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ORIGINAL ARTICLE

Antenatal depressed mood and child cognitive and physical growth at 18-months in South Africa: a cluster randomised controlled trial of home visiting by community health workers

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Aim. To examine the child outcomes at 18-months post-birth of a population cohort of women with antenatal depressed mood, half of whom were randomly chosen to receive perinatal home visits from community health workers during pregnancy.

Method. Pregnant women in 24 neighbourhoods (98% participation) were randomised by neighbourhood to: (1) standard clinic care (SC; 12 neighbourhoods; $n = 594$) or (2) the Philani Intervention Program, a home visiting intervention plus standard care (12 neighbourhoods; $n = 644$). The physical and cognitive outcomes of children of mothers with antenatally depressed mood (Edinburg Perinatal Depression Scale >13) in the intervention condition were compared at 18-months post-birth to children of mothers without depressed mood in pregnancy in both conditions.

Results. More than a third of mothers had heightened levels of antenatal depressed mood (35%), similar across conditions. Antenatal depressed mood was significantly associated with being a mother living with HIV, using alcohol and food insecurity. At 18-months, the overall cognitive and motor scale scores on the Bayley Scales of Development were similar. However, 10.3% fewer children of mothers with antenatal depressed mood in the intervention condition had cognitive scores on the Bayley Scales that were less than 85 (i.e., S.D. = 2 lower than normal) compared with children of mothers with antenatal depressed mood in the SC condition. Intervention children of mothers with antenatal depressed mood were also significantly less likely to be undernourished (Weight-for-Age Z-scores < −2).

Conclusion. Cognitive development and child growth among children born to mothers with antenatal depressed mood can be improved by mentor mother home visitors, probably resulting from better parenting and care received early in life.

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Key words: Antenatal depression, cognitive development, community health workers, home visiting, infants, low and middle income countries, maternal and child health.

Introduction

Advances in neuroscience in the last three decades are unequivocal that the first 1000 days (the antenatal period and the first 2 years of life) are foundational to brain development (McEwen, 2008; Fox *et al*. 2010). Neural connections formed in this early period are central to later social, emotional and cognitive development (Sameroff, 2010). In addition, it has been estimated that 250 million children living in low and middle income countries (LMIC) fail to reach their developmental potential (Black *et al*. 2016). The negative impact of toxic stress (such as poverty) on children's ability to regulate their behaviour, and emotions, as well as the development of attention (Shonkoff *et al*. 2012) will influence school success.

Depression is the most common of the mental health challenges (Whiteford *et al*. 2013) with the highest years lived with disability (3.7%) (Vos *et al*. 2012), and is about twice as common among women compared with men (Kessler, 2003). Despite the high prevalence and association with poverty (Patel & Kleinman, 2003), data on the prevention and treatment of maternal depression is limited for LMIC (Rahman, 2005). Maternal depression negatively impacts both

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mothers and their children (Tomlinson *et al*. 2005, 2006), with the most significant deficits in LMIC (Grantham-McGregor *et al*. 2007). Parenting difficulties are common in contexts of poverty and may be associated with caregiver mental health problems (Tomlinson *et al*. 2005, 2006). Maternal depression may compromise care-giving behaviours and responsive mother–infant interactions (Cooper *et al*. 1999) as well as being associated with insecure infant attachment (Tomlinson *et al*. 2005). There is, however, increasing recognition of the specificity of associations between different parenting qualities or deficits and specific child outcomes (Grusec & Davidov, 2010; Bornstein & Putnick, 2012).

There are a number of influences on child cognitive development, but antenatal depression poses a direct risk (Evans *et al*. 2012). Interventions in LMIC have typically coached parents in the play and stimulation of their child in order to improve infant and child cognitive outcomes (Engle *et al*. 2011; Baker-Henningham, 2014). By late infancy, children's cognitive performance is a good predictor of later cognitive functioning (Bornstein, 2014). Children's cognitive performance in South Africa is of considerable concern, with fewer than half of children in third grade performing at grade level (Department of Basic Education, 2011).

The first 2 years of life are a critical window for nutrition and physical health (Aboud & Yousafzai, 2015) and cognitive development is significantly related to children's nutrition (Nyaradi *et al*. 2013) – notably in this early critical period. However, the association between maternal common mental disorder and child under-nutrition is an inconsistent one. While there is a measure of consistency in studies in South Asia (Patel *et al*. 2003; Anoop *et al*. 2004; Rahman *et al*. 2004; Black *et al*. 2009) and some in Latin America (de Miranda *et al*. 1996; Surkan *et al*. 2008) and Africa (Adewuya *et al*. 2008) showing how maternal mental illness is associated with child undernutrition; other studies in Latin America (Surkan *et al*. 2008) and in Africa (Harpham *et al*. 2005; Tomlinson *et al*. 2006; Adewuya *et al*. 2008) have not found a significant association between postnatal psychological morbidity and undernutrition.

The Philani Project (le Roux *et al*. 2013) evaluated a home visiting programme delivered by community health workers called mentor mothers (MM), who address the multiple health challenges facing South African mothers during pregnancy and the early postnatal period. The MM home visitors focussed on HIV, alcohol, nutrition and maternal and child health. Cognitive-behavioural principles informed the approach, and the philosophy was one of supporting mothers to solve the problem, rather than to provide solutions to daily challenges. While the MM did not focus specifically on depressed mood, many of the factors related to positive child outcomes were addressed. In a previous report we have shown how this generalist, MM-delivered home visiting program improved infant growth, even when mothers' antenatal depressed mood was not reduced (Tomlinson *et al*. 2015). We found that antenatally depressed mothers in the intervention condition were significantly more likely to breastfeed longer than 3 months (OR = 3.1), to exclusively breastfeed for 6 months (OR = 3.6) and have children that were longer ($-2 \leq$ Height-for-Age Z-scores based on norms of the World Health Organization, OR = 2.6), and heavier at 6 months post-birth ($-2 \leq$ Weight-for-Age Z-score, OR = 2.1) compared with the SC condition (le Roux *et al*. 2013; Tomlinson *et al*. 2015). Depressed intervention mothers living with HIV were also significantly more likely to complete tasks to Prevent Mother-to-Child Transmission (PMTCT) of HIV (OR = 1.5). Building on these findings, this paper reports on the effects of our intervention on infant outcomes among children of antenatally depressed mothers, at 18 months post birth. We focus on physical growth and infant cognitive development as measured by the Mental Development Index (MDI) of the Bayley II Scales 16 (Bayley, 1993).

Ethics statement

The Institutional Review Boards of University of California Los Angeles (UCLA), Stellenbosch University, and Emory University approved the study, whose methods have previously been published (Rotheram-Borus *et al*. 2011). Written, voluntary, informed consent was received from all study mothers. We assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Three independent teams conducted the assessment (Stellenbosch), intervention (Philani Project) and randomisation and data analyses (UCLA). This cluster randomised control trial is registered with ClinicalTrials.gov (NCT00996528; https://clinicaltrials.gov/ct2/show/NCT00972699). The study was funded by the National Institute of Alcohol and Alcohol Addiction.

Methods

Participants

Neighbourhood matching and randomisation

Townships in Cape Town have both formal homes and informal shacks. Most families (70%) earn from 0 to 800 ZAR per month. Townships typically have tarred

roads, mast lighting, central water pumps, water-borne sewage services and some access to electricity and telephones. We identified neighbourhoods of similar size (450–600 households) that were within 5 kms of health clinics, had five to seven alcohol bars and were non-contiguous and/or separated by natural barriers (e.g., a highway). In a cluster randomised controlled trial design, the UCLA team randomised 12 matched pairs of neighbourhoods to Philani Intervention Programme (PIP) and standard care (SC) conditions.

Sample size

The sample size was based on calculations of the minimum number of pregnant women needed for recruitment per neighbourhood to achieve 80% power to detect a standardised effect size of 0.40 between women from the 12 neighbourhoods randomised to PIP and women from the 12 SC neighbourhoods.

Recruitment and retention

All pregnant women over the age of 18 years in the 24 neighbourhoods were eligible for recruitment. Township mothers were employed to go door-to-door to identify and recruit pregnant women, with each recruiter serving one PIP and one SC neighbourhood. From May 2009 to September 2010, recruiters visited homes on an ongoing basis to obtain consent for contact by the Assessment Team. Only 2% of pregnant women refused participation. The pregnant women were highly similar across conditions (le Roux *et al*. 2013; Tomlinson *et al*. 2015). Figure 1 summarises the flow of participants from recruitment to 18-months post-birth. The follow-up rates were high, collected

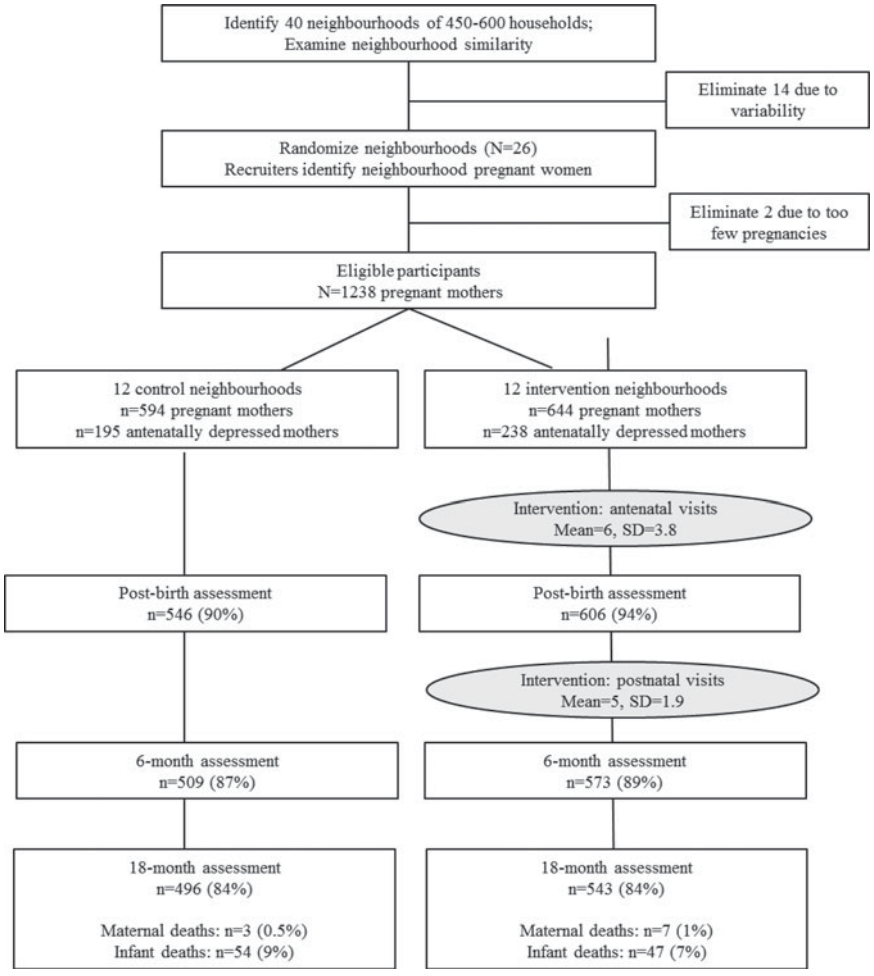

Fig. 1. Movement of participants through the trial at each assessment point for mothers in the control and the intervention arms.

within narrow time windows and similar across intervention conditions: 84% were assessed at 18-months (M = 18.6 months, S.D. = 2.4).

Assessments

Three interviewers were recruited from the local townships and received training in the ethical conduct of research, a question-by-question review of the assessment interviews, interviewing and infant assessment methods. Data were collected at baseline (antenatally) and then again at 18 months post-birth. Two data collectors were trained over the course of a month to administer the Bayley Scales of Infant Development. They were trained and supervised by a trained clinical social worker and a clinical psychologist. All Bayley assessments were video-recorded and checked following administration for any errors. All interview data were collected using low-end mobile phones (Nokia E61i and 2630) programmed using Mobenzi Researcher (http://www.mobenzi.com/researcher/). In addition to the measures (outlined below) socio-demographic data were collected from all participants. All assessments were conducted at the Prevention Research for Community Family and Child Health research site in Khayelitsha, Cape Town.

Measures

Maternal mood

Maternal mood and symptoms of depressed mood were collected during the face to face interview with the data collector using the Edinburgh Postnatal Depression Scale (EPDS) (Cox *et al*. 1996), a 10-item measure that has been extensively used in South Africa and other LMIC (Cooper *et al*. 1999; Hartley *et al*. 2011; Tomlinson *et al*. 2015). The EPDS items are rated on a scale of 0–3 for severity. A score greater than 13 was used to indicate the presence of depressed mood (Lawrie *et al*. 1998) at recruitment when mothers-to-be were an average of 26 weeks pregnant.

Infant cognitive development

The Bayley Scales, version II, was administered to children at 18-months post-birth (Bayley, 1993). The assessment was conducted in a township research site by trained research assistants who were blind to intervention condition.

Infant growth

The length and weight of each child was recorded on scales, with the scales calibration checked weekly. Infant growth was assessed by converting infant anthropometric data (collected from birth records and growth monitoring) to Weight-for-Age (WAZ), Height-for-Age (HAZ) and Weight-for-Length by Age (WLAZ) Z-scores based on the World Health Organization's (WHO) age-adjusted norms. A Z-score less than −2 was considered a serious health deficit (i.e., undernourished or stunted) (Cogill, 2003).

MM recruitment and training

MM were recruited from the townships and trained for 1 month using a manualised intervention (previously reported (Rotheram-Borus *et al*. 2011)). All MM were lay workers and were selected to have good social/communication skills, problem-solving skills and thriving children of their own (positive deviants). All MM were trained in: (1) cognitive-behavioural approaches to establish healthy routines and to problem-solve on goal setting, choices, triggers and shaping of desirable behaviours; (2) key health information about general maternal and child health, how to frame each health issue that is a risk (nutrition, alcohol and HIV) and how to apply the health information in families' daily lives; and (3) coping with their own life challenges. MMs were certified, supervised weekly and randomly visited while conducting home visits.

Procedures

MM systematically visited every home in their assigned neighbourhood in order to identify pregnant mothers and to repeatedly visit these households on an ongoing basis. MM routinely addressed three outcomes, aiming to visit households of pregnant women a minimum of eight times to improve:

(a) PMTCT tasks for mothers living with HIV (MLH) and to increase MLH's disclosure to their partners, the use of condoms and to encourage HIV testing;
(b) reduce alcohol use/abuse among mothers using a brief, one-meeting evidence-based intervention that was adapted for Cape Town mothers drinking alcohol during pregnancy (O'Connor *et al*. 2011);
(c) child growth and nutrition, encouraging mothers to breastfeed for at least six months and to encourage healthy food choices.

MM were not trained to screen for or actively treat depression.

Data analysis

Before analysing infant outcomes, we checked for confounding variables in baseline demographic characteristics between intervention conditions among mothers

with depressed mood antenatally and those without mood disturbances. The physical and cognitive outcomes of children of mothers with antenatally depressed mood were compared across PIP and SC conditions using multiple longitudinal regressions. Binary outcomes were assessed using a logistic regression in SAS PROC GENMOD with an exchangeable correlation structure for participants clustered within the same neighbourhood and continuous outcomes were assessed using a linear mixed effects regression model in SAS PROX MIXED with random intercepts based on neighbourhood assignment (version 9.2; SAS Institute Inc., Cary, North Carolina, USA). All models included the full Philani study sample at 18-months and indicator variables for intervention status (1 = PIP, 0 = SC), depressed mood status (1 = EPDS > 13, 0 = EPDS ≦ 13) and an interaction term between intervention status and depressed mood status. Infant scores on the Bayley Scales and measures of physical growth were compared for PIP and SC conditions among mothers with antenatally depressed mood. We estimated differences using a contrast between PIP and SC among mothers with antenatally depressed mood. Statistical significance was determined by testing if the value of the contrast was significantly different than zero with a two-tailed hypothesis test at alpha = 0.05.

Results

Participant characteristics

There were no significant differences found in baseline demographic characteristics between intervention conditions among mothers with antenatally depressed mood and those without antenatal mood disturbance (Table 1). Mothers were similar in their sociodemographic characteristics (age, education, employment, partnerships and income), housing conditions, food insecurity, risk behaviours and HIV-related issues, alcohol-related behaviours and number of previous children.

There were significant differences between the mothers with antenatally depressed mood compared with those without, ignoring intervention condition at the baseline recruitment. During pregnancy, mothers with antenatally depressed mood were similar in age and a past history of being employed, but had a half year less of education (10.1 *v.* 10.5 years, $p < 0.0005$), were less likely to live with a partner (51.3 *v.* 59.5%; $p < 0.005$) and to have a higher income greater than 2000 ZAR/US$130 (37 *v.* 52%; $p < 0.0001$). The type of housing (formal *v.* informal, having water on site and a toilet was similar, but the mothers with antenatally depressed mood were significantly less likely to have electricity compared with mothers without antenatal mood disturbance (85.2 *v.* 92.3%, $p < 0.000$). Mothers with antenatally depressed mood were significantly more likely to have gone hungry in the last week themselves (60.5 *v.* 43.6%, $p < 0.0001$), as well as their older children (37 *v.* 24.7%, $p < 0.0001$) at the time of recruitment. The percentage of MLH was similar across conditions, however, significantly fewer mothers with antenatally depressed mood knew their partners' serostatus (24.7 *v.* 43.4%) and had fewer seropositive partners compared with those without antenatally depressed mood (6.9 *v.* 9.6%, $p < 0.0001$). Alcohol use prior to pregnancy (30.1 *v.* 21.8%, $p < 0.002$), during pregnancy (9.2 *v.* 7.6%, $p < 0.014$) and problematic drinking (i.e., AUDIT > 2) (8.4 *v.* 4.1%, $p < 0.003$) were significantly higher among mothers with antenatally depressed mood.

Table 2 displays the difference between PIP and SC conditions on measures of infant nutrition and development among mothers with antenatally depressed mood. The children of mothers with antenatally depressed mood in the PIP condition were similar in growth overall to the children in the SC condition on height, weight and height × weight. PIP infants at 18 months of mothers with antenatally depressed mood were significantly more likely to have WAZ ≥ −2 (odds ratio (OR) 4.37, 95% confidence interval (CI) 1.03–18.49).

There were no significant differences across condition on the overall Bayley Scale Scores or the cognitive or motor subscales when comparing the SC and the PIP condition. There was however, a significant difference between the children of mothers with antenatally depressed mood in the PIP and the SC on the percentage of children who had Bayley cognitive composite score ≥85 (OR 3.18, 95% CI 1.23–8.21) compared with children of mothers with antenatally depressed mood in the SC condition. Based on previous findings where we found an impact of depression severity on infant outcome (Tomlinson *et al*. 2015*a*), we conducted an analysis of severity of depression but there were no significant associations.

Discussion

In South African townships, a home visiting intervention delivered by community workers to mothers in pregnancy and the first six postpartum months, benefitted infants of mothers with antenatally depressed mood, without improving rates of depression. Our intervention focused on maternal and child health – HIV, alcohol use and nutrition outcomes. There was no specific focus on cognitive development neither on screening for, nor reducing depressed mood. However, intervention children of mothers with

Table 1. *Baseline characteristics of mothers with antenatal depression and without antenatal depression in the intervention and control conditions*

	Antenatally depressed mothers EPDS > 13 ($N = 433$)				Not depressed mothers EPDS ≤ 13 ($N = 805$)			
	PIP ($n = 238$)		SC ($n = 195$)		PIP ($n = 406$)		SC ($n = 399$)	
	n	%	*N*	%	*n*	%	*n*	%
Age, mean (S.D.)	26.0 (5.4)		26.1 (5.2)		26.7 (5.6)		26.4 (5.8)	
Highest education level, mean (S.D.)	10.2 (2.0)		10.0 (1.9)		10.5 (1.8)		10.5 (1.8)	
Married or lives with partner	124	52.1	98	50.3	253	62.3	226	56.6
Ever Employed*	37	15.5	33	16.9	92	22.7	71	17.8
Monthly household income > 2000 rand	80	36.4	72	37.7	200	50.8	207	53.2
Formal housing†	61	25.6	66	33.8	136	33.5	125	31.3
Water on site	116	48.7	107	54.9	217	53.4	220	55.1
Flush toilet	122	51.3	111	56.9	218	53.7	232	58.1
Electricity	197	82.8	172	88.2	372	91.6	371	93.0
Mother hungry, past week	139	58.4	123	63.1	173	42.6	178	44.6
Children hungry, past week	81	34.0	80	41.0	94	23.2	105	26.3
Weeks pregnant at assessment, mean (S.D.)	26.5 (7.8)		25.6 (9.0)		25.8 (8.0)		25.9 (8.0)	
Non-primipara	156	65.5	133	68.2	266	65.5	261	65.4
Number of live births, mean (S.D.)*	1.4 (0.9)		1.6 (1.1)		1.5 (0.9)		1.7 (1.2)	
Antenatal clinic appointment	183	76.9	133	73.5	321	79.1	243	76.2
Tested for TB, lifetime	70	29.4	69	35.4	136	33.5	141	35.3
Tested positive for TB, lifetime	23	9.7	23	12.4	30	7.4	27	7.8
Sexual partner, past 3 months	208	87.4	168	86.2	372	91.6	354	88.7
Knowledge of partner serostatus								
Partner HIV+	16	7.7	10	6.0	30	8.1	40	11.3
Partner HIV−	92	44.2	69	41.1	233	62.6	227	64.1
Unknown, or no response	100	48.1	89	53.0	109	29.3	87	24.6
Request partner HIV test	115	80.4	89	81.7	276	83.4	266	83.6
Mother living with HIV	59	27.4	54	30.5	90	24.4	92	24.9
Number of people disclosed to, mean (S.D.)	3.9 (4.6)		4.5 (5.7)		3.7 (4.5)		5.3 (7.9)	
Current sexual partner, past 3 months	48	81.4	45	83.3	79	87.8	80	87.0
Disclosed to partner	39	73.6	37	82.2	60	74.1	68	82.9
Knowledge of partner status*								
Partner HIV+	13	27.1	10	22.2	29	36.7	40	50.0
Partner HIV−	6	12.5	6	13.3	7	8.9	11	13.8
Unknown, or no response	29	60.4	29	64.4	43	54.4	29	36.3
Drank any alcohol, month prior to pregnancy discovery	67	28.2	59	32.6	88	21.7	70	21.9
AUDIT-C > 2, month prior to pregnancy discovery	52	21.8	46	25.4	61	15.0	55	17.2
Drank any alcohol after pregnancy discovery	30	12.6	20	11.0	26	6.4	29	9.1
AUDIT-C > 2, after pregnancy discovery	24	10.1	11	6.1	17	4.2	13	4.1
Drank any alcohol, anytime during pregnancy	76	31.9	66	33.8	96	23.6	88	22.1
Previous LBW infants, among non-primiparous mothers	28	17.9	26	19.5	33	12.4	43	16.5

*Not depressed mothers: $p < 0.10$.
†Antenatally depressed mothers: $p < 0.10$.

antenatally depressed mood were significantly less likely to be S.D. = 2 below the mean on the Bayley Developmental Scales compared with children of mothers with antenatally depressed mood in the control condition. Importantly, there was no main effect of the intervention on infant cognitive development. It may be that a more cognitively focussed intervention with clear didactic early stimulation components is necessary for improvements to infant cognitive development to accrue (Vally *et al*. 2014).

The Philani intervention appears to have its greatest impact in the first 6 months of life when the home

Table 2. *Infant health and developmental outcomes at 18-months among mothers with antenatal depression, assessed using EPDS > 13 grouped by intervention condition: the Philani Intervention Program (PIP) v. Standard Care (SC)*

	Antenatal EPDS > 13					
	PIP ($N = 231$)		SC ($N = 178$)		Estimated odds ratio, PIP *v.* SC	
	n	%	*n*	%	OR[a]	95% CI
WAZ ≥ −2	166	98.8	132	95.0	4.37*	1.03–18.49
HAZ ≥ −2	147	87.0	128	92.1	0.58	0.28–1.20
WLAZ ≥ −2	164	97.6	134	97.1	1.23	0.37–4.13
Bayley scales						
Cognitive score ≥ 85	99	94.3	68	84.0	3.18*	1.23–8.21
Motor score ≥ 85	102	97.1	78	96.3	1.20	0.32–4.45
					Estimated mean difference, PIP *v.* SC	
	Mean	S.D.	Mean	S.D.	Difference[b]	95% CI
Weight-for-age Z-score (WAZ)	0.09	1.17	0.10	1.26	0.00	−0.28–0.28
Height-for-age Z-score (HAZ)	−0.55	1.30	−0.64	1.22	0.09	−0.17–0.34
Weight-for-length by age Z-score (WLAZ)	0.49	1.34	0.57	1.31	−0.08	−0.37–0.21
Bayley scales						
Cognitive score	100.6	15.7	99.9	(17.52)	0.70	−3.55–4.86
Motor score	103.3	13.1	102.2	(16.10)	1.10+	−2.61–4.77

[a]Logistic regression with exchangeable correlation structure for subjects within neighbourhood clusters.
[b]Random effects linear regression, adjusted for neighbourhood clustering.
*$p < 0.05$; +$p < 0.10$.

visiting was at its most intense. It may be that parenting support for infant cognitive development may be more effective when infant attention and motor skills have developed to a sufficient degree (usually after the age of 6–12 months) (Murray *et al*. 2015). After 12 months of age, children are more actively engaged with the environment and, in so doing, parents can more easily facilitate the cognitive skills of infants. In support of this, most successful interventions for improving cognitive development in LMIC have been delivered to children between the ages of 1 and 3 years of age (Baker-Henningham, 2014; Wallander *et al*. 2014).

Antenatal depression is an important public health concern and our findings suggest that it may be useful to tackle antenatal depression. There is an increasingly robust evidence-base on the link between antenatal depression and compromised child development (Plant *et al*. 2013; Waters *et al*. 2014). We have recently argued that treating depression does not remove the conditions that frequently cause depression (e.g., poverty and interpersonal violence), but by providing mothers the tools to help their infants thrive, allows them to act toward a powerfully motivated goal (Tomlinson *et al*. 2015). While our findings in this study provide further evidence of benefits for child development in the context of a primary preventive community-based intervention, we did not improve the levels of depressed mood. Achieving this will require the integration of more active screening for and treatment of moderate to severe depression. Having said this, Rahman *et al*. (2008). have recently shown that while a cognitive behavioural-based intervention delivered by Village Health Workers in Pakistan was able to markedly reduce levels of maternal depression, it had no impact on improving infant growth. Similar to the mixed findings on the association between maternal depression and infant undernutrition, the association between nutrition and mental disorder is multi-factoral and will involve complex mechanisms and pathways. Longitudinal research in different contexts is vital in order to better understand these pathways.

A limitation of the study is that we did not conduct full diagnostic interviews for depression but rather relied on a screening tool. A strength of our study is

that it is a cluster randomised controlled trial with high retention across time of mothers and children in both conditions.

Conclusion

Our findings provides evidence that there are significant benefits for child development in the context of antenatal depressed mood in a generalist intervention delivered by MM without a specific focus on maternal mental health. Recent programmes show that screening for depression in pregnancy can be successfully integrated into primary care in LMIC (Honikman *et al*. 2012). Future research should investigate whether active screening for and treatment for antenatal depression could reduce antenatal depression and further improve child cognitive functioning and growth in the context of a generalist community health worker delivered home visiting programme.

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Conflicts of Interests

We declare no competing interests.
ClinicalTrials.gov registration #NCT00972699.

Availability of data and materials

Study data are available through the Methods Core at the UCLA Center for HIV Identification Prevention and Treatment Services. The Director of the Methods Core is Dr Li Li, who can be reached at the following email address: lililili@ucla.edu Outside investigators should prepare a concept note describing their proposed analysis, and a list of specific variables requested. The data will be securely transmitted, and outside investigators must provide an appropriate plan for data safeguarding. Study questionnaires detailing the variables potentially available for analysis can be downloaded at the following link: http://chipts.ucla.edu/projects/philani-pregnantwomen-cape-town/

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