

Mindfulness, Stress and Well-Being in Parents of Children with Autism Spectrum Disorder: A Systematic Review

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Abstract Parenting a child with Autism Spectrum Disorder (ASD) is often associated with reduced quality of life, high stress, depression and anxiety due to the ongoing nature of care. This review systematically investigated the efficacy of mindfulness interventions in reducing stress and increasing psychological wellbeing in parents of children with ASD. A comprehensive electronic database search was conducted for relevant articles. Only studies investigating parental stress or a measure of psychological wellbeing in parents of children with ASD post a mindfulness-based intervention were included. Ten studies met inclusion criteria; each was examined for treatment fidelity. All included studies contributed at least one self-report finding supporting the efficacy of mindfulness interventions in reducing stress and increasing psychological wellbeing. Three studies included physiological measures of reduced stress and emotional responses. Two reported concomitant improvements in child behavior. Mindfulness-based interventions potentially have long-term positive effects on stress levels and psychological wellbeing of parents of children with ASD, in addition to enhancing their child's behavior. Future research is needed to develop a cost and time effective intervention aimed at maximising efficacy of current interventions in children with ASD and their parents.

Keywords Mindfulness · Autism Spectrum Disorder · Stress · Parents · Wellbeing

Introduction

An Autism Spectrum Disorder (ASD) is a lifelong condition for individuals, but also for their parents. Impairments in social interaction and communication paired with restrictive and repetitive behaviors characterise this complex developmental disorder, often resulting in restricted independence and ongoing care demands (Lecavalier et al. 2006). Early research identified reduced quality of life, parental burn-out and feelings of isolation as repercussion of raising a child with ASD (Sullivan et al. 1979). More recently, a large body of research has found that parents of children with ASD have substantially higher stress levels and symptoms of depression and anxiety than parents of typically developing children (Bitsika and Sharpley 2004; Dumas et al. 1991; Estes et al. 2009). The chronic stress experienced by parents of children with ASD is also reported to be greater than that experienced by parents of children with other disabilities, including Down Syndrome, behavioral disorders and Fragile X Syndrome (Abbeduto et al. 2004; Dabrowska and Pisula 2010; Dumas et al. 1991; Griffith et al. 2010) and has been associated with decreased relationship satisfaction and increased divorce rates amongst couples (Brobst et al. 2009; Hartley et al. 2010).

Parental stress can have a direct impact on their children's psychological well-being and has been shown to reduce the effectiveness of early teaching interventions (Osborne et al. 2008). Unless parents cope successfully with significant stressors and effectively manage mental health issues, the effectiveness of behavioral therapies may be restricted (Osborne et al. 2008), and behavioral problems may increase in children (Lecavalier et al. 2006; McGrath 2013; Neece et al. 2012). Parents report a reactive process; despite knowing how to implement recommended

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behavioral strategies, they experience difficulty when stressed, the child's behavior then becomes more challenging, which in turn, triggers more stress (Hastings 2002). Interventions that empower parents and enhance their mental health and overall wellbeing are potentially central to achieving optimal outcomes for their children with ASD.

Previous research has shown mindfulness training to be effective in reducing stress and enhancing psychological wellbeing in a wide variety of clinical and non-clinical groups, particularly with individuals under chronic stress conditions, including chronic disease, burn-out and caring for individuals with chronic conditions (Goodman and Schorling 2012; Grossman et al. 2004; Keng et al. 2011; Lengacher et al. 2012; Minor et al. 2006; Ruiz-Robledillo et al. 2014). Mindfulness training is associated with neural changes in particular areas of the brain, subsequently affecting attention, emotional regulation, mood, psychological well-being and behavior (Davidson et al. 2003; Jha et al. 2010). A recent review found that adding mindfulness-based training to existing behavioral knowledge produced clear and measurable positive changes for parents of children with developmental disabilities, in addition to a decrease in parental stress (Myers et al. 2014). More specifically, mindfulness interventions with such parents have reduced stress and depression, enhanced parental-perceived mother-child interactions, and reduced aggressive behavior and behavioral problems when working with their children (Neece 2014; Singh et al. 2007). Given the high stress associated with raising a child with ASD compared to other developmental disorders and the complexity of living and working with these children, research designed to investigate if a mindfulness-based intervention is helpful in improving psychological wellbeing and quality of life in this vulnerable population is well justified.

There is some variation in the literature as to what characterises the practice of mindfulness. Traditionally, mindfulness is a Buddhist tradition of attentive, non-judgemental, and receptive awareness of the present moment experience in terms of feelings, images, thoughts and sensations (Kabat-Zinn 2009). Of particular interest, *Mindful Parenting* has been described by Kabat-Zinn and Kabat-Zinn (1997) as paying attention to your child and your parenting in a specific way: intentionally, here and now, and non-judgementally which “calls to wake up to the possibilities, the benefits, and the challenges of parenting with a new awareness and intentionality” (p.71). A literature review by Bögels et al. (2010) concluded that Mindful Parenting improved parent-child interactions in mental health settings, changes including increased parental attention, reduced stress and preoccupation, improved executive functioning on the part of the children, and a breaking of the cycle of repeating dysfunctional own

upbringing schemes together with increasing self-nourishing attention. Further, the Mindful Parenting program improved marital functioning and the process of co-parenting. Bögels et al. (2010) acknowledge that there are few studies exploring mechanisms of change in Mindful Parenting, and that future research should investigate the effectiveness of such interventions in different participant groups with respect to child and parental problems. However, the results of their review signal the potential of mindfulness training in working with parents of children with ASD, to address their stress, thereby enhancing their ability to parent these sometimes difficult-to-parent children and take positive action to achieve long-term benefits. Mindfulness training aims to encourage parents to alter their current cognitive schemata, habits, and reinforcement patterns, in addition to utilising a gentler, more compassionate approach to reflecting on their own self and parenting.

There is preliminary evidence to suggest that parents of children with ASD who self-report higher mindful traits also report lower stress, depression and anxiety levels and overall mental health problems (Beer et al. 2013; Conner and White 2014; Weiss et al. 2012), in addition to decreased child problem behavior and particular ASD symptoms in their children (Beer et al. 2013; Conner and White 2014; Jones et al. 2014; Weiss et al. 2012).

However, to obtain conclusive evidence that mindfulness is an effective intervention for reducing parental stress and improving the psychological wellbeing of parents of children with ASD, studies need to investigate the effects of a mindfulness intervention with this population, comparing variables such as stress levels and psychological wellbeing pre and post intervention. While the effectiveness of mindfulness training in reducing stress and promoting positive outcomes across a variety of clinical and non-clinical populations is acknowledged, the feasibility and effectiveness of such interventions for parents of children with ASD remains uncertain. This review is the first study to systematically examine the evidence regarding the effectiveness of mindfulness interventions for parents of children with ASD. The nature and results of each study will be investigated systematically examining improvements in parental stress and psychological well-being, in addition to observed changes in child behavior where reported.

Method

Selection Criteria

Types of Studies

Quantitative and qualitative intervention studies were included which met the following inclusion criteria: (1) the

intervention included a mindfulness or ACT (based on mindfulness) component, (2) the study included an outcome measure of parental stress or psychological wellbeing, (3) the intervention must have been delivered to parents of children or adolescents (aged under 18 years) with a diagnosis of ASD and (4) the study was published in English. No other date restrictions or publication status specifications were applied. Systematic reviews or other review-based articles were not included.

Information Sources

Search Strategy

Searches of key words and titles were conducted on 21/01/2015 searching the following databases: PsycINFO, Embase, Medline, Monash University Subscribed Journal and Google Scholar. Reference lists were searched for additional titles. Search terms included mindfulness (mindful*, acceptance), ASD [autism, disabilit*, (special needs)] and parent (caregiver*).

Study Selection

The electronic search was completed, and duplicates removed. The first author assessed studies for relevance through a title and abstract screening process. Retained studies were examined in full-text to determine eligibility and inclusion (Fig. 1). Reference lists of included studies were searched to ensure that relevant studies were not disregarded. The third author independently reviewed 30 % of the studies to assess the reliability of the selection process. Inter-observer agreement (IOA) was 100 %.

Data Extraction

The primary author extracted the following data for each of the included studies: Authors, reference details, type of

study, participants and sample, intervention details, outcome measures, results and statistical analyses.

Treatment Fidelity

An assessment was undertaken of the fidelity of the mindfulness program presented in each of the reviewed papers. To this end, the mindfulness content and contact hours of delivery was compared with the well-established Mindfulness-Based Stress Reduction (MBSR) program (Kabat-Zinn 2003), elements included in each mindfulness program were compared and treatment fidelity measures and outcomes as described by authors were reviewed.

The current review was required to adhere to the 5–3–20 standard of evidence-based practice developed by What Works Clearinghouse (WWC 2014) these being: (1) a minimum of five Single Case Design (SCD) studies, (2) a minimum of three research teams and three different geographical locations, and (3) a total of at least 20 participants.

Results

The search strategy yielded ten studies that met criteria for inclusion (see flow diagram Fig. 1). The initial search provided a total of 1396 citations, 1339 with duplicates removed. Of these, 1293 were deemed ineligible for inclusion after screening titles for relevance. The abstracts and full-texts of the 46 remaining studies were examined in detail, following which 36 were excluded as they did not meet inclusion criteria. Thus, 10 studies met the inclusion criteria and were included in this systematic review.

Study Characteristics

Key details of each study are presented in Table 1. The ten studies included a total of 142 participants parenting children with ASD; parents were between 24 and 66 years of age. Of these, 111 (78 %) were female. One study was conducted in Spain (Ruiz-Robledillo et al. 2014), one in the Netherlands (de Bruin et al. 2014) and the remaining eight studies were conducted in various states in the United States of America. A total of eight independent research teams contributed to the results included in this review. Seven of the 10 studies are published peer-reviewed journal articles, and the remaining three are studies included in two dissertation theses at doctoral level. Two independent studies were part of one dissertation doctoral thesis (Hahs 2013a, b), however these will be referenced individually to clearly identify the characteristics and results of each study. This systematic review meets the 5–3–20 standard of evidence-based practice as it fulfils the following

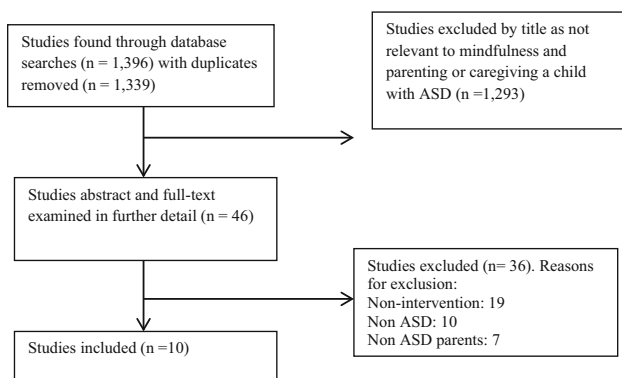


Fig. 1 Flow diagram of selected studies

Table 1 Mindfulness interventions for parents of children with ASD

Reference	Country/design	Participants	Intervention duration	Objective	Content	Instructor	Results
Benn et al. (2012)	US Between-group design	32 parents (F = 91 %) + 38 educators (F = 92 %) of children with disability (ASD = 46 %)	11 × 2.5 h sessions + 2 × 6 h sessions = 36 h Daily practice recommended; 10 min per day completed; 70 min per week	Reduced parental stress, anxiety, depression, affect personal growth, self- compassion, forgiveness, empathic concern, self- efficacy, and quality of parent–child interaction	SMART-in- Education (Stress Management and Relaxation Techniques) program— consists of 70 % MBSR program content)	Trainer with formal MBSR + mindfulness cognitive therapy training + 3 days SMART curriculum training with ongoing supervision	(1) Sig. increase in self-reported mindfulness (2) Sig. reduction in stress post-intervention, increasing at 2 month follow-up (3) Sig increase in psychological functioning: compassion, personal growth, empathic concern + forgiveness (4) No difference in parent–child interaction.
Blackledge and Hayes (2006)	US Within-subject, repeated measures design	20 parents (F = 75 %) children with ASD	2 × 7 h sessions = 14 h	Decrease parental distress, stress, and depression	ACT intervention program	Delivered by Author—an expert in ACT	(1) Sig. decrease in general distress and depression post intervention; maintained at 3-month follow up (2) Sig. increase in parent stress and active styles of coping between pre- intervention and follow- up period (no difference between pre- post intervention)
de Bruin et al. (2014)	nl Within-subject, repeated measures design	29 parents (F = 62 %) and 23 of their adolescent's with ASD (F = 23 %)	Mindful parenting + mindfulness for ASD Adolescent's programs: 9 × 1.5 h = 13.5 h each Joint booster sessions (parents + their adolescent's meditate/train together): 9 × 1.5 h = 13.5 h additionally	Parents: decreased parental stress, increased level of mindfulness – general + in the parenting relationship, decrease dysfunctional parenting, and increased quality of life Parent about child reports: increased social responsiveness of children + reduced parent- reported core symptoms of ASD Adolescents: reduced ASD core symptoms, increased current mindfulness (awareness and attention), decreased worries, depressed moods and rumination, and increased quality of life	Mindful parenting training program; 2/3 based on MBSR program and 1/3 of content based on mindful parenting issues MYmind: Mindfulness training for youngsters with ASD 'Joint Booster'— 9 weeks where adolescents and parents mediated together	Mental health care professionals with ASD experience who had already completed MBSR training— advanced teacher training for MYmind for adolescents with ASD and Mindful parenting specifically	(1) Sig. increase at post-test + follow-up on mindfulness measures (2) Observing, describing, acting with awareness and non-reactivity maintained increased effects at follow-up (3) Listening with full attention, emotional awareness, self-regulation in the parenting relationship, and non-judgemental acceptance significantly increase at follow-up (4) Borderline sig. increase in quality of life at post-intervention; decreased and non sig. at follow-up (5) Sig decrease in parental stress post-test, not follow-up (6) Borderline sig. decrease of dysfunctional parenting at follow-up (7) Sig. decrease in laxness and verbosity post-test <i>Parent report of adolescent:</i> (8) Sig increased social responsiveness. Sig improvement on subscales social cognition, social communication, preoccupations, and social motivation (borderline sig.) (9) No difference in ASD core symptoms reported <i>Adolescent:</i> (10) Sig. increase in quality of life, post-test + follow-up (11) Sig decrease in rumination post-test (12) No differences found for worrying, ASD core symptoms or mindfulness

Table 1 continued

Reference	Country/design	Participants	Intervention duration	Objective	Content	Instructor	Results
Ferraoli and Harris (2013)	US Between—group design	15 parents of children with ASD (F = 66 %)	8 × 2 h sessions = 16 h	Decreased parental stress, and increased parental health (somatic symptoms, social dysfunction, anxiety/insomnia, and depression)	Mindfulness-based intervention	Program led by two advanced doctoral students supervised by a clinical psychologist. The first author ran the ‘fall’ treatment round, thus measures were taken to prevent contamination	(1) Sig. decrease in parental stress + increased general health post-intervention in mindfulness group only (vs skills-based group) (2) Sig decrease in stress at follow-up in mindfulness group only (3) No sig. difference between mindfulness group and skills-based group immediately post-intervention
Hahs (2013a)	US Within-subject, repeated measures Design	18 parents of children with ASD (F = 72 %)		Decreased parental depression, experiential avoidance and increased psychological flexibility GSR increased skin resistance in the presence of aversive stimuli	ACT program	Primary researcher: doctoral student	(1) Increase in psychological flexibility + decreased experiential avoidance (2) Five of six participants GSR reading showed an increase in pre-post skin resistance after ACT training (3) 7/9 participants reported decreased depression
Hahs (2013b)	US Within-subject, repeated measures design (multiple baselines)	Three parents of children with ASD (F = 66 %)		Decreased parental depression, experiential avoidance and increased psychological flexibility GSR increased skin resistance in the presence of aversive stimuli	Two phases of intervention; 1. Mindfulness only phase (B) and; 2. The full ACT model (BC) including both mindfulness and behaviour-change processes	Primary researcher: doctoral student	(1) Increase in psychological flexibility + decreased experiential avoidance in mindfulness phase; increased with inclusion of ACT model (2) Increased skin resistance moving in an upward trend during training; author suggests a product of increased mindfulness (3) Increased effects from full ACT model rather than mindfulness-only (inclusion of behaviour change processes i.e. committed action)
Kowalkowski (2012)	US Between-groups design	13 ASD parents (F = 100 %)	8 × 1.5 h = 12 h	Decreased parental distress, depression, negative automatic thoughts and the believability of negative automatic thoughts Increased mindfulness, and positive aspects of caregiving	ACT program	Primary researcher: doctoral student	(1) Sig. increase in positive aspects of caregiving from post-intervention to follow-up (2) Trend of decreased believability of negative automatic thoughts at post-intervention and follow-up (3) Sig. decreases in parental distress and stress (4) No sig. differences post-intervention in depression or mindfulness
Ruiz-Robledillo et al. (2014)	ES Mixed design	6 ASD parents (F = 83 %)	9 × 2 h = 24 h	Increased parental self-reported health (depressive symptomology, somatic symptoms, and perceived general health) Decreased cortisol levels	Mindfulness-based program	A psychotherapist was trained in the application of the MBSR program & other types of meditation	<i>Within-group (all participants):</i> (1) Sig. reduction in health complaints, mood disturbances, depression & somatic symptoms; increase in self-perceived general health (2) Each session rated independently reduced anxiety, negative mood & cortisol levels <i>Between-group:</i> (3) Bigger reduction in cortisol levels of caregivers than non-caregivers post-treatment (not sig.—perhaps due to small sample size)

Table 1 continued

Reference	Country/design	Participants	Intervention duration	Objective	Content	Instructor	Results
Singh et al. (2006)	US Within-subject, repeated measures design	3 ASD parents (F = 100 %) + 3 children with ASD	12 × 2 h = 24 h (formal training) + 52 weeks of 'practice phase'	Increased satisfaction with parenting skills and increased use of mindfulness Decreased child aggression, self-injury & maladaptive behaviour; increased compliance	Mindfulness program for mothers	One-on-one training by the senior investigator	(1) During mindfulness training phase, parents increased satisfaction with parenting skills & interaction with their children increased from baseline, reaching highest levels when practicing mindfulness on a daily basis (2) Decrease in children's aggression and maladaptive behaviour during training to parents & by end of training, children only engaged in aggressive behaviour very occasionally, or not at all
Singh et al. (2014b)	US Single-subject (multiple baseline) design	3 ASD parents (F = 100 %) + 3 adolescent's with ASD	8 × 3 h = 24 h (formal training) Daily practice 5–60 min +48 weeks of 'MBPBS practice phase'	Decreased parental stress Decreased adolescent's aggression & disruptive behaviour; increased compliance	MBPBS program	One-on-one training delivered from whom has had "40 years of personal meditation practice experience, clinical expertise & experience in delivering mindful services in behavioural health"	(1) Sig. reduction in parent stress levels (2) Adolescent's aggressive & disruptive behaviour begun decreasing, & showed further sig. reductions during mindfulness practice phase following the training

ASD autism spectrum disorder, GSR galvanic skin response, MBPBS mindfulness-based positive behaviour support, MBSR mindfulness-based stress reduction

requirements (1) a minimum of five SCD studies, (2) a minimum of three research teams and three different geographical locations, and (3) a total of at least 20 participants (WWC 2014).

Treatment Fidelity of Mindfulness-Based Interventions

Comparison to the Mindfulness-Based Stress-Reduction Program

The Mindfulness-Based Stress-Reduction (MBSR) program was developed by an expert in the field, Kabat-Zinn (2003), and has been used successfully in reducing stress and increasing wellness in a wide variety of clinical and non-clinical populations. Traditionally, this program consists of 26 h of session time including eight classes of two and a half hours, in addition to one all-day class. The design of the mindfulness-based intervention utilised in each study was benchmarked against the MBSR program as one index of the fidelity of the program. One study exceeded the 26 contact hours of program delivery of the MBSR program; with a total of 36 contact hours with participants (Benn et al. 2012). Differing from other studies, de Bruin et al. (2014) delivered 13.5 contact hours separately to both their Mindful Parenting and Mindfulness program for adolescents, and then facilitated an additional 13.5 h of practice for parents with their children; resulting in a total of 27 h with both parents and their children. Similar to the MBSR benchmarking program, two studies delivered 24 contact hours to participants (Singh et al. 2006; 2014a). Four studies reported between 12 and 18 contact hours with participants (Blackledge and Hayes 2006; Ferraioli and Harris 2013; Kowalkowski 2012; Ruiz-Robledillo et al. 2014) and two studies reported that participants engaged in <12 contact hours (Hahs 2013a, b). The MBSR program consisted of eight short sessions (2.5 h) and one full day of training, thus a total of nine sessions. In comparison, three studies included nine or more face-to-face sessions (Benn et al. 2012; Kowalkowski 2012; Singh et al. 2006), eight face-to-face sessions (Ferraioli and Harris 2013; Kowalkowski 2012; Singh et al. 2014b) and two studies involved two full-day sessions as the entire intervention (Blackledge and Hayes 2006; Hahs 2013a, b). Benn was the only study to integrate regular short sessions with one full-day intervention training. Most studies included recommended daily practice and/or weekly homework tasks to apply the content learnt that week (see Table 2). Singh et al. (2006) required that participants engaged in 5–60 min practice on average per day. Similarly, Benn reported that participants practiced on average for 10 min per day.

Elements Included in Intervention

Though included elements of mindfulness varied, there was a substantial overlap across interventions in these studies (refer to Table 1). Three studies were based on an ACT program (Blackledge and Hayes 2006; Hahs 2013a; Kowalkowski 2012), one study included both a mindfulness-based phase and ACT phase (Hahs 2013b) and the remaining six studies were reporting on mindfulness-only intervention programs. Table 2 presents a summary of program elements which were evident in the ten studies. Contact with the present moment (included in nine studies), exploring breathing techniques (seven studies), a body scan or awareness of bodily sensations (nine studies), exploring mental states and emotions (ten studies), non-judgemental acceptance (seven studies), observing and altering/committing to taking action (nine studies), the inclusion of metaphor exercises (six studies) and visualisation exercises (six studies) appear to be the most commonly utilised.

Reported Treatment Fidelity of Included Studies

Eight of the 10 studies included several measures to assess the treatment fidelity of their intervention program. Benn et al. (2012) reported that strong treatment fidelity was obtained as they had (1) high program attendance (1 drop out, $m = 9.9$ sessions, range = 7–11 sessions) and (2) a high level of instructor adherence to the format, content and delivery of the intervention (observed by an RA unknown to the instructor). Blackledge and Hayes (2006) reported their intervention achieved treatment fidelity as (1) 82 % of participants completed the entire program and (2) inter-rater reliability across 16 tapes was 0.93, and most importantly (3) all tape segments had “considerable” to “extensive” emphasis on at least one (sometimes two) ACT processes (with exception of the introductory session) indicating that all expected ACT processes were covered and segments were focussed on ACT processes. In both experiments, Hahs (2013a, b) suggests that treatment fidelity and IOA of the training sessions was ensured via assessment of 30 % of recorded sessions utilising the ACT Adherence Rating Scale, indicating that the trainer adhered to ACT-consistent delivery of the concepts and related materials. However, the IOA result was not reported so this should be treated with caution. de Bruin et al. (2014) reported high program attendance (87 % for parents; 88 % for adolescents with ASD). Ferraioli and Harris (2013) utilised a variety of measures to confirm treatment fidelity including (1) >90 % inclusion of key components, and (2) high session attendance ($m = 6.2$ meetings, range 3–8). Similar to previously reviewed studies, Kowalkowski

(2012) reported high attendance, as no participants missed more than two sessions during the 8-week treatment (mean = 1 missed per participant). Singh et al. (2014b) were comprehensive in outlining treatment fidelity of the intervention utilised, reporting (1) mothers engaged in 5–10 min of practice during the first week of pre-training, gradually increasing to 30–40 min per day during the training phase, and up to an hour per day was maintained during the practice phase. On average the mothers practiced for between 40 and 60 min for 93 % of the days during the MBPBS practice phase. In addition to extensive practice, six randomly selected videotapes of sessions assessed by another qualified mindfulness instructor for fidelity of training scored 100 %. Two studies did not describe any means of establishing treatment fidelity (Ruiz-Robledillo et al. 2014; Singh et al. 2006), thus the fidelity of these interventions is unknown.

Social Acceptability of Included Studies

Four studies reported evidence of social acceptability of their mindfulness intervention (Benn et al. 2012; de Bruin et al. 2014; Ferraioli and Harris 2013; Singh et al. 2014b). Benn et al. (2014) reported that they attained >80 % of parent satisfaction with the program (rated 4–5 on a Likert scale of 5). Similarly, Ferraioli and Harris reported high parent ratings on a measure of treatment acceptability, indicating 67 % of participants were highly satisfied, and that they enjoyed the sense of support from other parents, although they wanted larger groups. However, this study did note that a higher level of attrition was evident for the mindfulness group (40 %) in comparison with a skills-based group (18 %); some participants stating they wanted to “actually learn something” (i.e. to be in the skills-based group). This result highlights the potential of pre-disposed attitudes towards mindfulness impacting upon the perceived efficacy, and application of mindfulness as an evidence-based tool. One study reported that qualitative responses from parents were overall very positive, finding the basic meditations “exhilarating” (Singh et al. 2014b). In addition, de Bruin et al. (2014) measured social acceptability of their mindfulness intervention for adolescents with ASD, reporting that eight out of nine sessions were rated by the adolescents as “somewhat useful to very useful” to them with one session (coping with changes) rated as “not very useful”. They speculate that the coping with changes session was least favoured by the adolescents due to individuals with ASD generally not liking change. Data were not reported concerning the parents’ judgments of the Mindful Parenting program, though parents reported positive changes in their children’s’ behavior.

Table 2 A contrast of the elements in each mindfulness program for parents of included studies

Study	Mindfulness Elements												
	Contact with present moment	Exploring breathing	Bodily sensations/body scan	Exploring mental states and emotion	Non-judgemental acceptance	Observing and altering action	Metaphor exercises or examples	Values and goals	Compassion/self-compassion	Visualisation	Shifting attention	Exploring forgiveness	Working with conflict or anger
Benn et al. (2012)	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓
Blackledge and Hayes (2006)			✓	✓	✓	✓	✓						
de Bruin et al. (2014)	✓	✓	✓	✓	✓	✓	✓			✓			✓
Ferraioli and Harris (2013)	✓	✓	✓	✓	✓	✓	✓						
Habs (2013a) ACP	✓		✓	✓	✓	✓	✓	✓		✓			
Habs (2013b) MFBP	✓		✓	✓	✓	✓	✓	✓		✓			
Kowalkowski (2012)	✓	✓		✓		✓							
Ruiz-Robledillo et al. (2014)	✓	✓	✓	✓	✓	✓		✓		✓			
Singh et al. (2006)	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓
Singh et al. (2014b)	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓

✓ included elements

Contrast of Methodologies

Six studies utilised a within-case repeated measures design, whereby the participants' stress levels were recorded and compared across three conditions: baseline, intervention, and at follow up (2–3 months post-intervention) (Blackledge and Hayes 2006; de Bruin et al. 2014; Hahs 2013a, b; Singh et al. 2006; 2014b). Three studies utilised a between-groups design, whereby a sample of parents of children with ASD that participated in intervention were compared to parents of typically developing children post intervention (Kowalkowski 2012), educators of children with ASD post intervention (Benn et al. 2012), and parents of children with ASD participating in a skills-based intervention (Ferraioli and Harris 2013). Ruiz-Robledillo et al. (2014) utilised a mixed design allowing pre and post comparisons of the mindfulness intervention for parents of children with ASD, and a between-groups comparison of these parents with parents of typically developing children post mindfulness intervention. All 10 studies utilised psychometrically valid and reliable measures of parental psychological wellbeing and contributed at least one positive psychological outcome for the parent and/or the child with ASD.

Mindfulness Training and Stress

Seven studies that measured parental stress or distress as a primary variable, utilising various self-report measures, found decreased stress or distress levels in parents of children with ASD associated with mindfulness training (Benn et al. 2012; Blackledge and Hayes 2006; de Bruin et al. 2014; Ferraioli and Harris 2013; Kowalkowski 2012; Ruiz-Robledillo et al. 2014, Singh et al. 2014b). Ferraioli and Harris reported a significant decrease in parental stress and increased general health post-intervention in their mindfulness group only (vs the skills-based group), and several studies found that decreased levels of stress were maintained over time (Benn et al. 2012; Blackledge and Hayes 2006; Kowalkowski 2012).

Notably, three studies included physiological measures of parental stress (Hahs 2013a, b; Ruiz-Robledillo et al. 2014). Ruiz-Robledillo et al. (2014) measured parental cortisol levels to determine their state of physiological stress, and Hahs, in both studies, included a galvanic skin measure of physiological responding to aversive stimuli to compare participant's skin conductance (indicating an emotional response) pre and post mindfulness training. Results by Ruiz-Robledillo et al. (2014) found that parents of children with ASD showed a greater reduction in cortisol levels than parents of typically developing children following the same intervention. Similarly, Hahs found in both studies that participants' GSR levels indicated an improvement in their physiological response to aversive

stimuli, representing a reduced emotional response. A reduction in stress is a common outcome in all ten studies, with self-report findings supported by physiological changes in cortisol levels and GSR responsivity indicating a reduction in stress response.

Mindfulness Training and Depression

Four studies found decreased self-reported depression post mindfulness-based intervention (Benn et al. 2012; Blackledge and Hayes 2006; Hahs 2013a, b). Blackledge and Hayes, and Hahs (both studies) used the Beck Depression Inventory-II (BDI-II) whilst Benn utilised the Centre for Epidemiological Studies Depression (CES-D). In contrast, Kowalkowski (2012) found no difference in depression measured by Depression Index of the Brief Symptom Inventory-18 (BSI-18) though Kowalkowski reported decreased believability of negative automatic thoughts at post-intervention and follow-up. Whether these contradictory findings are in part a function of the different measures used deserves further investigation; however the majority of studies report a decrease in depressive symptoms in parents of children with ASD post mindfulness training.

Mindfulness Training, Psychological Flexibility and Experiential Avoidance

Two studies measured psychological flexibility (Hahs 2013a, b). These studies reported increased psychological flexibility post ACT intervention, in addition to decreased experiential avoidance and improved physiological responding in the presence of aversive stimuli post intervention. Interestingly, Hahs (2013b) reported a greater influence in an ACT group than observed in mindfulness only intervention training.

Mindfulness Training and Broader Psychological Wellbeing

Four studies reported improvements in other dimensions of parental psychological wellbeing post mindfulness intervention (de Bruin et al. 2014; Kowalkowski 2012; Ruiz-Robledillo et al. 2014; Singh et al. 2006). Specifically, Ruiz-Robledillo et al. (2014) reported broad improvements in overall health complaints, mood disturbances, somatic symptoms, and self-perceived general health. Singh et al. (2006) found that mothers reported greater satisfaction with their parenting skills during mindfulness training, peaking when mindfulness training occurred routinely on a daily basis. Similarly, de Bruin et al. (2014) found increased mindfulness and an increase in quality of life in parents. This study reports continued effects of mindfulness training in parents behaving mindfully (observing,

describing, acting with awareness, and non-reactivity) (de Bruin et al. 2014). Similarly, Kowalkowski (2012) reported that participants' positive aspects of parenting continued to increase over time post mindfulness training. Thus, in summary, preliminary evidence suggests that mindfulness training potentially results in long-term psychological wellbeing benefits, with positive effects maintaining or even increasing up to three months after the mindfulness training.

Parent Mindfulness Training and the Child with ASD

Two studies investigated the indirect effects of a mindfulness intervention on child behavior, utilising child externalising behavioral problems, child compliance, and aggression (Singh et al. 2006, 2014b) as dependant variables. In addition, Singh et al. (2006) measured child maladaptive behavior and self-injury, and Singh et al. (2014b) measured the child's disruptive behavior. Singh et al. (2006) found children's aggression and maladaptive behavior decreased during, and following mindfulness training provided to their mothers. They report that toward the end of their study the children engaged in aggressive behavior very occasionally, or not at all. Similarly, Singh et al. (2014b) report that adolescents' aggressive and disruptive behaviors began decreasing and showed further clinically and statistically significant reductions during the 12 months mindfulness practice phase following the parent training. In addition, the adolescents' compliance to the mothers' requests began increasing during the intervention training phase, and further increased during the practice phase. Ultimately, these two studies suggest a positive indirect effect of mindfulness-based interventions for parents in reducing aggressive behavior in their children with ASD, an effect evident up to 12 months after the mindfulness training.

Mindfulness Training in the Child with ASD

One study conducted a mindfulness program designed specifically to help adolescents cope with common stressors associated with ASD in parallel to the Mindful Parenting program (de Bruin et al. 2014). Though de Bruin et al. (2014) reported no significant differences in adolescents' levels of worrying, ASD core symptoms, or mindfulness, they found a significant increase in quality of life which remained at follow-up, and a significant decrease in rumination from pre-test to follow-up. Parents also reported that their children's social responsiveness significantly improved at follow-up, in addition to social cognition, social communication, and reduced preoccupations at post-test. The authors proposed that this

represented improvements in theory-of-mind, central coherence, and executive functioning.

Overall Quality of Findings

The studies included in this review measured a variety of dependant variables of parental psychological wellbeing. The reviewed studies consistently reported reduced stress in particular post intervention. Although the delivery of mindfulness content and contact hours varied across studies, and a number of different measures of stress, including physiological measures, were utilised, consistent findings of reduced stress were reported. Similarly, a number of studies reported decreased self-reported depression, despite utilising different measures of depression. The robustness of the current findings across studies is demonstrated by the mindfulness interventions capacity to result in decreased stress and increased psychological wellbeing, and remain virtually unaffected by the differences, and variations in method parameters and measures utilised, providing an indication of its reliability during generalised usage in the target population. The research designs of included studies were considered to be executed well as (1) treatment fidelity of delivering accurate and evidence-based programs was high in eight out of 10 studies, (2) programs were delivered by qualified personnel, (3) a battery of self-report measures were used both within and across studies. This generally high quality of experimental control was weakened as only two studies reported specific data of time spent in home practice of mindfulness techniques. Despite this, reliability and validity were well addressed across studies, and is supported by consistent results using an array of outcome measures.

Discussion

The present review considered ten studies investigating the effects of mindfulness-based interventions with parents of children with ASD. Treatment fidelity of studies included in this review was examined in three ways; through comparison of mindfulness interventions with the MBSR program, a contrast of included mindfulness elements, and reported treatment fidelity by the authors. Eight out of 10 studies ensured treatment fidelity was established utilising different measures. The findings suggest that mindfulness training is effective in reducing stress and increasing wellbeing of these parents. This accords with a body of evidence that mindfulness training has resulted in a reduction in stress in parents of children with a variety of disabilities and chronic conditions (Abbeduto et al. 2004; Dabrowska and Pisula 2010; Dumas et al. 1991; Griffith et al. 2010), though this is the first systematic review of the

effectiveness of mindfulness training with parents of children with ASD. Preliminary evidence also suggests these may be long-term benefits, with positive effects maintaining or even increasing up to 3 months after the mindfulness training. Similar to previous research, this indicates the potential of relatively short-term mindfulness interventions in promoting lasting positive change and psychological benefits (Carmody and Baer 2009). Previous research has concluded that mindfulness positively influences romantic relationships (Barnes et al. 2007; Jones et al. 2011). The current review revealed that mindfulness training may also assist in co-parenting and satisfaction in parenting. Given evidence of decreased relationship satisfaction and increased divorce rates in parents of children with ASD (Brobst et al. 2009; Hartley et al. 2010), further investigation is warranted on the effects of mindfulness training on the processes of co-parenting and on relationship satisfaction between these parents.

Two longitudinal studies report a positive indirect ripple effect of parental mindfulness training in reducing aggressive behavior and increasing compliance in their children with ASD, with effects lasting up to 12 months. Post mindfulness training, these children were engaging in very little, if any, aggressive behavior. These results are in line with previous research, indicating that mindfulness decreases anger and aggression in a variety of populations (Borders et al. 2010; Singh et al. 2003). These findings are alluring, and extend previous research as the mindfulness programs were designed for parents, yet were associated with a positive behavioral response in their children. One study in this review investigated if mindful parenting training effects would be enhanced by running in parallel mindfulness training with their children. Interestingly, results indicated not only a reduction in stress in parents, but the intervention led to a number of changes in the children's behavior suggestive of improvements in theory-of-mind, central coherence, and executive functioning. Across time, parent satisfaction with their parenting skills and their interactions with their children increased from baseline levels, peaking when they were using mindfulness routinely and on a daily basis. This is an important consideration in developing mindfulness interventions as previous research suggests that home practice of formal meditation leads to significantly increased effects (Carmody and Baer 2008).

As there is some variation in the literature as to what defines mindfulness, and the association with Buddhism, this review provided preliminary evidence to suggest that attitudes towards mindfulness may impact upon its perceived efficacy. Hassed and Chambers (2014) noted that “the term meditation can evoke attitudes, assumptions, and stereotypical notions” (p. 6). Despite four studies providing evidence of favourable social acceptability of mindfulness

interventions, interestingly, Ferraioli and Harris (2013) reported that attrition was higher in their mindfulness-based group than in a (behavior analysis) skills based group, several parents stating that they wanted to be in the skills based group so they would “actually learn something”. Ironically, this study also reported significant improvements in parental stress and general health within the mindfulness group immediately after intervention, in addition to an increase in general health at 3-month follow up. However, attitudes such as those noted by Ferraioli and Harris may represent a barrier to the broader application of mindfulness-based interventions, restricting its utility in reducing stress in parents of children with ASD, with the associated gains noted from such stress reduction in their ability to work effectively with their children. Van Gordon et al. (2014) acknowledge the current divide, and argue the need for science and Buddhism to work together to develop empirically valid interventions. Further research exploring this is clearly warranted.

Two separate studies reported an increase in psychological flexibility post intervention. This supports previous evidence that mindfulness meditation can reduce cognitive rigidity (Greenberg et al. 2012). Interestingly, Hahs (2013b) reported that there was a greater influence on psychological flexibility and experiential avoidance with the introduction of the full ACT model as compared to the Mindfulness-Only training, suggesting the value of including behavior-change processes (i.e. committed action and values) to training for parents of individuals with autism. The efficacy of an ACT program based on principles of mindfulness and incorporating a behavior change component, in comparison with a mindfulness-only program, has not only been supported by these two studies (Hahs 2013a, b), but also by the long-term follow up effects observed in Blackledge and Hayes (2006), and in the increase in positive aspects of parenting and stress reduction reported by Kowalkowski (2012). Future research may benefit from contrasting the effects of different interventions (i.e. ACT versus mindfulness alone) in order to develop the most efficacious program for this population.

To our knowledge, this is the first systematic review to investigate the effects of mindfulness-based interventions with parents of children with ASD. We identified ten studies, undertaken by eight independent research groups in different locations, and involving a total of 142 participants parenting children with ASD, exceeding the 5–3–20 standard of evidence-based practice guidelines by What Works Clearinghouse (WWC 2014). In light of the array of research evidence presented we conclude that mindfulness interventions can be considered evidence based procedures for use with parents of children with ASD, and that it appears feasible to deliver mindfulness-based interventions in assisting this population in a cost-effective, sustainable

way. Despite the unique contribution of this review, several limitations are acknowledged together with a call for renewed research effort on these procedures.

Firstly, only two studies included mindfulness-based interventions that were specific to parenting (de Bruin et al. 2014; Singh et al. 2006). This is surprising, given the developments in mindful parenting over the last two decades (Bögels et al. 2010; Kabat-Zinn and Kabat-Zinn 1997). In all studies included in this review, parents of children with ASD benefitted from engaging in a mindfulness intervention as reflected in improvements in at least one domain of psychological wellbeing. However, mindfulness-based interventions designed to facilitate better psychological health in parents of children with ASD, and thereby to enhance the development and behavior of these children may be improved by incorporating content specific to the challenges these parents and families face. The recent finding by de Bruin et al. (2014) supports earlier evidence by Singh et al. (2006) regarding the efficacy of mindful parenting; specifically in the context of coping with the complexities involved in raising children with ASD. However, further research on this is clearly warranted. Systematic replications examining Mindful Parenting and child mindfulness effects in parallel, perhaps including physiological measures of the effects of the intervention and of Singh et al. (2014a) Mindfulness-Based Positive Behavior Support (MBPBS) study through examining the cost benefits of such training with parents and carers of children with ASD would strengthen this evidence base substantially.

Secondly, although several studies provided evidence of the potential long-term efficacy of relatively short-term mindfulness interventions, daily practice over a longer time frame has led to increased effects in longitudinal studies (Singh et al. 2006, 2014b). This parallels previous research indicating that in addition to the almost immediate physiological and psychological outcomes of mindfulness meditation, extended practice further increases the benefits of the procedure (Baron Short et al. 2010; Brefczynski-Lewis et al. 2007; Lykins and Baer 2009). Conversely, whilst extended practice may be considered best practice, Singh et al. (2014a) demonstrated the potential impact of only 7 days of intensive MBPBS in training staff caring for individuals with developmental disabilities. Not only did MBPBS produce positive results for carers, and for the individuals that they were caring for, these researchers were also able to demonstrate the cost effectiveness of the procedure within a 40 week time frame. The nature and duration of mindfulness-based interventions both require further research to establish the most efficacious modes of delivery of this promising treatment procedure.

The findings of this review indicate that mindfulness-based interventions may have a long-term positive effect

on stress levels and psychological wellbeing of parents of children with ASD. Secondly, these effects may in turn impact positively upon their children's behavior, and enhance their overall development. Overall, there was great variety of outcome measures utilised including objective, physiological measures to strengthen self-report findings, emphasising the robustness of the current research methods and supporting the validity of the results of these studies. Taken together the research examined in this review leads to the conclusion that mindfulness interventions constitute an evidence-based procedure when working with parents of children with ASD. In light of these findings it is important that researchers continue to refine and evaluate time and cost effective mindfulness-based intervention procedures aimed at maximising the efficacy of current interventions for children with ASD and their parents.

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