

## Supplemental Material A.

Table S1

*Demographic Characteristics (N = 2,650).*

				%	Mean	SD
<b>Father</b>						
Age					29.35	5.84
Race and ethnicity	White			45.60		
	African American			19.23		
	Asian			2.40		
	Native American			4.16		
	Pacific Islander			1.47		
	Others			27.14		
	Hispanic			40.48		
Education	At least a high school diploma		80.10			
Residential status	15 months follow-up	Lived with children at least	97.25			
	30 months follow-up	half of the time	91.97			
<b>Mother</b>						
Age					27.40	5.26
Race and ethnicity	White			48.81		
	African American			14.70		
	Asian			3.20		
	Native American			4.17		
	Pacific Islander			1.58		
	Others			27.54		
	Hispanic			40.65		
Education	At least a high school diploma		81.50			
<b>Couple</b>						
Marital Status	12-month follow-up		Married	85.29		
			In a committed relationship or romantically involved	10.10		
			Divorced	0.95		
	30-month follow-up		Separated	3.67		
			Married	79.44		
			In a committed relationship or romantically involved	9.56		
			Divorced	3.07		
			Separated	7.93		
			<b>Household</b>			
Income	Below the Federal Poverty Level (FPL)		38.12			
	Between 100% and 200% of FPL		41.99			
	Above 200% FPL		19.89			
<b>Focal Child</b>						
Gender	Boy		51.79			
	Girl		48.21			

## Supplemental Material B.

Table S2

*Descriptive Statistics for the Indicators, Covariates, and Distal Outcomes (N = 2,650).*

Father involvement		M (SD)	Skewness	Kurtosis	%
Time spent	Spend one or more hours a day with the child	4.84 (0.51)	-4.13	20.54	99.58
Paternal warmth	Told (focal child) that you love (him/her)?	3.92 (0.36)	-5.37	31.39	99.47
	Praised (focal child) or told him/her that you appreciated something that he/she did?	3.78 (0.61)	-3.17	9.93	97.43
	Laughed with (focal child)?	3.93 (0.32)	-5.21	30.59	99.77
Harsh discipline	Yelled, shouted, screamed at, or threatened (focal child) because you were mad at him/her?	1.59 (0.88)	1.37	0.88	38.12
	Hit, spanked, grabbed or used physical punishment with (focal child)?	1.24 (0.55)	2.50	6.39	18.91
Father's engagement	Played inside with games or toys	3.76 (0.54)	-2.61	7.32	98.98
	Taken the child for a walk or to play outside	3.01 (0.91)	-0.58	-0.53	93.00
	Sung songs or nursery rhymes with the child	3.10 (1.04)	-0.84	-0.57	87.78
	Read books or told stories to the child	2.93 (1.06)	-0.55	-0.98	86.01
	Dealt with the children when he/she did something wrong	3.21 (1.09)	-1.06	-0.35	86.26

## Supplemental Material C.

Table S3

### *Effects of the Covariates on the Distal Outcomes.*

Distal outcome	Covariates	Estimate	S.E.	Estimate/ S.E.	<i>p</i> -value
Social emotional functioning assessed by father	Child age	0.05***	0.01	8.13	0.000
	Child sex	0.02	0.02	1.06	0.288
	Couple education	-0.02	0.02	-1.03	0.305
	Poverty level-2	-0.00	0.02	-0.10	0.920
	Poverty level-3	-0.03	0.02	-1.27	0.205
Social emotional Functioning assessed by mother	Child age	0.05***	0.01	7.90	0.000
	Child sex	0.03*	0.02	2.21	0.027
	Couple education	-0.02	0.02	-1.30	0.195
	Poverty level-2	0.03	0.02	1.80	0.072
	Poverty level-3	0.04	0.02	1.94	0.052
Child internalizing behavior problem assessed by father	Child age	-0.00	0.00	-1.00	0.319
	Child sex	0.00	0.01	0.31	0.756
	Couple education	0.00	0.01	0.21	0.831
	Poverty level-2	-0.01	0.01	-1.21	0.228
	Poverty level-3	-0.02	0.01	-1.89	0.059
Child internalizing behavior problem assessed by mother	Child age	0.01*	0.00	2.15	0.032
	Child sex	0.00	0.01	0.44	0.662
	Couple education	-0.02*	0.01	-2.24	0.025
	Poverty level-2	-0.02*	0.01	-1.99	0.047
	Poverty level-3	-0.02	0.01	-1.75	0.080
Child externalizing behavior problem assessed by father	Child age	-0.04***	0.00	-7.94	0.000
	Child sex	0.00	0.01	0.20	0.844
	Couple education	0.02	0.01	1.66	0.096
	Poverty level-2	-0.02	0.01	-1.25	0.212
	Poverty level-3	-0.01	0.02	-0.60	0.551
Child externalizing behavior problem assessed by mother	Child age	-0.02***	0.01	-4.23	0.000
	Child sex	-0.00	0.01	-0.21	0.833
	Couple education	-0.02	0.01	-1.43	0.154
	Poverty level-2	-0.01	0.01	-0.36	0.722
	Poverty level-3	0.01	0.02	0.28	0.779
PPVT	Child age	2.30**	0.69	3.36	0.001
	Child sex	2.79**	0.98	2.85	0.004
	Couple education	2.86**	1.10	2.61	0.009
	Poverty level-2	2.81*	1.12	2.52	0.012
	Poverty level-3	7.35***	1.50	4.89	0.000

Note. \*:  $p < .05$ ; \*\*:  $p < .01$ ; \*\*\*:  $p < .001$ .

## Supplemental Material D.

Mplus syntax for the first step

DATA: FILE IS LCA\_step1.csv;

VARIABLE: NAMES ARE id spentime warmth1 warmth2 warmth3 emodisc phydisc  
playaver playin playout commaver song book dealwith  
!father involvement indicators  
chilagey chilgen edubhigh poverty2 poverty3  
!covariates  
emofun\_h emofun\_w inbfun\_h inbfun\_w exbfun\_h exbfun\_w ppvt;  
!distal outcomes  
USEVARIABLES ARE spentime warmth1 warmth2 warmth3 emodisc phydisc  
playin playout song book dealwith;  
CATEGORICAL = spentime warmth1 warmth2 warmth3 emodisc phydisc  
playin playout song book dealwith;  
AUXILIARY = chilagey chilgen edubhigh poverty2 poverty3  
!covariates  
emofun\_h emofun\_w inbfun\_h inbfun\_w exbfun\_h exbfun\_w ppvt;  
!distal outcomes  
MISSING ARE ALL (-999);  
CLASSES = c(4);

ANALYSIS: TYPE=MIXTURE;  
STARTS = 500 50;  
STITERATIONS = 20;

OUTPUT: TECH11 TECH14 SVALUES;

PLOT: TYPE = PLOT3;  
SERIES = spentime warmth1 warmth2 warmth3 emodisc phydisc  
playin playout song book dealwith(\*);

SAVEDATA: FILE IS Father\_involvement\_LCA\_from\_step1.txt;  
SAVE IS cprob;  
MISSFLAG = 999;

### Mplus syntax for the third step

DATA: FILE IS Father\_involvement\_LCA\_from\_step1.txt;

VARIABLE: NAMES ARE spentime warmth1 warmth2 warmth3 emodisc phydisc  
playin playout song book dealwith  
!father involvement  
chilagey chilgen edubhigh poverty2 poverty3  
!control variables  
emofun\_h emofun\_w inbfun\_h inbfun\_w exbfun\_h exbfun\_w ppvt  
!distal outcomes  
cprob1 cprob2 cprob3 cprob4 n;  
!cprobabilities and modal class  
USEVARIABLES ARE chilagey chilgen edubhigh poverty2 poverty3  
!control variables  
emofun\_h emofun\_w inbfun\_h inbfun\_w exbfun\_h exbfun\_w ppvt  
!distal outcomes  
n;  
!modal class  
NOMINAL = n;  
MISSING ARE ALL (999);  
CLASSES = c(4);

ANALYSIS: TYPE=MIXTURE;  
STARTS = 500 50;  
STITERATIONS = 20;

MODEL:  
%OVERALL%  
emofun\_h ON chilagey chilgen edubhigh poverty2 poverty3;  
emofun\_w ON chilagey chilgen edubhigh poverty2 poverty3;  
inbfun\_h ON chilagey chilgen edubhigh poverty2 poverty3;  
inbfun\_w ON chilagey chilgen edubhigh poverty2 poverty3;  
exbfun\_h ON chilagey chilgen edubhigh poverty2 poverty3;  
exbfun\_w ON chilagey chilgen edubhigh poverty2 poverty3;  
ppvt ON chilagey chilgen edubhigh poverty2 poverty3;  
  
%C#1%  
[n#1@3.351]; !logit from the result of step 1  
[n#2@1.923]; !logit from the result of step 1  
[n#3@1.627]; !logit from the result of step 1  
[emofun\_h] (efh1);  
[emofun\_w] (efw1);  
[inbfun\_h] (ibh1);  
[inbfun\_w] (ibw1);  
[exbfun\_h] (ebh1);

```
[exbfun_w] (ebw1);  
[ppvt] (ppvt1);  
emofun_h;  
emofun_w;  
inbfun_h;  
inbfun_w;  
exbfun_h;  
exbfun_w;  
ppvt;
```

%C#2%

```
[n#1@1.125]; !logit from the result of step 1  
[n#2@6.123]; !logit from the result of step 1  
[n#3@3.251]; !logit from the result of step 1  
[emofun_h] (efh2);  
[emofun_w] (efw2);  
[inbfun_h] (ibh2);  
[inbfun_w] (ibw2);  
[exbfun_h] (ebh2);  
[exbfun_w] (ebw2);  
[ppvt] (ppvt2);  
emofun_h;  
emofun_w;  
inbfun_h;  
inbfun_w;  
exbfun_h;  
exbfun_w;  
ppvt;
```

%C#3%

```
[n#1@4.899]; !logit from the result of step 1  
[n#2@7.612]; !logit from the result of step 1  
[n#3@9.445]; !logit from the result of step 1  
[emofun_h] (efh3);  
[emofun_w] (efw3);  
[inbfun_h] (ibh3);  
[inbfun_w] (ibw3);  
[exbfun_h] (ebh3);  
[exbfun_w] (ebw3);  
[ppvt] (ppvt3);  
emofun_h;  
emofun_w;  
inbfun_h;  
inbfun_w;  
exbfun_h;  
exbfun_w;
```

ppvt;

%C#4%

[n#1@-2.670]; !logit from the result of step 1

[n#2@-2.234]; !logit from the result of step 1

[n#3@-8.082]; !logit from the result of step 1

[emofun\_h] (efh4);

[emofun\_w] (efw4);

[inbfun\_h] (ibh4);

[inbfun\_w] (ibw4);

[exbfun\_h] (ebh4);

[exbfun\_w] (ebw4);

[ppvt] (ppvt4);

emofun\_h;

emofun\_w;

inbfun\_h;

inbfun\_w;

exbfun\_h;

exbfun\_w;

ppvt;

MODEL CONSTRAINT:

New(efh1v2 efh1v3 efh1v4 efh2v3 efh2v4 efh3v4

efw1v2 efw1v3 efw1v4 efw2v3 efw2v4 efw3v4

ibh1v2 ibh1v3 ibh1v4 ibh2v3 ibh2v4 ibh3v4

ibw1v2 ibw1v3 ibw1v4 ibw2v3 ibw2v4 ibw3v4

ebh1v2 ebh1v3 ebh1v4 ebh2v3 ebh2v4 ebh3v4

ebw1v2 ebw1v3 ebw1v4 ebw2v3 ebw2v4 ebw3v4

ppvt1v2 ppvt1v3 ppvt1v4 ppvt2v3 ppvt2v4 ppvt3v4);

efh1v2 = efh1 - efh2;

efh1v3 = efh1 - efh3;

efh1v4 = efh1 - efh4;

efh2v3 = efh2 - efh3;

efh2v4 = efh2 - efh4;

efh3v4 = efh3 - efh4;

efw1v2 = efw1 - efw2;

efw1v3 = efw1 - efw3;

efw1v4 = efw1 - efw4;

efw2v3 = efw2 - efw3;

efw2v4 = efw2 - efw4;

efw3v4 = efw3 - efw4;

ibh1v2 = ibh1 - ibh2;

ibh1v3 = ibh1 - ibh3;

$\text{ibh1v4} = \text{ibh1} - \text{ibh4};$   
 $\text{ibh2v3} = \text{ibh2} - \text{ibh3};$   
 $\text{ibh2v4} = \text{ibh2} - \text{ibh4};$   
 $\text{ibh3v4} = \text{ibh3} - \text{ibh4};$

$\text{ibw1v2} = \text{ibw1} - \text{ibw2};$   
 $\text{ibw1v3} = \text{ibw1} - \text{ibw3};$   
 $\text{ibw1v4} = \text{ibw1} - \text{ibw4};$   
 $\text{ibw2v3} = \text{ibw2} - \text{ibw3};$   
 $\text{ibw2v4} = \text{ibw2} - \text{ibw4};$   
 $\text{ibw3v4} = \text{ibw3} - \text{ibw4};$

$\text{ebh1v2} = \text{ebh1} - \text{ebh2};$   
 $\text{ebh1v3} = \text{ebh1} - \text{ebh3};$   
 $\text{ebh1v4} = \text{ebh1} - \text{ebh4};$   
 $\text{ebh2v3} = \text{ebh2} - \text{ebh3};$   
 $\text{ebh2v4} = \text{ebh2} - \text{ebh4};$   
 $\text{ebh3v4} = \text{ebh3} - \text{ebh4};$

$\text{ebw1v2} = \text{ebw1} - \text{ebw2};$   
 $\text{ebw1v3} = \text{ebw1} - \text{ebw3};$   
 $\text{ebw1v4} = \text{ebw1} - \text{ebw4};$   
 $\text{ebw2v3} = \text{ebw2} - \text{ebw3};$   
 $\text{ebw2v4} = \text{ebw2} - \text{ebw4};$   
 $\text{ebw3v4} = \text{ebw3} - \text{ebw4};$

$\text{ppvt1v2} = \text{ppvt1} - \text{ppvt2};$   
 $\text{ppvt1v3} = \text{ppvt1} - \text{ppvt3};$   
 $\text{ppvt1v4} = \text{ppvt1} - \text{ppvt4};$   
 $\text{ppvt2v3} = \text{ppvt2} - \text{ppvt3};$   
 $\text{ppvt2v4} = \text{ppvt2} - \text{ppvt4};$   
 $\text{ppvt3v4} = \text{ppvt3} - \text{ppvt4};$