Longitudinal effects of perinatal social support on maternal depression: a marginal structural modelling approach

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Abstract

Background: Depression in the perinatal period, during pregnancy or within one year of childbirth, imposes a high burden on women with rippling effects through her and her child's lifecourse. Social support may be an important protective factor, but the complex bidirectional relationship with depression, alongside a paucity of longitudinal explorations, leaves much unknown about critical windows of social support exposure across the perinatal period and causal impacts on future depressive episodes.

Methods: This study leverages marginal structural models to evaluate associations between longitudinal patterns of perinatal social support and subsequent maternal depression at 6 and 12 months postpartum. In a cohort of women in rural Pakistan (n=780), recruited in the third trimester of pregnancy and followed up at three, six, and 12 months postpartum, we assessed social support using two well-validated measures: the Multidimensional Scale of Perceived Social

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Support (MSPSS) and the Maternal Social Support Index (MSSI). Major Depressive Disorder was assessed with the Structured Clinical Interview for DSM IV.

Results: High and sustained scores on the MSPSS through the perinatal period were associated with a decreased risk of depression at 12 months postpartum (0.35, 95% CI: 0.19, 0.63). Evidence suggests the recency of support also matters, but estimates are imprecise. We did not find evidence of a protective effect for support based on the MSSI.

Conclusions: This study highlights the protective effect of sustained social support, particularly emotional support, on perinatal depression. Interventions targeting, leveraging, and maintaining this type of support may be particularly important for reducing postpartum depression.

Keywords

Introduction

Perinatal depression (PND), depression symptoms during pregnancy or within one year postpartum, imposes a high burden in low- and middle-income countries (LMIC).[1] As many as 19% of women in LMICs have a depressive episode within three months of giving birth.[2] PND imposes its own disease burden and has further implications for maternal and child physical outcomes.[3] Understanding the risk and protective factors for PND across the perinatal period facilitates evidence-based design of interventions to target the burden and sequelae of PND in LMIC.

Social support and social relationships promote health and well-being, reduce stress, and enhance quality of life.[4,5] Social support is widely recognized as multi-dimensional, consisting of support characterized as emotional, informational, appraisal, and instrumental.[6] In this study, we focus on emotional and instrumental support. Emotional support is the subjective notion that an individual has a social network that is caring and available to them. Social theory posits that emotional support is more strongly associated with mental health than other forms.[7] Instrumental support refers to the types of tangible help others may provide (e.g., help with cooking).[8] There are known behavioral, psychological, and biological mechanisms through which social support influences health outcomes, including PND.[9] Previous studies have found that appropriate and wanted organized support during pregnancy protects against PND through biological sensitivity to psychological distress (i.e., cortisol response).[10] For instance, one study found supportive prenatal groups lessened pregnant women's pregnancy-related stress.[11]

Although most literature conceptualizes and assesses social support as unidimensional,[12] different domains of social support (e.g., emotional, instrumental) may have different trajectories over time or relationship to PND.[13] In countries where intergenerational households are typical, the types and effects of social connectedness may manifest differently compared to other settings.[14] For example, in South Asia, intergenerational households may provide more instrumental support for everyday tasks compared to nuclear households. This relationship is particularly important to understand for women

in persistently adverse environments, where norms and expectations around different types of social support may vary.[15] For depression in particular, perceived support may impact depression severity or recovery more than objective instrumental support as one's perception is most likely to affect behaviors and well-being.[16] Additionally, most research has examined social support related to PND symptoms, leaving much to be learned about social support's effects on clinically relevant depression.

Furthermore, the relationship between PND and social support is likely cyclical, with improvement in depressive symptoms leading to improvements in social support and vice versa.[17] Because of this, depression interventions themselves sometimes target social support as a part of treatment. In Pakistan, the location of focus for this study, we found that a peer-delivered psychosocial intervention modestly improved perceived social support among prenatally depressed women at six months, but not three months post-partum.[18] However, to date, most research assessing the relationship between social support and PND, including our earlier study that only focused on the intervention, fails to account for this complexity.[19–21] To our knowledge, only one study has addressed the methodological challenge of the bidirectional relationship between social support and maternal depression.[12] Zhong and colleagues found the number of people providing support, moreso than satisfaction with social support, was protective against antepartum depression symptoms in Peru.[12] However, this study captures only two time-points during pregnancy, and does not account for social support following childbirth when there is likely an increase in needs and stress.[12] Understanding social support prenatally, soon after birth, and further into the postpartum period is necessary for informing the timing, design, and evaluation of PND interventions. In our study, we assessed social support and PND at four time-points: during the third trimester of pregnancy, and at 3, 6 and 12 months postpartum.

This research addresses these gaps with longitudinal data that follows mothers from their third trimester through their child's third year of life[22]. We used multiple time-varying measures of social support to estimate the average causal effect (ACE) on PND outcomes at six months and one year postpartum, accounting for both pre- and postnatal social support.

Methods

Study sample

This study was designed to leverage longitudinal data from the Bachpan Cohort, a representative sample of mothers followed from their third trimester of pregnancy through the postpartum period.[23] Between 2014 and 2016, all third trimester pregnant women in rural Rawalpindi, Pakistan were screened for PND. Embedded within the cohort was a cluster-randomzied control trial where positively screened women (10 on the Urdu-validated Patient Health Questionnaire-9) enrolled in the treatment arm received a low-intensity peer-delivered psychosocial intervention.[24] Findings specific to this cRCT have been reported elsewhere [18,25]. To build a population representative cohort, for every depressed woman enrolled, the next eligible woman that screened as non-depressed was asked to participate in the cohort. At baseline, 1,154 women were enrolled. We used all data for participants with information on perceived and instrumental social support and PND from baseline, three, six, and 12 months postpartum (n=783).

Social support

We measured social support in two ways. The 12-item Multidimensional Scale for Perceived Social Support (MSPSS), adapted for the Pakistani context, assesses perceived support from family, friends, and a significant other across multiple sub-domains (e.g., "Your friends really try to help you," etc.). Although not regarded as a measure of "emotional support," per se, the majority of MSPSS items elicit subjective assessments of types of support that are more affective in nature. In contrast, the Maternal Social Support Index (MSSI) measures maternal reports of task-based support, eliciting who provides instrumental assistance with eight tasks (e.g., meal preparation). Primaparous women did not answer the child-specific MSSI questions at baseline, and we dropped these three items to have a comparative score across parity and time-points. We totaled the times a woman indicated she did a task alone for each item so that higher scores indicated less support. Both measures were administered at baseline and three months, with the MSPSS additionally administered at six months. For both measures, we split total scores into tertiles and compared the two highest tertiles for comparison to the lowest tertile. For MSPSS, the tertile cutoffs were >4.38 and >5.50. For MSSI, the tertile cutoffs were >0 and >1. Therefore, high MSPSS was defined as having a score greater than 4.38 and high MSSI was defined as having a score greater than 0 (Supplemental Table 1).

Perinatal depression

PND was assessed using the Structured Clinical Interview for DSM IV Disorders (SCID) module for current major depressive episode at baseline, three, six, and 12 months postpartum. The SCID has been culturally adapted for assessing depression among pregnant and postpartum women and has been used extensively in South Asia. The outcome was SCID diagnosis at 12 months for MSPSS and SCID diagnosis at 6 months for the MSSI.

Confounders

Self-reported maternal age (continuous), maternal education (none, primary, middle, secondary, higher secondary, tertiary), intimate partner violence (IPV) experienced in the past 12 months (yes/no), parity (continuous), child's sex (male/female), socioeconomic status (quintiles), and study treatment arm (intervention/control) were collected at baseline.

Statistical analysis

The marginal structural models (MSM) for ACE of social support on PND were estimated with inverse probability weighted estimating equations with robust standard errors (Supplement 1).[26] Inverse probability of treatment weights (IPTW) account for observed confounders and the intermediary role of depression and social support at multiple time-points by constructing a weighted population where the observed confounders are no longer related to social support (Figure 1)[26]. Stabilized IPTW were calculated as

$$IPTW = \frac{\Pr(SS_0 = s)}{\Pr(SS_0 = s \mid W, D_0)} \times \frac{\Pr(SS_3 = s \mid SS_0)}{\Pr(SS_3 = s \mid W, SS_0, D_0)} \times \frac{\Pr(SS_6 = s \mid SS_3)}{\Pr(SS_6 = s \mid W, SS_3, D_3)}$$

where time is indicated by subscripts, *SS* is social support, *W* is baseline confounders, and *D* is PND. Weights were calculated separately for MSPSS and MSSI. To account for potentially informative loss-to-follow-up by observed characteristics, stabilized inverse probability of censoring weights (IPCW) were calculated as

$$IPCW = \frac{\Pr(C_3 = 0 \mid SS_0)}{\Pr(C_3 = 0 \mid W, SS_0, D_0)} \times \frac{\Pr(C_6 = 0 \mid SS_3)}{\Pr(C_6 = 0 \mid W, SS_3, D_0)} \times \frac{\Pr(C_{12} = 0 \mid SS_6)}{\Pr(C_{12} = 0 \mid W, SS_6, D_0)}$$

for which *C* indicates being lost-to-follow-up. IPCW account for informative loss-to-follow-up by creating a weighted population where the covariates included in the IPCW model are no longer related to censoring. Rather than assume loss-to-follow-up is uninformative, IPCW instead assumes that loss-to-follow-up is uninformative conditional on the variables include in the weight model. Sampling weights, IPTW, and IPCW were multiplied together. These weights were used to estimate a saturated model including only social support. Under the identification assumptions, the estimated parameters in our model unbiasedly estimate the ACE if everyone had high social support at each time compared to if everyone had low social support at each time. All analyses were conducted using Stata, version 16.0.

Results

A total of 781 women had relevant data across all timepoints through six months and 744 through 12 months. On average, women were 27 years old and 71% had at least another child (Table 1). About 30% of women completed less than primary education, and 45% reported IPV in the last year. PND, defined using the SCID, decreased over time: 37% of women were diagnosed at baseline, 15% at three months, 12% at six months, and 18% at 12 months. Details regarding MSPSS and MSSI tertile cut offs are in Supplemental Table 1. Over time, scores on both the MSPSS and MSSI increased and remained higher among women who were not depressed. For example, among those diagnosed with SCID at six months, 47% had high perceived support at that time. Among those not depressed at six months, 83% had high perceived support. Means of the MSPSS and MSSI over time, stratified by depression status, can be found in Supplemental Table 2.

We now present results estimating the causal effect of longitudinal patterns across all timepoints (pregnancy, three and six months postpartum) of high and low perceived and instrumental social support on perinatal depression at 12 and six months respectively. High MSPSS at all time-points reduced the 12-month prevalence of SCID diagnosis compared to low MSPSS throughout follow-up (Figure 2). Specifically, if all women had high MSPSS from baseline until six months postpartum, depression prevalence at 12 months would have been 0.35 (95% CI: 0.19, 0.63) times that of if all women had low social support from baseline to six months postpartum. Alternatively, if all women only had high MSPSS at six months, depression prevalence at 12 months would have been 0.76 (95% CI: 0.42, 1.36) that of having low MSPSS at all time points, though this estimate was imprecise. Similarly, if all women had high MSPSS in pregnancy or three months and then lost it, they would have had a lower prevalence ratio of SCID diagnosis at 12 months postpartum compared to all women having low MSPSS between pregnancy and six months, although these estimates are imprecise.

If all women reported high MSSI at either pregnancy or three months, they would have had a reduced prevalence ratio of PND at 12 months postpartum compared to if all had low MSSI during follow-up; but these results are imprecise (Figure 3).

Sensitivity Analyses

To explore instability of results due to social support cut-offs, we repeated the main analysis with MSPSS and MSSI using a median cut off (Supplemental Figures 1 and 2). While point estimates differ, the substantive conclusion that sustained high perceived support is protective of clinical depression was consistent (Supplemental Figure 1). However, reporting high MSPSS at six- or 12-months was more precise for some protective effects.

When constructing IPCW, child gender and time-varying depression were excluded from the weighted model due to the mean of the IPCW being far from 1. Analyses were repeated including time-varying depression and child gender (Supplemental Figures 3–6). Point estimates were closer to the null than the main analyses. However, the substantive conclusion that sustained high perceived support was protective of clinical depression remained (Supplemental Figures 3 and 5). Finally, we conducted a sensitivity analysis estimating the ACE of MSPSS on depression at 6 months with similar patterns in the main analyses, described in Supplemental Figures 7–10.

Discussion

In this longitudinal cohort study, our results suggest that women with sustained high scores on the MSPSS, capturing perceptions of primarily emotional support, between pregnancy and six months postpartum had reduced prevalence of clinically significant depression at 12 months postpartum. We also found that if all women with high MSPSS scores experienced a decrease during this time period, they would not have a substantially decreased depression prevalence relative to all women scoring low on the MSPSS at all time-points. In contrast to other studies, we find that it is not the timing of perceived support during this period that matters but that it is sustained over time.[11] These findings may be particularly important given the increased deployment of psychosocial interventions to address both treatment gaps for mental illness and child development.[27]

As in previous studies, we find that high amounts of perceived social support reduce the risk of perinatal depression; however many of these studies are restricted to assessing social support only during pregnancy or at a single time-point, limiting the ability to account for the bidirectional relationship of depression and social support.[12,28–31] With their longitudinal approach, Xie and colleagues found that, among women in China, both low subjective and objective social support measured in the third trimester and at two weeks postpartum were associated with increased risk of postpartum depression at two weeks, with stronger effects when social support was measured concurrently.[32] As with many other studies,[29,33] their analytic approach did not account for cumulative impacts of social support received over the perinatal period, did not measure prenatal depression, and had limited follow-up postpartum. Given that postpartum depression onset can occur within 12 months postpartum and that support levels may wane in the months following childbirth, they were unable to capture important information. Zhong and group used the MSM approach

to evaluate the effects of perceived support and number of support providers on antenatal depression among women in Peru conditional on baseline characteristics.[12] They found minimal effects of low perceived social support on increased risk of depression, and a more robust signal that a higher number of support persons decreased antenatal depression risk. Again, this analysis only captured prenatal depression. Li's group reported that social support was associated with current depression from pregnancy through one month postpartum but that perceived social support in pregnancy did not predict depression in future time-points.[30] These findings, along with ours, point to the importance of repeatedly assessing social support and ensuring its continuity.

The subjective assessment of support may be particularly important in the context of depression prevention or alleviation. However, untangling if it is the type, source, and amount of social support that provides the most protective effect is difficult and unclear given existing literature. For example, Reid and colleagues found that the variety of support providers in a woman's social network is important to protect against postpartum depression in the USA.[34] Tang et al note that, in China, the relationships with social support providers matter deeply in the context of maternal depression, so that, even if support is provided, conflict may impede positive effects. This indicates that the type, source, and amount may differ by culture and context.[35] Despite an increase in the number of tasks done alone following childbirth, we do not find women's reports of task-specific instrumental support to be associated with PND 6 months postpartum. Our MSSI results may indicate that the relationship between this type of support and PND may not be as strong as the relationship between more emotional aspects of perceived support, reflected in the MSPSS, and PND, which also contrasts with other studies that find both protect against PND.[13] This may be because much instrumental behavioral support is already embedded into the daily activities and distribution of household chores in the multigenerational familial context in rural Pakistan.[36] Instrumental support may, for example, be more important in contexts where nuclear household structures and single parenthood are more common and the need for help is more pronounced.[34] In Pakistan, another element of postpartum support, *chilla*, a traditional postpartum practice in which women receive relief from household work, additional familial support, and supplemental food for up to 40 days postpartum, protects against poor perinatal mental health[5]. In this same population, increased father involvement in childcare is protective of maternal depression.[37] Our findings in light of other work in this region highlight the importance of interventions and associated research to assess and address the type of social support most salient in the culture and context.[38]

Scholars have pointed to the 'stress buffering hypothesis' to explain the benefits of social support for mental health.[13,39] Indeed, an increase in support can relieve the increased demands associated with child rearing. Some scholars have found that this effect privileges those of lower SES or those following traditional gender norms. Others have found that the source of support matters in the type of stress alleviated. For example, Razurel and colleagues note that partner support buffered the effects of stress on depression but maternal, friend, or professionally sourced support did not.[40] Other investigations have found no buffering of social support on the effects of stress and depression. Our study does suggest a causal buffering effect of sustained perceived social support sourced from family and friends on clinical depression, highlighting that source and type are indeed culturally and

contextually meaningful. Indeed, all of the aforementioned studies call for social support to be leveraged through interventions targeting maternal depression and psychosocial stress. Singla and colleagues reported that social support was an important mediating component of a behavioral activation-focused intervention treating perinatal maternal depression.[41] Our findings provide important evidence that, in rural Pakistan, interventions that address and develop strategies to maintain perceived emotional social support may be particularly effective at buffering the risk of clinical depression after childbirth.

To estimate the ACE of social support on PND, we relied on several assumptions: causal consistency, conditional exchangeability, positivity, and correctly specified parametric models. Causal consistency stipulates that all methods of increasing social support categories are equivalent.[42] One potential threat to this assumption is that differentiating sources of social support lacked some cultural salience (i.e., friend and family support is often synonymous). Conditional exchangeability requires that all common causes of social support and depression are measured and no residual confounding occurs. The set of confounders were determined *a priori*. Positivity requires that all individuals have a non-zero probability for social support and covariate categories. Due to high data dimensionality, random violations of positivity occur. We relied upon parametric models to allow for some variable combinations to have zero probabilities due to random chance. Additionally, we are unable to account for lifetime history of depression. Indeed, prior history of depression may systematically affect reporting of social support so that we only find impacts on sustained perceived support. Specifically, it is possible that depressive symptoms bias individuals towards reporting lower levels of perceived support.[43,44] Our findings should thus be interpreted with this in mind.

To estimate the ACE, we assume no selection bias, no measurement error, and that all missing data are missing at random. Selection bias is assumed to be accounted for by sampling weights. To account for selection bias due to informative loss-to-follow-up, we used IPCW. Measurement error is most pertinent for social support scales. For social support categories, we relied on percentiles that result in information loss. However, our results were substantively similar across several potential cut-points. Additionally, MSPSS and MSSI were adapted but not validated for Pakistan. Lastly, several questions that pertained to children, and were only answered by women who had a child at baseline, were excluded from the MSSI score calculations to retain the original target population. Finally, we assume that all missing data aside from SCID is missing completely at random. Due to the minor extent of missing data, it is unlikely our complete case analysis differs from imputation or weighting approaches to account for missing data.

Despite the aforementioned considerations, our study has multiple meaningful strengths. First, we used analytical methods that account for the bidirectional relationship between social support and depression for the pre- and postnatal periods to estimate the causal impact of social support on perinatal depression. We also assessed the clinical levels of depression rather than depression screening instruments, making our results highly relevant to clinical settings. We used longitudinal data and examined the cumulative effects of social support, providing a fuller picture of women's supportive environment over time; and we assessed two distinct aspects of social support, emotional aspects and instrumental assistance.

In summary, we find that had all women sustained high levels of primarily emotional, or affective, social support during pregnancy and postpartum, the prevalence of depression at 12 months postpartum would have been lower, but that reported instrumental support was not protective in this sample. Our results point to the importance of longitudinally assessing the complex, bi-directional relationship between social support both pre- and postnatally and the individual components of social support. This finding highlights the protective effect of sustained social support on PND, providing the opportunity for programs to measure social support pre- and postnatally to identify women most vulnerable to depression. Interventions can then focus on leveraging and maintaining this type of support to protect against clinically significant PND.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

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What is already known on this subject?

Social support is known to be protective against perinatal depression, particularly in low- and middle-income settings. Yet, most work has neither explored the multidimensional nature of social support nor its complex bidirectional relationship with depression. Doing so is critical for informing the timing, design, and evaluation of perinatal depression interventions.

What this study adds?

We find evidence that sustained social support in the perinatal period is protective against subsequent clinical depression at one year postpartum. Emotional support appears to be more clearly associated with depression than instrumental support, but evidence suggests that episodic patterns of either at any time throughout the perinatal period are not associated with clinical depression at one year postpartum. Application of methods that can appropriately account for time-varying confounders enable us to better identify the relationship between social support and depression. Interventions that increase and sustain social support throughout the perinatal period may be particularly effective to reduce the risk of depression in low-resource settings.
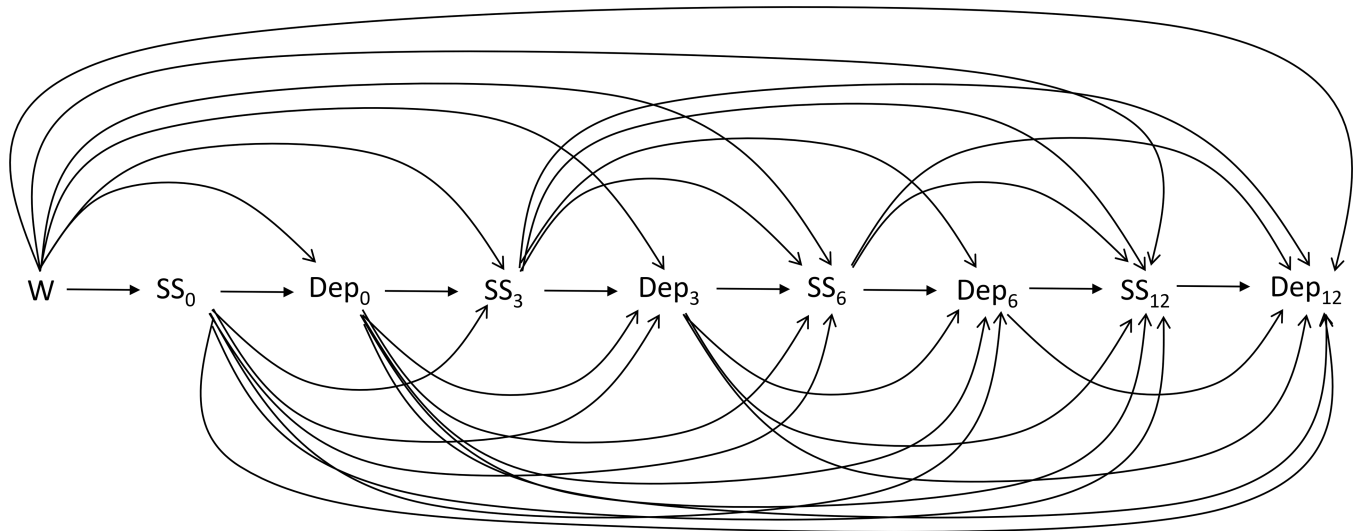
Figure 1.
Directed acyclic graph for the association of low social support and depression at 12 months postpartum, Bachpan Cohort, Pakistan. W represents the time-independent baseline covariates (parity, maternal age, maternal education, IPV experienced in the past 12 months, child gender, study arm, socioeconomic status). SS encompasses both perceived social support (MSPSS) and instrumental support (MSSI). $SS_i = 1$ if women perceived low social support at time i (i=0, 3, 6, 12) months postpartum; otherwise 0. $Depression_i = 1$ if women were depressed at time i (i =0, 3, 6, 12) months postpartum.

t_1 t_2 t_3		PR	95% CL
1 1 1		0.35	0.19, 0.63
1 1 0		0.84	0.44, 1.62
1 0 1		0.61	0.30, 1.23
1 0 0		0.82	0.35, 1.90
0 1 1		0.61	0.34, 1.10
0 1 0		0.73	0.36, 1.46
0 0 1		0.76	0.42, 1.36
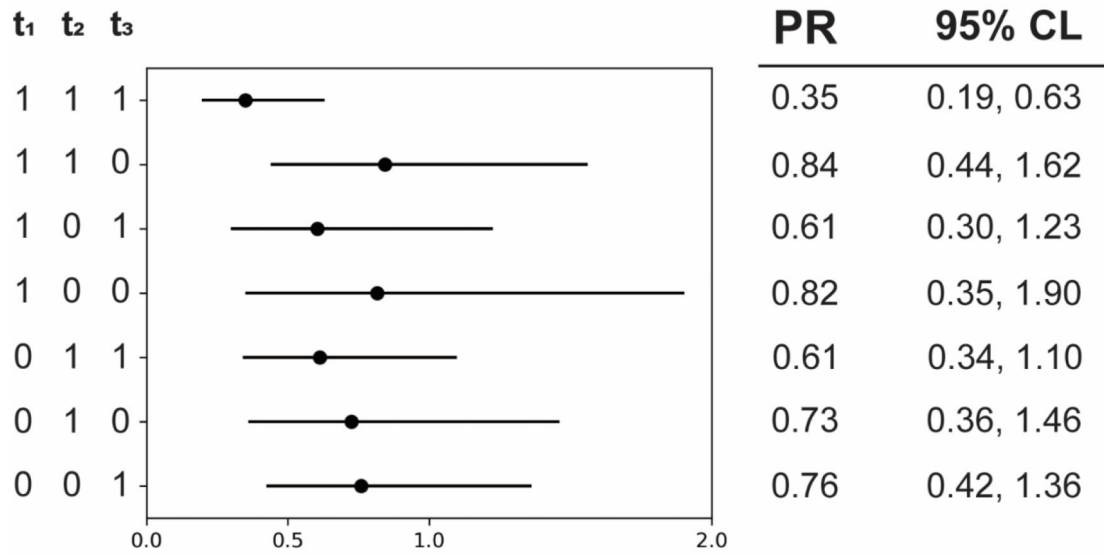
Figure 2: The average causal effect of perceived social support on perinatal depression at 12 months, Bachpan Cohort Study, Pakistan, N=744

PR: Prevalence Ratio, 95% CL: 95% confidence limit, t_1: baseline (third trimester of pregnancy) perceived social support, t_2: three months postpartum perceived social support, and t_3: six months postpartum perceived social support. Perceived social support was assessed using the 12-item Multidimensional Scale for Perceived Social Support adapted for the Pakistani context. Perceived social support was dichotomized as the two highest tertiles of total scores (indicated with a '1') for comparison to the lowest tertile (indicated with a '0'). Perinatal depression was assessed using the Structured Clinical Interview for DSM IV Disorders module for current major depressive episode at baseline, three, six, and twelve months postpartum.
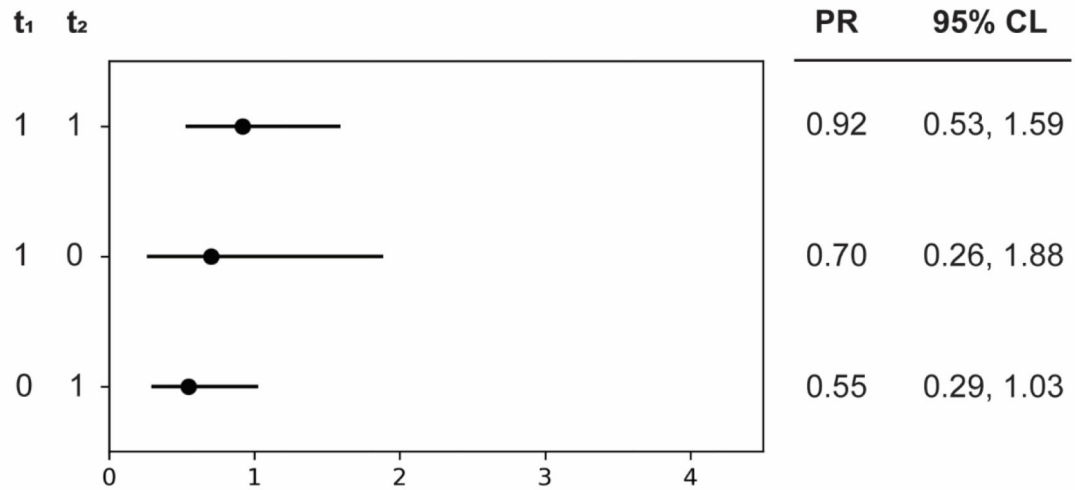
Figure 3: The average causal effect of instrumental social support on perinatal depression at 6 months, Bachpan Cohort Study, Pakistan, N=781

PR: Prevalence Ratio, 95% CL: 95% confidence limit, t_1: baseline (third trimester of pregnancy) perceived social support, and t_2: three months postpartum perceived social support. Instrumental social support was assessed using the Maternal Social Support Index excluding child related items. Instrumental social support was dichotomized as the two highest tertiles of total scores (indicated with a '1') for comparison to the lowest tertile (indicated with a '0'). Perinatal depression was assessed using the Structured Clinical Interview for DSM IV Disorders module for current major depressive episode at baseline, three, and six months postpartum.

Table 1:

Demographic, Social Support, and Depression Characteristics, Bachpan cohort, Pakistan[*]

| Characteristic		Total (N=1,154)		6 Months (n=780)				12 Months (783)			
				Depressed (N=97)		Non-Depressed (N=683)		Depressed (N=144)		Non-Depressed (N=639)	
		N/Mean	%/SD	N/Mean	%/SD	N/Mean	%/SD	N/Mean	%/SD	N/Mean	%/SD
Age		26.59	0.15	26.42	0.46	26.54	0.18	26.58	0.34	26.52	0.19
Education (years)	None	170	13.12%	17	20.96%	90	11.37%	38	24.94%	69	10.04%
	Primary (1–5)	226	17.88%	33	32.24%	118	15.94%	36	23.74%	115	16.45%
	Middle (6–8)	215	18.74%	15	15.08%	134	19.38%	25	19.97%	125	18.77%
	Secondary (9–10)	293	26.14%	23	21.50%	171	25.95%	27	19.22%	168	26.61%
	Higher Secondary (11–12)	109	10.05%	5	5.61%	74	11.59%	8	5.75%	71	11.86%
	Tertiary (>12)	141	14.07%	4	4.60%	96	15.77%	10	6.38%	91	16.27%
IPV	No	571	52.89%	33	37.52%	354	58.41%	46	35.11%	343	56.33%
	Yes	522	40.95%	61	59.36%	293	41.59%	93	60.48%	262	37.82%
	Missing	61	6.16%	3	3.12%			5	4.41%	34	5.85%
Parity (Baseline)	First Pregnancy	349	32.22%	20	21.57%	203	31.23%	32	23.66%	192	31.37%
	1–3 Children	699	59.84%	65	66.88%	428	62.11%	95	65.91%	399	61.97%
	4+ Children	106	7.95%	12	11.56%	52	6.66%	17	10.43%	48	6.66%
Child Gender	Male	506	45.02%	45	49.33%	342	50.64%	64	43.49%	323	51.53%
	Female	495	42.29%	52	50.67%	341	49.36%	80	56.51%	316	48.47%
	Missing	153	12.70%								
MSPSS Baseline	Low	396	28.50%	59	55.45%	208	25.68%	69	42.54%	201	26.64%
	High	758	71.50%	38	44.55%	475	74.32%	75	57.46%	438	73.36%
MSPSS 3 Month	Low	224	16.83%	47	46.08%	147	18.72%	59	38.58%	138	18.88%
	High	661	59.61%	50	53.92%	536	81.28%	85	61.42%	501	81.12%
	Missing	269	23.55%								
MSPSS 6 Month	Low	214	16.87%	52	52.82%	129	17.31%	55	37.15%	126	18.00%
	High	715	63.27%	45	47.18%	554	82.69%	89	62.85%	513	82.00%
	Missing	225	19.85%								
MSSI Baseline	Low	390	35.66%	29	30.48%	241	36.93%	41	29.32%	230	37.60%

Characteristic		Total (N=1,154)		6 Months (n=780) Depressed (N=97)		6 Months (n=780) Non-Depressed (N=683)		12 Months (783) Depressed (N=144)		12 Months (783) Non-Depressed (N=639)	
		N/Mean	%/SD	N/Mean	%/SD	N/Mean	%/SD	N/Mean	%/SD	N/Mean	%/SD
MSPSS 3 Month	High	764	64.34%	68	69.52%	442	63.07%	103	70.68%	409	62.40%
MSSI 3 Month	Low	170	15.02%	19	20.03%	130	19.15%	29	21.63%	120	18.72%
	High	715	61.42%	78	79.97%	553	80.85%	115	78.37%	519	81.28%
	Missing	269	23.55%								
SCID Baseline	No	712	73.40%	35	45.55%	458	77.14%	65	54.80%	429	77.19%
	Yes	442	26.60%	62	54.45%	225	22.86%	79	45.20%	210	22.81%
SCID 3 Month	No	750	66.44%	55	58.95%	607	90.36%	100	72.70%	564	89.49%
	Yes	135	10.00%	42	41.05%	76	9.64%	44	27.30%	75	10.51%
	Missing	269	23.55%								
SCID 6 Month	No	807	71.31%	N/A	N/A	N/A	N/A	96	69.29%	587	92.82%
	Yes	119	8.57%	N/A	N/A	N/A	N/A	47	30.11%	50	6.81%
	Missing	228	20.12%	N/A	N/A	N/A	N/A	1	0.60%	2	0.36%
SCID 12 Month	No	768	68.93%	50	55.66%	587	88.14%	N/A	N/A	N/A	N/A
	Yes	175	12.86%	47	44.34%	96	11.86%	N/A	N/A	N/A	N/A
Missing		216	18.21%								

*
Percentages are based on weighted data

IPV: Intimate Partner Violence; MSPSS: Multidimensional Scale for Perceived Social Support. Perceived social support was dichotomized as the two highest tertiles of total scores for comparison to the lowest tertile. MSSI: Maternal Social Support Index measures instrumental social support and was dichotomized as the two highest tertiles of total scores for comparison to the lowest tertile. SCID: Structured Clinical Interview for DSM IV Disorders module for current major depressive episode where 'Yes' indicates a positive diagnosis.

Descriptive Statistics were calculated for all uncensored observations (N=783). Two observations were dropped in marginal structural models due to missingness within observations, resultsing in N=781.