





# Mindfulness Therapies for Improving Mental Health in Parents of Children with a Developmental Disability: a Systematic Review

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## Abstract

Mindfulness offers promise as a therapy approach for parents of children with developmental disabilities (DD), however its effectiveness in managing mental health symptoms remains unclear. This review quantitatively examines the comparative effectiveness of mindfulness-based and informed interventions, drawing on the evidence base from randomised controlled trials (RCTs). Eight RCTs were identified from the Embase, PsycINFO, PubMed and Scopus databases. Risk of bias was assessed using the Cochrane Collaboration tool and Hedges'  $g$  effect sizes, with associated 95% confidence intervals and  $p$  values calculated. Parents who completed Mindful Parenting or Mindfulness-Based Stress Reduction programs reported immediate and large to very large reductions in psychological distress ( $g_w$  range: .39–1.94), with some improvements maintained up to 6 months post-treatment. A single study reported short-term benefits with Acceptance and Commitment Therapy. Evidence for the mental health benefits of mindfulness for parents of children with DD is still at an early stage. Controlled trials are needed to determine the differential effects of specific mindfulness techniques and how to best adapt this approach to best meet the unique needs of a vulnerable caregiver population.

**Keywords** Autism · Developmental disorders · Mindfulness · Parents · Meta-analysis

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## Introduction

Parenting a child with a developmental disability (DD) has been described as an experience that is both life enriching and challenging. Parents have reported an increased sense of belonging and social connectedness, but also amplified levels of psychological distress, also referred to as stress or emotional distress, due to their child's specialised care requirements (Ali et al. 2012; Arora et al. 2020; Baker et al. 2005; Hastings 2002; Plant and Sanders 2007). Concerningly, parenting stress can negatively impact parenting practices, including decreased parental responsiveness and increased authoritarian parenting (Hastings 2002; Neece et al. 2012). Considering the bidirectional effects between parent emotion and child outcomes in families of children with DD, interventions to promote parental wellbeing are paramount (Neece et al. 2012; Woodman et al. 2015).

Interventions which incorporate mindfulness - or present moment, non-judgemental awareness of external experiences, thoughts, emotions and bodily sensations (Kabat-Zinn 2003) - may assist parents of children with DD to self-manage their own reactions to their child's unique developmental needs. The ability to intentionally attend to the present moment without judgement can also help to enhance parental wellbeing (Hartley et al. 2019). The suggestion is that mindfulness meditation reduce stress, rumination, depressive and anxiety symptoms (Chiesa and Serretti 2009; Chiesa and Serretti 2011) whilst also enhancing emotional regulation and attentional capacity (Chiesa et al. 2011; Keng et al. 2011). These findings have been underpinned by neural changes (e.g., enhanced brain activity, increased prefrontal cortical thickness) that accompany mindfulness practice (Chiesa et al. 2011; Chiesa and Serretti 2010; Lazar et al. 2005; Marchand 2014).

Mindfulness can be introduced into psychotherapy with various intensities. Foreexample, Mindfulness-Based Stress Reduction (MBSR, Kabat-Zinn 2003) involves a secular group program with prolonged, formal meditation practice for both instructors and attendees. Alternatively, treatments such as Acceptance and Commitment Therapy (ACT; Hayes 2004) focus on the development of mindfulness skills and acceptance towards experience through informal exercises (Gu et al. 2015). Studies have also differed in their program content. As an example, mindful parenting programs, which borrow aspects from the Kabat-Zinn (1990) protocol, aim to foster everyday mindfulness in the context of parenting and parent training (Bögels and Restifo 2013; Pakdaman et al. 2014). Mindfulness elements have also been incorporated within existing behavioural skills programs (e.g. Mak et al. 2018).

Despite its growing evidence-base, the comparative effectiveness of mindfulness for parents of children with DD remains to be determined. In particular, mindfulness-based interventions have been delivered to diverse groups, including children and adults with or without a DD as well as parents, educators and staff (e.g., Benn et al. 2012; Brooker et al. 2013; Chapman et al. 2013). Furthermore, individual studies have largely evaluated mindfulness using a quasi-experimental design (e.g. single group pretest-posttest) which can introduce validity concerns and, moreover, overestimate the benefits of treatment (e.g., Blackledge and Hayes 2006; Cachia et al. 2016; Chapman et al. 2013; Hartley et al. 2019; Rayan and Ahmad 2018). Importantly, RCT's in this area have recently been published which can add to the current evidence-base (e.g., Behbahani et al. 2018; Chan and Neece 2018; Whittingham et al. 2015).

The current systematic review was conducted to assess the evidence-base for mindfulness training and practice, as applied to parents of children with DD. The specific aims were to 1) determine the impact of mindfulness on mental health (symptoms of depression, anxiety, distress) relative to those receiving standard care or another intervention, or those on a wait-list, and 2) whether noted improvements (if any) are sustained over time, once mindfulness training has ceased.

## Method

### Study Eligibility

This study is registered on The International Prospective Register of Systematic Reviews (PROSPERO CRD 42019135245) and follows the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Liberati et al. 2009). In addition to being published in English and in a peer-reviewed journal, studies had to meet the following criteria:

**Population:** Studies assessed parents of children with DD (no age range of child or parent specified); a diverse group of conditions characterised by impairments in physical ability, learning, language and/or behaviour (i.e. intellectual disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), Down syndrome; World Health Organisation 2018).

**Intervention.** Studies had to explicitly refer to mindfulness, mindfulness skills, or mindfulness training in their description of the primary intervention. This included mindfulness-based programs which emphasise lengthy meditation practices (e.g. MBSR, MBCT), but also programs which incorporate mindfulness exercises to promote awareness and focus attention (e.g., Acceptance and Commitment therapy; Shapero et al. 2018).

**Comparison or control condition.** Mindfulness was compared to wait-list control, standard medical or psychosocial care or an active intervention (e.g., parenting skills-based training).

**Outcome.** Mental health - defined as symptoms of depression, anxiety, or psychological distress (including emotional reactions to the concurrent and often prolonged stressful events experienced by caregivers; Ridner 2004) was assessed pre- and post-mindfulness using a standardised self-report or clinician-administered measure. This included studies with or without follow-up periods.

**Design.** Only randomised controlled trials, considered the ‘gold standard’ for assessing treatment efficacy, were eligible (Hariton and Locascio 2018; Reeves et al. 2017).

### Literature Search

The Embase, PubMed, and PsycINFO databases were searched for studies, dating from database inception to March 11, 2020. Search terms were developed with the assistance of a specialist research librarian and included terms related to the child population (i.e., developmental disability, autism spectrum disorder, down syndrome) and intervention of interest (e.g., mindfulness, meditation; see Table S1 online supplemental material).

Reference lists of included studies were hand-searched for further articles and Scopus citation searching of included studies performed, yielding one additional result.

## Search Results

Database searching yielded 874 records (see Fig 1). The records were imported into Covidence systematic review software (Veritas Health Innovation n.d.) for independent screening by the first and second authors, with excellent agreement (92%, kappa = 1.0). The titles and abstracts of 712 records were screened against the eligibility criteria, with 561 full text articles subsequently re-screened for eligibility. During this process five studies with overlapping samples were identified (Chan and Neece 2018; Neece 2014; Whittingham et al. 2014; Whittingham et al. 2015; Whittingham et al. 2019) and treated as two distinct studies, based on publication recency (Chan and Neece 2018) and relevance of data (Whittingham et al. 2015). This resulted in a final sample of eight independent randomised controlled trials.

## Data Collection and Preparation

### Data Extraction

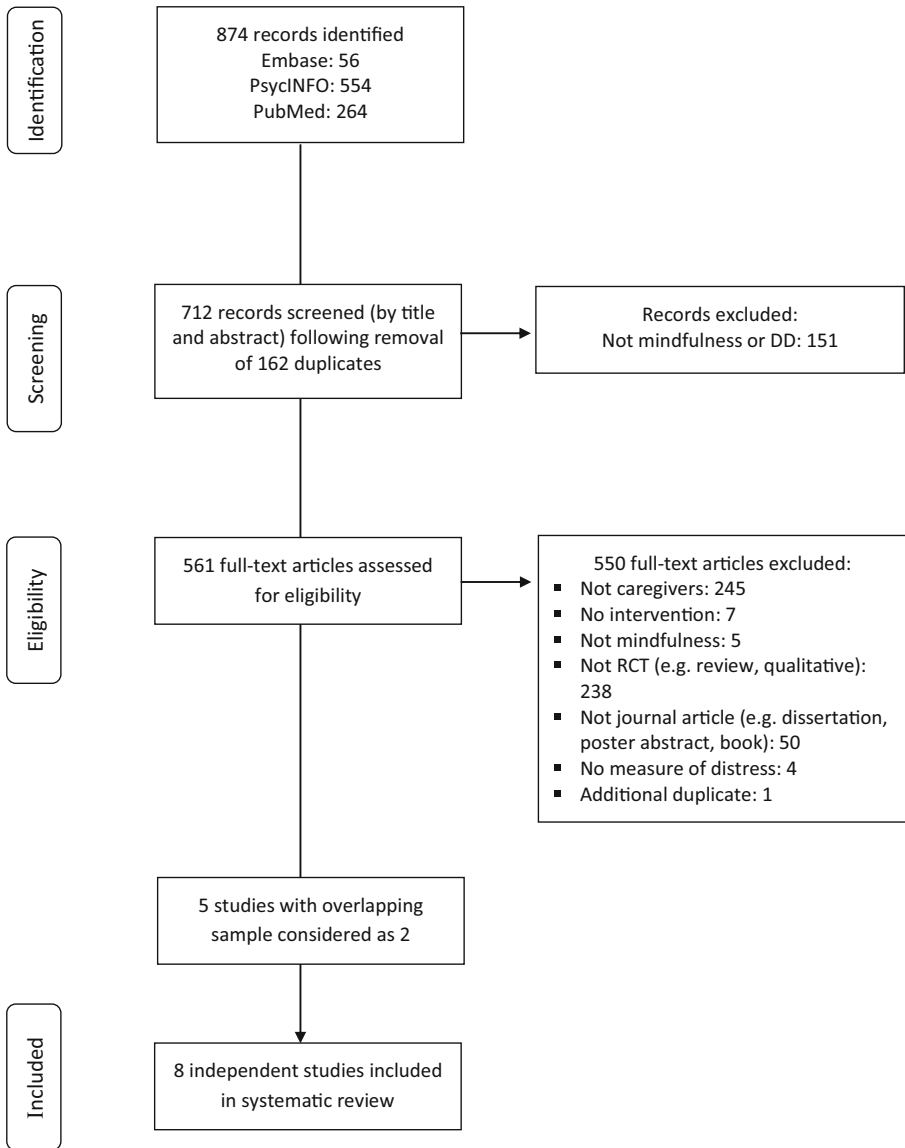
The following data were extracted from each study by the first author, and checked by the second: study characteristics (e.g., sample size, country), sample characteristics (e.g., type of DD), characteristics of the mindfulness intervention (e.g., framework, duration, delivery), and statistical data to calculate effect estimates for each measure of depression, anxiety and distress used by a study. Additional data were requested from six authors, with three responding (Ferraioli and Harris 2013; Lo et al. 2017; Mak et al. 2018).

### Risk of Bias Assessment

Methodological bias was assessed using the Cochrane Collaboration Risk-of-Bias tool (RoB; Higgins et al. 2011). The RoB assesses six types of bias: selection, performance, detection, attrition, reporting and other potential sources of bias). For the purpose of this review, treatment fidelity (i.e., adequate therapist training, use of standardised protocols; Munder and Barth 2018) was considered for this final domain. For each study, bias is assessed as ‘low’, ‘unclear’, or ‘high’ per domain. The percentage of studies meeting each quality rating was then calculated. RoB ratings were independently conducted by the first and second authors, with disagreements resolved through consensus discussion.

### Statistical Analysis

Means and standard deviations for each psychological measure administered at pre- and post-treatment and, where available, at follow-up were entered into Comprehensive Meta-Analysis Version 3 (CMA; Borenstein et al. 2013). Hedges’ *g*, which provides an unbiased population estimate (as compared to Cohen’s *d*), was the primary effect size estimate (Hedges 1982). Cohen’s (1992) criteria were used to interpret *g*, with values of



**Fig. 1** PRISMA flow diagram of study selection process (Liberati et al., 2009)

.2, .5 and  $\geq .8$  representing small, medium and large to very large effects, respectively. When calculating  $g$  for studies with a repeated measures design, the test-retest correlation for each measure is required. As studies did not routinely provide this statistic, an estimate of 0.7 was used: the average test-retest correlation obtained from psychometric data for the included self-report measures ( $r$  range = .51 to .85; Abidin 2012; Brown et al. 1997; Fydrich et al. 1992; Radloff 1977; Zimmerman 1986).

Individual  $g$ 's were grouped according to their conceptual framework (e.g. MBSR, ACT) and outcome measure. Additionally, 95% confidence intervals (CIs) were calculated to quantify the uncertainty of both individual and pooled  $g$ 's, where

narrower CI's represent higher precision. *P* values were also calculated to assess the statistical significance of *g*. Our initial goal was to pool individual effect sizes, however this was deemed inappropriate given the variability in the mindfulness interventions delivered across the eight RCTs in addition to the combination of children with distinct developmental disorders.

To address the pervasive 'file drawer' problem, whereby significant and strong results are more likely to be published, Orwin's Fail-safe  $N$  ( $N_{fs}$ ) was calculated. This statistic estimates the number of hypothetical publications that would be required to reverse a *g* to a small, statistically unimportant effect size (i.e.,  $g \leq .20$ ; Orwin 1983). We considered an  $N_{fs} < 8$  (total number of studies reviewed) to indicate a high probability of publication bias.

## Results

### Study Characteristics

As seen in Table 1, all studies were published in the last decade, reflecting increased research on mindfulness in recent years. Five different measures of affect were used by these studies, most commonly the Parenting Stress Index (PSI;  $N_{studies} = 6$ ) - designed to evaluate degree of stress in the parent-child relationship (Abidin 2012).

### Sample Characteristics

Studies included small convenience samples sourced for a feasibility study ( $N = 21$ ; Ferraioli and Harris 2013) and larger-scale trials (e.g.,  $N = 243$ ; Dykens et al. 2014). Study participants were mothers (96%) and fathers (4%) of children with ASD, ADHD, and Cerebral Palsy, or a combination of these disorders.

### Intervention Characteristics

All studies adopted group-based programs. This included Mindful Parenting (Behbahani et al. 2018; Lo et al. 2017; Ferraioli and Harris 2013), MBSR (Dykens et al. 2014; Chan and Neece 2018), and Family-based Mindfulness (Lo et al. 2020). Programs which included mindfulness elements were also evaluated: Mak et al. (2018) had parents assist their child with daily hatha yoga practice whilst Whittingham et al. (2015) supplemented an evidence-based parent skills training (Stepping Stones Triple P, SSTP; Sanders et al. 2004) with ACT. These latter two studies also incorporated (weekly) telephone consults for parents following group training.

Weekly face-to-face sessions of 1.5 hours, on average ( $SD = 2.5$ ), were delivered over 6 to 8 weeks by a trained allied health professional (e.g., psychologist, social worker, doctoral student). Intervention modifications were made to suit the specific needs of this caregiver population – namely brief daily meditation time (Lo et al. 2017; Lo et al. 2020), the option of onsite childcare while parents received the intervention, and the use of peers (parents of children with a DD) trained in, and supervised by, allied health professionals to deliver MBSR (Dykens et al. 2014). These latter elements were incorporated to ensure that treatment providers had a shared experience with

**Table 1** Study Characteristics

Lead author (date)	Sample		Child age (mean years)	Country	Child diagnoses	Measures			Mindfulness Treatments		Control condition
	Total <sup>a</sup> (M:F; not specified)	MI				C	dropout <sup>b</sup>	Framework	Format	Sessions (number x duration)	
Bebahami (2018)	60 (all female)	30	30	Iran	ADHD	PSI-SF	13%	Mindful Parenting	Group	8 × 90 mins over 8 weeks	Usual care
Chan (2018)	80 (3:77)	39	41	US	Mixed diagnoses	PSI-SF CES-D	–	MBSR	Group	8 × 120 mins +6 h retreat over 8 weeks	Wait list
Dykens (2014)	243 (all female)	116	127	US	ASD	PSI-SF BDI BAI	18.9%	MBSR	Group	6 meetings (range: 3–8 meetings)	Positive Psychology
Ferraoli (2013)	21 (5:10:6)	10	11	US	ASD	PSI-SF	40%	Mindful Parenting	Group	8 × 120 mins over 8 weeks	Skills-based Parenting
Lo (2017)	180 (11:169)	91	89	Hong Kong	Mixed diagnoses	PSI-SF CES-D	7.6%	Mindful Parenting	Group	6 × 90 mins over 6 weeks	Usual care
Lo (2020)	100 (4:96)	50	50	Hong Kong	ADHD	PSI-SF	.04%	Family Mindfulness	Group	6 × 90 mins over 6 weeks	Wait list
Mak (2018)	42 (5:36:1)	21	21	Australia	Cerebral Palsy	DASS	9.5%	MIYoga	Group + Individual	6 × 90 mins +2 phone consults over 8 weeks	Wait list
Whittingham (2015)	67 (2:65)	23	22 (C1) 22 (C2)	Australia	Cerebral Palsy	DASS-21	9.5%	SSPPP +ACT	Group + Individual	2 × 120 mins ACT 6 × 120 mins SSTP 3 × 30 mins phone consults	SSPPP (C1) Wait-list (C2)

<sup>a</sup>Number of participants allocated to groups at baseline, MI = Mindfulness Intervention, C = Control or comparison group, <sup>b</sup> Number who did not complete primary mindfulness intervention; (–) = data not detailed or provided. Note: dropout rate of 20% specified in Chan (2018) paper referred to total sample only (*n* = 16/80 dropout); ADHD = Attention Deficit Hyperactivity Disorder, ASD = Autism Spectrum Disorder; PSI-SF = Parenting Stress Index- Short Form, CES-D = Center for Epidemiological Studies Depression Scale, BDI = Beck Depression Inventory, BAI = Beck Anxiety Inventory, DASS/DASS-21 = Depression, Anxiety and Stress Scales (short form), MBSR = Mindfulness-Based Stress Reduction, ACT = Acceptance and Commitment Therapy, SSPPP = Stepping Stones Positive Parenting Program

participants (Dykens et al. 2014). The average drop-out rate (where reported) was a low 12% among intervention participants – although 40% of the sample in Ferraioli and Harris' (2013) feasibility trial withdrew prior to, or during, mindfulness-based parenting training.

### Control Conditions

Studies compared mindfulness to waitlist control ( $N_{\text{studies}} = 4$ ) or usual care ( $N_{\text{studies}} = 2$ ). Whittingham et al. (2015) included a second control arm, involving skills-based parenting (SSPPP), to examine the unique effects of ACT. Dykens et al. (2014) and Ferraioli and Harris (2013) also used comparative, evidence-based psychotherapies as controls.

### Risk of Bias Assessment

All included studies had some concerns of bias in at least one RoB domain (Figs. S1 and S2 online supplemental material). Most (63%) minimised selection bias by providing details about their randomisation and group allocation procedures. Performance bias was also addressed (65%) by adopting standardised intervention protocols (e.g., MBSR) and/or the use of active treatments as controls. Conversely, all studies had a high risk for detection bias - a finding that was not unexpected due to the reliance on self-report data (Munder and Barth 2018). Attrition bias was low (63%), with reasons for participant drop out routinely provided in addition to the use of intent-to-treat analyses. Reporting bias was addressed, with trial protocols used and both significant and non-significant outcomes reported. Finally, therapist fidelity, or adherence to treatment, as a potential source of bias was monitored and maintained through the use of checklists (e.g., Mak et al. 2018; Lo et al. 2017, Lo et al. 2020 [Mindfulness-Based Interventions Teaching Assessment Criteria Scale]; Chan and Neece 2018, Ferraioli and Harris 2013), established protocols (Whittingham et al. 2015; Behbahani et al. 2018) and/or supervised practice (Dykens et al. 2014).

### Effectiveness of Mindfulness

Short and longer-term effect estimates are listed for individual studies in Tables 2 and 3. Estimates are grouped according to their theoretical framework and outcome measure and ranked in order of size.

### Mindful Parenting

Three studies evaluated the effectiveness of mindfulness-based parenting to help parents engage with their children. All three reported significant improvements in one or more self-reported ratings of stress and depression (Table 2). This included very large effects in comparison to skills-based training (Ferraioli and Harris 2013); a finding that was robust. However, small to medium and non-significant reductions in stress ratings, compared to usual care or wait-list controls, were also noted (Behbahani et al. 2018; Lo et al. 2020). A single study reported continued, positive effects among their sample of mothers at 2-month follow-up (Behbahani et al. 2018; Table 3).



Ferraioli and Harris (2013) also reported a longer-term trend towards reduced stress scores on the PSI, although this finding did not reach significance, likely due to the small sample size ( $N = 15$ , Table 3).

## MBSR

Two studies examined MBSR, with varied results. Very large short-term gains in favour of mindfulness were noted on the PSI (Chan and Neece 2018), however this same study reported no significant differences between their MBSR and wait-list control groups in depression symptom severity (Center for Epidemiological Studies – Depression Scale; Table 2). Dykens et al. (2014) provided statistical data to calculate follow-up effects for their targeted MBSR program, reporting sustained effects for mindfulness in reducing symptoms of depression (Beck Depression Inventory), anxiety (Beck Anxiety Inventory) and stress (PSI) - over and beyond the improvements noted by mothers who accessed a positive psychology program (Table 3).

## Act

Whittingham et al. (2015) was the only study to evaluate the unique contribution of ACT in a three-arm RCT. Parents who accessed a combined positive parenting (SSPPP) and ACT program showed decreased parental symptoms on the Depression, Anxiety, Stress Scales in comparison to wait-list controls (Table 2). However there were no significant group effects between SSPPP+ACT and SSPPP alone. A similar trend was noted at 6-month follow-up. These findings should be treated cautiously, given the associated  $N_f$ s statistics were consistently low ( $N_f \leq 2$ ).

## Family Mindfulness

Lo et al. (2020) examined the effect of a mindfulness-based family program for children with ADHD and their parents. A small benefit was noted on the PSI, with intervention participants reporting a more harmonious parent-child relationship and reduced distress (PSI subscales, Table 2). The authors note that this effect was stronger for parents who reported severe levels of stress and depression at baseline. These findings are, however, susceptible to publication bias ( $N_f < 8$ ).

## MiYoga

A single study measured the effectiveness of yoga and mindfulness meditations, as well as informal mindfulness activities (e.g. mindful eating), targeted to children with CP and their parents (Lo et al. 2020). No superior effects with mindfulness were noted in comparison to wait-list controls, although the associated  $N_f$ s value was small (Table 2).

## Discussion

This review updates the current evidence base for mindfulness interventions for parents of children with DD. Data from eight RCTs identified immediate, medium to large

**Table 2** Short-term effects (immediately post-intervention) associated with mindfulness

Framework	Measure	Subscale	N <sub>studies</sub>	N <sub>participants</sub>	g	95% CI		p	N <sub>fs</sub>	Group	Control	Lead author (date)
						L	U					
Mindful Parenting	PSI	Total score	1	15	<b>1.94*</b>	.75	3.14	<.01	9	ASD	Skills-based parenting	Ferrarioli (2013)
			1	56	<b>1.22*</b>	.65	1.78	<.01	5	ADHD	Usual care	Behbahani (2018)
		Interaction	1	180	.29	-.00	.58	.05	0	ADHD/ASD	Wait-list	Lo (2017)
			1	56	<b>1.27*</b>	.70	1.84	<.01	5	ADHD	Usual care	Behbahani (2018)
		Parent distress	1	180	<b>.39*</b>	.09	.68	.01	1	ADHD/ASD	Wait-list	Lo (2017)
			1	56	<b>.66*</b>	.12	1.19	.02	2	ADHD	Usual care	Behbahani (2018)
MBSR	PSI	Difficult child	1	180	.12	-.17	.40	.43	0	ADHD/ASD	Wait-list	Lo (2017)
			1	56	.46	-.06	.98	.08	1	ADHD	Usual care	Behbahani (2018)
			1	180	.24	-.04	.54	.09	0	ADHD/ASD	Wait-list	Lo (2017)
		CES-D	1	180	<b>.43*</b>	.14	.73	<.01	1	ADHD/ASD	Wait-list	Lo (2017)
		Parent distress	1	80	<b>1.54*</b>	1.04	2.03	<.01	7	DD	Wait-list	Chan (2018)
			1	80	.34	-.09	.78	.12	1	DD	Wait-list	Chan (2018)
ACT	DASS	Anxiety	1	45	<b>.69*</b>	.09	1.28	.02	2		Wait-list	Whittingham (2015)
			1	45	.52	-.06	1.10	.08	2		SSPPP	Whittingham (2015)
		Stress	1	45	<b>.64*</b>	.05	1.23	.03	2	CP	Wait-list	Whittingham (2015)
		Depression	1	45	.46	-.11	1.05	.11	1		SSPPP	Whittingham (2015)
			1	45	<b>.63*</b>	.04	1.22	.03	2	CP	Wait-list	Whittingham (2015)
			1	45	.31	-.26	.89	.29	1		SSPPP	Whittingham (2015)
Family mindfulness	PSI	Difficult child	1	100	.35	-.04	.74	.07	1	ADHD	Usual care	Lo (2020)
		Total score	1	100	.32	-.07	.71	.11	0	ADHD	Usual care	Lo (2020)

**Table 2** (continued)

Framework	Measure	Subscale	N <sub>studies</sub>	N <sub>participants</sub>	g	95% CI		p	N <sub>is</sub>	Group	Control	Lead author (date)
						L	U					
		Parent distress	1	100	.26	-.12	.66	.17	0	ADHD	Usual care	Lo (2020)
		Interaction	1	100	.22	-.16	.61	.26	0	ADHD	Usual care	Lo (2020)
Mi Yoga	DASS	Total	1	42	.17	-.42	.76	.56	0	CP	Wait-list	Mak (2018)

*Note.* N<sub>studies</sub> = number of studies providing this data, N<sub>participants</sub> = number of participants; g = Hedges' g; PSI = Parental Stress Index (includes short-form); CES-D = Centre for Epidemiological Studies - Depression Scale; DASS = Depression Anxiety Stress Scales; MP = Mindful Parenting; MBSR = Mindfulness Based Stress Reduction; ACT = Acceptance and Commitment Therapy; FM = Family Mindfulness; ADHD = Attention Deficit Hyperactivity Disorder; ASD = Autism Spectrum Disorder; DD = developmental disability; CP = Cerebral Palsy, SSPPP = Stepping Stones Positive Parenting Program

\*indicates significant finding, i.e. CI ≠ 0, p < 0.05

**Table 3** Longer-term effects (up to 6 months post) associated with mindfulness

Framework	Measure	Subscale	N <sub>studies</sub>	N <sub>participants</sub>	Time	g	95% CI		p	N <sub>fs</sub>	Group	Control	Lead author (date)
							L	U					
Mindful Parenting	PSI	Interaction	1	56	2	<b>1.68*</b>	1.07	2.28	<.01	7	ADHD	Usual care	Behbahani (2018)
		Total score	1	56	2	<b>1.44*</b>	.86	2.02	<.01	6	ADHD	Usual care	Behbahani (2018)
		Difficult child	1	15	3	.86	-.15	1.88	.09	3	ASD	Skills-based parenting	Ferraroli (2013)
MBSR		Parent distress	1	56	2	<b>1.33*</b>	.76	1.90	<.01	6	ADHD	Usual care	Behbahani (2018)
	BDI		1	56	2	<b>.85*</b>	.31	1.39	<.01	3	ADHD	Usual care	Behbahani (2018)
	BAI		1	94	6	<b>.97*</b>	.55	1.39	<.01	4	ASD	Positive Psychology	Dykens (2014)
ACT	PSI	Parent distress	1	94	6	<b>.80*</b>	.38	1.22	<.01	3	ASD	Positive Psychology	Dykens (2014)
	DASS	Depression	1	94	6	<b>.48*</b>	.07	.89	.02	1	ASD	Positive Psychology	Dykens (2014)
		Stress	1	28	6	.34	-.39	1.07	.36	1	CP	SSPPP	Whittingham (2015)
			1	28	6	.17	-.55	.90	.64	0	CP	SSPPP	Whittingham (2015)
			1	28	6	.13	-.62	.84	.76	0	CP	SSPPP	Whittingham (2015)

Note. N<sub>studies</sub> = number of studies providing this data, N<sub>participants</sub> = number of participants; Time = time post-intervention (in months); g<sub>w</sub> = Hedges' g; PSI = Parental Stress Index (includes short-form); BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory; MP = Mindful Parenting; MBSR = Mindfulness Based Stress Reduction; ACT = Acceptance and Commitment Therapy; ADHD = Attention Deficit Hyperactivity Disorder; ASD = Autism Spectrum Disorder; CP = Cerebral Palsy, SSPPP = Stepping Stones Positive Parenting Program

\*indicates significant finding, i.e. CI ≠ 0, p < 0.05

reductions in symptoms of distress associated with mindful parenting, MBSR, and ACT. Whether mindfulness practice offers a sustained effect still needs to be determined as a limited number of studies provided follow-up data.

These findings are in keeping with the current evidence base for mindfulness. Previous RCTs have reported decreased psychological symptoms for the adult population (e.g., Keng et al. 2011). Beneficial mental health effects, including improvements in psychological flexibility and general wellbeing, have also been noted for other family caregivers (e.g. Rayan and Ahmad 2018). In saying this, six of the examined studies did not find an effect in one or more of the domains examined (i.e. depression, anxiety, stress; Behbahani et al. 2018; Chan and Neece 2018; Ferraioli and Harris 2013; Lo et al. 2017, Lo et al. 2020, Mak et al. 2018; Whittingham et al. 2015). These findings may reflect the significant variability in what was delivered, even among studies that claimed to follow the same framework. For example, Chan and Neece (2018) used traditional MBSR (i.e.,  $8 \times 2$  h sessions, followed by a retreat – all delivered by a certified instructor) whereas Dykens et al. (2014) adapted their MBSR ( $6 \times 1.5$  h sessions, no retreat, delivered by parents of children with DD). Moreover, while the majority of treatments included in this review had a formal meditation component, some did not (e.g. Whittingham et al. 2015). Further modifications to treatment included brief meditation practice (Lo et al. 2017; Lo et al. 2020) and the availability of onsite childcare (Dykens et al. 2014).

Controlled studies are needed to examine potentially important therapeutic processes that may moderate the effectiveness of mindfulness. These moderators might include differences in administration (e.g. MBSR teacher or external facilitator) and duration (e.g. total minutes of mindfulness practice). Interestingly, medium to large effect sizes have been reported for MBSR programs with reduced contact hours (Carmody and Baer 2009). Brief daily meditation (e.g., 13 min daily meditation for 8 weeks) has also contributed to improvement in mood symptoms (Basso et al. 2019), while online mindfulness treatments have shown promise as an accessible, feasible method of treatment delivery (Cavanagh et al. 2013).

## Methodological Limitations

The current findings need to be considered in the context of several methodological shortcomings. First, our operationalisation of distress relied on the PSI, a measure which has largely been validated with parents of healthy, neurotypical children. The content validity of the PSI for parents of young children with DD requires further research (Zaidman-Zait et al. 2010). Second, our caregiver sample was largely characterised by mothers. Gender differences in response to mindfulness have been identified in general and college student samples, with women experiencing more favourable outcomes - a finding that warrants further investigation among caregivers (e.g. Katz and Toner 2013; Rojiani et al. 2017). Third, treatment acceptability, an important consideration for caregivers of children with DD, who are known to experience significant barriers to accessing face-to-face psychological treatment, was not routinely examined (Osborn et al. 2019). Although the average drop-out rate was low, suggesting that participants likely found treatment to be manageable, time-wise, the high rate noted by Ferraioli and Harris (2013) highlights a need to foster early acceptance in mindfulness training – specific instructions have been developed for this

purpose (e.g. Lindsay and Creswell 2017). Finally, our main outcomes were all reliant on self-reported data. Future research might consider incorporating objective, physiological measures of stress (e.g., cortisol or galvanic skin response, blood pressure and heart rate monitoring), which have demonstrated smaller, albeit positive benefits with mindfulness meditation (Pascoe et al. 2017; Cachia et al. 2016). Alternatively, clinician-based assessments of mental health (e.g. diagnostic interview) might be considered to examine whether individuals with current or lifetime mood disorder report similar benefits with mindfulness.

## Conclusion

The current findings indicate that mindfulness-based treatments can help to promote mental health for parents of children with DD. Future controlled trials are needed to expand this evidence base. This should include comparative effectiveness trials, in order to determine which specific elements and adaptations of mindfulness treatment are most effective in reducing distress for this vulnerable cohort.

## Compliance with Ethical Standards

**Conflict of Interest** The authors have no conflicts of interest to report.

**Ethical Approval** This article does not contain any studies with human participants or animals performed by any of the authors. This work was supported by an Australian Government Research Training Program Scholarship.

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