Acceptance and commitment therapy–based asthma management programme for parents of children with asthma and attention-deficit hyperactivity disorder: abridged secondary publication

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KEY MESSAGES

1. An acceptance and commitment therapy–based asthma management programme for parents of children with asthma and attention-deficit hyperactivity disorder resulted in significant reductions in unplanned healthcare visits and significant improvements in asthma control and attention-deficit hyperactivity disorder symptom severity at 12 months post-intervention.
2. Parents showed improvements in psychological adjustment, asthma management self-efficacy, psychological flexibility, parenting competence, and overall family functioning across the 12-month follow-up period.
3. Qualitative feedback from parents affirmed the practicality and appropriateness of the intervention.

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Introduction

Asthma and attention-deficit hyperactivity disorder (ADHD) are common paediatric conditions. Children with asthma are 1.6 times more likely to develop ADHD.[1] The underlying mechanisms may involve inflammatory processes and immune dysregulation, affecting neurodevelopment and sleep. In Hong Kong, there has been a notable increase in the use of psychiatric services for ADHD among children with asthma.[2,3]

Children affected by both asthma and ADHD are more likely to require emergency care for asthma exacerbations. Heightened parental stress and increased risks of parental depressive and anxiety disorders may compromise effective asthma management. ADHD-associated executive function deficits present further challenges to asthma management, thereby requiring greater parental engagement and communication. Asthma education and parenting programmes often overlook the psychological aspects of parenting. A Cochrane review highlighted the ineffectiveness of family therapy and problem-solving therapy in improving parental psychological health or child asthma outcomes.[4]

Acceptance and commitment therapy (ACT), a mindfulness-based cognitive behavioural therapy, has demonstrated efficacy in enhancing psychological flexibility and self-management across various chronic diseases. When combined with parenting programmes, ACT has been effective in reducing parental anxiety and stress and ameliorating children's behavioural problems. Compared with education alone, our ACT-augmented parental training programme has shown greater effectiveness in improving parental psychological well-being and asthma management, resulting in decreased child asthma morbidity.[5] The present study aimed to investigate the effects and cost-effectiveness of an ACT-based asthma management programme, relative to treatment as usual (TAU), among children diagnosed with asthma and ADHD and their parents.

Methods

This assessor-blind, two-arm, repeated-measures, randomised controlled trial was conducted at a public hospital in Hong Kong between 1 April 2021 and 31 August 2023. Parents aged 18 to 65 years and their children aged 3 to 12 years with concurrent diagnoses of uncontrolled asthma (Childhood Asthma Control Test [C-ACT] score ≤19) and ADHD were invited to participate. Those involved in other intervention studies or displaying major comorbidities were excluded.

Participants were randomly allocated to either the ACT or TAU group in a 1:1 ratio, using permuted blocks of six to ensure balanced distribution. The TAU group received standard outpatient asthma care, which included biannual or quarterly paediatric follow-ups and medication reviews, along with regular asthma education sessions for parents every 3 to 4 weeks delivered by a paediatric respiratory nurse specialist. Referrals to community care and welfare services were made for parental training in ADHD management by psychiatrists or medical social workers. The ACT group received TAU plus a parenting programme titled Positive Parenting from Healthy Living, delivered in 2-hour sessions every 2 weeks, which aimed to improve parental self-regulation and positive parenting practices for childhood asthma management. Subsequently, 2-hour ACT sessions were introduced every 4 weeks for parents, focusing on enhancing parental psychological flexibility. These sessions included accepting parenting challenges, practising mindfulness, recognising the 'observer self', and committing to personal values while addressing parental well-being. The ACT module was customised for Hong Kong parents caring for children with asthma and ADHD; it emphasised coping with persistent thoughts related to comorbidities, managing emotions associated with asthma care and perceptions of ADHD, and navigating societal stigma related to ADHD. The costs associated with delivering the ACT programme were calculated.

The primary outcome was the frequency of unscheduled healthcare visits for childhood asthma exacerbations (including emergency department visits, specialist or private consultations, and hospitalisations) at 12 months post-intervention. Secondary outcomes were asthma symptoms assessed using the C-ACT, asthma-related behavioural issues assessed using the Asthma Behaviour Checklist, and ADHD symptoms assessed using the parent-reported Strengths and Weaknesses of ADHD-Symptoms and Normal-Behaviour Rating Scale (SWAN). For parents, psychological flexibility was assessed using the Acceptance and Action Questionnaire II (AAQ-II); higher scores indicated less flexibility. Parenting competence and self-efficacy in managing their child's asthma were measured using the Parenting Sense of Competency Scale and the Parent Asthma Management Self-Efficacy Scale. The Parent Experience of Child Illness (PECI) was used to assess parental adjustment to their child's illness, whereas the PedsQL Family Impact Module evaluated family and parental functioning. These outcomes were evaluated at 1 week, 6 months, and 12 months post-intervention.

Generalised estimating equations with a first-order autoregressive structure were used to assess intervention effects over time. Mediation analysis used structural equation modelling to examine whether early changes in parental psychological flexibility and competence mediated later parental and child outcomes. Cost-effectiveness analysis used retrospective cost data from post-intervention healthcare visits, considering both parental and societal perspectives; the incremental cost-effectiveness ratio was derived from differences in costs and healthcare visits between groups. All statistical analyses followed intention-to-treat principles, and the statistical significance threshold was set at $P<0.05$ (two-tailed).

Results

Of 5495 parent-child dyads screened, 130 were eligible; of these, 118 were randomly assigned to either the ACT (n=59) or TAU (n=59) group. Common reasons for non-participation were work or family commitments and concerns related to COVID-19. In the ACT group, 53 (89.8%) parents attended all sessions. Participation rates were 100% at baseline, 99.2% at 1 week, 94.1% at 6 months, and 89.0% at 12 months; retention rates were 89% at both 6 and 12 months.

Parental participants (mean age, 40.3 years) were predominantly mothers (91.5%) and housewives (54.2%) [Table 1]. Child participants (mean age, 7.9 years) had asthma onset at a mean age of 3.4 years and were mostly boys (73.7%). Of the child participants, 83.1% were receiving daily inhaled corticosteroids, 28.8% had experienced unscheduled healthcare visits for asthma in the previous year, 47.5% showed concomitant asthma and ADHD, and 26.2% were taking medication for ADHD. The two groups were comparable in baseline characteristics.

Over the 12-month follow-up period, children whose parents in the ACT group had significantly fewer unscheduled healthcare visits for asthma (adjusted incidence rate ratio [IRR]=0.33, $P<0.001$), fewer emergency department visits (adjusted IRR=0.25, $P=0.047$), and fewer consultations with private practitioners (adjusted IRR=0.34, $P=0.005$) [Table 2].

Significant time-by-group interactions were observed for asthma control (C-ACT score) and ADHD symptoms (SWAN total, inattention, and hyperactivity scores) [all $P<0.001$], with medium to large effect sizes (Cohen's d=0.76-1.43, all $P<0.001$-0.032). Asthma-related behavioural issues were also significantly reduced ($P<0.001$).

Among parents, there were significant improvements in psychological flexibility (AAQ-II score), parenting competence (PSOC total and subscale scores and PECI subscale scores), and self-efficacy concerning management of their child's

TABLE 1. Baseline characteristics of parents and children with asthma and attention-deficit hyperactivity disorder (ADHD).

Characteristic	All (n=118)*	Acceptance and commitment therapy group (n= 59)*	Treatment as usual group (n=59)*	P value
Relationship with the child				0.186
Father	10 (8.5)	3 (5.1)	7 (11.9)	
Mother	108 (91.5)	56 (94.9)	52 (88.1)	
Age, y	40.3±5.5	41.0±6.1	39.5±4.7	0.195
Educational attainment				0.663
Primary education or below	3 (2.5)	1 (1.7)	2 (3.4)	
Secondary education	76 (64.4)	42 (71.2)	34 (57.6)	
Tertiary education or above	39 (33.1)	16 (27.1)	23 (39.0)	
Monthly household income, HK$				0.575
Comprehensive Social Security Assistance	8 (6.8)	4 (6.8)	4 (6.8)	
<4000	1 (0.9)	1 (1.7)	0	
4000-9999	3 (2.5)	2 (3.4)	1 (1.7)	
10 000-24 999	39 (33.1)	21 (35.6)	18 (30.5)	
25 000-39 999	30 (25.4)	17 (28.8)	13 (22.0)	
40 000-59 999	24 (20.3)	8 (13.6)	16 (27.1)	
≥60 000	12 (10.2)	6 (10.2)	6 (10.2)	
Marital status				0.357
Single	4 (3.4)	3 (5.1)	1 (1.7)	
Married	103 (87.3)	49 (83.1)	54 (91.5)	
Separated, divorced, or widowed	11 (9.3)	7 (11.9)	4 (6.8)	
Occupation				0.567
Housewife	64 (54.2)	32 (54.2)	32 (54.2)	
Manager	4 (3.4)	0	4 (6.8)	
Professional	7 (5.9)	4 (6.8)	3 (5.1)	
Clerk	17 (14.4)	8 (13.6)	9 (15.3)	
Machine operator	2 (1.7)	1 (1.7)	1 (1.7)	
Service and sales	8 (6.8)	5 (8.5)	3 (5.1)	
Unemployed	1 (0.8)	1 (1.7)	0	
Part-time	15 (12.7)	8 (13.6)	7 (11.9)	
Sex of child				0.143
Male	87 (73.7)	40 (67.8)	47 (79.7)	
Female	31 (26.3)	19 (32.2)	12 (20.3)	
Age of child, y	7.9±2.2	8.0±2.1	7.8±2.3	0.653
Age at asthma onset, y	3.4±2.1	3.5±1.9	3.6±2.3	0.664
Age at ADHD onset, y	4.9±1.6	4.8±1.4	5.1±1.8	0.462
Current use of inhaled corticosteroids				0.703
None	20 (16.9)	12 (20.3)	8 (13.6)	
Beclomethasone dipropionate	70 (59.3)	35 (59.3)	35 (59.3)	
Fluticasone propionate	10 (8.5)	5 (8.5)	5 (8.5)	
Fluticasone propionate and salmeterol	11 (9.3)	5 (8.5)	6 (10.2)	
Budesonide	7 (5.9)	2 (3.4)	5 (8.5)	
ADHD diagnosis				0.306
Inattention	20 (16.9)	9 (15.3)	11 (18.6)	
Hyperactivity/impulsivity	42 (35.6)	25 (42.4)	17 (28.8)	
Combined	56 (47.5)	25 (42.4)	31 (52.5)	

* Data are presented as No. (%) of participants; missing data per variable is <3%.

TABLE 1. (cont'd)

Characteristic	All (n=118)*	Acceptance and commitment therapy group (n= 59)*	Treatment as usual group (n=59)*	P value
Current use of ADHD medications				0.593
None	87 (73.7)	41 (69.5)	46 (78.0)	
Yes, central nervous system stimulants	26 (22.0)	15 (25.4)	11 (18.6)	
Yes, non-central nervous system stimulants	1 (0.8)	1 (1.7)	0	
Yes, both	4 (3.4)	2 (3.4)	2 (3.4)	
Specialist outpatient visits due to asthma exacerbations over the past 12 months				0.580
None	106 (89.8)	53 (89.8)	53 (89.8)	
1-2	11 (9.3)	6 (10.2)	5 (8.5)	
3-4	1 (0.8)	0	1 (1.7)	
Private practitioner clinic visits due to asthma exacerbations over the past 12 months				0.115
None	101 (85.6)	46 (78.0)	55 (93.2)	
1-2	11 (9.3)	9 (15.3)	2 (3.4)	
3-4	3 (2.5)	2 (3.4)	1 (1.7)	
≥5	3 (2.5)	2 (3.4)	1 (1.7)	
Emergency department visits due to asthma exacerbations over the past 12 months				0.648
None	113 (95.8)	56 (94.9)	57 (96.6)	
1-2	5 (4.2)	3 (5.1)	2 (3.4)	
Hospitalisation due to asthma exacerbations over the past 12 months				0.098
None	107 (90.7)	52 (88.1)	55 (93.2)	
1-2	7 (5.9)	6 (10.2)	1 (1.7)	
3-4	4 (3.4)	1 (1.7)	3 (5.1)	
Unscheduled healthcare service use due to asthma exacerbations over the past 12 months				0.204
None	84 (71.2)	37 (62.7)	47 (79.7)	
1-2	22 (18.6)	15 (25.4)	7 (11.9)	
3-4	8 (6.8)	5 (8.5)	3 (5.1)	
≥5	4 (3.4)	2 (3.4)	2 (3.4)	

asthma (Parent Asthma Management Self-Efficacy subscale score). These improvements showed significant time-by-group interactions (all P<0.001) and medium to large effect sizes (Cohen's d=0.65-1.59, all P<0.001-0.032). Improvements in family functioning (Family Impact Module subscale score) also were significant (all P<0.001).

Changes in AAQ-II and PSOC scores at 1-week post-intervention significantly mediated improvements in C-ACT scores, Parent Asthma Management Self-Efficacy subscale scores, and the PECI long-term uncertainty subscores at 6 months post-intervention (P=0.001-0.034). Changes in AAQ-II and/or PSOC total scores at 6 months post-intervention significantly mediated improvements in SWAN total and hyperactivity scores, as well as PECI long-term uncertainty and emotional resources subscale scores, at 12 months (Fig).

By the 12-month follow-up, parents in the ACT group incurred out-of-pocket costs totalling HK$7750 for 26 unscheduled asthma-related visits, whereas parents in the TAU group paid HK$20 210 for 69 visits. Compared with baseline, the ACT group avoided 38 visits, whereas the TAU group experienced 22 additional visits. The incremental cost-effectiveness ratio was HK$913 per visit avoided (HK$54 770 incremental cost divided by the 60 visits avoided).

TABLE 2. Medical consultations due to asthma exacerbations over the past 12 months in the acceptance and commitment therapy (ACT) group and the treatment as usual (TAU) group across time.

Outcome	Baseline*	1 week*	6 months*	12 months*	P value			Adjusted incidence rate ratio (95% confidence interval)	P value
					Time effect	Group effect	Time-by-group effect		
Emergency department visits					0.445	0.934	0.042	0.25 (0.06-0.93)	0.047
ACT group	0.12±0.06	0.12±0.05	0.04±0.03	0.04±0.03					
TAU group	0.04±0.02	0.15±0.10	0.25±0.11	0.28±0.11					
Specialist outpatient visits					0.634	0.020	0.686	0.43 (0.17-1.10)	0.077
ACT group	0.24±0.11	0.18±0.07	0.09±0.05	0.12±0.05					
TAU group	0.36±0.12	0.37±0.12	0.29±0.11	0.26±0.07					
Private practitioner clinic visits					0.499	0.194	0.098	0.34 (0.16-0.74)	0.005
ACT group	0.58±0.20	0.51±0.17	0.38±0.09	0.31±0.08					
TAU group	0.36±0.13	0.44±0.14	0.58±0.19	0.68±0.21					
Hospital admissions					0.076	0.786	0.224	0.63 (0.12-3.22)	0.580
ACT group	0.17±0.07	0.10±0.05	0.04±0.03	0.04±0.03					
TAU group	0.17±0.07	0.03±0.02	0.10±0.04	0.08±0.04					
Total number of unscheduled healthcare service visits					0.922	0.067	0.001	0.33 (0.19-0.55)	<0.001
ACT group	0.98±0.24	0.90±0.20	0.54±0.10	0.50±0.10					
TAU group	0.63±0.80	0.98±0.27	1.20±0.33	1.30±0.32					
Total number of days of inpatient hospital stay					-	-	-	-	-
ACT group	4.00±0.62	4.00±1.73	4.50±0.71	4.00±0.01					
TAU group	4.75±0.63	4.00±1.41	3.80±0.84	4.25±0.25					

* Data are presented as mean ± standard error.

Discussion

Our findings demonstrated the efficacy of the ACT intervention for parents. Significant outcomes included reduced childhood asthma morbidity and ADHD symptoms, as well as decreased parental psychological distress. Improvements in parenting competence and asthma management self-efficacy persisted at 12 months. Children whose parents had received the ACT intervention displayed a significant reduction in emergency department visits and unscheduled healthcare utilisation for asthma exacerbations at the 12-month follow-up.

The ACT intervention directly affected parental psychological flexibility and parenting competence, whereas its mediating effect on health outcomes was more nuanced. Partial mediation was observed at 6 months for illness management uncertainty and asthma control; significant indirect effects for ADHD symptoms and parental perceptions of uncertainty and emotional resources were observed at 12 months. These findings suggest that the intervention is particularly effective over time, although other factors may moderate outcomes and thus warrant further investigation.

Our study's high recruitment and retention rates underscore the programme's feasibility and acceptability, highlighting gaps in current healthcare systems for families with comorbid conditions. Economic benefits were also observed: healthcare costs for the ACT group were reduced at 12 months post-intervention.

Limitations of the study include potential confounding factors, timing during the post-pandemic period, and limited generalisability due to the single-centre design and predominant participation of mothers. The use of parental reports to evaluate ADHD symptoms also indicates the need for a more robust multi-informant approach in future studies.

Our findings support the inclusion of ACT and positive parenting strategies in healthcare professional training and care guidelines. Future studies should aim to compare the specific benefits of ACT with those of other active treatments and ensure that interventions are precisely tailored to family needs.

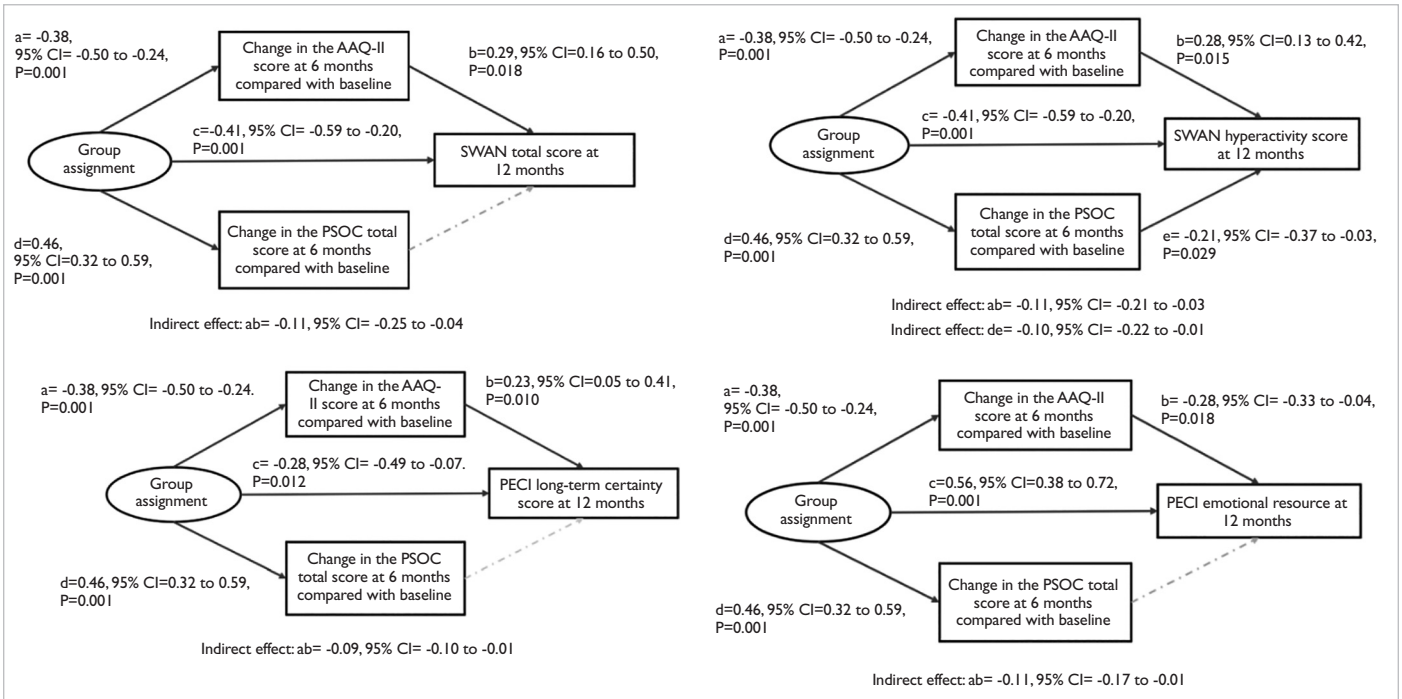

FIG. Significant indirect effects of acceptance and commitment therapy at 1-week post-intervention on scores of the Acceptance and Action Questionnaire-II (AAQ-II) and the Parenting Sense of Competence Scale (PSOC), mediating scores of the Parent Experience of Child Illness (PECI) and the Strengths and Weaknesses of ADHD-Symptoms and Normal Behaviours Rating Scale (SWAN) at 6-month post-intervention.
Abbreviation: 95% CI = 95% confidence interval.

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Disclosure

The results of this research have been previously published in:

1. Chong YY, Chien WT, Fung KP, Leung SP, Lam SY. Acceptance and commitment therapy–based parenting program in children with co-occurring asthma and ADHD: a randomized clinical trial. JAMA Pediatr 2025;179:846-56.
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