DPICS assessment was conducted by PCIT practitioners who were aware of the group status of the participants. This could have introduced observer bias.

This study provided promising evidence on the effectiveness of PCIT with Chinese children with ADHD or ADHD features. This study was unique in two ways. First, this study was a service-based evaluation with the treatment provided by

regular frontline social workers rather than expert clinicians in clinical or tertiary settings. The results were, however, promising with effect sizes comparable to other published efficacy studies. This indicates that with adequate preservice training, ongoing in-service supervision, and, in this case, participation in the evaluation study of the service, all helped to cultivate frontline practitioners into competent and effective service providers in specific interventions. Second, the program was offered to parents of children with ADHD or ADHD features in a community setting. The facilitators adhered to the PCIT protocol with no specific modifications, but they were able to carefully and flexibly attend to the needs of the families. This is consistent with the dual assertion of Mazzucchelli and Sanders (2010) in maintaining program fidelity and attending to the diverse needs of families in effective intervention. Again, the evidence in this study shows that the selection and ongoing cultivation of PCIT therapists to use suitable attitude, knowledge, and skills to articulate their expertise to deliver PCIT with needed adaptations to cater for specific family needs is shown to be possible and productive.

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Notes

1. Due to missing postintervention parenting practices data, multiple imputation (five imputations) was used to estimate the missing data. The ranges for the F and adjusted R^2 represented the results based on the five sets of imputed data.
2. Due to missing follow-up data, multiple imputation (five imputations) was used to estimate the missing data. The ranges for the F and adjusted R^2 reported represented the results based on the five sets of imputed data.

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