



The efficacy of an evidence-based parenting program in preventing child maltreatment in mainland China

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ABSTRACT

Background: There is limited evidence regarding the effectiveness of online parenting programs for preventing child maltreatment in low- and middle-income countries. Therefore, this study aimed to examine the effectiveness of the online Parenting for Lifelong Health for Young Children (PLH-YC) program in preventing child maltreatment among Chinese families specifically.

Methods: A quasi-experiment was conducted, wherein 274 parents with children aged 2–9 years were assigned to either the online PLH-YC group ($n = 135$) or a waitlist control group ($n = 139$). Data were collected at baseline and one week after intervention. A difference-in-differences (DiD) design with propensity score weighting was used to estimate the between-group difference for child maltreatment as well as the associated risk and protective factors.

Results: Compared to the parents in the control group, parents in the online PLH-YC intervention reported a significant reduction in the occurrence of corporal punishment ($b = -1.21$; 95 % CI $[-2.37, -0.03]$), emotional abuse ($b = -3.09$; 95 % CI $[-5.36, -0.82]$), and general maltreatment ($b = -4.94$; 95 % CI $[-8.86, -1.02]$) as well as an increased frequency of positive parenting strategies ($b = 6.46$; 95 % CI $[2.21, 10.72]$). Additionally, parents with high levels of depressive symptoms were significantly more likely to drop out of the program, and those with lower education levels engaged in fewer sessions.

Conclusion: The online PLH-YC program can benefit families with young children by reducing the incidence of child maltreatment through improved positive parenting strategies. More randomized controlled trials with long-term follow-ups are required to further verify the accuracy of the results obtained in this study.

1. Introduction

Violence against children is a global public health concern that severely affects the well-being of children, especially those from low- and middle-income countries (LMICs) (Beatriz & Salhi, 2019; Cerna-Turoff et al., 2021; Hillis et al., 2016). According to a 2010 report by the United Nations Children's Fund (UNICEF), three out of four children aged 2–14 years in 33 LMICs had experienced violent physical and psychological disciplining at home during the previous month (United Nations Children's Fund, 2013). A recent meta-analysis estimated that the pooled prevalence of child physical abuse among Chinese primary and middle school students was 20

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%, with the reported prevalence of emotional abuse being 30 %, sexual abuse 12 %, physical neglect 47 %, and emotional neglect 44 % (Wang et al., 2020). Evidence has shown that child abuse and neglect have severe and lasting adverse effects on children's health, brain structure, education, and self-esteem, while significantly increasing the risk of mental health problems, and substance abuse issues (Danese & Tan, 2014; Garder et al., 2019; Halpern et al., 2018; Romano et al., 2015; Theicher et al., 2016; Zhang et al., 2022). The effects of child physical, emotional, and sexual abuse cost China, the world's largest developing country, an estimated 0.84 %, 0.47 %, and 0.39 %, respectively, of its gross domestic product every year (Fang et al., 2015). This points to an obvious need to implement evidence-based programs that can help to prevent child maltreatment in LMICs.

Parenting programs that focus on providing parents with better child development education, identifying effective discipline strategies, enhancing parenting skills, and promoting confidence in parenting have been identified as effective public health approaches for preventing child maltreatment (Begle & Duma, 2011; Ward et al., 2020), and are considered as one of seven core strategies for ending violence against children (World Health Organization, 2016). Substantial evidence has demonstrated that parenting programs are an effective means of reducing substantiated and self-reported child maltreatment (see Chen & Chan, 2016 for a detailed review of this topic), changing child conduct and reducing the occurrence of risky behaviors (Piquero et al., 2009), enhancing positive parenting skills, and reducing parental stress (Sanders et al., 2014). However, most of the evidence presented on the effectiveness of parenting programs has come from high-income countries and has been delivered by trained professionals using an in-person format (Barlow et al., 2006; Chen & Chan, 2016; Leijten et al., 2016). These programs are usually costly and heavily Western culturally oriented, which hinders their potential for scaling up in LMIC contexts where budgets and human resources are more limited (Mikton, 2012; Ward et al., 2020).

To meet the child maltreatment prevention needs of LMICs, a low-cost group-based parenting program for caregivers of children aged 2–9 years (Parenting for Lifelong Health for Young Children, PLH-YC) was developed by a research team from Oxford University and a group of collaborators (See Lachman et al., 2016 for program development details). The program integrates social learning theory and the needs for facilitators and parents, and includes a structured manual emphasizing the need for the establishment of a strong foundation of positive parent-child relationships, as well as the mastering of non-violent behavior management and discipline strategies for parents (Lachman et al., 2016; Mamaug et al., 2021). The effectiveness of this program has previously been demonstrated in an in-person format in South Africa (Lachman et al., 2017; Ward et al., 2020), Thailand, and the Philippines (Mamaug et al., 2021; McCoy et al., 2021). After the pilot study, which was implemented in a hybrid format in China with 21 rural and urban parents participating, the adapted eight-session PLH-YC program specially tailored to Chinese co-parenting practices and intergenerational conflict management showed good acceptability and feasibility (Wang et al., 2023). However, the efficacy of this program in large controlled trials has not been tested in Mainland China.

Although the PLH-YC program has demonstrated positive results and great promise in terms of increasing positive parenting and reducing harsh parenting in LMICs (Ward et al., 2020), it may not be feasible for all parents to attend in-person programs. Previous in-person parenting programs have revealed low participation rates (68 %–75 %) and high levels of attrition (12 %–30 %), which have been attributed to the many traffic and time barriers faced (Lachman et al., 2017; Ward et al., 2020). Additionally, some evidence-based home-visiting programs like the Nurse-Family Partnership, which aims to reduce barriers to program participation, have shown that only 35 % to 40 % of parents in the United States remained engaged for the entire duration of the program (Hernandez et al., 2019). With the rapid development of technology as well as the constraints imposed by the spread of the COVID-19 virus, online education and programs are becoming increasingly common in developing countries, including China. Previous studies have shown that online parenting programs can increase the level of positive parenting and reduce the occurrence of negative parent-child interactions, negative discipline strategies, and problematic child behaviors (Floean et al., 2020; Spencer et al., 2020), which can directly benefit parents who are unable to access in-person resources. However, evidence on the efficacy of the online PLH-YC program has not yet been made available. Owing to the intermittent COVID-19 containment measures put in place in China in 2022, this study adopted an online delivery design using a real-time video conferencing platform (Tencent Meeting).

To further understand the potential scale-up ability of the PLH-YC program in LMICs, the present study aimed to examine the efficacy of its adapted online version using a quasi-randomized controlled trial for families with children aged 2–9 years in China.

2. Methods

2.1. Study design

This study was a parallel, two-group quasi-randomized controlled trial, with outcome assessors masked to the participants' condition assignments. Ethical approval was provided by the institutional review board of the first author's university. Written informed consent was obtained from all participants by an experienced research assistant. The study protocol was preregistered with the Chinese Clinical Trial Registry.

2.2. Participants and settings

Participants were recruited through online advertisements on a social media-based platform (WeChat) and from a public kindergarten in Henan Province, China. Recruitment took place from November 10 to November 25, 2022. The inclusion criteria were (a) having at least one child aged 2–9 years, (b) residing in the same household as their children for at least four nights per week to ensure adequate time for practicing learned parenting skills, (c) being available to participate in the study's weekly sessions for eight consecutive weeks, (d) being capable of using the Tencent Meeting platform. If parents had more than one child aged 2–9 years, they

were asked to select the child that exhibited more difficult behaviors, as these children are more likely to be punished violently. The exclusion criteria were (a) children with a diagnosed developmental delay or mental disability, (b) parents who had mental health problems, (c) parents who had previously participated in any other parent education or support programs.

A total of 274 participants were deemed eligible for this study under the relevant inclusion and exclusion criteria. Table 1 presents the participants' characteristics. Participants who completed the baseline assessments were predominantly female (89.78 %), married (96.72 %), and had a tertiary level education (75.91 %), with a mean age of 35.20 years ($SD = 0.20$). Of them, 17.52 % of the participants were self-employed or unemployed, 5.11 % lived in rural areas, and 50.36 % had a non-agricultural hukou (household registration system). The *hukou* system provides citizens with a legal document and divides Chinese residents into two categories: agricultural hukou and urban hukou (Liu, 2005). A person's hukou status can determine that citizen's access to housing, education, medical treatment, and other social welfare rights (Wu et al., 2023).

Among the sample, there was an average of 1.29 ($SD = 0.03$) children per household and the mean age of the selected children was 5.32 years ($SD = 0.10$).

2.3. Power calculations

Power calculations were based on a meta-analysis of parenting programs focused on preventing child maltreatment, and found an effect size of 0.416 to be the average difference in child maltreatment between the intervention and control groups (Gubbels et al., 2019). To achieve a statistical power of 80 % with a two-sided significance level of 0.05, at least 92 participants were required per group. Considering an anticipated drop-out rate of 20 % (Wang et al., 2023), a sample size of 220 participants was necessary to generate the expected power and was calculated using the G* Power 3.1 (Faul et al., 2009).

2.4. Procedures

The study was undertaken from November 2022 to March 2023. Online advertisements were posted and interested parents could register via the program website. Research assistants contacted each potential participant; those who could be successfully contacted, agreed to participate, and met the outlined inclusion criteria signed a written consent form. After signing the consent form, the parents who registered through the WeChat-based Platform were assigned to the experiment group, while those who registered through the kindergarten were assigned to the waitlist control group.

The participants who were assigned to the intervention group received online PLH-YC training. During this period, the control group did not receive any services from the research team; however, the principal of the kindergarten was reminded of their compulsory reporting obligations regarding child maltreatment, and was advised to educate parents about child maltreatment. Both groups of parents completed the assessment within one week of the intervention group receiving the training sessions (baseline survey), and again within one week after the intervention (post-intervention survey). All outcome assessments were automatically collected through Questionnaire Star; a professional online questionnaire software platform that was used to design and create a link to the questionnaire. The automated data collection process reduces the measurement bias caused by researchers. The participants completed the questionnaires independently at home and returned them within the predefined time. If the participants had any questions regarding the questionnaire, they could contact the researcher who was blinded to the participants' condition assignments. Fig. 1 presents the flowchart of the participants' involvement throughout the study.

2.5. Intervention process

The online PLH-YC intervention followed the adapted PLH-YC manual in mainland China, and was conducted through the Tencent Meeting platform to allow remote delivery of the intervention to caregivers in their homes. It included eight group sessions and two online home visits conducted over eight consecutive weeks. Sessions one to three focused on establishing a strong and positive relationship between parents and children through spending quality time, discussing feelings, praising, and rewarding. Sessions four to

Table 1
Demographic characteristics of the sample.

	Total (n = 274)	Intervention group (n = 135)	Control group (n = 139)	p value
	N or Mean (% or SD)	N or Mean (% or SD)	N or Mean (% or SD)	
Caregiver gender (female)	246 (89.78)	125 (50.81)	121 (87.05)	0.130
Caregiver age, mean (SD)	35.20 (3.37)	35.59 (3.66)	34.83 (3.01)	0.060
Marital status (married)	265 (96.72)	129 (95.56 %)	136 (97.84)	0.288
Caregiver education (tertiary education)	208 (75.91)	129 (95.56)	79 (56.83)	0.000
Occupation (self-employed/unemployed)	48 (17.52)	9 (6.67)	39 (28.06)	0.401
Current hukou (non-agricultural hukou)	138 (50.36)	106 (78.52)	32 (23.02)	0.000
Living areas (rural)	14 (5.11)	4 (2.96)	10 (7.19)	0.112
Number of children, mean (SD)	1.29 (0.49)	1.24 (0.44)	1.35 (0.53)	0.070
Child age, mean (SD)	5.32 (1.71)	5.52 (1.78)	5.13 (1.61)	0.058

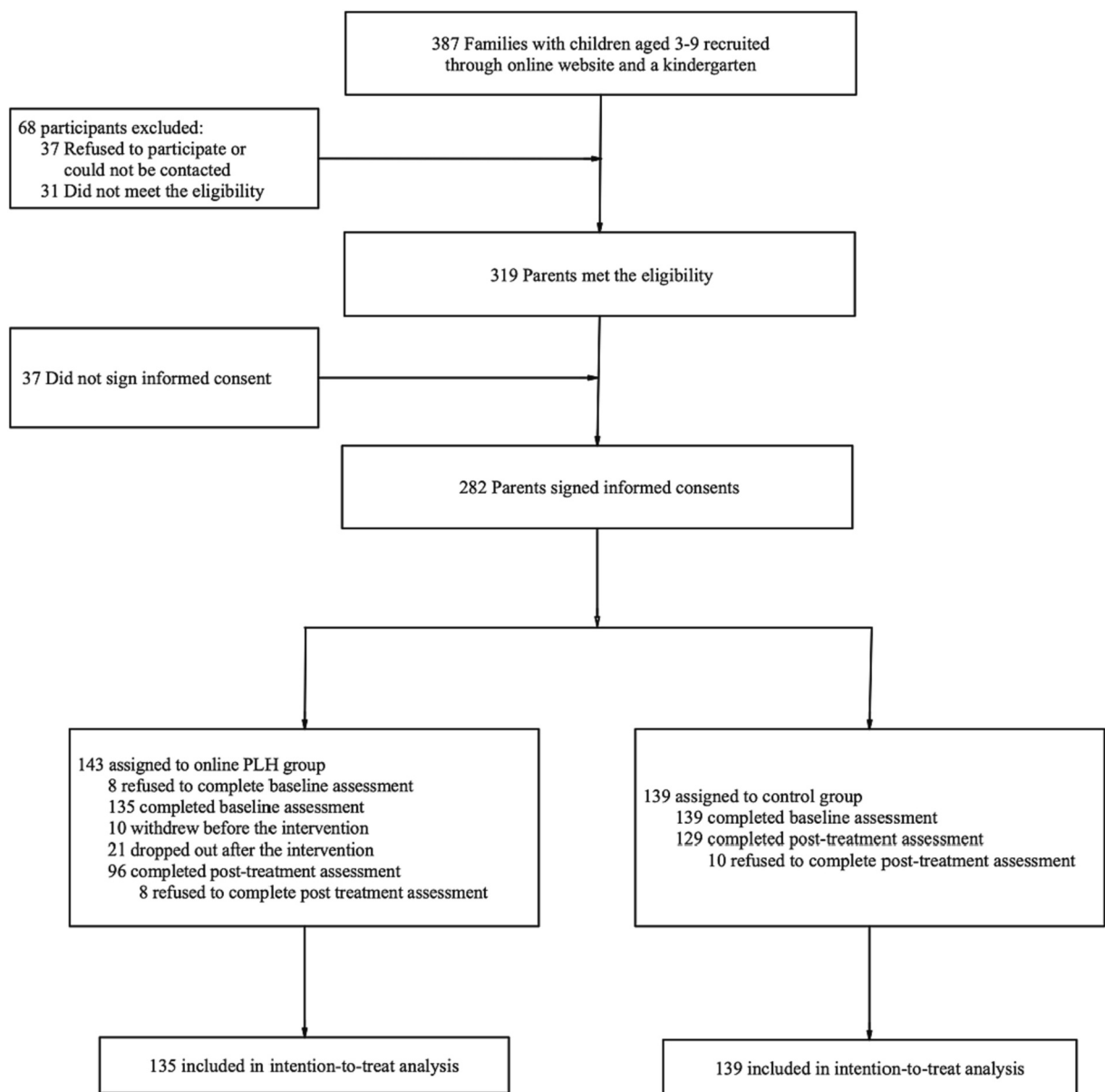


Fig. 1. Participant flowchart.

seven addressed limit setting and non-violent discipline skills by (a) giving positive instructions and establishing household rules, (b) redirecting negative behaviors and ignoring seeking or demanding behaviors, (c) using consequences and cool down strategies, and (d) resolving conflicts in the family and managing the parenting team. Discussions and brainstorming over conflict between parents and grandparents and between parents themselves were added to tailor the intervention to fit Chinese co-parenting practices, as inter-generational co-parenting of young children is the dominant parenting pattern in China. The final session entailed program reflection and moving on. Each group session lasted for approximately 120 min. The two online home visits were generally conducted after sessions one and four to address parenting challenges and personal distress. Each home visit lasted for approximately 60 min and was conducted through Tencent video conferencing. Facilitators sent text message “boosters” to remind participants of the core parenting skills every other day and to encourage parents to practice learned skills at home.

Given the restrictions online interventions place on the interaction between group members, modifications were made to fit the implementation context. These included reducing the degree of physical exercise and role-play and modifying the format for group discussion of illustration stories. More specifically, to mobilize participants to actively engage and ensure optimal levels of concentration, parents were invited to lead the discussion of illustration stories, while facilitators ensured that the discussion did not deviate from the intended topic.

The online PLH-YC program was delivered by 12 trained native Master of Social Work students from the first author's university. Each group session was implemented by two facilitators (who led and summarized the group discussions) and two assistants (who sent participation reminders, shared PowerPoint presentations and illustrated pictures, recorded the main points during the group discussion and fidelity evaluation, and so on). Each online group consisted of 10 to 15 parents. Each facilitator received a mean of three hours of weekly group supervision by professors specializing in child development and parenting via Tencent Meeting.

2.6. Measures

2.6.1. Child maltreatment

Child maltreatment was measured using the Parent-Child Conflict Tactics Scale (PCCTS; [Straus et al., 1998](#)), which includes subscales for measuring emotional abuse (five items), corporal punishment (six items), physical abuse (four items), and neglect (five items). Participants reported the number of times that they had perpetrated neglect, physical violence, or emotional violence toward their children over the previous two months on a nine-point Likert scale (0 = did not happen; 8 = more than eight times). The PCCTS has been widely used to assess parenting practices in China, and the Chinese version of the PCCTS has shown good internal consistency in previous studies ([Fu et al., 2019](#); [Xing & Wang, 2017](#)). The internal consistency reliability of this scale was high at the baseline survey (Cronbach's $\alpha = 0.82$).

2.6.2. Child externalizing behavior

The subscale of the Conners Child Behavior Scale (CCBS; [Conners et al., 1998](#)) was used to assess the participating children's externalizing behavior. Parents rated their child's behavior on a 4-point scale, ranging from 0 ("never") to 3 ("a lot"). The Chinese version of the CCBS was translated and tested by [Xu \(1990\)](#) and has been widely used in previous studies showing good reliability and validity ([Gau et al., 2006](#)). The 12-item scale also showed high internal consistency in this study (Cronbach's $\alpha = 0.92$).

2.6.3. Positive parenting strategies

The Parenting Young Children Scale (PYCS) was used to assess positive parenting strategies ([McEachern et al., 2012](#)). This scale consists of 21 items covering three dimensions: supporting positive behavior, setting limits, and proactive parenting. Participants rated how often they had engaged in these parenting behaviors over the past two months on a 7-point scale. The PYCS has previously been validated in China ([Fang et al., 2022](#)). The internal reliability for each subscale was high in this study (Cronbach's $\alpha = 0.85$ – 0.87).

2.6.4. Parental stress

Parental stress was measured using the Parental Stress Scale (PSS), which is an 18-item questionnaire developed to measure the level of stress associated with raising children ([Berry & Jones, 1995](#)). Each item was scored on a 5-point Likert scale (1 = disagree, 5 = strongly agree). The Chinese version of the PSS has shown good internal consistency in a previous study ([Cheung, 2000](#)), and also showed high internal consistency in this study (Cronbach's $\alpha = 0.85$).

2.6.5. Parent-child relationship

The quality of the parent-children relationship was assessed using the Child-Parent Relationship Scale-Short Form (CPRS-SF, [Lieberman et al., 1999](#)). This 15-item scale has two subscales (closeness and conflict subscales) rated on a 5-point scoring system, ranging from 1 ("definitely does not apply") to 5 ("definitely applies"). The Chinese version of the CPRS has shown good psychometric properties in previous studies ([Ip et al., 2018](#)), and its internal consistency was high in this study (Cronbach's $\alpha = 0.86$).

2.6.6. Parents' depressive symptoms

Depressive symptoms were measured using the 10-item Center for Epidemiologic Studies Depression Scale (CESD; [Mohebbi et al., 2018](#)). The frequency with which depressive symptomatology occurred over the previous week was measured on a 4-point scale ranging from 0 ("rarely") to 3 ("all of the time"). Higher scores indicated severe depressive symptoms. The CES-D short form has been shown to have excellent psychometric properties among Chinese adults ([Chen & Mui, 2014](#)). In this study, its internal consistency reliability was 0.79.

2.6.7. Social support

Social support was measured using the modified 8-item Medical Outcomes Study: Social Support Survey ([Moser et al., 2012](#)). Responses were rated on a five-point Likert scale ranging from 0 ("none of the time") to 4 ("all the time"), with higher scores indicating greater social support. The Chinese version of this scale has been shown to have good reliability and validity ([Chen et al., 2015](#)) and its internal consistency was high in this study (Cronbach's $\alpha = 0.94$).

The demographic information collected in this study included parent-level factors: age, sex, marital status, level of educational attainment, employment status, and household registration status. The family-level factors identified were: number of children under the age of 18 per household and child age.

2.7. Intervention evaluation

Intervention evaluation was captured by participants' level of involvement, fidelity, and quality of delivery. Participants' involvement was measured by attendance rate (research assistants completed check-in sheets after every session to record attendance

figures) and drop-out rate (represented by the percentage of participants who missed three consecutive sessions and were unavailable for home visit consultations).

Fidelity was assessed using a checklist tailored to the PLH-YC program, which captured key intervention strategies for each session. Either “present” or “absent” was recorded to indicate whether any intervention strategies was covered during a session with 80 % and above regarded as “high fidelity” (Borrelli et al., 2005). The quality of delivery was measured using the Group Facilitation Competency Checklist (Wong et al., 2019). This 16-item checklist includes four subscales: (a) facilitating focused group discussion (5 items), (b) communication skills (4 items), (c) interpersonal style (3 items), and (d) session structure (4 items) with four response categories: 0 = not observed, 1 = observed-not done well, 2 = observed-done adequately, 3 = observed-done well. The score ranged from 0 to 48 points. The fidelity and quality of delivery for each group were recorded by two assistants. Any disagreements were subsequently resolved by the supervisor after viewing the video recordings.

2.8. Statistical analysis

The data were analyzed using an intention-to-treat approach. Baseline group differences were explored using independent samples *t*-tests and chi-square tests. To examine pre-post changes within the intervention and control groups, respectively, baseline and post-test scores were compared using a paired-sample *t*-test, and Cohen's *d* was adopted to calculate the effect sizes.

The effectiveness of the online PLH-YC program was evaluated through difference-in-differences (DiD) design with propensity score weighting (PSW). PSW was utilized to reduce selection bias and improve the baseline balance for the between-group comparison. The kernel-matching algorithm was used as a weighting method based on the propensity score, with propensity scores calculated using logistic regression. Balance tests were performed after matching to guarantee the validity of the DiD-PSW method.

Multivariate regression models were conducted to examine the factors associated with participants' drop-out and attendance. The factors were selected based on previous literature (Axford et al., 2012; Utting et al., 2007), including parents' age, gender, education, baseline child externalizing behaviors, and parental depressive symptoms.

All statistical analyses were conducted using Stata 15, and the significance level was set at 0.05 (two-tailed).

3. Results

3.1. Primary outcomes

Table 2 presents the results of the baseline and post-intervention outcome measures. Independent *t*-tests and chi-squared tests

Table 2
Baseline and post-intervention outcome measures.

Outcome measures	Intervention (n = 135)			Control (n = 139)			<i>p</i> ^a value
	Baseline	Post-test	Cohen's <i>d</i>	Baseline	Post-test	Cohen's <i>d</i>	
	M (SD)	M (SD)	[95 % CI]	M (SD)	M (SD)	[95 % CI]	
Primary outcomes							
Corporal punishment	2.84 (3.98)	1.16 (1.79)	0.54 [0.30, 0.79]	3.44 (4.50)	3.21 (5.31)	0.05 [−0.19, 0.28]	0.243
Physical abuse	0.66 (1.88)	0.50 (2.43)	0.08 [−0.17, 0.32]	0.83 (2.96)	0.85 (3.09)	−0.01 [−0.24, 0.23]	0.576
Emotional abuse	9.40 (7.17)	6.67 (6.34)	0.40 [0.16, 0.64]	8.04 (7.38)	7.28 (7.46)	0.10 [−0.13, 0.34]	0.122
Neglect	3.46 (4.63)	3.13 (4.62)	0.07 [−0.17, 0.31]	2.07 (4.33)	1.96 (4.39)	0.03 [−0.21, 0.26]	0.011
General maltreatment	16.36 (12.51)	11.45 (10.98)	0.42 [0.18, 0.66]	14.38 (14.90)	13.30 (16.47)	0.07 [−0.17, 0.30]	0.235
Secondary outcomes							
Externalizing behavior	8.64 (5.91)	7.15 (5.40)	0.26 [0.02, 0.50]	5.60 (5.86)	5.71 (5.71)	0.05 [−0.19, 0.28]	0.000
Parental stress	44.44 (7.63)	42.71 (8.00)	0.02 [−0.22, 0.25]	44.92 (8.06)	44.79 (8.62)	0.22 [−0.02, 0.46]	0.616
Caregiver depression	5.75 (4.80)	5.28 (4.86)	0.10 [−0.14, 0.34]	4.96 (4.38)	5.47 (4.93)	−0.11 [−0.35, 0.13]	0.159
Positive parenting							
Supporting behavior	39.75 (5.08)	41.19 (3.77)	−0.32 [−0.56, −0.08]	40.78 (5.62)	41.04 (5.55)	−0.05 [−0.28, 0.19]	0.113
Setting limits	37.01 (4.64)	39.72 (3.88)	−0.63 [−0.88, −0.39]	39.94 (5.90)	40.27 (5.28)	−0.06 [−0.29, 0.18]	0.000
Proactive parenting	38.07 (5.17)	40.54 (4.08)	−0.53 [−0.77, −0.29]	40.01 (6.20)	40.22 (5.62)	−0.04 [−0.27, 0.20]	0.005
Total parenting	114.84 (12.92)	121.45 (10.5)	−0.56 [−0.80, −0.32]	120.73 (16.26)	121.53 (14.93)	−0.05 [−0.29, 0.18]	0.001
Parent-child relationship							
Closeness	23.95 (3.29)	24.71 (3.09)	−0.24 [−0.48, 0.00]	22.47 (4.36)	23.11 (4.81)	−0.14 [−0.37, 0.10]	0.002
Conflict	20.98 (5.36)	21.73 (5.48)	−0.14 [−0.38, 0.10]	18.48 (7.44)	19.84 (7.46)	−0.18 [−0.42, 0.05]	0.002
Total relationship	44.93 (7.39)	46.44 (7.28)	−0.21 [−0.45, 0.03]	40.95 (8.78)	42.95 (9.38)	−0.22 [−0.46, 0.02]	0.001
Caregiver support	24.18 (6.58)	25.13 (6.20)	−0.15 [−0.39, 0.09]	22.38 (7.58)	22.83 (7.29)	−0.07 [−0.30, 0.17]	0.037

^a Baseline differences between the treatment and control groups.

conducted on the baseline survey found no differences between the online PLH-YC intervention and control group for child maltreatment outcome measures, with the exception of neglect. For the PLH-YC online intervention group, the results showed a significant reduction in corporal punishment (mean [SD], 2.84 [3.98] vs 1.16 [1.79]; Cohen *d*, 0.54, 95 % CI [0.30, 0.79]), emotional abuse (mean [SD], 9.40 [7.17] vs 6.67 [6.34]; Cohen *d*, 0.40, 95 % CI [0.16, 0.64]), and general maltreatment (mean [SD], 16.36 [12.51] vs 11.45 [10.98]; Cohen *d*, 0.42, 95 % CI [0.18, 0.66]) from pre- to post-intervention. Regarding the control group, no significant differences were observed regarding all primary outcomes before and after the intervention.

Table 1 indicates that there were significant differences in parents' *hukou* ($t = -11.00$, $p = 0.000$), education ($\chi^2 = 56.15$, $p = 0.000$), and employment status ($\chi^2 = 84.38$, $p = 0.000$) between the intervention and control groups. After the propensity score matching (PSM), all covariates were balanced and no differences remained (see Table A1 in Appendix). The DiD-PSM estimations are presented in Table 3. The results showed that online PLH-YC intervention can significantly reduce the occurrence of corporal punishment ($b = -1.21$; 95 % CI [-2.37, -0.03], $p = 0.044$), emotional abuse ($b = -3.09$; 95 % CI [-5.36, -0.82], $p = 0.008$) and general maltreatment ($b = -4.94$; 95 % CI [-8.86, -1.02], $p = 0.014$).

3.2. Secondary outcomes

Parents from the intervention group reported a significant reduction in their children's externalizing behavior (mean [SD], 8.64 [5.91] vs 7.15 [5.40]; Cohen *d*, 0.26, 95 % CI [0.02, 0.50]). Increases in overall positive parenting strategies were also reported (mean [SD], 114.84 [12.92] vs 121.45 [10.5]; Cohen *d*, -0.56, 95 % CI [-0.80, -0.32]), as they were for the subscale on supporting positive behavior (mean [SD], 39.75 [5.08] vs 41.19 [3.77]; Cohen *d*, -0.32, 95 % CI [-0.56, -0.08]), proactive parenting (mean [SD], 38.07 [5.17] vs 40.54 [4.08]; Cohen *d*, -0.53, 95 % CI [-0.77, -0.29]), and setting limits (mean [SD], 37.01 [4.64] vs 39.72 [3.88]; Cohen *d*, -0.63, 95 % CI [-0.88, -0.39]) pre- to post-intervention.

The results obtained indicated that the online PLH-YC intervention effect was associated with increased overall positive parenting strategies ($b = 6.46$; 95 % CI [2.21, 10.72], $p = 0.003$), subscales of proactive parenting ($b = 2.43$; 95 % CI [0.88, 3.98], $p = 0.002$), and setting limits ($b = 2.48$; 95 % CI [0.91, 4.05], $p = 0.002$), in comparison to the control group.

3.3. Implementation evaluation

There was an acceptable rate of overall program enrolment, as 95.6 % of participants allocated to the online PLH-YC group attended at least one session, with 15.56 % of participants dropping out after receiving one intervention session. More than a third of the participants (36 %) attended all or missed only one session, with 74.1 % attending four or more sessions. One partial explanation for participants' absence was that many of them or their family members were infected with COVID-19; consequently, they did not have the time or energy to attend the program. Overall, the mean fidelity score for each session was 93 %, and the mean quality of delivery score was 40.29 ($SD = 14.87$).

The multivariate regression model analyses for potential factors associated with drop-out and attendance level are presented in Table 4. The results showed that severe parental depressive symptoms at baseline were related to higher drop-out levels ($b = 0.02$; 95 % CI [0.00, 0.04]; $p = 0.042$) and that tertiary education was related to higher attendance levels ($b = 0.51$; 95 % CI [0.02, 0.99]; $p = 0.041$).

Table 3
Difference-in-differences model with propensity scores weighting.

Outcome measures	b [95 % CI]	t	p value
Primary outcomes			
Corporal punishment	-1.21 [-2.37, -0.03]	2.02	0.044
Physical abuse	-0.12 [-0.77, 0.53]	0.35	0.725
Emotional abuse	-3.09 [-5.36, -0.82]	2.68	0.008
Neglect	-0.52 [-1.95, 0.91]	0.72	0.474
General maltreatment	-4.94 [-8.86, -1.02]	2.47	0.014
Secondary outcomes			
Child externalizing behavior	-1.82 [-3.76, 0.12]	1.84	0.067
Parental stress	-0.14 [-2.69, 2.41]	0.11	0.914
Caregiver depression	-1.09 [-2.60, 0.42]	1.42	0.157
Positive parenting			
Supporting positive behavior	1.54 [-0.166, 3.25]	1.78	0.076
Proactive parenting	2.43 [0.88, 3.98]	3.07	0.002
Setting limits	2.48 [0.91, 4.05]	3.11	0.002
Total positive parenting	6.46 [2.21, 10.72]	2.97	0.003
Parent-child relationship			
Closeness	-0.22 [-1.40, 0.96]	0.36	0.720
Conflict	0.44 [-1.60, 2.48]	0.43	0.670
Total parent-child relationship	0.23 [-2.44, 2.90]	0.17	0.869
Caregiver support	0.90 [-1.43, 3.23]	0.76	0.448

4. Discussion

To the best of our knowledge, this is the first study that has attempted to examine the effects of an evidence-based online parenting program aimed at preventing maltreatment of young children in China by adopting a quasi-randomized controlled trial design. The findings of this study revealed a positive effect on positive parenting and a reduced incidence of corporal punishment and emotional abuse. The PLH-YC program was initially designed based on evidence from effective parenting programs in high-income countries, and is sensitive to the conditions in LMICs (Lachman et al., 2016). It has since been rapidly implemented in over 25 LMICs (Shenderovich et al., 2020). The significant effect shown in this study on the prevention of child maltreatment suggests great promise regarding the potential scaling up of this program in mainland China.

The results indicate that online interventions can significantly and immediately decrease the incidence of corporal punishment and emotional abuse, which is consistent with those obtained in other previous PLH-YC programs implemented in South Africa and the Philippines (Lachman et al., 2017, 2021; Ward et al., 2020). These positive effects support the efficacy of the adapted PLH-YC program in developing countries. This study also expands upon the in-person delivery method used in previous studies by focusing on an online intervention format, which offers greater opportunities for scaling up the implementation of this program in middle-income countries. While a notable reduction was achieved with regard to the incidence of corporal punishment and emotional abuse among the intervention group, no effects were found on physical abuse and neglect. One plausible explanation is that the majority of parents who joined this program came from urban areas in China and seldom resorted to physical abuse or neglect in their daily life; however, corporal punishment and emotional abuse were more prevalent compared with their rural counterparts (Wang et al., 2020; Wang & Liu, 2014).

Compared to the control group, caregivers who participated in this program reported more positive parenting skills. In the first half of this program, parents were empowered through child-led play, emotional management, praising of children's positive actions, and setting of limits. They also discussed these skills with other parents during the online meeting and were asked to practice them at home, which provided positive alternatives to their previous dysfunctional parenting practices (van der Put et al., 2018). This result further confirmed the protective role of positive parenting in preventing child abuse revealed in previous studies (Lachman et al., 2017; Meinck et al., 2013; Pickering & Sanders, 2016).

Regarding child externalizing behaviors, the intervention showed a number of positive effects, although it only reached a marginally statistically significant level. Previous studies have shown that the incidence of problematic child behavior should naturally decrease following the application of positive parenting techniques, as parents learn to use warm responses to break the dysfunctional interaction cycle with their children (Nowak & Heinrichs, 2008; Ward et al., 2020; Wiggins et al., 2009). Given the short-term observations of the present study and the fact that reports were taken from caregivers only, follow-up studies should be designed to examine the long-term intervention effects and to include multiple report sources on children's behaviors. Contrary to our expectation, the results of this study indicated that the online PLH-YC program had no significant effect on improving the parent-child relationship. In China, parents typically hold a high level of authority with children expected to show obedience and respect toward their parents' opinions. In this context, parents may tend to believe their relationship with their child is good if the child ultimately obeys them, despite severe conflicts occurring in their interaction. One clear implication of this finding is that parent-child relationships are bidirectional in nature (Oosterom et al., 2020); thus, future studies should seek to include children's perspectives as well as observations from professionals. Another implication for future interventions is that Chinese parents should be cautious about encouraging excessive obedience in children, which may be an expression of repressed emotions. Parents should seek to spend quality time with their children and engage in open discussions about their respective feelings to foster a deep emotional connection.

Although a decreasing trend in terms of parental stress and caregiver depression was evident in the intervention group, no statistically significant differences were found with the control group. One potential explanation is that the parental stress measured in this study was not related to the child's behavior or to interactions with the child, but was more generally associated with global parenting concerns (Mersky et al., 2015). However, the concerns of urban Chinese parents' have complicated sources, especially considering their high expectations regarding higher education and their greater involvement with regard to children's academic achievements (Zou et al., 2013). Regarding parental depressive symptoms, it is plausible that parents in the intervention group felt more stressed and depressed when discovering that their partners were performing much better than expected during the group discussion. No significant difference was found in terms of caregiver support between the intervention and control groups, a finding

Table 4
Multivariate models: factors associated with participant attendance and engagement.

Predictors	Model 1: Dropout rate			Model 2: Attendance		
	b [95 % CI]	t	p	b [95 % CI]	t	p
Female	0.13 [−0.18, 0.43]	0.86	0.408	−0.09 [−0.38, 0.23]	−0.56	0.607
Caregiver age	−0.01 [−0.33, 0.01]	−0.91	0.359	−0.01 [−0.03, 0.01]	−0.82	0.455
Tertiary education	0.03 [−0.11, 0.18]	0.47	0.680	0.51 [0.02, 0.99]	2.09	0.041
Self-employed	−0.15 [−0.14, 0.48]	0.95	0.297	−0.14 [−0.44, 0.18]	−1.02	0.408
Number of children	0.08 [−0.10, 0.26]	0.86	0.398	0.13 [−0.06, 0.32]	1.40	0.183
Child age	−0.01 [−0.05, 0.05]	−0.19	0.875	0.03 [−0.02, 0.08]	1.22	0.214
Baseline child behavior	−0.05 [−0.02, 0.01]	−0.82	0.474	0.01 [−0.01, 0.02]	0.89	0.290
Baseline caregiver depression	0.02 [0.00, 0.04]	2.08	0.042	−0.00 [−0.02, 0.02]	−0.10	0.789

that was consistent with the results of most in person PLH-YC programs in other countries (Lachman et al., 2017; Ward et al., 2020). Although COVID-19 has changed the traditional service delivery format, this will ultimately bring more opportunities than challenges in terms of making services more available to most parents, as internet access has become very prevalent in China.

It was also found that parents with high levels of depressive symptoms were more likely to withdraw from the program and that those with lower levels of education engaged in fewer sessions. As with PLH-YC programs implemented in other LMICs, caregiver engagement was a significant concern, one which may have affected the intervention effect of this study (Ward et al., 2020). While the program was implemented at as low a cost as possible, the training, supervision, and labor payment of all facilitators came to an estimated USD 10,000. The program was implemented on Saturday evenings because the participating parents were not available during working days and they needed to accompany their children during the weekends. However, this timing remained a challenge for some mothers who liked to read books with or take care of their young children before bedtime. Future studies may consider using mobile applications that can flexibly fit with the participant's timeframe and increasing online family visit frequency to encourage greater retention.

This study possessed several limitations that should be strengthened in future studies. First, this study adopted a quasi-randomized controlled trial and only collected baseline and post-intervention data. Thus, a randomized controlled trial with multiple follow-up assessments is necessary in further studies. Second, most participants in this study were well-educated urban parents who could easily understand and reflect on their parenting practices, so the generalizability of this program to rural parents with lower average education levels remains unknown. Third, most participants were mothers; meaning it is necessary to include more fathers in future programs to maximize the benefits to children. Fourth, the measurement of parent stress requires adaptation to more precisely reflect parents' stress sources, with professionals' observations also being important for obtaining intervention effect information. Fifth, a qualitative interview of the participants is required to further identify the reasons for the non-significant effects regarding parental stress, parent-child relationships, caregiver depressive symptoms, and social support after the program. Sixth, due to the small sample of parents with children aged 6–9 years, we could not perform further regression analysis to compare the changes that occurred in this group with another group of parents with children aged 2–5 years. This confined us to adjust our intervention according to the characteristics of children at different age cohorts.

Despite these limitations, the findings of this study contribute to the empirical evidence supporting the efficacy of the PLH-YC program in preventing child maltreatment in mainland China based on a quasi-randomized controlled trial. Online evidence-based parenting programs can significantly improve positive parenting practices and reduce the incidence of corporal punishment and emotional abuse. This suggests that great scale-up potential exists in middle-income countries, although a new technology format, shorter sessions, and the training of paraprofessional facilitators is required to facilitate further exploration, and to ensure the delivery quality of the program.

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Declaration of competing interests

Jamie M. Lachman is the CEO of Parenting for Lifelong Health (PLH), a charitable organization based in the United Kingdom that developed content for the Naungan Kasih Parenting Program. Jamie M. Lachman also receives occasional fees for providing training and supervision for PLH programs. Jamie M. Lachman has participated/is participating in a number of research studies involving the program as investigators, and the University of Oxford receives research funding for these. Conflict is avoided by declaring these potential conflicts of interest and by conducting and disseminating rigorous, transparent, and impartial evaluation research on both this and other similar parenting programs. No profit or financial gain will be made from this program.

Data availability

The data that has been used is confidential.

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