

Applying Mindfulness to Benefit Economically Disadvantaged Families: A Randomized Controlled Trial

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Abstract

Objective: To evaluate the effects of family-based mindfulness intervention (FBMI) to promote the stress management and early development of economically disadvantaged families. **Method:** Families receiving social security allowance and full textbook allowance and with children aged 5–7 were recruited. Participants were randomized to an FBMI with parallel programs for parents and children ($n = 51$) and to a wait-list control condition ($n = 51$). **Results:** Intent-to-treat analyses showed more significant improvements in child attention, self-regulation, and in parenting stress, in the intervention group than in the control group. At-risk group analyses showed that the high stress group benefited in small to moderate effect sizes in parenting stress and depression, and in moderate to large effect sizes in child behavioral problem and self-regulation. **Conclusions:** The results provide preliminary support that FBMI can alleviate the impact of economic disadvantage. FBMI should be applied in social work practice to support disadvantaged families.

Keywords

mindfulness-based intervention, economically disadvantaged families, randomized controlled trial, child mental health, parenting stress

Children from economically disadvantaged families (EDFs) suffer in almost every domain of development and are susceptible to delayed cognitive and language development and poor mental health (Dickerson & Popli, 2011; Huston & Bentley, 2010). Economic disadvantage affects children and their families at three levels: the individual level, including issues such as the quality of food intake; the relational level, which can include the quality of parenting and peer relationships; and the institutional or contextual level, which includes schooling, parental work conditions, and neighborhood environments (Yoshikawa, Aber, & Beardslee, 2012). Disadvantaged children are also found to suffer from chronic physiological stress, which affects the activities of the sympathetic nervous system (blood pressure) and hypothalamic pituitary adrenal axis (dysregulated cortisol; Obradović, Bush, Stamperdahl, Adler, & Boyce, 2010). Parents from EDFs experience the same chronic cumulative stressors, resulting in high levels of physiological and psychological stress. High levels of stress are associated with unresponsive, unaffectionate, and irritable behavior and harsh and inconsistent disciplining of children. Such parenting has unfavorable effects on the cognitive functioning and language development of children (Blair et al., 2011).

Family stress theory originated in the 1990s and examines the effects of severe income loss on the family (Conger &

Elder, 1994). It specifies the impacts of poverty on family interactional processes and on the individual members of a family. Economic hardship leads to family pressure, which gives rise to parental emotional distress and problematic issues, such as alcohol abuse. Disruptions in couple functioning and parent–child relationships are more likely to arise, due to the conflicts stemming from financial concerns and parenting practices. Such disruptions can cause harsh, inconsistent, and uninvolved parenting, which consequently leads to emotional and behavioral problems and impaired competence of the child (Donnellan, Martin, Conger, & Conger, 2013).

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Mindfulness-based intervention may reduce the biological stress reactivity of parents and children to stressor exposures (Creswell, 2015). It can also develop parents' sensitivity to children's needs and responsive behaviors, which can aid the development and adjustment of children. From the age of 4, a child learns to interpret internal emotional states, motives, and intentions and to understand and remember. The child learns inhibitory control, which is the ability to control impulses and to pay better attention and avoid distractions in learning. The child's working memory abilities are also improved through their learning to combine different information for problem-solving (Rothbart, Sheese, Rueda, & Posner, 2011).

Mindfulness is defined as paying attention to the present moment non-judgmentally (Kabat-Zinn, 2013; Segal, Teasdale, & Williams, 2013). Mindfulness training may improve the ability to strengthen the attentional processes, which not only promotes the executive functioning of children from EDFs but also improves parents' self-regulation of attention in response to their child's challenging behavior and alters the dysfunctional patterns in parenting behavior (Bögels, Lehtonen, & Restifo, 2010). Mindfulness thus promotes overall family relationship quality, as it not only enhances the sensitivity and responsiveness of a parent in promoting their child's development but also promotes the ability to cope with adversity (Rigby, Schultz, & Ryan, 2014).

Studies on the development of executive function, which refers to the neurocognitive processes involving in flexible, goal-directed problem-solving, suggested that in preschool years young children experience a rapid development of executive function (Diamond & Lee, 2011; Espinet, Anderson, & Zelazo, 2013). Training on executive functions should be incorporated with training addressing social and emotional development. Principles for developing age appropriate mindfulness programs have been discussed and generated among researchers and practitioners (Semple & Burke, 2012).

Evidence of mindfulness training for families with young children and EDFs is emerging. Earlier trials have investigated the feasibility to mindfulness-based intervention not only for clinical populations but also for a universal or selective preventive program. Unfortunately, the majority of studies have flawed research designs, such as small sample sizes or the lack of a control group, and only a few have focused on preschool children. Black and Fernando (2013) developed a 5-week mindfulness-based curriculum for 409 children from kindergarten to the sixth grade from low-income and ethnic minority families. The results showed improvements in attention, self-control, and caring for others. However, there was no control group and effects on other developmental aspects on the children were unclear. Van de Weijer-Bergsma, Langenberg, Brandsma, Oort, and Bögels (2014) recruited 199 students aged 8–12 who were randomized into intervention and wait-list control conditions. After 6 hr of training, the initially small effect sizes of child-reported verbal sharing of emotions and bodily awareness of emotions increased immediately after

intervention, and more significant improvements were found for child-reported differentiating of emotions, a sense of coherence, parent-reported anxiety, and angry/aggressive symptoms, at the 7-week follow-up. These two school-based studies had the advantage of large group sizes, but parents were not recruited into the programs.

Applying mindfulness in parallel parent and child programs is rare. Felver, Tipsord, Morris, Racer, and Dishion (2017) conducted a randomized trial for 41 healthy children aged 9–12 and their parents. The family-based mindfulness program lasted for 8 weeks and each session took 1½ hr. The results showed a medium effect size of significant improvements in conflict monitoring attention. Lo et al. (in press) conducted a randomized study of 100 children aged 5–7 with attention deficit and hyperactivity symptomology. Participants completed a 9-hr family-based mindfulness program and reported moderate improvements in the reduction of child inattention and hyperactivity symptoms and lower levels of improvements in parents' stress and well-being.

Two recent studies, in addition to that of Black and Fernando (2013), have suggested that mindfulness can benefit children and adults from EDFs. Poehlmann-Tynan et al. (2016) recruited 29 children from EDFs aged 3–5 and randomized them into a 12-hr mindfulness intervention plus a reading treatment and a treatment-as-usual condition. Children who underwent the mindfulness intervention had significantly increased scores in attention and self-regulation at the posttest and the 3-month follow-up. Van der Gucht, Takano, van Broeck, and Raes (2015) investigated the effect of mindfulness-based intervention on 42 participants from low-income backgrounds. The mindfulness program lasted for 8 weeks, and each session was 1½ hr. Results showed improvements in the reduction of stress, anxiety, and depression symptoms. Both studies have shown promising results regarding the benefits of mindfulness in improving the mental health of individuals from EDFs. However, the studies targeted either the children or parents from EDFs only and also had other methodological limitations, such as small sample sizes and the absence of a control group. The present study is the first known randomized controlled trial (RCT) to investigate changes in the well-being of EDFs by applying family-based mindfulness intervention (FBMI), including parallel parent and child mindfulness-based intervention programs.

Based on the literature, the following hypotheses were proposed for this study of FBMI: (i) Parents in the intervention group will have lower parenting stress, depressive symptoms, and higher levels of mindfulness, perceived family functioning than those in the control group; (ii) children from EDFs in the intervention group will demonstrate better attention, behavioral regulation, and less behavioral problems than children in the control group after FBMI; and (iii) parents and children with high level of stress in the intervention group will have lower parenting stress, higher levels of mindfulness, attention, behavioral regulation, and less behavioral problems than those in the control group after FBMI.

Method

Design

The effects of FBMI were tested using a two-arm RCT, comparing the FBMI (Arm 1) to a wait-list control (Arm 2). The program effects were tested using both between-subject (comparison of two arms) and within-subject (comparison of measures at T1, T2, and T3) comparisons. Assessments were made before (T1) and after intervention (T2). A 3-month follow-up (T3) was included for Arm 1 to test whether the intervention effects sustain after the intervention.

Sample size estimation is based on the outcomes of a study by Bogels and colleagues (2013), reported an effect size of .4 in parenting stress. For a two-tailed α error of 5%, an 80% power, and a test of two independent groups, the required sample size will be 100 families per arm (Cohen, 1988). With references to the dropout rate of 20% in two local mindfulness training studies (Hu et al., 2014; Lo et al., 2013), we aim to recruit 120 families per group, and 240 families for the two arms in total.

Participants

Participants were recruited from eight primary schools or integrated family service centers from four Hong Kong districts (Kwai Ching, Kwun Tong, Wong Tai Sin, and Yuen Long), which were ranked in the top five among all districts in terms of the percentage of low-income population (Hong Kong Council of Social Service, 2013). School and family social workers promoted this program among eligible families, and parents were invited to join a mindfulness seminar during January 2016 to October 2017 by phrases, after which they were invited to participate in the program with their children. The inclusion criteria of this study were (1) families in receipt of the Comprehensive Social Security Scheme (CSSA), (2) families who were receiving the full rate School Textbook Assistance Scheme (STAS), and (3) both parents and children were committed to participating in the program. The asset upper limit for CSSA in 2018 is HKD42,000 (about US\$5,385) for two-person families, and HKD84,000 (about US\$10,769) for families with four members or more. The STAS monthly household income upper limit and asset upper limit were HKD13,700 (about US\$1,756) and HKD338,000 (about US\$43,333) for two-person families, respectively, and HKD20,100 (about US\$2,577) and HKD514,000 (about US\$65,898) for four-person families, respectively. As the school and family social workers had all information about the family income, they would invite parents who met the inclusion criteria to join the briefing session without creating psychological discomfort to participants. The exclusion criteria were children with developmental disorders, such as attention deficit hyperactivity disorder (ADHD), autistic spectrum disorder, and parents with psychosis, including schizophrenia and bipolar disorder.

Research Assistant A was responsible for all conducting the briefing sessions and interviews of the project applicants. After screening, a total of 102 eligible families were randomized into the intervention group and the wait-list control group. Research

Assistant B was responsible for the randomization of the families. Two team members reported the recruitment progress to the principal investigator directly. The randomization procedure was as follows. A 10×10 table was first created by randomly assigning digits 0–9. One row of the table was then randomly selected, and the sequence of digits in that row was observed. A participant list was prepared, and the sequence of participants was observed. The first digit would determine the first participant's group and so on. Participants with an even digit were assigned to the intervention group, and those with an odd digit to the control group. After the families were assigned to groups, Research Assistant B contacted the parents by phone, to inform them of the results of randomization and to confirm that both the parents and the child would participate in the study. Research Assistant A who interviewed the families was thus blinded to the assignment process.

As shown in Figure 1, two families from the intervention groups participated for less than three lessons and four families did not complete the postassessment at T2. For the control group, five families completed less than a half of the intervention and another five did not complete the postassessment. The data of the remaining 102 families were used for data analyses using intent-to-treat analysis.

Procedures

The FBMI has been developed using the steps of program planning and intervention research proposed by Fraser and Galinsky (2010). The process is illustrated in Figure 2. First, develop problem and program theories: The FBMI refers to the family stress theory for its understanding of the sources of stress among EDFs (Conger & Elder, 1994). Mindfulness-based intervention is selected to promote the use of acceptance and approach in coping with daily stress (Blair et al., 2011; Kabat-Zinn, 2013). The intervention is designed in the programs. Second, specify program structures and processes: Two research supported mindfulness training programs were selected for further adaptation in the project. The parent mindfulness training program is a brief version of the mindful parenting course developed by Bögels and Restifo (2014). It was originally developed for reducing the stress of parents of adolescents with ADHD or aggression (Bögels et al., 2013). Third, refine and confirm in efficacy tests: The parent program of FMI was used in a feasibility study of a brief mindfulness-based intervention for parents of children with developmental disabilities (Lo et al., 2017). The protocol for the child program was developed by Snel (2014), for children aged 5–8. Pilot tests were conducted in mid-2014 after two research team meetings and a consultation with the original founder. Minor modifications were made in each of the three main components of the mindfulness-based intervention, namely, in-class mindfulness exercises, discussion of relevance to context, and homework exercises. The same protocol was applied to a study for children with ADHD symptomatology and their parents and positive outcomes of FBMI were reported (Lo et al., 2016, in press).

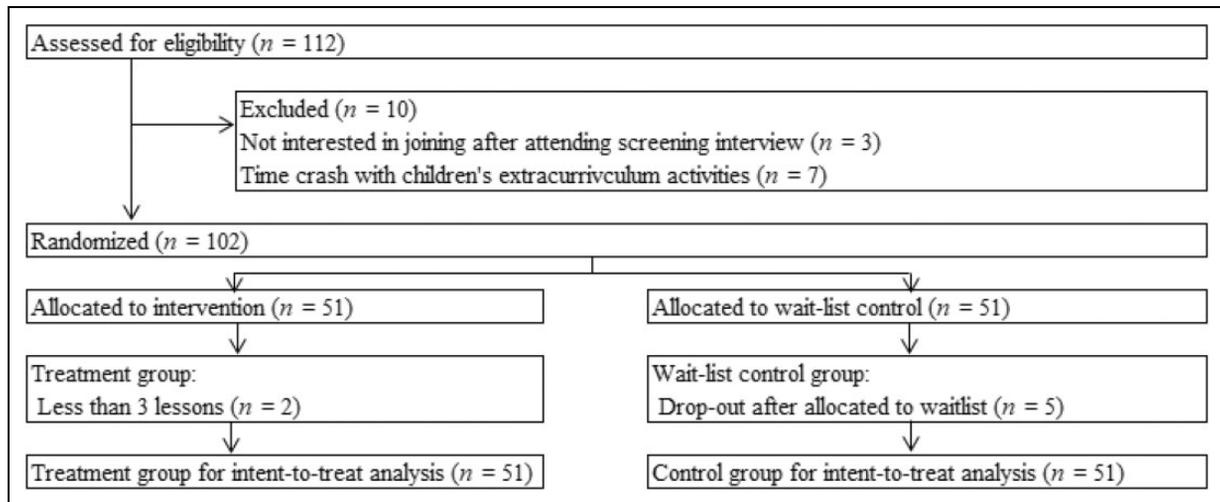


Figure 1. Flow diagram of the process for this randomized controlled trial.

All instructors in the program hold a degree or higher qualification in social work, psychology, education, or nursing and completed a basic 8-week mindfulness training program. They also took part in training courses offered by the research team (either a 2-day course for the parent program or a 6-day course for the child program). Tables 1 and 2 provide the session outlines of the respective programs.

After the first assessment (T1), only the EDFs in Arm 1 received FBMI and those in Arm 2 were on the wait-list. After the intervention in Arm 1, participants in both arms completed the second assessment of the study (T2). Participants in the wait-list (Arm 2) did not receive any intervention during this phase. Each session lasted 60 min for children and 90 min for parents. Two additional half-hour parent and child joint programs were arranged in Sessions 5 and 8. Ten minutes of daily homework practice was required of both parents and children. The whole FBMI lasted for 3 months. Participants on the wait-list (Arm 2) received the same intervention after T2. A 3-month follow-up was arranged for Arm 1 (T3).

The trial is registered with the U.S. Clinical Trials Registry (ClinicalTrials.gov): NCT03662867. Ethical approval for this study has been obtained from the Human Subjects Ethics Subcommittee of the principal investigator's affiliated university (reference number: 3-35-201502). The research team explained all information about the study in a briefing session and all participants signed on a written consent form.

Measures

As both the problem and program theories of this study are related to stress, parenting stress is selected as the primary outcome of this study. Based on previous studies, we found stress related measures are more sensitive to changes after mindfulness-based intervention.

Parenting Stress Index Short Form (PSI-SF). The PSI includes 36 items and was developed to reveal sources of difficulties and

the level of parenting stress (Abidin, 1995). The scale is divided into three subscales: Parental Distress, Parental–Child Dysfunctional Interaction, and Difficult Child. The Chinese version has been validated (Lam, 1999). The internal consistency in this study for the total score was .93.

This study is also interested to explore the effects of FBMI on child and parent positive and negative functioning. Secondary outcomes include positive functioning for children (self-regulation and attention), negative functioning for children (child behavior), positive functioning for parents (interpersonal mindfulness and family functioning), and negative functioning for parents (depression).

Self-regulation tests. Two behavior tests were administered to assess the child's self-regulation skills. The Counting Span Test proposed by Bull and Scerif (2001) was conducted as follows. Stimuli were printed on plain white cards, and each card displayed one to nine green spots and one to nine yellow spots. The yellow spots were presented as distractor items. Children were instructed to count the number of green spots on the presented card. The test was started with the span size of one card. Three trials were done per span size level. If participants made two errors on at a particular span level, the test would be terminated; otherwise, the number of cards will be increased after three trials. The total number of correct answers is thus the score. The Head–Toes–Knees–Shoulders (HTKS) task measures behavioral regulation with children's responses to 31 trial commands (Ponitz, McClelland, Matthews, & Morrison, 2009). After habituating to two oral commands (e.g., "touch your head" and "touch your toes"), children were asked to respond in an unnatural way to two types (on the 16 trials from the Head-to-Toes task) and then four types (on the following 15 trials) of paired behavioral commands. For example, if the administrator said, "Touch your toes," the correct response would be for the child to touch his or her head; the correct response to a "Touch your knees" command would be for the child to touch his or her shoulders. Correct responses

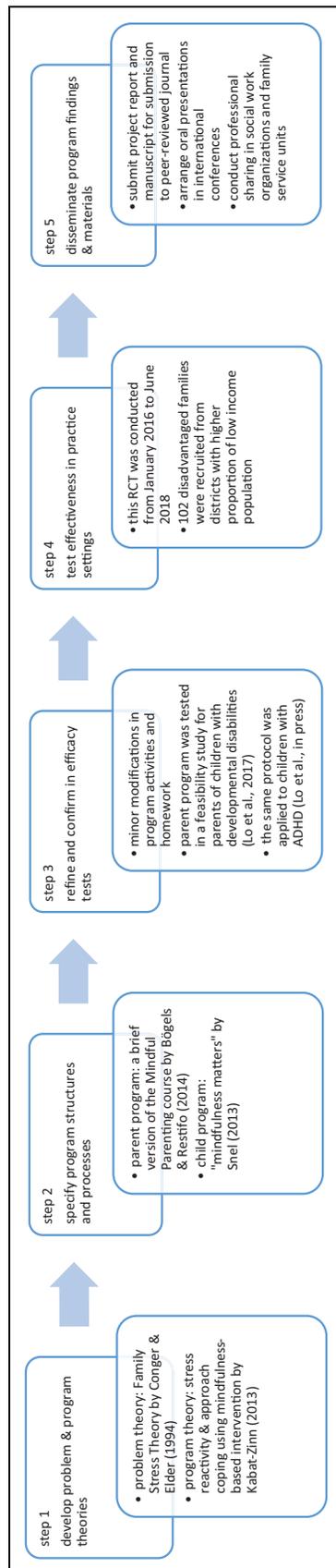


Figure 2. Development of family-based mindfulness intervention based on step model in intervention research by Fraser and Galinsky (2010).

earned 2 points; incorrect responses earned 0 points; 1 point was given if the child gave an incorrect response but then self-corrected and ended with the correct action. Scores ranged from 0 to 62. Commands were given in a consistent, nonrandom order. Higher scores indicated higher levels of behavioral regulation.

The child Attention Network Test (ANT). The ANT was developed by Posner and Petersen (1990). It presents five fish in a horizontal row that appear above or below a set fixation point. The children were instructed to press a key indicating in which direction the central fish was pointing and to ignore the flanker fishes. Completion of the task allows calculation of three scores related to the efficiency of attention networks. Alerting is measured by the additional time required to respond with no cue, compared to the baseline of responding to a cue that informs the child that a target will occur shortly. Orienting is measured by the time taken to respond to a cue at the target location, minus the reaction time to a central cue. Conflict monitoring is measured by prioritizing cognitive attentional resource allocation among competing stimuli. The ANT has previously used in other studies of mindfulness-based intervention for children (Felver, Tipsord, Morris, Racer, & Dishion, 2017; Lo et al., in press).

The Child Behavior Checklist (CBCL). The CBCL was used to assess parents' ratings of their children's behavior problems (Achenbach & Rescorla, 2000). The test-retest reliability and criteria validity of the schoolchildren version of the CBCL have been established for Hong Kong Chinese (Leung et al., 2006). The checklist has 67 items involving six subscales (Emotionally Reactive, Anxious/Depressed, Somatic Complaints, Withdrawn, Aggressive Behavior, and Attention Problem). The internal consistency in this study for the total score was .96.

The Interpersonal Mindfulness in Parenting (IM-P) Inventory. The original IM-P Scale includes 31 items that assess a parent's quality of mindfulness, specific to his or her family context (Duncan, 2007). The 23-item Chinese version of IM-P includes Compassion for Child, Nonjudgmental Acceptance in Parenting, Emotional Awareness in Parenting, and Listening with Full Attention. A scale validation study has been conducted by the first author and colleagues (Lo et al., 2018). The internal consistency of the index was .87.

The Family Adaptation, Partnership, Growth, Affection, Resolve (APGAR) Scale. The Family APGAR Scale includes 5 items that assess the parent's satisfaction of family functions across five domains using a 3-point response scale, where 0 = *hardly ever* and 2 = *almost always* (Smilkstein, Ashworth, & Montano, 1982). The internal consistency of the index in this study was .91.

The Patient Health Questionnaire (PHQ-9). The PHQ-9 includes 9 items that assess the parent's depression symptoms (Kroenke, Spitzer & Williams, 2001), directly based on the nine diagnostic criteria for major depressive disorder in the *Diagnostic and*

Table 1. Mindfulness Training for Parents.

Session	Theme	Goal
1	Stress of being a parent	<ul style="list-style-type: none"> – Establish motivation to learn mindfulness for promotion of family health – Introduce mindfulness training – Introduce body scan
2	Automatic reactions	<ul style="list-style-type: none"> – Introduce stretching – Notice physiological, emotional, and cognitive reaction in stressful moments of parenting – Use of mindful breathing and nonjudgmental attitude in managing the reaction in parenting
3	Respond to children mindfully	<ul style="list-style-type: none"> – Introduce mindfulness to breath and body – Further notice reactive patterns in parenting – Introduce 3 min breathing as coping – Practice deep listening in mindfulness
4	Quality parenting	<ul style="list-style-type: none"> – Joint session: practice with children, progress review – Introduce mindfulness to sounds and thoughts – mindful living for ADHD children and family caregivers
5	Facing difficulties with kindness	<ul style="list-style-type: none"> – Exploring difficulties with mindfulness practice – Introduce loving-kindness practice for self-care, and care of others
6	Self-care of parents	<ul style="list-style-type: none"> – Joint session: practice with children, progress review – Care plan of children and self – Consolidate learning

Note. ADHD = attention deficit hyperactivity disorder.

Table 2. Child Program of Family-Based Mindfulness Intervention.

Session	Theme	Goal
1	A for attention	<ul style="list-style-type: none"> – Establish motivation of be attentive and mindful – Use breathing as a beginning of exploration of attention
2	Exploring our body	<ul style="list-style-type: none"> – Introduce mindful movement exercises – Expand awareness of body sensation
3	Tasting, smelling, hearing, seeing, and feeling	<ul style="list-style-type: none"> – Introduce the use of multiple senses in understanding our inner and outside world
4	Feel our feelings	<ul style="list-style-type: none"> – Learn to be aware and to describe feelings
5	Accepting feelings	<ul style="list-style-type: none"> – Acknowledge feelings of self and others – Experience the importance of accepting feelings
6	Conscious movement	<ul style="list-style-type: none"> – Bring attention and awareness to self and others
7	The power of awareness and thoughts	<ul style="list-style-type: none"> – Experience the application of mindful attention and thoughts in daily life
8	Being nice is good	<ul style="list-style-type: none"> – Consolidate learning – Practice of loving-kindness

Statistical Manual (DSM, 4th ed.). The participants were asked to report the severity of their depression symptoms using a 4-point response scale where 0 = *not at all* and 3 = *nearly every day*. The internal consistency of the index in this study was .91.

In addition to the above scales for assessing outcomes, we collected the demographic data of the participating families and measured the impact of economic disadvantage using the *Confusion, Hubbub, and Order Scale (CHAOS)*. This includes 6 items that assess the parent's perception of household chaos, [Please check whether chaos could be changed to CHAOS to maintain consistency.] using a 5-point response scale where 1 = *not at all like your own home* and 5 = *very much like your own home* (Matheny, Wachs, Ludwig, & Phillips, 1995). The internal consistency of the index was .92.

Implementation fidelity

Mindfulness-based interventions—Teaching assessment criteria (MBI: TAC). This scale was adopted to assess the treatment

fidelity of the parent programs. It includes six domains of competence in instructing a mindfulness program that can apply to a brief mindfulness-based intervention (Crane et al., 2013). Child programs were assessed by a 5-point scale in two criteria—adherence to the manual and competence in teaching. All sessions were audio recorded for assessing treatment fidelity. For each group, 10% of the sessions were randomly selected. Two independent reviewers were recruited to rate the implementation fidelity of the study. All participants who completed the FBMI were also invited to complete a satisfaction questionnaire. The attendance rate and attrition rate were also assessed to evaluate the feasibility of the program.

Statistical Analyses

The baseline characteristics of the intervention group and the wait-list control group were then compared by analysis of covariance for continuous variables and χ^2 tests for categorical

Table 3. Pretreatment Evaluation Between Treatment Group and Wait-List Control Group.

Variables	Treatment (n = 51)	Control (n = 51)	T	χ^2	p
Parent M_{age} (SD)	38.20 (7.60)	39.06 (5.81)	-0.63		.528
Child M_{age} (SD)	6.42 (0.83)	6.57 (0.83)	-0.90		.372
Parent sex				1.38	.240
Male	2	5			
Female	49	46			
Child sex				0.36	.550
Male	27	30			
Female	24	21			
Education				0.39	.413
Primary or below	3	7			
Secondary	39	40			
Tertiary or above	8	3			
Marital status				3.64	.057
Married	38	46			
Divorced/separated/widowed	12	5			
Single	0	0			
CBCL	0.43 (0.30)	0.41 (0.27)	0.44		.660
PSI	105.29 (22.76)	107.37 (16.47)	-0.53		.598
PHQ-9	8.18 (6.67)	7.25 (5.44)	0.76		.446
IM-P	78.51 (13.87)	77.73 (8.66)	0.34		.733
APGAR	5.53 (3.20)	4.59 (2.89)	1.56		.122
CHAOS	18.67 (3.19)	19.53 (2.40)	-1.54		.126

Note. CBCL = Child Behavior Checklist; PSI = Parenting Stress Index; PHQ-9 = Patient Health Questionnaire; IM-P = Interpersonal Mindfulness in Parenting; APGAR = Family Adaptability, Partnership, Growth, Affection, and Resolve Scale; CHAOS = Confusion, Hubbub, and Order Scale.

variables. The baseline factors include the age of the children and the parents, the sex of the children and the parents, parent's education, marital status, and the pretest of scores of household chaos, PSI, PHQ, CBCL, and APGAR. The intervention effect was evaluated by comparing the intervention (Arm 1) and wait-list control groups (Arm 2). Repeated measures analysis of variance (ANOVA), with time (pretest and posttest) as the within-subject variable and group (intervention group and control group) as the between-subject variable, was used to detect effects of time, group, and Time \times Group interactions for each of the outcome measures. All analyses were carried out according to the intention-to-treat approach. The participants' missing values will be imputed using the last-observation-carried-forward method. A two-sided p value of .05 or less is considered statistically significant. Effect sizes were calculated for significant results. Cohen (1988) suggested that $d = .2$ should be considered a small effect size, .5 a medium effect size, and .8 a large effect size. For ANT analyses, we followed the recommendations that trials with incorrect responses or with response time lower than 200 ms or greater than 2,000 ms were removed from analyses (Ratcliff, 1993).

In this study, further attempts were made to explore whether there were significant improvements in the high stress families. ANOVAs (2 time points \times between groups) were conducted to test whether more significant differences in changes of outcome variables (including CBCL, child self-regulation, ANT, PSI, PHQ, IM-P, and APGAR) was found in the intervention group.

We also examined the overall attrition rates, defined by completion of not less than half of the program, that is, three

sessions. The results of the RCT, attendance rates, and service user satisfaction data were included to investigate the overall feasibility of the program. All analyses were performed using SPSS Version 23.0.

Results

Demographics

The parents on average were aged 38.64 years old, and the children were 6.50 years old. A total of 93.1% of the parents were female and 55.9% of the children were male. As reported in Table 3, no significant differences were found in most of the demographics and pretest scores between the intervention and control group (all $p > .05$). It showed that the randomization is successful. These demographic factors have been controlled for the study and the results are suitable for further analyses.

Changes in Primary Outcome Measures at T2

As Table 4 shows, significant Time \times Group (2 pre-post \times 2 intervention-control ANOVA) interactions were shown for self-regulation, $F(1, 100) = 6.02, p < .05$; PSI parent-child dysfunctional interaction, $F(1, 100) = 9.10, p < .01$; PSI difficult child, $F(1, 100) = 7.27, p < .01$; and PSI total stress, $F(1, 100) = 7.80, p < .01$. These results indicate that after completing the FBMI, children from the intervention group were found to have more significant improvements in their self-regulation than those in the control group, and parents from the intervention group were found to have significant improvements in their parenting stress.

Table 4. Measures Over Time for Intervention Group and Wait-List Control Groups.

Measures	Intervention Group (n = 51)						Control Group (n = 51)				ANOVA for Between-Group TI Versus T2		
	T1		T2		T3		T1		T2		F(1, 100)	p	d
	M	SD	M	SD	M	SD	M	SD	M	SD			
CBCL total problems	0.43	0.30	0.32	0.21	0.27	0.19	0.41	0.27	0.36	0.25	3.02	.09	
CBCL anxious/depressed	0.44	0.39	0.26	0.27	0.23	0.26	0.36	0.33	0.29	0.29	3.45	.07	
CBCL withdrawn/depressed	0.34	0.30	0.25	0.30	0.22	0.24	0.33	0.32	0.28	0.33	.39	.53	
CBCL somatic complaints	0.22	0.26	0.16	0.17	0.11	0.12	0.22	0.22	0.18	0.20	.11	.74	
CBCL attention problems	0.66	0.42	0.52	0.37	0.42	0.34	0.70	0.44	0.68	0.40	4.45	.04	.37
CBCL aggressive behavior	0.56	0.41	0.44	0.29	0.41	0.31	0.51	0.40	0.43	0.34	.63	.43	
CBCL internalizing problems	0.34	0.28	0.23	0.20	0.19	0.17	0.31	0.24	0.25	0.22	1.82	.18	
CBCL externalizing problems	0.44	0.37	0.33	0.23	0.30	0.24	0.40	0.33	0.35	0.28	1.81	.18	
Memory span	8.31	2.79	9.29	2.86	10.16	3.06	8.20	2.55	8.57	2.65	2.42	.12	
HTKS behavioral regulation	52.65	10.28	55.84	7.02	58.08	3.35	53.78	6.39	54.51	6.51	6.02	.02	-.37
ANT total response time	1,096.54	200.06	988.38	181.61	1,028.29	210.88	1,105.18	179.49	984.38	192.22	0.14	.71	
ANT accuracy	0.92	0.08	0.91	0.09	0.90	0.09	0.88	0.13	0.88	0.14	0.14	.71	
ANT alerting	74.57	84.67	98.90	95.00	129.85	148.83	74.75	97.91	72.20	85.05	1.88	.17	
ANT orienting	34.71	109.21	28.31	96.14	20.16	114.42	1.37	77.68	31.63	103.11	2.98	.09	
ANT conflict monitoring	110.69	100.98	80.50	70.31	76.49	83.84	72.87	100.62	87.54	78.78	4.93	.03	.35
PSI total stress	105.29	22.76	99.41	22.11	100.18	19.42	107.37	16.47	108.10	17.07	7.80	.01	.26
PSI parental distress	36.94	9.16	35.04	9.41	34.43	8.98	39.73	8.09	38.33	8.12	0.22	.64	
PSI dysfunctional interaction	33.14	6.65	31.73	7.07	32.78	6.31	34.22	5.78	35.33	5.94	9.10	.00	.21
PSI difficult child	35.22	9.82	32.65	9.10	32.96	7.14	33.43	8.03	34.43	7.42	7.27	.01	.27
PHQ-9	8.18	6.67	6.29	4.81	5.92	4.69	7.25	5.44	7.27	5.69	4.37	.04	.33
IMP total	78.51	13.87	79.10	12.19	77.61	11.41	77.73	8.66	76.73	9.49	1.17	.28	
IMP compassion for child	25.39	5.42	25.51	5.28	24.84	4.71	25.67	3.27	24.73	3.52	1.80	.18	
IMP nonjudgmental acceptance	17.06	4.35	17.33	3.96	17.20	4.15	16.76	3.78	16.92	3.57	0.04	.84	
IMP emotional awareness	19.12	4.33	19.14	4.00	19.14	3.60	19.33	2.74	18.75	3.01	0.95	.33	
IMP listening with full attention	16.94	3.72	17.12	3.59	16.43	3.08	15.96	3.44	16.33	3.40	0.17	.68	
APGAR	5.53	3.20	6.10	3.02	6.20	3.12	4.59	2.89	4.67	2.98	1.78	.19	

Note. CBCL = Child Behavior Checklist; HTKS = Head-Toes-Knees-Shoulders; ANT = Attention Network Task; PSI = Parenting Stress Index Short Form; PHQ = Patient Health Questionnaire; IMP = Interpersonal Mindfulness in Parenting; APGAR = Family Adaptability, Partnership, Growth, Affection, and Resolve Scale; CHAOS = Confusion, Hubbub, and Order Scale; ANOVA = analysis of variance.

Changes in Secondary Outcome Measures at T2

As Table 4 shows, significant Time \times Group (2 pre-post \times 2 intervention-control ANOVA) interactions were found for parent depression PHQ, $F(1, 100) = 4.37, p < .05$; CBCL attention problem, $F(1, 100) = 4.45, p < .05$; and child ANT conflict monitoring, $F(1, 100) = 4.93, p < .05$. These results indicated that after completing the FBMI, children from the intervention group appeared to have significant improvements in their CBCL attention problems, attention regulation as measured in ANT, and parents were found to have significant improvements in their PHQ-9 depression. However, changes in parent IM-P and family functioning APGAR were insignificant.

Change at T3 Follow-Up

As Table 4 shows, results of the 3-month follow-up were examined by paired samples. Overall, the positive changes of EDFs continued after the t tests (pretest vs. 3-month follow-up) for the intervention group were significant for CBCL

anxious/depressed, $t(1, 50) = 4.57, p < .001$; CBCL withdrawn/depressed, $t(1, 50) = 3.10, p < .01$; CBCL somatic complaints, $t(1, 50) = 2.88, p < .01$; CBCL attention problems, $t(1, 50) = 5.58, p < .001$; CBCL aggressive behavior, $t(1, 50) = 4.07, p < .001$; CBCL internalizing problems, $t(1, 50) = 4.44, p < .001$; CBCL externalizing problems, $t(1, 50) = 4.17, p < .001$; CBCL total problems, $t(1, 50) = 5.13, p < .001$; memory span, $t(1, 50) = -5.39, p < .001$; HTKS behavioral regulation, $t(1, 50) = -4.11, p < .001$; ANT total response time, $t(1, 50) = 5.71, p < .001$; ANT alerting, $t(1, 50) = -2.40, p < .05$; ANT conflict monitoring, $t(1, 50) = -2.11, p < .05$; PSI parental distress, $t(1, 50) = 2.65, p < .05$; PSI difficult child, $t(1, 50) = 2.06, p < .05$; PSI total stress, $t(1, 50) = 2.56, p < .05$; PHQ, $t(1, 50) = 2.53, p < .01$; and APGAR, $t(1, 50) = -2.20, p < .05$. These results indicated that after participating in the FBMI for 3 months, children from the intervention group were found to have made further improvements in their behavioral problems, self-regulation, and attention regulation, and parents were found to have made further

Table 5. Measures Over Time for Intervention Group and Wait-List Control Groups for Samples With PSI Total Score = or >100.

Measures	Intervention Group (n = 30)				Control Group (n = 36)				2 × 2 ANOVA		
	T1		T2		T1		T2		F(1, 64)	p	d
	M	SD	M	SD	M	SD	M	SD			
CBCL total problems	0.58	0.30	0.40	0.22	0.49	0.27	0.44	0.24	4.75	.033	.70
CBCL anxious/depressed	0.60	0.43	0.33	0.32	0.44	0.35	0.36	0.31	4.31	.042	.72
CBCL withdrawn/depressed	0.46	0.29	0.30	0.30	0.37	0.32	0.29	0.30	0.77	.384	
CBCL somatic complaints	0.31	0.29	0.22	0.19	0.26	0.23	0.21	0.21	0.25	.619	
CBCL attention problems	0.85	0.39	0.64	0.37	0.81	0.41	0.78	0.37	4.58	.036	.56
CBCL aggressive behavior	0.73	0.40	0.54	0.29	0.61	0.41	0.54	0.33	3.32	.073	
CBCL internalizing problems	0.46	0.29	0.29	0.21	0.36	0.25	0.29	0.24	2.60	.112	
CBCL externalizing problems	0.59	0.39	0.40	0.24	0.49	0.34	0.44	0.27	4.82	.032	.60
Memory span	7.83	2.88	9.07	2.91	8.39	2.57	8.83	2.68	2.14	.148	
HTKS behavioral regulation	52.57	9.80	56.60	5.12	53.58	5.22	54.50	5.53	5.78	.019	-.52
ANT total response time	1,130.16	180.14	1,002.88	196.39	1,097.83	193.10	973.94	182.20	0.01	.927	
ANT accuracy	0.90	0.10	0.90	0.11	0.88	0.14	0.88	0.16	0.13	.718	
ANT alerting	68.75	96.74	84.23	95.57	72.49	107.91	75.05	79.53	0.26	.613	
ANT orienting	24.24	116.66	18.03	102.52	4.22	88.03	46.72	107.98	3.41	.070	
ANT conflict monitoring	112.18	117.34	86.13	68.87	81.84	105.35	77.61	82.70	0.83	.367	
PSI total stress	119.37	16.72	111.93	17.46	115.33	10.75	114.72	14.09	5.54	.022	.44
PSI parental distress	41.90	7.33	40.07	7.39	43.08	6.18	40.89	7.52	0.07	.797	
PSI dysfunctional interaction	36.57	5.51	35.07	6.27	36.33	4.44	36.89	5.69	4.42	.039	.26
PSI difficult child	40.90	7.62	36.80	8.84	35.92	7.64	36.94	6.75	8.70	.004	.51
PHQ-9	11.37	6.76	8.37	5.00	8.89	5.56	8.97	5.77	5.36	.024	.51
IMP total	71.77	11.54	74.07	11.57	75.33	7.77	74.19	9.09	4.55	.037	.20
IMP compassion for child	23.67	5.40	24.70	5.61	25.42	3.18	24.25	3.72	6.08	.016	.19
IMP nonjudgmental acceptance	14.57	3.29	15.23	3.14	15.83	3.63	16.03	3.58	0.43	.512	
IMP emotional awareness	18.07	4.23	18.07	4.00	19.06	2.62	18.42	3.16	0.70	.407	
IMP listening with full attention	15.47	3.54	16.07	3.64	15.03	3.33	15.50	3.38	0.05	.820	
APGAR	4.40	3.02	5.23	3.04	3.89	2.53	4.06	2.86	1.98	.164	

Note. CBCL = Child Behavior Checklist; HTKS = Head-Toes-Knees-Shoulders; ANT = Attention Network Task; PSI = Parenting Stress Index Short Form; PHQ = Patient Health Questionnaire; IMP = Interpersonal Mindfulness in Parenting; APGAR = Family Adaptability, Partnership, Growth, Affection, and Resolve Scale; ANOVA = analysis of variance.

improvements in their parenting stress, depression, and perceived family functioning. However, change in parent interpersonal mindfulness was insignificant.

At-Risk Subgroup Analyses

Based on the mean score of PSI of a previous study (Lam, 1999), a PSI score of 100 was selected as cutoff and families facing higher level of stress was selected for subgroup analyses. As Table 5 shows significant Time × Group interactions for child outcomes, including CBCL total problems, $F(1, 64) = 4.75, p = .03$; CBCL anxious/depressed, $F(1, 64) = 4.31, p = .04$; CBCL attention problems, $F(1, 64) = 4.58, p = .04$; and CBCL externalizing problems, $F(1, 64) = 4.82, p = .03$. We also found effect in HTKS behavioral regulation, $F(1, 64) = 5.78, p = .02$. These effect sizes for parent outcomes ranged from .52 to .72.

For parent outcomes, significant Time × Group interactions was found for PSI total stress, $F(1, 64) = 5.54, p = .02$; PSI dysfunctional interaction, $F(1, 64) = 4.42, p = .04$; PSI difficult child, $F(1, 64) = 8.70, p < .01$; PHQ-9 depression, $F(1, 64) = 5.36, p = .02$; IMP total score, $F(1, 64) = 4.55, p = .04$; and

IMP compassion for child, $F(1, 64) = 6.08, p = .02$. These effect sizes for parent outcomes ranged from .19 to .51.

These results indicate that compared with the control group, parents from the intervention group with high PSI score were found to have more significant improvements in their children's overall behavioral problems, externalizing problems, attention problems, anxious/depressed problems, self-regulation, and the parents' own overall stress, stress due to parent-child dysfunctional interaction, and having a difficult child, depression, interpersonal mindfulness, particularly in their compassion for children.

Participant Satisfaction and Implementation Fidelity

Positive feedback was received from the participants who completed the intervention. All sessions of the FBMI were completed by 86 parents, and they were invited to complete the feedback form. A total of 72 parents completed the questionnaire, and thus, the response rate was 83.72%. A total of 93.06% of the respondents felt satisfied with the content of the FBMI, and 91.67% considered that their stress and emotional management was enhanced.

Among the completers, the attendance rate of the intervention groups was 91.50%, for the wait-list groups, it was 78.10%, and for all groups, the rate was 83.66%. The attrition rate judged from participating in at least three sessions of the program was 3.92% for the intervention groups, 19.61% for the wait-list groups, and 11.76% for all groups.

Independent *t* tests were conducted to test whether there were significant differences in baseline CHAOS and PSI between completers ($n = 45$) and dropouts ($n = 6$; i.e., participating in less than three sessions of the program or not reporting the posttest) in the intervention group. The differences in CHAOS ($t = -0.14, p = .89$) and in PSI total score ($t = -1.15, p = .25$) were both insignificant. For the implementation fidelity, the average rating of MBI-TAC for the parent program was 5.3 (range = 5.0–5.7) of the 6, and the fidelity checklists for the child program were 3.58 in adherence and 3.50 in competence of the 5.

Discussion and Applications to Social Work Practice

While economic disadvantage has been shown to have a strong adverse impact on development in early childhood, and is consequently detrimental to the physical and psychosocial health of individuals over their course of life, current policy and social work practices are relatively limited. Most strategies that aim to alleviate poverty of EDFs mainly fall under the umbrella of income transfer or resource redistribution policies, such as assistance in accommodation. However, it must be understood that the far-reaching effects of mental illnesses and traumas from childhood cannot be treated with fiscal resources alone. School systems and the community are indirectly burdened by economic disadvantage. Our study attempts to shed light on how familial economic disadvantage can be combatted at both the individual and the relational level (Yoshikawa et al., 2012) with the use of mindfulness-based intervention.

To our knowledge, our study is the first RCT on the effects of a mindfulness-based intervention on EDFs. To address the aforementioned limitations of previous studies in the same domain, this study has a strong research design with a relatively large sample and parallel interventions for parents and young children have been implemented, thus effectively addressing the issues EDFs encounter in their daily lives at individual and relational levels.

The results of the study are encouraging. Benefits in terms of children's attention and self-regulation are evident, where the intervention group showed small effect sizes of .37 after the intervention. The effects were even more prominent at the 3-month follow-up and further increased to .63 for attention and .72 for self-regulation, suggesting the potential of FBMI as a sustainable intervention method. Such positive changes reflected not only on rating scales by parents but also on child behavioral test results. These benefits are also extremely valuable as attention and self-regulation are key components to the executive functioning of learning. Thus, it is expected that these improvements will have far-reaching benefits to the

child's learning and adjustment. In addition to the cognitive changes in the children's abilities, overall improvements in the mental health of the parents and children are observed. This is indicated by reductions in the parental stress and depression symptoms and in the positive improvements in all dimensions of the children's behavior at the 3-month follow-up.

The change of relational well-being in EDFs was also investigated in this study. We used two measures, PSI parent-child dysfunctional interaction and Family APGAR, to assess the changes after FBMI. Although our results were inconsistent, they do offer preliminary evidence for this change. The intervention group's scores for PSI parent-child dysfunctional interaction showed significant and a small effect size of improvement immediate after FBMI, compared with the wait-list control group. Such result was confirmed in the at-risk group analysis. Although such change was small in effect size, we expect that the changes in individual family members and at relational level can promote a nurturing living environment for individual members, particularly for young children from EDFs. Further studies could select more measures in relational well-being and reexamine the potential benefits of FBMI.

The at-risk group analyses further confirmed that EDFs at high stress level can benefit from the intervention. In our study, we found families with higher stress level benefited more in terms of effect sizes. Among the families in intervention group with high stress, moderate to high effect sizes on child outcomes (i.e., .70 for overall behavioral problem and .52 for behavioral regulation), and small to moderate effect sizes on parent outcomes (i.e., .44 for parenting stress and .51 for depressive symptoms) were reported. Slightly stronger effect sizes were found for at-risk families, compared with the whole sample.

The FBMI program lasts for only 9 hr, which is a relatively brief intervention designed to accommodate the tight schedule of EDFs living in fast-paced societies such as Hong Kong and many other cities around the world. We suggest that careful and thoughtful planning and strategies, including the research team and collaborating staff members sending regular reminders to participants about the program meetings, should be used in the program implementation, to improve attrition and attendance rates. The high level of participation satisfaction also reflected that the FBMI is a feasible method of improving the mental health of EDFs. Although we encountered numerous recruitment difficulties, the attrition rate was similar to other mindfulness projects in the same city that were developed by the first author using these special measures (Lo, Ng, & Chan, 2015; Lo et al., 2017). However, due to the relatively small group size in each site (i.e., a mean of 6.4 group members), the exchange and support among participants, particularly for parents, was undermined. Some instructors from our project reported that when enquiring in more detail about the mindfulness exercises, some parents expressed difficulties and found the application to their life experiences more challenging.

In addition to the complexity of the FBMI program implementation, we acknowledge three limitations to this study. First, the project team encountered strong difficulties in recruitment and our sample met below 50% of our sample size target. Many collaborators are interested to participate, but they were unable to recruit enough number of families within the same unit. Replication of the study may consider an alternative strategy to recruit families at all income levels and to investigate whether there are differences in outcomes among different income groups. Second, many outcome measures are based on parent-reported questionnaires, including those related to the child's functioning. Hence there may be potential participant bias because the personal experiences of parents may influence their perceptions about changes in their children and in family relationships. However, the target of this study includes young children aged from 5 to 7 who are too young to complete most psychological inventories, so many of the child outcome measures could reflect the perceptions of the parents only. Although such limitations have been addressed by including three behavioral tests on attention regulation and self-regulation, further studies should consider the inclusion of multiple informants, such as both parents, the schoolteachers, and the use of other objective measures, such as biomarkers that can assess the changes of individuals and relationships after FBMI.

Second, the 3-month follow-up design is relatively short and this follow-up period did not include the wait-list control group. While this study shows promising effects of FBMI, we believe further studies with longer follow-up periods such as a 6-month or 1-year period will help to generate more evidence regarding the long-term effects of mindfulness-based intervention.

Last, our study includes a wait-list control design, and the intervention and control groups were randomized within each site. We cannot exclude the contamination of between-group participants, as some of the parents and children knew each other before the FBMI. Further studies should consider the use of active control group design, such as an ordinary parenting program with a student tuition program to minimize the contamination effect.

To conclude, this is the first known RCT of mindfulness-based intervention for young children and their parents from economically disadvantaged conditions. The positive results on the child outcomes in terms of attention and self-regulation, the parent outcomes in terms of parental stress and depressive symptoms, and the relational outcome in terms of family functioning have provided a preliminary evidence base for FBMI as a selective prevention approach to EDFs. Application of FBMI may also be considered for children with other clinical problems, such as autism spectrum disorder, severe behavioral problems, conduct disorders, depression, and anxiety, and for other needy populations, such as postmigration families. More studies of FBMI are recommended for strengthening the evidence base of this recently developed approach.

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