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Treatment of maternal depression in urban slums of Karachi, Pakistan: A randomized controlled trial (RCT) of an integrated maternal psychological and early child development intervention

Nusrat Husain[a, b, g], Farah Zulqernain[b], Lesley-Anne Carter[c], Imran B. Chaudhry[a, b], Batool Fatima[b], Tayyeba Kiran[b], Nasim Chaudhry[b, d], Shehla Naeem[b, e], Farhat Jafri[b, f], Farah Lunat[b, g], Sami Ul Haq[b], Meher Husain[b], Chris Roberts[c], Farooq Naeem[h], Atif Rahman[i]

[a] Division of Psychology and Mental Health, School of Health Sciences, University of Manchester, United Kingdom
[b] Pakistan Institute of Living & Stop Learning, Karachi, Pakistan
[c] University of Manchester, United Kingdom
[d] Greater Manchester West Mental Health Trust, University of Manchester, United Kingdom
[e] Institute of Nursing, Dow University of Health Sciences, Karachi, Pakistan
[f] Karachi Medical and Dental College, Karachi, Pakistan
[g] Lancashire Cate NHS Foundation Trust, United Kingdom
[h] Department of Psychiatry, Queens University, Canada
[i] University of Liverpool, United Kingdom

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ABSTRACT

Background: Maternal depression is a major public health problem. This may affect a mother s ability to provide adequate care for the child. The objective of this study was to evaluate the effectiveness of the Learning through Play Plus program (LTP Plus) a parenting program integrated with Cognitive Behaviour Therapy (CBT).

Methods: A total of 247 women with symptoms of depression in Karachi, Pakistan were assigned randomly to either LTP Plus or routine care (Clinical Trials Identifier: NCT00835016). Symptoms of maternal depression were measured using the Edinburgh Postnatal Depression Scale (EPDS) at 3 and 6 months after baseline.

Results: At 3 months, there was a significant reduction in the EPDS scores in the intervention group compared to the routine group (adjusted mean difference [AMD] −3.65, 95% CI −6.14 to −1.15, $p < 0.004$). This effect was sustained at 6 months (AMD −2.62, 95% CI −4.43 to −0.81, $p < 0.005$). These women also reported less parental distress and disability. There was also a significant improvement in maternal knowledge about child development at 6 months.

Conclusion: There was a significant reduction in depression among women who received the group parenting program LTP Plus. This intervention has the potential to be scaled up and integrated with mother and child health programs.

1. Introduction

Health of women during pregnancy, childbirth and the postpartum period is defined under solitary term of maternal health (World Health Organization, 2016) Depression during pregnancy or in the years following childbirth is a public health priority, both because of the high prevalence and the consequent suffering and disability of the mother (Rahman et al., 2004a; Masood et al., 2015) as well as the negative impact on the child s health and development (Tsivos et al., 2015; Patel, 2004; Rahman et al., 2004a, 2004b; Goodman and Gotlib, 1999). Infant cognitive and emotional development is adversely affected by maternal depression and can lead to poor child outcomes. (Tsivos et al., 2015; Murray and Cooper, 1997; Milgrom et al., 2004). Depression starting during the perinatal period is often persistent and may continue during the early years even up to 3 to 4 years after birth

Correspondence author at: Level 3, Jean McFarlane Building, University of Manchester, Oxford Road, Manchester, M13 9PL, United Kingdom.
Email address: nusrat.husain@manchester.ac.uk (N. Husain)

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(McMahon et al., 2005; Kumar and Robson, 1984) which are considered to be critical period for child development (Howrwitz et al., 2009). Prevalence of maternal depression was reported as high as 15.6% during pregnancy and 19.8% after child birth (Fisher et al., 2012). A recent report from low and middle income countries suggests antepartum depression in one of four women and postpartum depression in one of five women (Gelaye et al., 2016). Frequently reported predictors of maternal common mental health issues in South Asian countries are poverty, lack of social support, adverse life events, disappointment with the sex of the baby and poor relationship with a mother-in-law or partner (Husain et al., 2011; Shidhaye and Giri, 2014).

In Pakistan, the rate of depression in women is amongst the highest in the world (Husain et al., 2000), and its impact, particularly on child growth and development, has been well-documented (Rahman et al., 2004b). Recent estimates from studies in developing countries showed prevalence of stunting and underweight as 32% and 20% respectively (Surkan et al., 2011). Pakistan like many other low income countries face malnutrition as one of the major child health issues (Rahman et al., 2004b). Literature show that compromised growth and development of child is associated with poor mental health of mother (Stewart, 2007). It is reported by various studies that children of depressed mothers are more at risk of poor development as compared to non-depressed mothers (Fisher et al., 2009; Tronick, 2009). Compromised child growth and development in low and middle income countries found significantly associated with maternal depression and the adverse effects may persist up to age of 8 years (Herba et al., 2016; Bennett et al., 2016). Interventions for maternal depression have been tested in low-income settings and cognitive behavioral approaches have been found to have the strongest effect in improving depressive symptoms in this group (Rahman et al., 2013a).

Given the impact of maternal depression on child outcomes, a strong case has been made for integrating interventions for maternal depression into general programmes for maternal and child health (Rahman et al., 2013b). Such approaches could potentially save costs (as the same health personnel would deliver the intervention) and lead to synergistic effects for both maternal and child outcomes. In Pakistan, studies have successfully tested the effectiveness of a Cognitive Behavioral Therapy (CBT)-based intervention for perinatal depression called The Thinking Healthy Programme (THP) in rural settings and mothers were recruited and assessed during their last trimester and the intervention was completed 12 weeks postnatally (Rahman, 2007; Rahman et al., 2013c). Evidence suggested that CBT is effective in minimizing postpartum depression when provided at individual level (Rahman, 2007); nevertheless it is likely to be cost effective when delivered in groups (Scope et al., 2013).

In the same settings in Pakistan, there is a report on the feasibility of a parent-based intervention for early child development the Learning Through Play (LTP) programme that led to an improvement in knowledge, attitude and practices of depressed mothers about child development; however, no reduction was found in maternal distress (Rahman et al., 2009). The theoretical underpinnings of LTP are to be found in Piaget s theory of cognitive development (Piaget, 2013), and Bowlby s theory of attachment (Bowlby, 1999). The programme was originally developed in Toronto, Canada, using the stages and elements of development as defined by Evans (1982).

The aims of this study were threefold: first, to test the feasibility of combining the CBT-based intervention for symptoms of depression (THP) and the play/interaction-based early child development intervention (LTP) in a single integrated intervention as the previous trial showed that LTP alone did not show reduction in maternal distress and also the previous trials included mothers with infants whereas the focus of this trial was on mothers with young children up to age 30 months; second, to test the delivery of the intervention in a group rather than an individual format as in a study with British South Asians depressed women felt that meeting other people in similar situations and sharing experiences were major motivating factors for participation in the intervention sessions (Masood et al., 2015); and third, to test the effectiveness of this integrated intervention, in a low income setting

2. METHODS

2.1. Design

This was a rater-blind individual randomized controlled trial, with two parallel groups.

2.2. Study Area

The study was conducted at Bilal Colony and Bhatiabad. These are low-income urban areas of Karachi District in southern Pakistan. Karachi is the largest city in Pakistan with a population of approximately 25 million. The combined population of these two urban settlements is approximately 300,000. These areas have been constructed in an unplanned manner, typical of many such settlements in large South Asian cities. The study was conducted in both government and private primary care practices providing care to women and children. Ethical approval (PILL-LTP-0108-2008-9) was obtained from the Pakistan Institute of Living and Learning (PILL) Ethics Committee and the Trustees Committee of the Bilal Trust. No adverse events were reported during the implementation of the trial or longer-term follow-up.

2.3. Sample Size

The sample size was calculated based on Rojas et al. (2007). We expected 40% of the mothers receiving treatment as usual and 60% of the mothers in the LTP Plus group to recover from symptoms of depression within three months. A difference of 20% was regarded as worth detecting. Based on two-sided 5% alpha, 107 mothers needed to be recruited into each group to have 80% power of detecting the difference. We aimed to recruit 130 mothers into each group to allow for 20% attrition.

2.4. Participants

Screening and recruitment for the study started in 2009 and outcome assessments were completed in 2011. A total of 552 mothers with children aged up to thirty months attending the primary care clinics were approached by their health workers to take part in the study. Training was provided to all health workers on how to approach the mothers, introduce the research project, and get consent for initial screening. Out of these, 517 women completed the Edinburgh Postnatal Depression Scale (EPDS) out of which 412 mothers scored 12 (a cut off score of 12 was reported to be the most commonly used cut off to distinguish depressed cases from non-depressed group (Husain et al., 2012) and completed baseline assessments. After obtaining written informed consent, all eligible mothers were interviewed by a trained research assistant using the Revised Clinical Interview Schedule (CIS-R) (Lewis et al., 1992) to confirm the diagnosis of depression. This interview has been used in Pakistan earlier (Husain et al., 2014a).

A total of 338 women scored 14 on CISR. Out of these, 247 (73.08%) women met the study criteria: met diagnosis of depression, aged 18 to 35 years, and planning to reside in the study area for 6 months were included in the study. Women with psychosis or a diagnosed physical condition requiring ongoing treatment were excluded. Depressed women recruited into the study were assigned randomly to intervention or routine care arms by an independent trial center in

Karachi. Assessment was conducted by trained research assistants separately for each participant. Out of 247 women, 123 were randomized into intervention and 124 into routine care group. A total of 112 mothers from the intervention group and 110 mothers from routine care group completed the intervention and third month follow up assessments at the end of intervention. A total of 110 mothers from the intervention group and 96 mothers from the routine care group completed the six month follow up assessment after the baseline by blind raters; it was ensured throughout that the raters remain masked for assessment and participants were asked not to share the details of their intervention to the raters. Data on demographic and socio-economic status was also collected.

2.5. Study Intervention

The intervention, called LTP Plus, consisted of 10 group sessions delivered weekly in 60 90 minutes over 12 weeks. The intervention was delivered by graduate psychologists with limited clinical experience; however, they were supervised regularly by a senior clinical psychologist to ensure the fidelity of the intervention. Case conferences were held on a regular basis to discuss each group session. LTP Plus comprised of two components Learning Through Play (LTP) and Thinking Healthy Program (THP). Each session was designed to include both components to form the LTP Plus intervention. The participants also continued to receive treatment as usual which consisted of routine follow-ups by lady health workers or traditional birth attendants. The LTP programme is intended to provide parents with developmentally appropriate messages to stimulate early child development in a culturally appropriate format. The central feature of the programme is a pictorial calendar devised for parents which depicts eight successive stages of child development from birth to 3 years along with illustrations of parent-child play and other activities that promote parental involvement, learning, and attachment. The first version of the LTP calendar a pictorial booklet showing child development stages and play activities in each age and stage, was developed by the Toronto Public Health department for use by lay home visitors working with at-risk, multi-ethnic parents and children. It was later revised by The Hincks-Dellcrest Centre (2002). The Learning Through Play (LTP) calendar is accompanied by a comprehensive training manual for workers (Ashem, 2002) which provides additional information on child development and techniques on how to conduct group or individual sessions for parents using the calendar as a focus. LTP is a low-cost intervention since homemade toys, books, and materials found commonly in the home are used to keep costs down to the minimum. The programme can be carried out by a variety of non-specialist staff (e.g. health workers, day care workers, lay home visitors) after appropriate training. The programme is flexible and can be delivered in a variety of formats with individual parents or groups of parents (e.g. a one-week workshop integrated with routine antenatal and postnatal visits, or spread over the first 3 years of the child s life with parent groups conducted at regular intervals). The LTP calendar is a relatively inexpensive and simple tool that relies minimally on the literacy of the parents. These attributes make it suitable for use in developing countries. Anecdotal evidence of the calendar s usefulness has come from India, China, Philippines, the Middle East, Peru, El Salvador, the Caribbean, and Canada. For the current study in Pakistan, we used the Urdu version of the calendar and the translated manual. Both the THP and LTP were field-tested and were used in our previous studies (Rahman, 2007; Rahman et al., 2009).

The THP manual includes step-by-step instructions for each session organized into five modules. Each module focuses on the following three areas: the mother s personal health, the mother-infant relationship, and the psychosocial support of significant others. The THP adopts a here and now problem-solving approach. It uses CBT techniques of active listening, changing negative thinking, collaboration with the family, guided discovery (i.e. style of questioning to both gently probe for the family s health beliefs and to stimulate alternative ideas), and homework (i.e. trying things out between sessions, putting what has been learned into practice) while educating participants about symptoms of depression, correlates and management, offering social support, and giving practical advice on using healthcare.

The LTP Plus supervisors carried out direct observation of the delivery of 2 sessions for each group. This observation aimed to assess the extent to which the LTP Plus THP contents were delivered as it was intended, by the group facilitator. Other than regular peer group supervision which also involved role plays the facilitators were provided with constructive individual feedback by the supervisor following observation of the sessions.

2.6. Treatment as Usual

The control group received treatment as usual which consisted of routine follow-ups by lady health workers or traditional birth attendants. Each Lady Health Worker (LHW) serves a population of 1,000 people in the community and also extends her services in the catchment population through monthly home visits. Their work includes covering all aspects of maternal, new born and child care. Province of Sindh has poor indicators in terms of maternal and child health care during and after pregnancy. The LHWs also provide family planning support and are also trained and taught about community organization, interpersonal communication skills, nutrition and child health i.e. Acute Respiratory Illness. The program of immunization is also carried out by LHWs. Moreover, hygiene domain is also covered by LHWs the focus of which is on clean drinking water and sanitation.

2.7. Primary Outcome Measure

Maternal depression was assessed using the Edinburgh Postnatal Depression Scale (EPDS) (Cox and Holden, 2003). This is a 10-item, self-report questionnaire and each item has four possible responses scored from 0 to 3. For example I have felt happy , where 0 = *Yes, all the time* 1 = *Yes, most of the time*, 2 = *No, not very often* and 3 = *No, not at all.* Cutoff score 12 was suggestive of depression and depression was sever with high EPDS score (Husain et al., 2011). It is the most widely used tool developed specifically to screen r postpartum depression (Scope et al., 2013) and has shown good psychometric properties in Pakistan (Husain et al., 2012, 2014a; Rahman et al., 2005).

2.8. Secondary Outcome Measures

The Hamilton Depression Rating Scale (HAM-D) (Hamilton, 1967) was administered to assess the severity of depression. It is a clinician-rated instrument and in this study it was administered and rated by masters level research assistants. HAM-D has been used earlier with Pakistanis in the UK (Gater et al., 2012) and in an earlier study in Pakistan (Husain et al., 2011).

The Parenting Stress Index (PSI) Urdu version was used to identify stress in the parent-child relationship. PSI is designed for the early identification of parents who are at risk for dysfunctional parenting, children with behavioral and emotional problems, and parenting and family characteristics that fail to promote normal development and functioning in children (Abidin, 1982). The higher the score the greater the parenting stress.

The Urdu version of the Rosenberg Self-Esteem Scale (Rosenberg SES) (Rosenberg, 1965)was used to measure self-esteem and personal worthlessness (Husain et al., 2014b). A higher score reflects a higher level of self-esteem.

The Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet et al., 1988)was used to measure perceived social support. The MSPSS has been translated into Urdu and this has been used in earlier studies in Pakistan (Husain et al., 2006). The lower the score the lower is the perceived social support.

The Brief Disability Questionnaire (BDQ) (Von Korff et al., 1996) was used to assess disability. This questionnaire assesses disability in everyday activities and is comprised of 8 items rated from 0 (not at all impaired) to 2 (moderate or definitely impaired). Maximum possible score is 16 while disability will be higher the higher the total score. In this study the Urdu language version was administered which has been already used in Pakistan (Husain et al., 2011).

Mothers knowledge and attitudes about the zero-to-36 month s stage of development was assessed at baseline and at 3 and 6 months using a specially developed Infant Development Questionnaire (IDQ). Higher score suggest greater knowledge of mothers regarding child development (Caldwell, 1967).

The children s weight and length (or height) was measured by standard anthropometry procedures used in an earlier study in Pakistan (Rahman et al., 2004b).

All the instruments have been used in Pakistan and are available in the local Urdu language.

2.9. Statistical Analysis

Intention to treat analysis was conducted. Preliminary analysis examined missing data patterns and the relationship between baseline characteristics and missing outcome data. Any characteristics found to be predictors of missing baseline scores data were included in the final model to satisfy the assumption of maximum likelihood estimation that the data were missing at random. To allow for the clustering effect of the treatment groups in the intervention arm, two-level linear mixed models were used for primary and secondary analysis, with a random effect to measure between-group variation in the intervention arm. Treatment effect was estimated after adjusting for baseline outcome score, mother s age, mother s education, baby s gender, socioeconomic status, and baby s standardized weight. Heteroscedasticity was allowed for to prevent bias in the estimate of the variance components (Roberts and Roberts, 2005). Analyses were conducted in Stata 11 (StataCorp, 2009).

RESULTS

Total 247 mothers participated in this study of them 124 (50.2%) were in treatment as usual (TAU) group while 123 (49.8%) were in LTP Plus group. Table 1 presents the demographic data for the routine and intervention groups. The groups were comparable across demographic characteristics. There were 13% missing outcome data at 3 months and 17% at 6 months. Logistic regression was used to find predictors of the missing data. The baby s age, weight, standardized weight, and height significantly predicted missing outcomes at 3 months but only weight and standardized weight were significant at 6 months (Fig. 1).

A total of 11 mothers (8.9%) did not attend any LTP Plus group sessions; 18 (14.6%) attended 1-3 sessions; 30 (24.4%) attended 4-7 sessions; and 64 (52%) attended 8-10 sessions. The mean number of sessions attended by the mothers was 6.4 (SD 3.4).Maternal depression is presented in Table 2 as mean EPDS scores for the LTP Plus and TAU

Table 1
Demographic Information.

		Control (n = 124)		Intervention (n = 123)	
		n	%	n	%
Mother s information					
Marital status	Married	124	100	123	100
Status of house	Owned	52	41.94	56	45.53
Access to clean drinking water?	No	81	65.32	87	70.73
	Yes	43	34.68	36	29.27
Mode of household waste disposal	In box with/without cover	68	54.84	71	57.72
	Outside the house	56	45.16	52	42.28
Work for income outside the house?	No	97	78.23	92	74.80
	Yes	27	21.77	31	25.20
Education	No education	99	79.84	81	65.85
Loss of a child?					
	Yes	34	27.42	44	35.77
Place of delivery	Maternity home/city/Town Govt. Hosp	56	45.16	53	43.09
Delivery conducted by	Local dai	65	52.42	68	55.28
Currently breastfeeding?	Yes	103	83.06	101	82.11
		Mean	**Std. Dev**	**Mean**	**Std. Dev**
Mother s age		27.26	5.50	28.20	5.47
Number of family members		8.94	4.60	7.86	3.96
Total monthly income (in rupees)		6266.13	2990.12	5910.57	2867.31
Total number of children		3.98	2.23	4.33	2.32
Fatherss information					
Education	No education	70	56.45	69	56.10
Income	Unemployed	19	15.32	15	12.20
Socioeconomic Status					
Have any debt?	Yes	75	60.48	77	62.60
Slept hungry in the last month?	Yes	52	41.94	57	46.34
Child s information					
Sex	Male	64	51.61	62	50.41
Vaccinated?	Yes	52	41.94	58	47.15
		Mean	**Std. Dev**	**Mean**	**Std. Dev**
Age (months)		15.34	8.41	15.62	8.36
Weight (kg)		9.82	3.48	10.97	3.79
Height (cm)		71.67	9.77	73.07	8.91
Days of diarrhoea		3.14	4.81	3.51	5.83
Days of chest infection		3.57	5.48	4.58	7.13

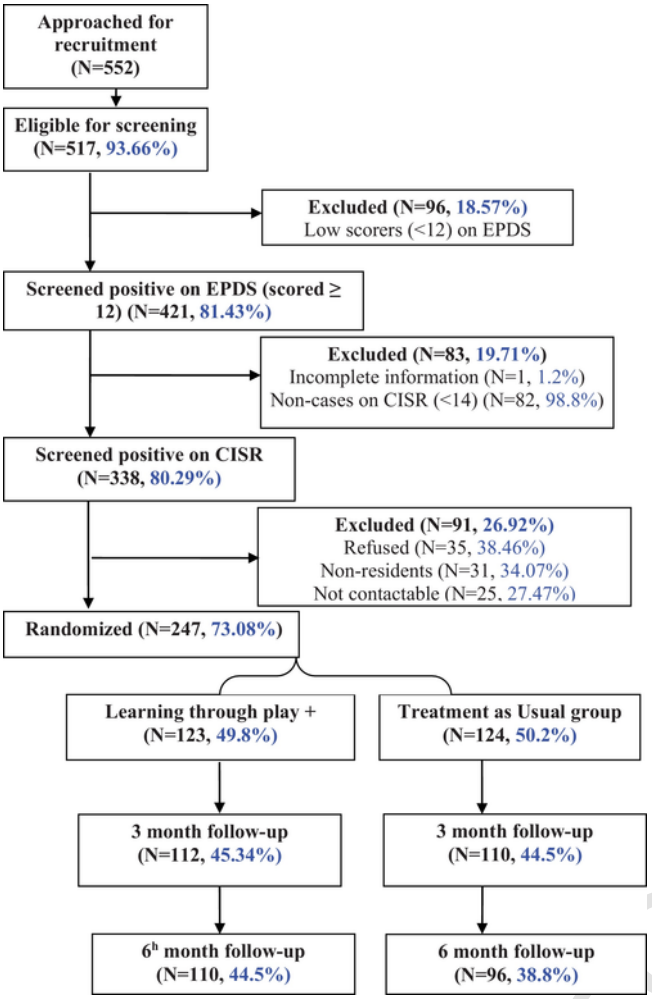

Fig. 1. Flow of participants through the Trial.

groups at baseline and follow-up alongside the adjusted mean difference. At both 3 and 6 months, the LTP Plus group had lower mean depression scores than the routine group, significant after controlling for the mother s age, mother s education, baby s sex, socioeconomic status, and standardized weight. The intra cluster correlation coefficient (ICC) was large, with 44% of the unexplained variation in outcome between intervention groups. This may have been due to the relatively small number of intervention groups.

Growth velocity was measured as the change in the baby s unstandardized height and weight from baseline to 6-month follow-up (Table 3). Table 4 shows that both height and weight were lower in the control group at each measurement occasion. However, the growth velocity did not significantly differ between groups after controlling for the set covariates.

Secondary outcomes adjusted for baseline outcome score, mother s age, mother s education, sex of baby; socioeconomic status and standardized weight, with random effects for intervention and control groups are presented in Table 5. It shows that mothers in the LTP Plus group also had lower levels of depression at both time points when measured using the HAM-D scale.

The LTP Plus group displayed significantly lower scores of parental stress and disability at both time points and had significantly higher self-esteem at 3 months. No significant difference was found for perceived social support between control and intervention group. IDQ scores were significantly higher for mothers in the LTP Plus group at 6 months. (Table 5)

3. DISCUSSION

This randomized trial from two deprived urban slums in a low-income country shows that an integrated intervention combining cognitive behavioral techniques with parent-mediated, structured child play and interaction had a positive impact on maternal mood and led to a reduction in maternal depression. The intervention reduced maternal disability and parenting stress markedly, and led to improved maternal self-esteem. The intervention also improved maternal knowledge and practices with regard to early child development. There was significant reduction in EPDS mean score among mothers in LTP Plus group both at 3 and 6 months. Similarly significant difference was found among mother in LTP Plus group for severity in depression measured

Table 2
Primary outcome adjusted for baseline Edinburgh Postnatal Depression Scale (EPDS), mother s age, mother s education, sex of baby, socioeconomic status and standardized weight, with random effects for intervention groups.

Intervention				Control			Adjusted mean difference (Intervention Control)	(95% CI)	P value	ICC
EPDS	Mean	SD	N	Mean	SD	N				
Baseline	15.89	2.70	123	15.85	3.08	124	n/a	n/a	n/a	n/a
3 Months	10.29	5.29	112	13.86	4.50	104	−3.65	(−6.14, −1.15)	0.004	−3.65
6 Months	9.08	4.64	110	12.14	3.46	95	−2.62	(−4.43, −0.81)	0.005	−2.62

Table 3
Unstandardized weight and height summary data of child.

	Weight (kg)						Height (cm)					
	Intervention			Control			Intervention			Control		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Baseline	10.97	3.79	123	9.82	3.48	124	73.07	8.91	123	71.67	9.77	124
3 Months	12.75	3.43	112	11.50	3.02	110	76.56	8.63	112	74.70	8.98	110
6 Months	14.36	3.21	110	12.69	3.02	95	79.57	8.16	110	77.13	8.64	95

Table 4
Growth velocity adjusted for baseline EPDS, mother s age, mother s education, sex of baby, socioeconomic status and standardized weight, with random effects for intervention groups.

	Intervention			Control			Adjusted* mean difference (Intervention -Control)	95% Confidence Interval	P value	ICC
	Mean change	SD	N	Mean change	SD	N				
Weight	0.48	0.21	110	0.49	0.23	95	0.04	(−0.02, 0.10)	0.177	0.000
Height	0.92	0.50	110	0.92	0.50	95	0.04	(−0.11, 0.18)	0.613	0.003

by a clinician rated scale, parental distress and disability both at 3 and 6 months while for self-esteem at 3 months and knowledge about infant development at 6 months. The study was successfully delivered in group settings in a routine primary care environment, demonstrating the potential for scaling up the programme and integrating it with maternal and child health programmes.

Compared with other trials of integrated interventions in low and middle income countries, we were successful in showing a strong positive impact on maternal depression. A South African study of the adaptation of the Health Visitor Intervention Programme incorporating principles of WHO s Improving the Psychosocial Development of Children programme (World Health Organization, 1999; Cooper et al., 1999) reported improvement in mother-infant interaction and attachment, but improvements in maternal mood were not significant. A recent systematic review also reported effectiveness of CBT in reducing postnatal depression (Scope et al., 2013). Group CBT when compared with usual care in two RCTs (Rojas et al., 2007; Honey, 2002) showed significant reduction in depressive symptoms using EPDS in intervention group. These findings are consistent with the outcome of our study. Conversely group CBT was also compared with waiting list in two nonrandomized studies andboth studies reported greater improvement of EPDS in intervention group (Highet and Drummond., 2004; Meager and Milgrom., 1996). In rural Pakistan, the LTP programme without the cognitive behavioral strategies for mothers resulted in significant improvements in maternal knowledge and practices for infant development but did not achieve improvements in maternal mood (Rahman et al., 2009).

.'There is however, evidence of the effectiveness of parenting programmes in improving maternal mood as well as child outcomes. For example, a study of an intervention conducted in Jamaica consisting of extensive social support (weekly half hour home visits by a health worker for up to 2 years) improved mother s knowledge, child rearing practices and self-esteem (Baker-Henningham et al., 2005). It also aimed to encourage age-appropriate play activities and responsive feeding through empathic listening and praise (Baker-Henningham et al., 2005). However, the sustainability and cost of such an intensive programme inhibits its scalability. In India, a group-based participatory intervention was conducted with a focus on maternal and neonatal health, clean births, and care seeking (Tripathy et al., 2010). Maternal depression, although not a direct focus of the intervention, showed significant improvement, possibly as a result of social support available within the group and acquisition of problem-solving skills. Both programmes were universal, i.e. were targeted at all women instead of depressed ones only.

Our intervention targeted depressed women and we believe that combining the psychosocial techniques with the play strategies facilitated delivery and led to a synergistic effect. For example, the positive maternal mood, self-esteem, and motivation necessary for optimal interaction with infants and toddlers were promoted through the various cognitive behavioral and supportive strategies of the THP. The structured infant and toddler play and interaction activities of the LTP programme provided a framework to apply techniques of behavioral activation, where tasks were broken down into smaller components and depressed mothers were supported in achieving them through encouragement and praise, thus leading to a reduction in depression and disability. Similarly, the structured child play and interactional activities of the LTP, when sufficiently mastered, had a positive impact on maternal self-esteem and mood. Thus the two approaches combined to create a positive loop that benefitted both outcomes.

While the cognitive behavioral component may have been the more active ingredient to address depressive symptoms, we call the intervention Learning Through Play Plus because it was less stigmatizing to the mothers and more acceptable to the wider community. The early child development agenda provided a non-stigmatizing entry point to engage the mothers and family members in the intervention. Earlier formative research (Rahman, 2007) has shown that many women do not view themselves as depressed, and have problems engaging in programmes that might label them as such. The early child development agenda helped engage not only the mother, but other significant family members including father and grandparents into the programme.

Furthermore, in low-income settings such integrated interventions should include other important key messages, such as those related to infant nutrition. An intervention incorporating the CBT techniques of the Thinking Healthy Programme into a combined child development and nutrition programme has been piloted successfully in rural Pakistan and is being evaluated for scaled-up implementation (Lewis et al., 1992). This is important especially in the context of South Asia where up to 45% of all infants are malnourished (ACC/SCN, 2000). The LTP programme is currently being delivered in 33 countries across the world and can provide a platform for scaling up the LTP Plus intervention combined with a nutrition component both for the mother and the child.

4. LIMITATIONS

The intervention was designed for ease of implementation in a community setting; but we cannot be certain that our results are generalizable as this study was conducted only in urban slums that do not represent the larger rural population of Pakistan. However, such psychosocial interventions have already been tried with positive results in other developing countries such as Jamaica (ACC/SCN, 2000). A further limitation of the study is that child cognitive, social and emotional development was not measured. However, the reduction in parental stress and improvement in knowledge and practice of child development could be expected to positively influence these outcomes.

Author s Contribution

NH had the overall responsibility of the project. All authors contributed equally in writing the manuscript. TK was involved in delivering training and recruiting participants. CR and SH were responsible for the analysis and reporting of findings. FL, NCand IBC were involved in providing supervision in analysis and writing the manuscript. MH, FN and AR were involved in providing supervision to the project research staff.

Table 5
Secondary outcomes adjusted for baseline outcome score, mother s age, mother s education, sex of baby, socioeconomic status and standardized weight, with random effects for intervention groups.

Intervention				Control			Adjusted mean difference (Intervention − Control)	Effect size (adjusted mean difference/pooled SD of baseline)	(95% CI)	P value	ICC
Depression Severity	Mean	SD	N	Mean	SD	N					
Baseline	19.15	3.69	123	18.98	3.37	124					
3 Months	9.60	6.05	112	15.95	5.87	110	−6.33	−1.79	(−8.60, −4.06)	<0.001	0.189
6 Months	10.57	5.97	110	14.49	4.43	96	−3.08	−0.87	(−5.60, −0.56)	0.016	0.327
Parental Distress											
Baseline	44.34	8.39	123	44.53	7.48	124					
3 Months	26.43	11.00	112	35.14	8.07	110	−8.75	−1.10	(−13.58, −3.92)	<0.001	0.373
6 Months	26.35	10.80	110	34.56	12.69	96	−6.76	−0.85	(−11.54, −1.98)	0.006	0.265
Self-esteem											
Baseline	15.63	4.10	123	15.01	3.98	124					
3 Months	19.63	2.30	112	17.42	3.13	110	1.99	0.49	(1.10, 2.89)	<0.001	0.128
6 Months	19.14	2.75	110	17.83	3.23	96	1.02	0.25	(−0.09, 2.13)	0.072	0.179
Disability											
Baseline	9.38	4.20	123	9.02	3.51	124					
3 Months	4.05	2.76	112	6.49	2.47	110	−2.53	0.49	(−3.29, −1.78)	<0.001	0.016
6 Months	4.75	2.82	110	6.09	2.59	96	−1.31	0.25	(−2.38, −0.23)	0.017	0.188
Social Support											
Baseline	40.46	13.89	123	41.53	13.45	124					
3 Months	41.11	16.33	112	36.98	14.67	110	3.32	0.24	(−1.48, 8.13)	0.175	0.056
6 Months	38.96	16.88	110	35.55	17.90	96	1.62	0.12	(−4.73, 7.97)	0.618	0.141
Mother s Knowledge and Attitudes about child Development											
Baseline	91.93	10.76	123	90.73	10.57	124		0.15			
3 Months	100.57	6.39	112	99.00	7.27	110	1.61	0.39	(−0.57, 3.80)	0.148	0.089
6 Months	102.29	5.23	110	97.96	9.57	96	4.20		(1.95, 6.46)	<0.001	0.000

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