

Improvements in Maternal Depression as a Mediator of Child Behaviour Change

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Depression is a common and debilitating illness and there is a strong association between maternal depression and childhood Conduct Disorder (CD). This paper examines the impact of maternal depression on the outcome of treatment for the prevention of CD. Data from the Hutchings et al. (2007) Randomised Controlled Trial (RCT) of a parenting programme for parents of high-risk three and four year olds are used to explore the potential role of change in maternal depression as a mediator of child behaviour outcome. The role of positive parenting as an additional mediator was also examined due to previous research findings. Improvement in maternal depression was found to be a significant partial mediator of improvement in child behaviour. Maternal depression continued to be a partial mediator when positive parenting was included in the mediation model. Parenting interventions for the prevention of CD are more likely to result in improved child behaviour when they also address the skill deficits known to be associated with maternal depression.

Keywords: Maternal Depression; Child Behaviour Problems; Parenting Intervention/Training; Mediator

Introduction

Maternal Depression and Childhood Conduct Problems

There is substantial literature showing the co-occurrence of maternal depression and Conduct Disorder (CD) in children (Goodman et al., 2011; Gross, Shaw, & Moilanen, 2008). More than 50% of mothers of children with CD have clinical levels of depression (Alpern & Lyons-Ruth, 1993; Webster-Stratton & Hammond, 1988; Hutchings, 1996) and among parents of older CD children (aged eight and above) Hutchings et al. (2011) found that 79% of 300 parents reported clinically significant levels of depression.

Some evidence suggests that maternal depression is causal in the development of CD (Patterson, 1982; Rutter, 1996). Depressed mothers exhibit low rates of praise and failure in monitoring their child's behaviour, which are both associated with the development of CD (Webster-Stratton & Herbert, 1994). Even shortly after birth, coded videos of mother-infant interactions show differences in behaviour between depressed and non-depressed mothers (Field, 1995a, 1995b). Other research suggests that problematic child behaviour can precipitate maternal depression, particularly if the child displays characteristics that make parenting difficult, such as temperament problems and poor sleep patterns (Webster-Stratton & Spitzer, 1996). There can also be external predictors for both conditions such as socio-economic disadvantage that have been shown to be independently associated with both problems (Silberg & Rutter, 2002; Mensah & Kiernan, 2010).

There are a number of skill deficits commonly associated

with depression that have also been shown independently to describe parents of conduct problem children. These include poor problem solving and inability to recall specific events. Depressed people display over-general rather than specific memories (Williams et al., 2007; Williams, 1996) and this has been shown to be associated with poor problem solving (Evans, Williams, O'Loughlin, & Howells, 1992; Pollock & Williams, 2001; van Vreeswijk & Wilde, 2004). Wahler and colleagues (Wahler & Dumas, 1989; Wahler & Sansbury, 1990), and McMahon & Frick (2005), found that, while mothers of children with CD tended to focus on their children's deviant behaviours, their descriptions of behaviour were lacking in detail and over-general. Similarly, Hutchings et al. (1998) found that, compared to a non-referred sample, mothers of children referred to a child and adult mental health service with behavioural problems had significantly lower ability to recall specific events in relation to their child's life.

Parents of children with CD and depressed individuals also both show insensitivity to the cues of others and have poor observation skills (Cummings & Davies, 1994; Meunier, 2007). Hutchings, Smith, and Gilbert (2000) showed that their measures of maternal observational style, autobiographical memory, and parental problem solving were highly correlated and differentiated well between the parents of children referred for treatment of CD and parents of non-referred children.

Studies for the Treatment and Prevention of CD

Intervention programmes that have been most effective with parents of children with CD address skill deficits that are com-

mon in this population (Hutchings, Gardner, & Lane, 2005). In a review of parenting programmes, Barlow, Coren, and Stewart-Brown (2009) found them to be effective at improving both child behaviour and a range of parental factors, including maternal depression, anxiety, and self-esteem. While some studies have found that maternal depression can predict poor outcomes for interventions to address CD (Beauchaine, Webster-Stratton, & Reid, 2005; Forehand, Furey, & McMahon, 1984; Hinshaw, 2002) others have demonstrated that not only can gains be made for the child, despite maternal depression, but also that the depression itself improves significantly as a result of parent training (Hutchings, Appleton, Smith, Lane, & Nash, 2002; Hutchings et al., 2007; Hutchings, Lane, & Kelly, 2004). In one of the few studies to provide long-term data, Hutchings et al. (2002, 2004) compared the results of providing standard Child and Adolescent Mental Health Service (CAMHS) management advice with an intensive treatment programme involving coaching and rehearsing parents in relevant skills and incorporated observational skills training and realistic goal setting. While the CAMHS treatment resulted in short-term improvements in child behaviour, it did not impact on maternal mental health and the improvements in child behaviour were not maintained beyond the six-month follow-up. By contrast, the intensive treatment group significantly improved both child behaviour and maternal mental health at six months and these improvements were both still significantly better at a four-year follow up compared to baseline. Hutchings, Lane et al. (2004) suggest that the long-term improvements were due to the intensive treatment's focus on helping parents to learn and practice effective observation and problem solving skills as well as specific child management strategies. They concluded that for parents experiencing depression, without improvement of maternal depression, the benefits of parenting interventions may not be sustained.

Maternal depression may be a mediating variable between intervention and child behaviour. That is, some, or all, of the effect of the intervention on child behaviour may be a result of a change in maternal depression. The identification of mediating variables is important in gaining a better understanding of how parent programmes work, so that, in developing and improving interventions, special attention can be given to factors shown to have a significant effect on outcome (Laurenceau, Hayes, & Feldman, 2007; Goodman et al., 2011).

The aim of this study is to examine the potential mediating effect of maternal depression on the outcome of a parent programme to reduce child behaviour problems using data from a Randomised Controlled Trial (RCT) of the Incredible Years (IY) Parent programme (Hutchings et al., 2007). In a recent evaluation of the IY Parent programme delivered as a preventive intervention to parents of children at risk of developing CD, significant improvements in parental depression, parenting skills and child behaviour were found at the six-month follow-up (see **Table 1**) (Hutchings et al., 2007). Improvements in parental depression, parenting skills, and child behaviour were maintained at 12-month and 18-month follow-up (Bywater et al., 2009). Additionally, a similar study using the same data set found that observed positive parenting partially mediated the relationship between intervention status and child behaviour problems, therefore this study aims to investigate whether maternal depression and positive parenting are joint mediators.

Method

Participants

The RCT was conducted in 11 Sure Start areas in north and mid Wales. These areas had been identified by Local Authorities as having high levels of social and economical disadvantage and received government funding to support services for children under five years of age. Baseline characteristics of the children in the sample are presented in **Table 2**.

One hundred and fifty three children and their primary caregivers were recruited to the trial and were randomised on a 2:1 basis to intervention or waiting list control conditions. Health visitors administered the Eyberg Child Behaviour Inventory (ECBI; Robinson, Eyberg, & Ross, 1980) to parents of preschool children aged between 36 and 59 months. The ECBI measures levels of child behaviour problems. Participants were eligible if the child scored above the clinical cut-off on the ECBI problem or intensity scale, lived with the primary caregiver and the caregiver was able to attend an IY parenting group (Hutchings et al., 2007).

Intervention

The participating caregivers attended 12 weekly group sessions lasting 2 to 2.5 hours per week. The IY BASIC Parent programme (Webster-Stratton & Hancock, 1998) was delivered to each group by two trained leaders. Control families were offered the programme after the six-month follow-up.

Measures

The following measures were collected for the original evaluation during two home visits at each time point, at baseline and one at six-month follow up, by which time the intervention parents had received the programme. All measures are standardized measures typically used in the evaluation of parenting interventions. Full details of all measures, scoring, rationale for use, normative data, reliability and validity can be seen in the protocol of measures (Hutchings, Eade et al., 2004).

Measures of Child Problem Behaviour

The Eyberg Child Behaviour Inventory (ECBI; Robinson et al., 1980). A 36-item inventory of child behaviours measured on two scales: a 7-point intensity scale and a Yes/No scale of whether the behaviour is viewed as a problem. The Yes/No problem scale was used for data analysis in this study. The ECBI demonstrates good stability and homogeneity, with reliability coefficients from .86 (test-retest) to .98 (internal consistency). The scale has also shown good convergent validity, with ECBI scores being significantly correlated with scores on the Child Behaviour Check List (CBCL; Achenbach & Edelbrock,

Table 1.
Baseline and six-month follow-up measures.

Measure	Intervention (n = 86)		Control (n = 47)	
	Baseline	F-up	Baseline	F-up
ECBI-problem score	16.6 (6.9)	9.5 (7.9)***	14.7 (7.7)	13.7 (8.3)
BDI-II	17.7 (10.8)	10.3 (10.2)***	15.0 (9.7)	13.7 (10.3)
Positive parenting [§]	23.0 (19.3)	32.4 (19.3)**	21.9 (15.4)	21.7 (16.8)

Note: [§]Frequency count in 30 minutes; ** $p < .01$, *** $p < .001$, results of paired t tests to compare baseline and follow-up scores.

1983) and the Parenting Stress Index (PSI; Abidin, 1995).

Measures of Maternal Depression

The Beck Depression Inventory II (BDI-II; Beck et al., 1961). A 21-item inventory measuring the severity, on a scale of 0 to 3, of symptoms associated with depression. The BDI-II demonstrates high internal consistency with a mean coefficient alpha of .92 reported for psychiatric groups and .93 for college students (Beck, Steer, & Brown, 1996). The test-retest reliability correlation is .93. Various types of analysis were used to estimate the convergent validity of the BDI-II. The correlation between the BDI-II and BDI-I was .93 ($p < .001$).

Observational Measure

The Dyadic Parent-Child Interaction Coding System (DPICS; Eyberg & Robinson, 1981) was used to code positive parenting behaviour in a 30-minute home observation. Observers were blind to group allocation and inter-reliability was tested and maintained through regular training. The DPICS has shown good reliability with mean reliability between raters of .91 for parent behaviours and .92 for child behaviours. Kappa coefficients for the current study showed high reliability amongst raters (an average of $\kappa = .91$ over the two time points) on 20% of the total visits. The discriminant validity of the DPICS has been established through a number of studies (e.g. Eyberg & Matarazzo, 1980).

Statistical Procedure

Since the hypothesis concerns maternal depression, data for fathers was not included in the analysis. Complete data (both baseline and six-month follow-up) from 130 mothers and their children was available for analysis. Of these families, 85 took part in the intervention and 45 were waiting-list control families. Control families were offered the IY Parent programme after the six-month follow-up visit had been completed. Fifty-seven (44%) mothers were in the clinical range for depression at baseline.

Mediator Analysis

To examine the effect of the mediator variable a series of regression analyses were conducted using SPSS 17.0. A total of four regression parameters were estimated as described by Baron and Kenny (1986): 1) the parameter for the mediator regressed on the predictor variable; 2) the parameter for the mediator regressed on the outcome variable; 3) the parameter for the outcome variable regressed on the predictor variable; and 4) the parameter representing the indirect effect of the predictor on the outcome via the mediator. Bootstrap procedures described by Preacher and Hayes (2008) was used to estimate the indirect effect of intervention status on change in child behaviour due to the small sample size (Preacher & Hayes, 2004, 2008). It is also the recommended procedure for testing mediation models in developmental psychology (Dearing & Hamilton, 2006). The reported results are based on 5000 bootstrap samples and both child age and child gender were included as covariates. Change scores were calculated using simple subtraction, such that a higher change score represents greater improvement in the desired therapeutic direction. Using change scores ensures that baseline levels of positive parenting and maternal depression are controlled for in the analysis and has been used in similar mediation analyses (e.g. Gardner et al., 2007, 2010).

Results

Simple Mediation Model

Figure 1 shows a schematic of the simple mediation model in which change in maternal depression is a proposed mediator of the relationship between intervention status and changes in child behaviour. Results of the mediation analysis using bootstrap procedures are displayed in Table 3.

Results show that the indirect effect of maternal depression was significant ($b = 3.89, p = .011$). Bias corrected and accelerated (BCa) confidence intervals (CI) indicate that maternal depression is a partial mediator of the relationship between intervention status and child behaviour since the CI do not cross zero.

Multiple Mediation Model

Since previous research has shown improvements in positive parenting to mediate the relationship between intervention status and child behaviour problems (see Gardner et al., 2010;

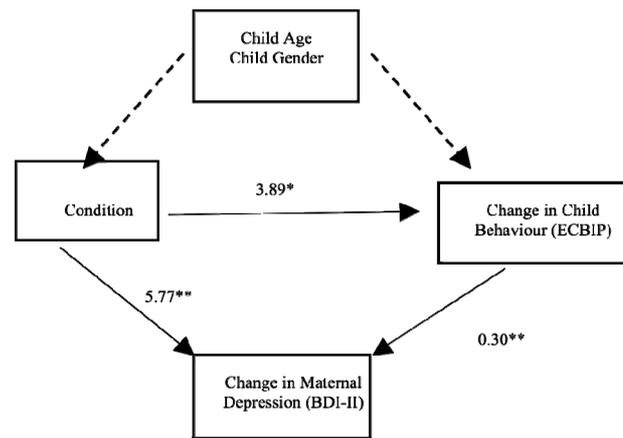


Figure 1. Simple mediation model of the effect of intervention status on child behaviour through maternal depression (controlling for child age and gender).

Table 2.

Characteristics of the families in the sample at baseline.

	No follow-up*			
	Intervention n = 86	Control n = 47	Intervention n = 18	Control n = 2
No. (%) of boys	49 (57)	31 (66)	7 (39)	29(100)
No. (%) Welsh speaking	10 (12)	9 (19)	3 (17)	0(0)
Child age in months (SD)	46.4 (6.6)	46.2 (4.2)	43.9 (4.8)	52 (1.4)
No. (%) single parent	38 (44)	16 (34)	9 (50)	1 (50)
Total weekly income < £64/person	76 (88)	42 (89)	17 (94)	2 (100)
Mean (SD) age of mother at birth of first child	21.4 (5.0)	20.5 (4.2)	21.4 (4.4)	17 (0)
Scores (SD):				
Conduct problems (ECBI)	16.5 (7.0)	14.8 (7.7)	15.7(5.1)	28 (4.2)
Hyperactivity (SDQ)	6.2 (2.7)	6.9 (2.2)	5.9(1.9)	8.5 (.7)
Self Control (SCRS)	127.9 (29.8)	130.2 (27.7)	119.2(24.2)	130.5 (27.6)

Note: *A two sample t test found no significant differences between intervention families who remained in the study and those lost to follow up. This was not tested for control families; ECBI = Eyberg child behaviour inventory; SDQ = Strengths and Difficulties Questionnaire; SCRS = Self-control rating scale.

Shaw et al., 2009), a multiple mediator analysis, using macros written by Preacher and Hayes (2008), was conducted to examine whether both maternal depression and positive parenting are mediators. **Figure 2** shows the schematic of the multiple mediator model in which both maternal depression and positive parenting skills were proposed to mediate the relationship between intervention status and change in child behaviour. The total indirect effect for both proposed mediators was significant with BCa CI of 1.05 - 4.20, indicating that both maternal depression and positive parenting mediated the relationship between intervention status and change in child behaviour (see **Table 3**).

The specific indirect effect of each mediator was 1.57 through maternal depression and .60 through positive parenting. Further examination of the specific contribution of each indirect effect using BCa CI revealed that both are significant mediators of the relationship between intervention status and change in child behaviour (i.e. none of the CI cross zero). Maternal depression seems to be the stronger mediator however contrasts revealed no significant difference between the two mediators since the CI crosses zero (**Table 3**).

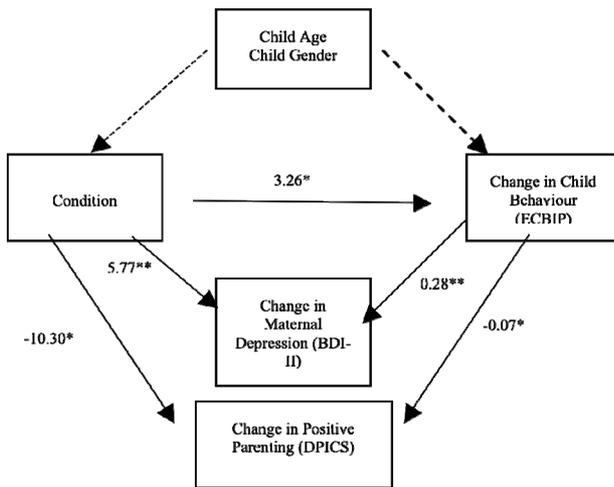


Figure 2. Multiple mediation model of the effect of intervention status on child behaviour through maternal depression and positive parenting (controlling for child age and gender).

Table 3. Mediation of the relationship between intervention status and child behaviour through maternal depression and observed positive parenting.

	Point Estimate	S.E.	z	Bootstrap BCa 95% CI	
				Lower	Upper
<i>Model summary for maternal depression</i>					
Maternal Depression	1.6980	.6683	2.5405	.6056	3.5027
<i>Model summary for maternal depression/positive parenting</i>					
Total	2.1631	.7651	2.8275**	1.0543	4.2017
Maternal Depression	1.5669	.6512	2.4062*	.5850	3.3099
Positive Parenting	.5963	.3899	1.5292	.0591	2.0297
<i>Contrast</i>					
MD vs. PP	1.0119	.7409	1.3658	-.5295	2.8889

Note: * $p < .05$; ** $p < .01$. BCa, bias corrected and accelerated; MD, maternal depression; PP, positive parenting. Estimates based on 5000 bootstrap samples.

Discussion

The first aim of this study was to establish whether improvements in maternal depression mediate improvements in child behaviour following attendance on an IY Parent programme. Results using a simple mediation model showed that maternal depression was a partial mediator of the relationship between intervention status and improved child behaviour. The second aim of this study was to examine whether both maternal depression and positive parenting together mediate this relationship. A multiple mediator analysis was conducted showing that both variables were partial mediators with no significant difference between their specific contributions to the indirect effect.

These findings are important as they add to our understanding of the mechanisms operating when child behaviour improves as a result of parent training. Identifying mediators is necessary if we are to understand the active ingredients of treatment. These results extend previous findings by Gardner et al. (2010) who found that an increase in observed positive parenting behaviour was a partial mediator for improved child behaviour. The present findings suggest that both change in the practice of positive parenting and change in maternal depression are key factors mediating change in child problem behaviour.

One explanation for why improvements in maternal depression were seen in mothers who attended a parent programme dealing with their children's behaviour problems is that improving parents' skills increases their confidence, which in turn improves their mental health. DeGarmo et al. (2004) found that improvements in parenting skills were followed by improvements in child behaviour and which were subsequently followed by improvements in maternal depression. Shaw et al. (2009) found that maternal depression was a significant mediator of the relationship between a toddler intervention and child behaviour problems when accounting for the effects of positive parenting. The results of the current study corroborate these findings.

The IY parent programme includes components and strategies that promote effective parenting by addressing specific skill deficits. Parents are taught accurate observation skills, goal setting and problem solving skills, which are known to be deficient in parents experiencing depression. It also provides the opportunity for these skills to be practiced and reinforced, initially in group-based practice and subsequently by success in home activities with children (Hutchings et al., 2005).

Gaining experience of using new skills with success is particularly important for depressed parents. Early functional accounts of depression such as those posited by Fester (1973) and Seligman (1975) reasoned that a depressed individual's inability to deal with problems was due to the failure of past efforts to be rewarded. Fester described the behavioural patterns that characterised depression, as a low rate of positively reinforced behaviours and a high rate of escape and avoidance from stressful situations. These ideas were developed by Seligman in his "learned helplessness" theory of depression (1975). His research with animals and humans lead him to conclude that when repeatedly confronted by situations that are outside their control, people cease trying to do things that could potentially improve their situation. As a reduction in activity reduces opportunities for their actions to be reinforced by success, it serves to maintain feelings of helplessness and depression.

Seligman (1975) suggested that “forced” exposure to success was the most effective strategy to overcome learned helplessness. The group based rehearsal and training for home activities encouraged in the IY programme may be doing just that. The emphasis on teaching observation, problem solving and realistic goal setting skills and rehearsal of these new skills increases the likelihood that the new behaviours will be reinforced by their success. This also impacts on parental depression, giving parents more confidence in their parenting abilities and their ability to manage other aspects of their life. In the present study, 25 (61%) of the intervention parents who scored in the clinical range on the BDI-II at baseline, moved to the non-clinical range at follow-up. This compared with five (31%) of those in the control group.

It is likely that the extent to which the skill deficits are addressed contributes to the varying outcomes in both child behaviour and maternal depression that are reported in the literature. While some studies have found maternal depression to predict poor intervention outcome, almost 30 years of research of the IY programme using high quality RCT trials, has consistently demonstrated significant improvements in both parental mental health and outcomes for children. Evidence also suggests that improvements in child behaviour are more likely to be maintained over time when there are also improvements in maternal mental health (Hutchings, Lane et al. 2004). The findings of the present study add to the evidence that the aspects of the IY programme (training in observation skills, rehearsal and problem solving) that are also likely to impact on maternal mental health are important ingredients in improving child behaviour.

An alternative explanation for the improvements in maternal depression could be that the increased social support and access to a trained group facilitator lead to improvement in maternal mood. All the parents who attended the groups had children who scored above the clinical cut-off for behaviour problems and were considered to be socially disadvantaged based on number of risk factors (e.g. single parents, teenage parents, family poverty, history of drug/alcohol abuse, etc.). It is possible that having access to a group of people with similar challenges meant that parents no longer felt alone. Also having access to a trained professional to help with their children’s challenging behaviour may have lessened depressive symptoms and enabled parents to feel more in control of their lives. Several studies have found associations between poor maternal mental health and low social support (Sheppard, 1994, 1997, 2009). However there are many parent programmes that report that depressed people do less well in addressing child behaviour problems so the evidence suggests that it is the specific components of the IY programme described above that result in the changes found (Gardner et al., 2006; Hutchings et al., 2007).

Limitations of the Study

One limitation of this study concerns the use of parent-report for both child behaviour problems and maternal depressive symptoms. It is possible that the improvement in maternal depression changed mother’s view of their own parenting practices, their child’s behaviour and their impression that their child’s behaviour was a problem. Previous research has found larger effect sizes for studies that relied on mother-report of child externalizing problems compared to child self-report, others’ reports, or independent observations (Goodman et al.,

2011). However, a number of studies have shown the ECBI parent report measure to correlate significantly with independent observation of child behaviour (Webster-Stratton, 1985; Webster-Stratton & Hammond, 1998; Webster-Stratton & Lindsay, 1999). Nevertheless, it is important for future research to include objective measures of both child behaviour and maternal depression.

Another limitation is that, due to the design of this trial, temporal precedence for the mediators was not established. Both mediators (maternal depression and positive parenting) and the outcome variable (child behaviour) were assessed at the same time point meaning that it is not possible to see whether these potential mediators are actual causal agents or covariates of change (Laurenceau et al., 2007). Future research using a more appropriate design including several measurement time points for both child behaviour and maternal depression would solve this problem.

Conclusion

The co-occurrence of maternal depression and child conduct problems is well established. While this may be explained by a number of causal pathways, the findings of this mediator analysis show that improvements in child behaviour following the programme were partially but significantly mediated by improvements in maternal depression. Findings also showed that both maternal depression and positive parenting together were mediators of intervention status on child behaviour. This suggests that, for interventions to be effective in reducing child conduct problems, they need to emphasise those aspects of the programme that are also likely to impact on maternal depression such as the training in specific observation, problem solving, realistic goal setting skills and rehearsal of effective behaviours, thereby contributing to improvement in, and the longer term maintenance of, improvements in child behaviour.

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