

The effect of singing interventions on symptoms of postnatal depression: a three-arm randomised controlled trial

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Abstract

This study assessed whether a novel psychosocial intervention could reduce symptoms of postnatal depression (PND) in the first 40 weeks post-birth. Analyses were carried out of 134 mothers with symptoms of PND randomised into 10-weeks of group singing workshops or group play workshops for them and their babies, or usual care. Overall, amongst all mothers with symptoms of PND, there was a non-significant faster improvement in symptoms in the singing group than either play group or usual care ($F_{4,262}=1.66$, $p=.16$, $\eta^2=0.012$). When isolating mothers with moderate-severe symptoms of PND, this result became significant, with a faster improvement in symptoms in the singing group ($F_{3.9,139.8}=2.74$, $p=.033$, $\eta^2=0.028$).

Conflict of interest

The authors declare no conflict of interest.

Postnatal depression (PND) is characterised by both psychological and behavioural changes including fatigue, irritability, disturbance of appetite, insomnia, and anhedonia, with 25% of women affected experiencing symptoms lasting over a year (1). There are several treatment models currently available to women experiencing symptoms of PND, including psychotherapy and antidepressants, but there are challenges associated with each (1). Consequently, there is a need to identify further ways of supporting the mental health of new mothers. Given that studies examining predictors of PND have identified psychosocial factors such as daily hassles, parenting stress, chronic strain and both perceived and received social support (2), group interventions that simultaneously relax mothers and enhance their support networks could be of value. In particular, there is theoretical research suggesting that singing could support new mothers: singing is widely practised in cultures around the world, with anthropological theories that singing even evolved with the aim of reassuring infants, promoting mother-infant bonding and paving neonates' neurological development to support future language comprehension (3). Further, there have been a number of studies in different populations showing the benefits of singing for mental health in older adults (4,5), patients with chronic obstructive pulmonary disease (COPD) (6), and people with dementia (7). Yet to date, there have been no controlled studies exploring the effect of singing on mental health in new mothers; specifically on symptoms of PND.

Therefore, this three-arm parallel group randomised controlled trial explored the impact of ten-week community singing programmes for mothers experiencing symptoms of PND and their babies compared with a comparison group of ten-week community play activities and a control non-intervention group. Participants were adult women with babies up to 40 weeks post birth who displayed symptoms of PND, indicated with a score of 10 or higher on the Edinburgh Postnatal Depression Scale (EPDS; a 10-item self-report measure scored from 0-30 with 10+ indicative of possible depression and higher scores indicating more severe depression (8)). They were randomised with SPSS with a 1:1:1 allocation using random block sizes of 6, stratified by age of their child and the severity of their EPDS score. Women were recruited through midwives, doctors, perinatal psychiatrists, health visitors and GPs in the Greater London area, as well as through social media, leaflets and by a research assistant in children's centres and in the local community. The study received ethical approval from the NHS Research Ethics Committee (REC reference 15/SS/0160, provided on 22nd September 2015) and all participants provided informed consent. No adverse events occurred across the duration of the study.

A total of 307 women were screened for participation, of whom 148 were eligible to participate and consented to take part, and 135 completed data collection (see Supplementary Figure 1). One participant reported not responding to the questions accurately so was retrospectively excluded, providing a final N of 134 (92% completion rate). There were no differences across any of the baseline variables measured between those who did complete and those who did not complete data collection. Participants were recruited and participated between December 2015 and August 2016. In the singing group, the median number of sessions attended was 8 (mean 7.2, SD 2.6) and in the play group, the median number of sessions attended was 6 (mean 5.7, SD 2.8).

Participants randomised to the singing (experimental) and creative play (comparison) groups received weekly free 60 minute workshops in groups of 10-13 for them and their baby for 10 weeks in a children's centre local to them (5 groups ran per arm to accommodate all participants). Groups were led by professional workshops leaders, with the same leaders leading both the singing and creative play sessions to ensure consistency of person and place between the two conditions. Singing workshops involved mothers listening to songs sung by the leader, learning and singing songs with their babies, and creating new songs together reflecting aspects of motherhood. Creative play workshops involved mothers engaging in sensory play with their babies, doing arts and crafts and playing simple games together. Participants randomised

to the control group did not receive any workshops above any beyond their usual care for 10 weeks but were provided with singing classes at the end of their research participation as a thank you. No adverse events were reported across the study.

Participants provided baseline demographic data and completed EPDS at baseline, week 6 and week 10. Data were analysed using IBM SPSS version 23.0 (SPSS, Chicago IL). Baseline comparisons using one-way ANOVAs, Kruskal Wallis test and Chi-square test for linear, ordinal and categorical data respectively revealed that groups were well matched (see Table 1). Changes across time were measured using two-way repeated measures ANOVAs looking at the effects across time and the time*group interaction. Given that there are two recommended levels of EPDS cut-off (EPDS \geq 10 for symptoms of PND and EPDS \geq 13 indicating more severe depression; sometimes classed as minor and major PND)(9), planned sensitivity analyses were performed parallel to the main analyses using EPDS \geq 13, the results of which are reported.

There was a significant decrease across time in EPDS score, indicating that women in all three groups experienced improvements in symptoms of PND across the 10 weeks (EPDS \geq 10: $F_{2,262}=143.21$, $p<.001$, $\eta^2=0.52$; EPDS \geq 13: $F_{1,9,139,8}=118.39$, $p<.001$, $\eta^2=0.60$). When considering the time*group interaction, using EPDS \geq 10, there was no significant effect ($F_{4,262}=1.66$, $p=.16$, $\eta^2=0.012$). However, using EPDS \geq 13, the time*group interaction reached significance ($F_{3,9,139,8}=2.74$, $p=.033$, $\eta^2=0.028$). To explore over which time period this time*group difference occurred, we looked at the within-subject contrasts, which showed a significant difference between groups from baseline to week 6 (EPDS: $F_{2,72}=3.93$, $p=.024$, $\eta^2=0.05$), but showed the difference between groups narrowing again by week 10 ($F_{2,72}=0.27$, $p=.76$, $\eta^2=0.001$) (see Figure 1). To explore which group differed across this period of significance, we ran ANOVAs of the change from baseline to week 6, which confirmed the significant difference between groups ($F_{2,72}=3.93$, $p=.024$, $\eta^2=0.10$), with post hoc tests with Bonferroni corrections demonstrating that the singing group had a significantly faster improvement than the control group (mean difference=-2.83, SE=1.06, 95%CI=-5.44--0.22, $p=.029$, $d=0.78$) but not the play group (mean difference=-2.03, SE=1.05, 95%CI=-4.61-0.54, $p=.17$, $d=0.56$), with no difference between the play and control group (mean difference=-0.80, SE=1.13, 95%CI=-3.57--1.97, $p>.99$, $d=0.20$). Descriptive statistics are provided in Supplementary Table 1, and show that this improvement amongst the singing group equated to an average 35% decrease in depressive symptoms across the first 6 weeks by which point 65% of the singing group no longer had an EPDS \geq 13. This decrease in depressive symptoms in the singing group extended to a 40% decrease by week 10, by which point 73% of the singing group no longer had an EPDS \geq 13. Sensitivity analyses factoring as covariates whether mothers were also receiving additional support for their mental health alongside involvement in the study did not affect the significance of ANOVA results either across time or for the time*group interaction.

This study supports findings from previous studies showing that symptoms of PND improve over time (10). However, mothers involved in the singing group had a significantly faster decrease in their symptoms. Research suggests that children whose mothers suffered from PND have higher rates of insecure attachments and poor emotional adjustment in early years, delay in reading and demonstration of behaviour disturbances and impaired patterns of communication 5 years on (11,12). However, early remission from PND has been associated with reduced effects on both mother and baby (12). Consequently, evidence that singing interventions could speed the rate of recovery in women affected by symptoms of PND could have a clinical relevance.

It is notable that there was no significant difference in speed of recovery between the play group and controls. This might suggest that the social support provided by the play group was not enough in itself to improve symptoms of PND and that there were characteristics specific to the singing group that played a key role in the improvements found. However, it is noted that post-hoc tests showed the singing group did not

have a significantly faster improvement than the play group, implying that the social support provided by the play group was, if not an entirely explanatory factor, at least a factor in the improvements found in the singing group.

Regarding limitations, participants and researchers were not blind to the groups they were allocated to. However, women were not informed that the study hypothesis involved singing having significantly different results to the play group, so the fact that there were no improvements in the play group compared to the control would seem to suggest results were not entirely driven by placebo. Overall, this study suggests that 10-week programmes of group singing workshops could help speed the recovery from symptoms of PND amongst new mothers. While the study sample size is in line with previous studies exploring the effects of interventions for the treatment of PND (13), further work remains to be undertaken to replicate the findings with a larger sample size and to ascertain the viability of such workshops in clinical practice.

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REFERENCES

1. Morrell C, Warner R, Slade P, Dixon S, Walters S, Paley G, et al. Psychological interventions for postnatal depression: cluster randomised trial and economic evaluation. The PoNDER trial. *Health Technol Assess* [Internet]. 2009 Jun [cited 2014 Nov 25];13(30). Available from: <http://www.journalslibrary.nihr.ac.uk/hta/volume-13/issue-30>
2. Yim IS, Stapleton LRT, Guardino CM, Hahn-Holbrook J, Schetter CD. Biological and Psychosocial Predictors of Postpartum Depression: Systematic Review and Call for Integration. *Annu Rev Clin Psychol*. 2015;11(1):99–137.
3. Falk D. Prelinguistic evolution in early hominins: whence motherese? *Behav Brain Sci*. 2004 Aug;27(4):491-503-583.
4. Coulton S, Clift S, Skingley A, Rodriguez J. Effectiveness and cost-effectiveness of community singing on mental health-related quality of life of older people: randomised controlled trial. *Br J Psychiatry J Ment Sci*. 2015 Sep;207(3):250–5.
5. Cohen G. Research on Creativity and Aging: The Positive Impact of the Arts on Health and Illness. *Generations*. 2006 Apr 1;30(1):7–15.
6. Lord VM, Hume VJ, Kelly JL, Cave P, Silver J, Waldman M, et al. Singing classes for chronic obstructive pulmonary disease: a randomized controlled trial. *BMC Pulm Med*. 2012;12:69.
7. Särkämö T, Tervaniemi M, Laitinen S, Numminen A, Kurki M, Johnson JK, et al. Cognitive, Emotional, and Social Benefits of Regular Musical Activities in Early Dementia: Randomized Controlled Study. *The Gerontologist*. 2014 Aug 1;54(4):634–50.
8. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry*. 1987 Jun 1;150(6):782–6.
9. Gibson J, McKenzie-McHarg K, Shakespeare J, Price J, Gray R. A systematic review of studies validating the Edinburgh Postnatal Depression Scale in antepartum and postpartum women. *Acta Psychiatr Scand*. 2009 May 1;119(5):350–64.
10. Cooper PJ, Campbell EA, Day A, Kennerley H, Bond A. Non-psychotic psychiatric disorder after childbirth. A prospective study of prevalence, incidence, course and nature. *Br J Psychiatry J Ment Sci*. 1988 Jun;152:799–806.
11. Cooper PJ, Murray L. Postnatal depression. *BMJ*. 1998 Jun 20;316(7148):1884–6.
12. Harris B, Huckle P, Thomas R, Johns S, Fung H. The use of rating scales to identify post-natal depression. *Br J Psychiatry J Ment Sci*. 1989 Jun;154:813–7.
13. Bledsoe SE, Grote NK. Treating Depression During Pregnancy and the Postpartum: A Preliminary Meta-Analysis. *Res Soc Work Pract*. 2006 Mar 1;16(2):109–20.

Table 1: Demographic and psychological characteristics of participants

	EPDS \geq 10 N=134				EPDS \geq 13 N=75			
	Singing n=48	Play n=42	Control n=44	Test statistic	Singing n=30	Play n=23	Control n=22	Test statistic
Age of mother (years), $\mu \pm$ SD	35.3 \pm 4.0	35.9 \pm 4.2	34.6 \pm 3.4	F _{2,131} =1.23, p=.30	35.6 \pm 4.4	36.3 \pm 4.6	34.1 \pm 4.1	F _{2,72} =1.46, p=.24
Age of baby (weeks), $\mu \pm$ SD	20.0 \pm 8.9	20.4 \pm 9.3	18.4 \pm 9.1	F _{2,131} =0.56, p=.57	22.0 \pm 9.0	20.4 \pm 8.6	21.0 \pm 10.2	F _{2,72} =0.22, p=.81
Marital status, % married (n)	68.8% (33)	69.0% (29)	77.3% (34)	X ² (2)=1.02, p=.60 ^b	56.7% (17)	56.5% (13)	68.2% (15)	X ² (2)=0.87, p=.65 ^b
Previous children, %	10.9% (5)	7.1% (3)	11.4% (5)	X ² (2)=0.48, p=.79 ^b	10.0% (3)	4.3% (1)	4.5% (1)	X ² (2)=0.89, p=.73 ^c
Educational attainment, %				X ² (2)=0.39, p=.82 ^a				X ² (2)=0.38, p=.84 ^c
Up to NVQ3/GCE A Level	10.4% (5)	9.5% (4)	4.5% (2)		10.0% (3)	13.0% (3)	4.5% (1)	
NVQ4/NVQ5/Undergraduate degree	35.4% (17)	31.0% (13)	45.5% (20)		36.7% (11)	39.1% (9)	54.5% (12)	
Postgraduate degree	54.2% (26)	59.5% (25)	50% (22)		53.3% (16)	47.8% (11)	40.9% (9)	
Household income, %				X ² (2)=0.39, p=.82 ^a				X ² (2)=0.02, p=.99 ^c
<£30,000	8.9% (4)	14.3% (6)	11.6% (5)		14.3% (4)	8.7% (2)	14.3% (3)	
£30,000-£60,000	24.4% (11)	21.4% (9)	16.3% (7)		19.0% (5)	26.1% (6)	19.0% (4)	
£60,000-£90,000	28.9% (16)	23.8% (10)	30.2% (14)		33.3% (11)	30.4% (7)	33.3% (8)	
£90,000-£120,000	22.2% (10)	23.8% (10)	20.9% (9)		19.0% (6)	26.1% (6)	19.0% (4)	
>£120,000	15.6% (7)	16.7% (7)	20.9% (9)		14.3% (4)	8.7% (2)	14.3% (3)	
Frequency of singing to baby				X ² (2)=0.87, p=.65 ^a				X ² (2)=1.33, p=.52 ^c
Occasionally	22.9% (11)	16.7% (7)	13.6% (6)		13.3% (4)	21.7% (5)	18.2% (4)	
Often	22.9% (11)	28.6% (12)	25.0% (11)		23.3% (7)	30.4% (7)	22.7% (5)	
Daily	54.2% (26)	54.8% (23)	61.4% (27)		63.3% (19)	47.8% (11)	59.1% (13)	
Receiving psychotherapy/counselling	18.8% (9)	16.7% (7)	13.6% (6)	X ² (2)=0.44, p=.80 ^b	23.3% (7)	30.4% (7)	27.3% (6)	X ² (2)=0.34, p=.84 ^b
Taking anti-depressant medication	10.4% (5)	2.4% (1)	9.1% (4)	X ² (2)=2.35, p=.35 ^c	10.0% (3)	4.3% (1)	13.6% (3)	X ² (2)=1.17, p=.63 ^c
Postnatal depression at baseline, $\mu \pm$ SD	13.9 \pm 3.4	13.8 \pm 2.9	13.1 \pm 2.9	F _{2,131} =1.01, p=.37	15.7 \pm 2.8	16.0 \pm 2.1	15.5 \pm 2.0	F _{2,72} =0.29, p=.75

Notes: μ = mean; SD = standard deviation; ^a Kruskal-Wallis; ^b Chi-squared; ^c Exact

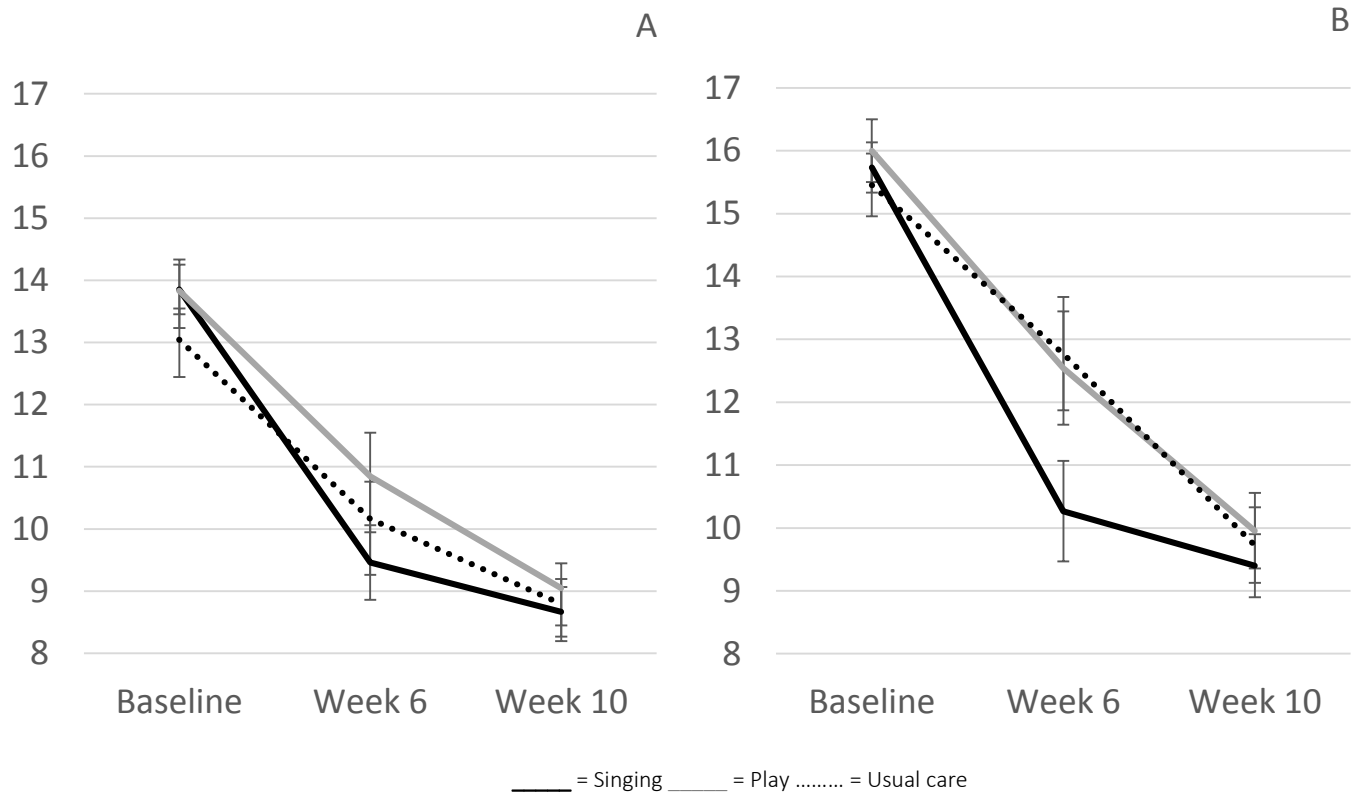
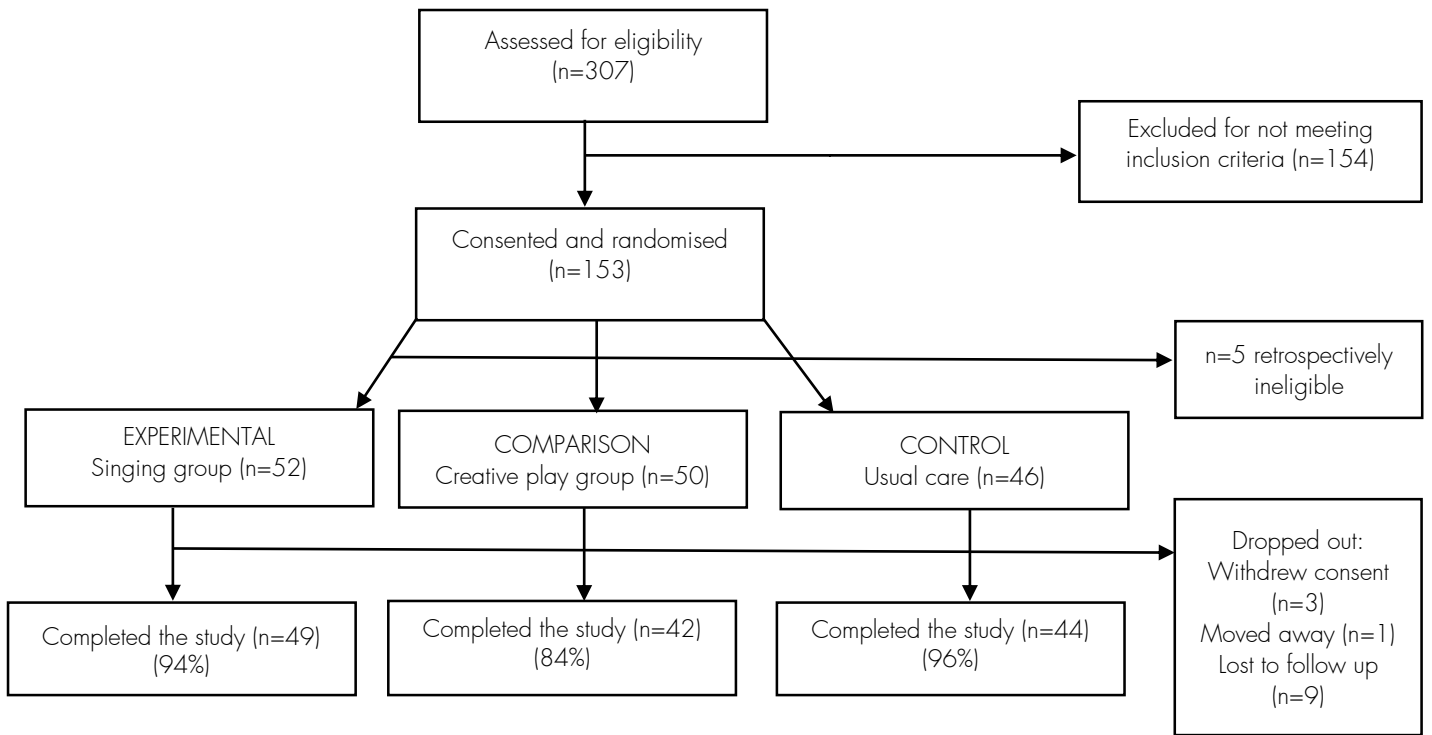


Figure 1: Changes across 10 weeks in depression (A: EPDS \geq 10, B: EPDS \geq 13) with standard error in singing, play and usual care group

Supplementary Table 1: Mean EPDS score across time in the three groups

	EPDS \geq 10 $\mu \pm$ SE (CI)		
	Singing	Play	Control
Baseline	13.85 \pm 0.44 (12.98-14.73)	13.83 \pm 0.47 (12.90-14.77)	13.05 \pm 0.46 (12.14-13.97)
Week 6	9.46 \pm 0.61 (8.25-10.67)	10.86 \pm 0.65 (9.56-12.15)	10.18 \pm 0.64 (8.92-11.45)
Week 10	8.67 \pm 0.41 (7.86-9.48)	9.05 \pm 0.44 (8.18-9.91)	8.80 \pm 0.43 (7.95-9.64)
	EPDS \geq 13 $\mu \pm$ SE (CI)		
	Singing	Play	Control
Baseline	15.73 \pm 0.44 (14.86-16.61)	16.00 \pm 0.50 (15.00-17.00)	15.46 \pm 0.51 (14.44-16.47)
Week 6	10.27 \pm 0.79 (8.70-11.83)	12.57 \pm 0.90 (10.78-14.35)	12.82 \pm 0.92 (11.00-14.65)
Week 10	9.40 \pm 0.55 (8.31-10.49)	9.96 \pm 0.62 (8.71-11.20)	9.73 \pm 0.64 (8.46-11.00)

Notes: μ = mean; SE = standard error; CI = 95% confidence intervals



Supplementary Figure 1: Flowchart of participants included in the study