

Supplementary information

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Appendix Table 1. A Day in Life (DiL) Questionnaire

Maternal grandmother (MGM); Paternal grandmother (PGM); Maternal grandfather (MGF); Paternal grandfather (PGF)	
I. Instrumental care	
For sleep routine please note who does each of the three following:	
1. Morning waking	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
1a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other___
2. Daytime nap(s)	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
2a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other___
3. Sleeping at night	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
3a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other___
For meal time, please note who helps feed the child or supports mother in doing so.	
4. Morning feed	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
4a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other___
4o. Morning other feed.	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
4o(a). Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other___
5. Afternoon meal	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
5a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other___
6. Afternoon other food	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
6a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other___

7. Evening feed	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
7a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
8. Evening other food	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
8a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
Other tasks	
9. Change diaper, clothes, washing during morning	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
9a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
10. Change diaper, clothes, washing during afternoon	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
10a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
11. Change diaper, clothes, washing during evening	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
11a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
12. When mother is occupied with other tasks (chores which are regarding the house/herself, napping etc), in the morning the baby is with whom?	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
12a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
13. When mother is occupied with other tasks (chores which are regarding the house/herself, napping etc.) in the afternoon, the baby is with whom?	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
13a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
14. When mother is occupied with other tasks (chores which are regarding the house/herself, napping etc.) in the evening, the baby is with whom?	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
14a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other

15. Giving bath to the child	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
15a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
16. Playing or interacting with child	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
16a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
17. Who does the child like to be held by the most?	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
17a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
18. Soothing the child when he/ she is restless/crying	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
18a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
19. Care for the child when the mother is unwell	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
19a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other
20. Care for the child when the mother is working	1--- Mother only 2--- Mother and someone else together or taking turns 3--- Others mostly or others only 4--- No one, baby is alone/does on his/her own
20a. Who else does it or helps? (multiple options allowed)	1--- MGM 2--- PGM 3--- MGF 4--- PGF 5--- SIBLING 6--- Aunt/Uncle 7--- Paid Help 8--- Father 9---Other

Appendix Table 2. Sample characteristics and child outcomes in unweighted data, Bachpan Cohort, Pakistan

	Mean or N	SD or %	min	max
Demographic characteristics				
Maternal characteristics				
Age	26.75	4.43	18	40
Number of living children				
Pregnant with first child	219	28.37		
1-3	489	63.34		
4 or more	64	8.29		
Educational attainment				
None	105	13.60		
Primary or Middle	299	38.73		
Secondary	191	24.74		
Higher secondary or tertiary	177	22.93		
Depressive symptoms (PHQ-9; baseline)	8.53	6.66	0	25
Depression diagnosis (SCID; 3 months)	112	14.51		
Depression diagnosis (SCID; 12 months)	145	18.78		
Disability (WHO-DAS)	10.87	9.48	0	44
Perceived stress (PSS-10)	17.58	9.05	0	40
Any self-reported IPV in the past year (12 months)				
Yes	289	37.44		
Did not report	19	2.46		
Any self-reported IPV in the past year (24 months)				
Yes	356	46.11		
Did not report	99	12.82		
Paternal characteristics				
Educational attainment				
None	60	7.77		
Primary or Middle	226	29.27		
Secondary	353	45.73		
Higher secondary or tertiary	133	17.23		
Absent in household (3 months)	136	17.62		
Absent in household (12 months)	157	20.34		
Currently working (baseline)	706	91.45		
Grandmother characteristics				
Co-residence with grandchild	535	69.30		
Household characteristics				
People per room	2.37	1.75	0	23
Nuclear family	97			
Wealth quintiles				
Lowest	142	18.39		
Lower middle	151	19.56		
Middle	161	20.85		
Upper middle	154	19.95		
Highest	164	21.24		
Child sex: Female	399	51.68		
Child diarrhea (12 months)				
At least once weekly	102	13.21		
Every 2 weeks	45	5.83		
Every month	91	11.79		
Less often than every month	534	69.17		

Appendix Table 2. Sample characteristics and child outcomes in unweighted data, Bachpan Cohort, Pakistan

Child Outcomes	Mean	SD	Min	Max
Growth (3 months, n=772)				
WLZ	-1.39	1.46	-4.96	4.55
WAZ	-1.08	1.17	-5.32	3.22
LAZ	0.00	1.60	-5.80	5.20
Growth (12 months, n=727)				
WLZ	-0.53	1.26	-4.78	3.65
WAZ	-0.76	1.12	-4.16	3.66
LAZ	-0.74	1.20	-4.91	3.99
Growth (24 months, n=712)				
WLZ	-0.41	1.13	-4.76	2.55
WAZ	-0.90	1.00	-3.87	2.46
LAZ	-1.19	1.19	-4.86	3.13
BSITD Scaled Scores (12 months, n=759)^φ				
Cognitive	9.44	2.18	1	14
Receptive Language	8.03	1.4	1	12
Expressive Language	9.18	1.52	1	13
Fine Motor	9.12	1.76	1	15
Gross Motor	8.29	2.2	1	14
Socioemotional Development (24 months, n=723)^φ				
ASQ-SE Total Score	13.31	26.94	0	180

Calculations were based on the total sample of participants present at either 12-months or 24-months (n=772). Means, standard deviations, and percentages were based on weighted data to account for both the sampling design in which 1 in every 3 non-depressed pregnant women and the inverse probability of missingness.

^φHigher BSITD scores indicate better development and higher ASQ-SE scores indicate worse development
Abbreviations: Patient Health Questionnaire (PHQ-9); Structured Clinical Interview for DSM (SCID); Intimate Partner Violence (IPV); World Health Organization-Disability Assessment Scale (WHO-DAS); Perceived stress scale (PSS-10); Weight-for-length z-score (WLZ); Weight-for-age z-score (WAZ); Length-for-age z-score (LAZ); Bayley Scales of Infant and Toddler Development (BSITD); Ages and Stages Questionnaire-Socioemotional (ASQ-SE)

Appendix Table 3. Paternal and maternal grandmother caregiving at 3 and 12 months postpartum

	Paternal				Maternal			
	3 months		12 months		3 months		12 months	
	N	%	N	%	N	%	N	%
Instrumental care								
Sleep / Naps	111	14.99	123	16.71	21	2.88	20	2.29
Feeding meals	25	3.40	76	10.4	4	0.59	12	1.40
Providing snacks to the child	54	7.38	176	23.26	4	0.43	26	3.24
Changing diapers/clothes, washing/cleaning	99	13.19	105	14.05	19	2.66	18	2.09
Giving a bath	163	22.05	88	12.67	43	6.35	6	0.65
Non-instrumental care								
Playing or interacting with child	297	38.78	301	39.59	82	11.45	60	7.84
Who does the child like to be held by the most?	97	12.78	163	21.49	15	2.03	18	2.56
Soothing child when restless / crying	128	16.76	176	24.15	13	1.68	21	2.62
Other support (care for the child)								
When mother is occupied with other tasks/chores	408	53.64	344	45.45	49	6.69	43	5.60
When mother is unwell	333	43.72	329	43.10	60	8.12	42	5.38
When mother is working	332	43.80	330	43.18	42	5.72	37	4.46

Calculations were based on the total sample of participants present at either 12-months or 24-months (n=772). Percentages were based on weighted data to account for both the sampling design in which 1 in every 3 non-depressed pregnant women were eligible for study inclusion and the inverse probability of missingness.

Appendix Table 4. Grandmother involvement on child growth outcomes

	12-month (n=727)			24-month (n=712)		
	MD (95% CI)			MD (95% CI)		
	WLZ	WAZ	LAZ	WLZ	WAZ	LAZ
Grandmother score three-months+						
Non-involved	ref	ref	ref	ref	ref	ref
Low	0.03 (-0.15 - 0.20)	0.13 (-0.02 - 0.27)	0.17 (0.00 - 0.34)	-0.18 (-0.44 - 0.08)	-0.13 (-0.28 - 0.03)	0.02 (-0.17 - 0.22)
High	0.21 (-0.02 - 0.45)	0.25 (0.07 - 0.43)	0.14 (-0.09 - 0.38)	-0.31 (-0.56 - -0.06)	-0.18 (-0.36 - -0.01)	0.13 (-0.13 - 0.39)
Grandmother score 12-months++						
Non-involved	ref	ref	ref	ref	ref	ref
Low	0.05 (-0.21 - 0.31)	0.05 (-0.21 - 0.31)	-0.03 (-0.27 - 0.21)	-0.37 (-0.59 - -0.15)	-0.24 (-0.39 - -0.08)	0.03 (-0.11 - 0.18)
High	-0.05 (-0.32 - 0.21)	-0.07 (-0.27 - 0.14)	-0.02 (-0.26 - 0.21)	-0.22 (-0.42 - -0.01)	-0.09 (-0.22 - 0.04)	0.08 (-0.13 - 0.30)

Generalized linear models accounted for clustering with robust standard errors. Inverse probability weighting was used to account for missingness and sampling. Twelve-month outcomes accounted for three-month measures and 24-month outcomes accounted for three-month and 12-month measures.

+ *A priori* controls included sex, number of living children, maternal age, maternal education, maternal depression at three months, father absence at three months, paternal education, crowding, nuclear family, assets, and treatment arm. Additional baseline covariates that predicted missingness at 12 months included depressive symptoms, maternal disability measure, and perceived social support

++ Additional *a priori* controls included three-month grandmother involvement, 12-month child diarrhea, 12-month father absence, and any self-reported interpersonal violence in the past year

Abbreviations: Mean difference (MD); Confidence Interval (CI); Weight-for-length z-score (WLZ); Weight-for-age z-score (WAZ); Length-for-age z-score (LAZ)

Appendix Table 5. Grandmother involvement on child development outcomes

	BSITD (12 months, n=727) MD (95% CI)					ASQ-SE (24 months, n=712) MD (95% CI)
	Cognitive	Receptive Communication	Expressive Communication	Fine Motor	Gross Motor	Total Score
Grandmother score three-months+						
Non-involved	ref	ref	ref	ref	ref	ref
Low	-0.05 (-0.50 - 0.39)	0.17 (-0.09 - 0.43)	0.00 (-0.34 - 0.34)	0.16 (-0.24 - 0.56)	0.13 (-0.28 - 0.54)	0.25 (-6.21 - 6.72)
High	0.06 (-0.41 - 0.53)	0.22 (-0.09 - 0.53)	0.04 (-0.35 - 0.43)	0.23 (-0.13 - 0.60)	0.19 (-0.41 - 0.78)	2.39 (-8.28 - 13.07)
Grandmother score 12-months++						
Non-involved	ref	ref	ref	ref	ref	ref
Low	0.09 (-0.31 - 0.49)	-0.08 (-0.32 - 0.16)	-0.00 (-0.32 - 0.32)	0.43 (0.09 - 0.78)	0.34 (-0.17 - 0.84)	-15.70 (-28.68 - -2.72)
High	0.38 (-0.01 - 0.76)	0.02 (-0.20 - 0.24)	-0.22 (-0.54 - 0.09)	0.45 (0.08 - 0.83)	0.09 (-0.43 - 0.60)	-17.83 (-31.47 - -4.19)

Generalized linear models accounted for clustering with robust standard errors. Inverse probability weighting was used to account for missingness and sampling. Higher BSITD scores indicate better development while higher ASQ-SE scores indicate worse development

+ *A priori* controls included sex, number of living children, maternal age, maternal education, maternal depression at three months, father absence at three months, paternal education, crowding, nuclear family, assets, and treatment arm. Additional baseline covariates that predicted missingness at 12 months included depressive symptoms, maternal disability measure, and perceived social support

++ Additional *a priori* controls included three-month grandmother involvement, 12-month child diarrhea, 12-month father absence, and any self-reported interpersonal violence in the past year

Abbreviations: Mean difference (MD); Confidence Interval (CI); Bayley Scales of Infant and Toddler Development (BSITD); Ages and Stages Questionnaire-Socioemotional (ASQ-SE)

Appendix Table 6. Paternal grandmother involvement on child growth outcomes

	12-month (n=727)			24-month (n=712)		
	WLZ	WAZ	LAZ	WLZ	WAZ	LAZ
Grandmother score three-months+						
Non-involved	ref	ref	ref	ref	ref	ref
Low	0.02 (-0.16 - 0.19)	0.10 (-0.04 - 0.24)	0.19 (-0.01 - 0.39)	-0.16 (-0.42 - 0.10)	-0.11 (-0.25 - 0.02)	0.02 (-0.21 - 0.25)
High	0.21 (-0.08 - 0.50)	0.25 (0.04 - 0.47)	0.17 (-0.05 - 0.38)	-0.24 (-0.48 - 0.00)	-0.12 (-0.28 - 0.04)	0.15 (-0.12 - 0.43)
Grandmother score 12-months++						
Non-involved	ref	ref	ref	ref	ref	ref
Low	0.05 (-0.20 - 0.31)	0.09 (-0.08 - 0.27)	0.04 (-0.19 - 0.28)	-0.31 (-0.55 - -0.06)	-0.19 (-0.36 - -0.02)	0.05 (-0.12 - 0.21)
High	-0.04 (-0.31 - 0.23)	-0.07 (-0.26 - 0.13)	0.00 (-0.27 - 0.28)	-0.17 (-0.39 - 0.04)	-0.05 (-0.18 - 0.09)	0.13 (-0.09 - 0.36)

Generalized linear models accounted for clustering with robust standard errors. Inverse probability weighting was used to account for missingness and sampling. Twelve-month outcomes accounted for three-month measures and 24-month outcomes accounted for three-month and 12-month measures.

+ *A priori* controls included sex, number of living children, maternal age, maternal education, maternal depression at three months, father absence at three months, paternal education, crowding, nuclear family, assets, and treatment arm. Additional baseline covariates that predicted missingness at 12 months included depressive symptoms, maternal disability measure, and perceived social support

++ Additional *a priori* controls included three-month grandmother involvement, 12-month child diarrhea, 12-month father absence, and any self-reported interpersonal violence in the past year

Abbreviations: Weight-for-length z-score (WLZ); Weight-for-age z-score (WAZ); Length-for-age z-score (LAZ)

Appendix Table 7. Paternal grandmother involvement on child development outcomes

	BSITD (12 months, n=727)					ASQ-SE (24 months, n=712)
	Cognitive	Receptive Communication	Expressive Communication	Fine Motor	Gross Motor	Total Score
Grandmother score three-months+						
Non-involved	ref	ref	ref	ref	ref	ref
Low	0.14 (-0.35 - 0.62)	0.17 (-0.10 - 0.44)	-0.03 (-0.31 - 0.26)	0.10 (-0.28 - 0.48)	0.13 (-0.25 - 0.50)	-2.69 (-8.06 - 2.67)
High	0.10 (-0.40 - 0.60)	0.17 (-0.16 - 0.49)	-0.08 (-0.45 - 0.29)	0.15 (-0.23 - 0.52)	0.01 (-0.60 - 0.63)	0.54 (-7.11 - 8.19)
Grandmother score 12-months++						
Non-involved	ref	ref	ref	ref	ref	ref
Low	-0.02 (-0.45 - 0.41)	0.07 (-0.20 - 0.34)	0.05 (-0.28 - 0.38)	0.45 (0.13 - 0.78)	0.31 (-0.17 - 0.80)	-13.43 (-23.94 - -2.93)
High	0.48 (0.10 - 0.87)	0.13 (-0.15 - 0.40)	-0.03 (-0.37 - 0.32)	0.58 (0.24 - 0.92)	0.18 (-0.34 - 0.70)	-15.2 (-26.87 - -3.53)

Generalized linear models accounted for clustering with robust standard errors. Inverse probability weighting was used to account for missingness and sampling. Higher BSITD scores indicate better development while higher ASQ-SE scores indicate worse development

+ *A priori* controls included sex, number of living children, maternal age, maternal education, maternal depression at three months, father absence at three months, paternal education, crowding, nuclear family, assets, and treatment arm. Additional baseline covariates that predicted missingness at 12 months included depressive symptoms, maternal disability measure, and perceived social support

++ Additional *a priori* controls included three-month grandmother involvement, 12-month child diarrhea, 12-month father absence, and any self-reported interpersonal violence in the past year

Abbreviations: Scales of Infant and Toddler Development (BSITD); Ages and Stages Questionnaire-Socioemotional (ASQ-SE)

Appendix Table 8. Grandmother involvement on child growth outcomes without inverse probability weights

	12-month (n=727)			24-month (n=712)		
	MD (95% CI)			MD (95% CI)		
	WLZ	WAZ	LAZ	WLZ	WAZ	LAZ
Grandmother score three-months+						
Non-involved	ref	ref	ref	ref	ref	ref
Low	0.03 (-0.15 - 0.21)	0.12 (-0.02 - 0.26)	0.15 (-0.02 - 0.33)	-0.18 (-0.44 - 0.08)	-0.12 (-0.27 - 0.03)	0.03 (-0.16 - 0.22)
High	0.20 (-0.04 - 0.44)	0.24 (0.06 - 0.42)	0.14 (-0.10 - 0.38)	-0.31 (-0.56 - -0.06)	-0.18 (-0.35 - 0.00)	0.13 (-0.13 - 0.38)
Grandmother score 12-months++						
Non-involved	ref	ref	ref	ref	ref	ref
Low	0.05 (-0.20 - 0.30)	0.05 (-0.13 - 0.23)	-0.04 (-0.28 - 0.20)	-0.37 (-0.59 - -0.16)	-0.23 (-0.39 - -0.08)	0.04 (-0.11 - 0.18)
High	-0.06 (-0.32 - 0.20)	-0.08 (-0.28 - 0.12)	-0.04 (-0.28 - 0.20)	-0.22 (-0.42 - -0.02)	-0.10 (-0.23 - 0.04)	0.08 (-0.13 - 0.29)

Generalized linear models accounted for clustering with robust standard errors and unequal sampling probabilities. Twelve-month outcomes accounted for three-month measures and 24-month outcomes accounted for three-month and 12-month measures.

+ *A priori* controls included sex, number of living children, maternal age, maternal education, maternal depression at three months, father absence at three months, paternal education, crowding, nuclear family, assets, and treatment arm. Additional baseline covariates that predicted missingness at 12 months included depressive symptoms, maternal disability measure, and perceived social support

++ Additional *a priori* controls included three-month grandmother involvement, 12-month child diarrhea, 12-month father absence, and any self-reported interpersonal violence in the past year

Abbreviations: Mean difference (MD); Confidence Interval (CI); Weight-for-length z-score (WLZ); Weight-for-age z-score (WAZ); Length-for-age z-score (LAZ)

Appendix Table 9. Grandmother involvement on child development outcomes without inverse probability weights

	BSITD (12 months, n=727)					ASQ-SE (24 months, n=712)
	MD (95% CI)					MD (95% CI)
	Cognitive	Receptive Communication	Expressive Communication	Fine Motor	Gross Motor	Total Score
Grandmother score three-months+						
Non-involved	ref	ref	ref	ref	ref	ref
Low	-0.06 (-0.51 - 0.39)	0.19 (-0.07 - 0.45)	-0.01 (-0.35 - 0.33)	0.17 (-0.23 - 0.56)	0.14 (-0.26 - 0.55)	0.07 (-6.04 - 6.17)
High	0.06 (-0.41 - 0.52)	0.23 (-0.08 - 0.54)	0.05 (-0.34 - 0.43)	0.25 (-0.12 - 0.61)	0.22 (-0.35 - 0.79)	2.14 (-8.03 - 12.30)
Grandmother score 12-months++						
Non-involved	ref	ref	ref	ref	ref	ref
Low	0.13 (-0.26 - 0.52)	-0.09 (-0.33 - 0.15)	-0.02 (-0.34 - 0.30)	0.44 (0.09 - 0.78)	0.34 (-0.16 - 0.84)	-15.21 (-27.60 - -2.83)
High	0.41 (0.03 - 0.79)	0.01 (-0.21 - 0.24)	-0.25 (-0.56 - 0.07)	0.45 (0.08 - 0.82)	0.09 (-0.42 - 0.60)	-17.39 (-30.32 - -4.47)

Generalized linear models accounted for clustering with robust standard errors and unequal sampling probabilities. Higher BSITD scores indicate better development while higher ASQ-SE scores indicate worse development

+ *A priori* controls included sex, number of living children, maternal age, maternal education, maternal depression at three months, father absence at three months, paternal education, crowding, nuclear family, assets, and treatment arm. Additional baseline covariates that predicted missingness at 12 months included depressive symptoms, maternal disability measure, and perceived social support

++ Additional *a priori* controls included three-month grandmother involvement, 12-month child diarrhea, 12-month father absence, and any self-reported interpersonal violence in the past year

Abbreviations: Mean difference (MD); Confidence Interval (CI); Bayley Scales of Infant and Toddler Development (BSITD); Ages and Stages Questionnaire-Socioemotional (ASQ-SE)

Appendix Table 10. Grandmother involvement on child growth outcomes stratified by sex at 12 months

	WLZ	p-value	WAZ	p-value	LAZ	p-value
Female child (N=373)						
Grandmother score three-months+						
Non-involved	ref		ref		ref	
Low	-0.07	0.27	0.08	0.36	0.16	0.84
	(-0.39 - 0.25)		(-0.17 - 0.34)		(-0.05 - 0.38)	
High	0.30	0.90	0.36	0.71	0.28	0.25
	(-0.08 - 0.67)		(0.04 - 0.68)		(-0.06 - 0.63)	
Male child (N=354)						
Grandmother score three-months +						
Non-involved	ref		ref		ref	
Low	0.09		0.13		0.14	
	(-0.28 - 0.46)		(-0.14 - 0.40)		(-0.12 - 0.40)	
High	0.14		0.12		-0.06	
	(-0.18 - 0.45)		(-0.12 - 0.36)		(-0.38 - 0.26)	
Female child (N=373)						
Grandmother score 12-months++						
Non-involved	ref		ref		ref	
Low	0.29	0.21	0.26	0.10	0.03	0.43
	(-0.07 - 0.66)		(-0.02 - 0.54)		(-0.30 - 0.36)	
High	0.01	0.46	-0.02	0.52	-0.02	0.90
	(-0.35 - 0.36)		(-0.31 - 0.27)		(-0.42 - 0.37)	
Male child (N=354)						
Grandmother score 12-months++						
Non-involved	ref		ref		ref	
Low	-0.16		-0.11		-0.08	
	(-0.52 - 0.19)		(-0.37 - 0.15)		(-0.42 - 0.27)	
High	0.01		0.01		0.01	
	(-0.38 - 0.40)		(-0.27 - 0.28)		(-0.30 - 0.33)	
Generalized linear models accounted for clustering with robust standard errors. Inverse probability weighting was used to account for missingness and sampling. P-values are from child sex and grandmother involvement interactions. Twelve-month growth outcomes accounted for three-month measures.						
+ <i>A priori</i> controls included sex, number of living children, maternal age, maternal education, maternal depression at three months, father absence at three months, paternal education, crowding, nuclear family, assets, and treatment arm. Additional baseline covariates that predicted missingness at 12 months included depressive symptoms, maternal disability measure, and perceived social support						
++ Additional <i>a priori</i> controls included three-month grandmother involvement, 12-month child diarrhea, 12-month father absence, and any self-reported interpersonal violence in the past year						
Abbreviations: Weight-for-length z-score (WLZ); Weight-for-age z-score (WAZ); Length-for-age z-score (LAZ)						

Appendix Table 11. Grandmother involvement on Bayley development outcomes stratified by sex at 12 months (n=727)

	Cognitive	p-value	Receptive Communication	p-value	Expressive Communication	p-value	Fine Motor	p-value	Gross Motor	p-value
Female child (N=373)										
Grandmother score three-months+										
Non-involved	ref		ref		ref		ref		ref	
Low	-0.29	0.50	0.14	0.74	-0.20	0.49	0.10	0.71	-0.54	0.00
	(-0.93 - 0.34)		(-0.28 - 0.57)		(-0.76 - 0.37)		(-0.41 - 0.61)		(-1.19 - 0.11)	
High	-0.10	0.47	0.32	0.66	-0.12	0.77	0.13	0.93	-0.38	0.08
	(-0.98 - 0.78)		(-0.15 - 0.79)		(-0.82 - 0.58)		(-0.59 - 0.84)		(-1.51 - 0.74)	
Male child (N=354)										
Grandmother score three-months+										
Non-involved	ref		ref		ref		ref		ref	
Low	0.10		0.26		0.10		0.13		0.71	
	(-0.50 - 0.71)		(-0.15 - 0.67)		(-0.34 - 0.53)		(-0.41 - 0.66)		(0.15 - 1.27)	
High	0.22		0.22		0.13		0.37		0.67	
	(-0.39 - 0.83)		(-0.23 - 0.67)		(-0.39 - 0.65)		(-0.19 - 0.94)		(0.04 - 1.30)	
Female child (N=373)										
Grandmother score 12-months++										
Non-involved	ref		ref		ref		ref		ref	
Low	0.39	0.23	0.11	0.29	0.08	0.55	0.56	0.23	0.52	0.97
	(-0.02 - 0.81)		(-0.23 - 0.45)		(-0.27 - 0.43)		(0.17 - 0.96)		(-0.14 - 1.18)	
High	0.47	0.93	0.16	0.33	-0.36	0.39	0.40	0.94	0.23	0.48
	(-0.00 - 0.94)		(-0.18 - 0.50)		(-0.73 - 0.01)		(-0.04 - 0.83)		(-0.48 - 0.94)	
Male child (N=354)										
Grandmother score 12-months++										
Non-involved	ref		ref		ref		ref		ref	
Low	-0.26		-0.18		-0.18		0.27		0.07	
	(-0.85 - 0.34)		(-0.54 - 0.19)		(-0.67 - 0.31)		(-0.22 - 0.75)		(-0.54 - 0.68)	
High	0.27		-0.06		-0.12		0.44		-0.10	
	(-0.29 - 0.83)		(-0.44 - 0.31)		(-0.62 - 0.37)		(-0.07 - 0.94)		(-0.74 - 0.54)	

Generalized linear models accounted for clustering with robust standard errors. Inverse probability weighting was used to account for missingness and sampling. P-values are from child sex and grandmother involvement interactions. Higher Bayley Scales of Infant and Toddler Development scores indicate better development. + *A priori* controls included sex, number of living children, maternal age, maternal education, maternal depression at three months, father absence at three months, paternal education, crowding, nuclear family, assets, and treatment arm. Additional baseline covariates that predicted missingness at 12 months included depressive symptoms, maternal disability measure, and perceived social support

++ Additional *a priori* controls included three-month grandmother involvement, 12-month child diarrhea, 12-month father absence, and any self-reported interpersonal violence in the past year

Appendix Table 12. Grandmother involvement on child outcomes stratified by sex at 24 months (n=712)

	Anthropometric Growth z-scores						ASQ-SE	
	WLZ	p-value	WAZ	p-value	LAZ	p-value	Total Score	p-value
Female child (N=370)								
Grandmother score three-months +								
Non-involved	ref		ref		ref		ref	
Low	-0.19	0.94	-0.10	0.98	0.07	0.70	2.45	0.83
	(-0.45 - 0.08)		(-0.29 - 0.09)		(-0.24 - 0.37)		(-4.37 - 9.28)	
High	-0.41	0.12	-0.27	0.05	0.19	0.99	5.28	0.77
	(-0.74 - -0.07)		(-0.55 - 0.02)		(-0.23 - 0.60)		(-6.62 - 17.19)	
Male child (N=356)								
Grandmother score three-months +								
Non-involved	ref		ref		ref		ref	
Low	-0.10		-0.12		-0.11		-2.41	
	(-0.51 - 0.31)		(-0.40 - 0.16)		(-0.41 - 0.19)		(-7.60 - 2.78)	
High	-0.01		-0.09		-0.19		-1.06	
	(-0.42 - 0.40)		(-0.37 - 0.19)		(-0.54 - 0.16)		(-8.04 - 5.91)	
Female child (N=370)								
Grandmother score 12mo++								
Non-involved	ref		ref		ref		ref	
Low	-0.26	0.65	-0.11	0.36	0.16	0.25	-17.88	0.02
	(-0.54 - 0.02)		(-0.32 - 0.11)		(-0.06 - 0.38)		(-28.62 - -7.14)	
High	-0.05	0.43	-0.06	0.70	-0.08	0.06	-18.62	0.34
	(-0.34 - 0.23)		(-0.26 - 0.14)		(-0.33 - 0.17)		(-30.66 - -6.59)	
Male child (N=356)								
Grandmother score 12mo++								
Non-involved	ref		ref		ref		ref	
Low	-0.47		-0.33		-0.11		-6.33	
	(-0.80 - -0.13)		(-0.60 - -0.07)		(-0.41 - 0.19)		(-17.45 - 4.79)	
High	-0.36		-0.14		0.15		-11.15	
	(-0.70 - -0.02)		(-0.39 - 0.11)		(-0.15 - 0.44)		(-23.51 - 1.22)	

Generalized linear models accounted for clustering with robust standard errors. Inverse probability weighting was used to account for missingness and sampling. P-values are from child sex and grandmother involvement interactions. Twenty-four-month growth outcomes accounted for 3- and 12-month measures. Lower ASQ-SE scores indicate better development.

+ *A priori* controls included sex, number of living children, maternal age, maternal education, maternal depression at three months, father absence at three months, paternal education, crowding, nuclear family, assets, and treatment arm. Additional baseline covariates that predicted missingness at 12 months included depressive symptoms, maternal disability measure, and perceived social support

++ Additional *a priori* controls included three-month grandmother involvement, 12-month child diarrhea, 12-month father absence, and any self-reported interpersonal violence in the past year

Abbreviations: Weight-for-length z-score (WLZ); Weight-for-age z-score (WAZ); Length-for-age z-score (LAZ); Ages and Stages Questionnaire-Socioemotional (ASQ-SE)