

Supplementary Materials for

Child Maltreatment Risk as a Function of Poverty and Race/Ethnicity in the United States

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Data Preparation

We merged NCANDS and ACS (5 year estimates) at the county level. While there were 3,143 US counties (and equivalents) in ACS, the county-ID (i.e., FIPS county code) of many small counties were suppressed in NCANDS due to confidentiality concerns. NCANDS suppressed the county-ID of reported children who were from counties with < 1,000 maltreatment cases, but did indicate which state those suppressed counties were from (the state-ID of those children was left intact). To maximize data utility, we aggregated such “suppressed” counties into a “combined” area of each state, and we treated these “combined” areas as county-equivalents in analyses.

From the full 3,143 US counties, all Pennsylvania counties (n = 67) were excluded as Pennsylvania provided no race/ethnicity information to NCANDS. We further excluded three counties in Massachusetts and four counties of Rhode Island as no (or almost no) cases were provided to NCANDS from these counties. Among the remaining 3,069 counties, 616 counties were identified in NCANDS with an unsuppressed county-ID and 2,453 counties were suppressed in NCANDS. We aggregated these “suppressed” counties into 46 “combined” areas, one per each of 46 states. The “identified” 616 counties housed 73.84% of US children, and the “suppressed” and “combined” counties housed 22.27% of US children. That is, even though we combined many suppressed counties, over 70% of US children were residing in the “identified” counties. Altogether, our merged database had 662 area units covering 3,069 counties (97.65% of US counties housing 96.11% of US children). Figure S1 delineates this process.

From the merged database, we constructed race/ethnicity-specific data. While doing this, we handled outliers and low population counties to avoid misleading estimates. First, we excluded counties with ≤ 300 race/ethnicity-specific children to ensure reliable counts of both maltreatment and poverty cases in a county. Then, we excluded counties with race/ethnicity-specific maltreatment rates exceeding the theoretical boundary (i.e., 100%). Finally, we excluded some outlier counties in the bivariate distributions of child poverty rates and maltreatment report rates by race/ethnicity, using a bagplot which is a bivariate version of a box plot.[31] Table S1 in this Supplement summarizes the initial sample size, the number of excluded counties, and the final sample size of race/ethnicity-specific data.

For the White-specific data, we excluded Searcy County of Arkansas as its White report rate (= 128.25%) exceeded the theoretical boundary. We further excluded three outlier counties based on a bagplot (Table S2 and Figure S2). All counties in the merged database had a sufficient number (over 2,000) of White children. The White-specific data had 658 area units covering 3,065 counties (97.52% of US counties housing 94.14% of US White children).

Some counties had a small number of Black or Hispanic children which may lead to unreliable counts of both maltreatment and poverty cases. To address this issue, we decided to exclude counties with ≤ 300 race/ethnicity-specific children from Black- and Hispanic-specific data based on sensitivity analyses which we will visit later. We excluded 79 counties with ≤ 300 Black children from the Black-specific data and 22 counties with ≤ 300 Hispanic children from the Hispanic-specific data. Then, we excluded two Black counties with a Black report rate over 100%. Based on a bagplot, we further excluded 9 outlier counties from the Black-specific data and 9 outliers from the Hispanic-specific data (Figures S3-S4, and Table S2). Finally, the Black-specific data had 572 area units covering 2,965 counties (94.34% of US counties housing 96.25% of US Black children). The Hispanic specific data consists of 631 area units covering 3,027 counties (96.31% of US counties housing 98.29% of US Hispanic children).

Table S1. Sample size of race/ethnicity-specific data.

Dataset	Initial sample size	# of excluded counties due to			Final sample size
		≤ 300 race/ethnicity-specific children	report rate > 100%	outlier ^a	
White-specific counties	662	0	1 ^b	3	658
Black-specific counties	662	79	2 ^c	9	572
Hispanic-specific counties	662	22	0	9	631

^a based on bagplot. ^b Searcy County, Arkansas. ^c Delaware County, New York and McNairy County, Tennessee.

Table S2. List of outliers.

FIPS	Name	Child population	Child poverty %	CPS report %
White-specific counties				
36087	Rockland, NY	57,053	25.06	0.98
36047	Kings, NY	195,685	29.51	0.87
5123	St. Francis, AR	2,095	29.70	74.74
Black-specific counties				
51015	Augusta, VA	483	9.40	23.77
9999	Litchfield, CT	567	15.60	20.78
9013	Tolland, CT	699	37.39	80.31
17081	Jefferson, IL	709	46.70	30.13
26017	Bay, MI	332	62.54	30.48
17001	Adams, IL	706	68.25	26.88
48479	Webb, TX	354	74.34	2.54
19061	Dubuque, IA	509	76.47	29.19
35045	San Juan, NM	400	79.25	3.10
Hispanic-specific counties				
36023	Cortland, NY	301	8.64	9.10
9013	Tolland, CT	2,023	12.75	28.20
36999	Delaware, NY	8,211	26.16	19.94
5055	Greene, AR	438	26.71	11.78
36015	Chemung, NY	838	27.05	11.41
51165	Rockingham, VA	1,760	27.33	15.57
25011	Franklin, MA	932	34.19	18.48
18043	Floyd, IN	866	62.28	14.09
12063	Jackson, FL	471	74.73	9.04

FIPS = Federal Information Processing Standard county code.

Figure S1. Sample construction.

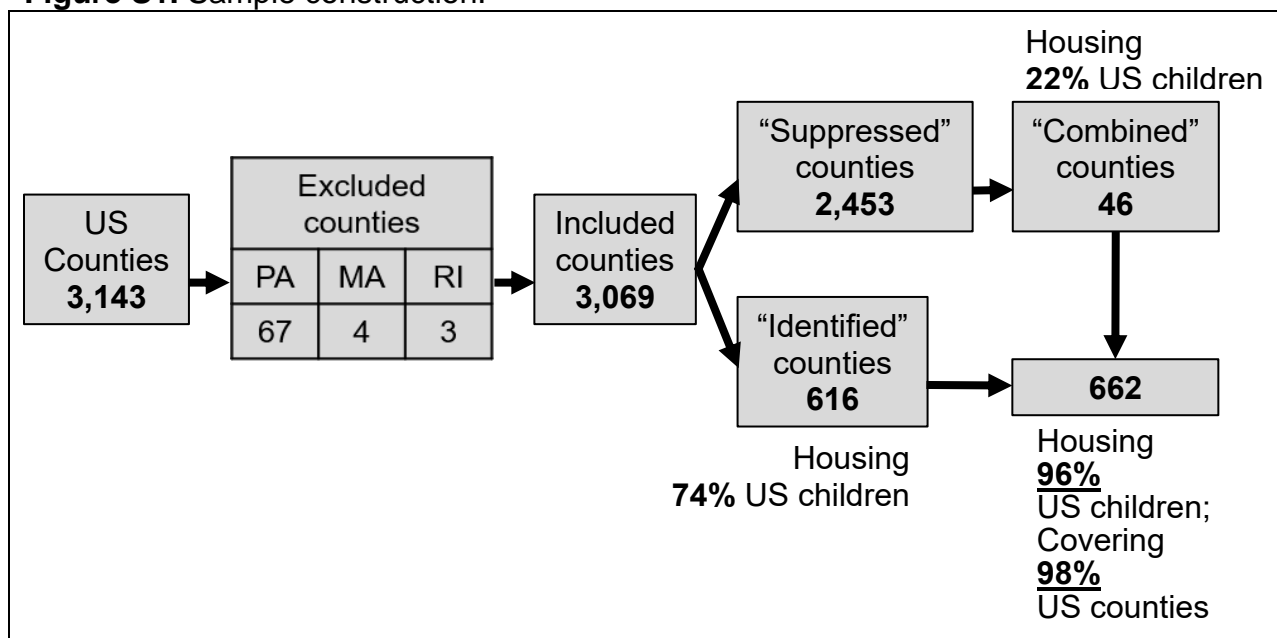
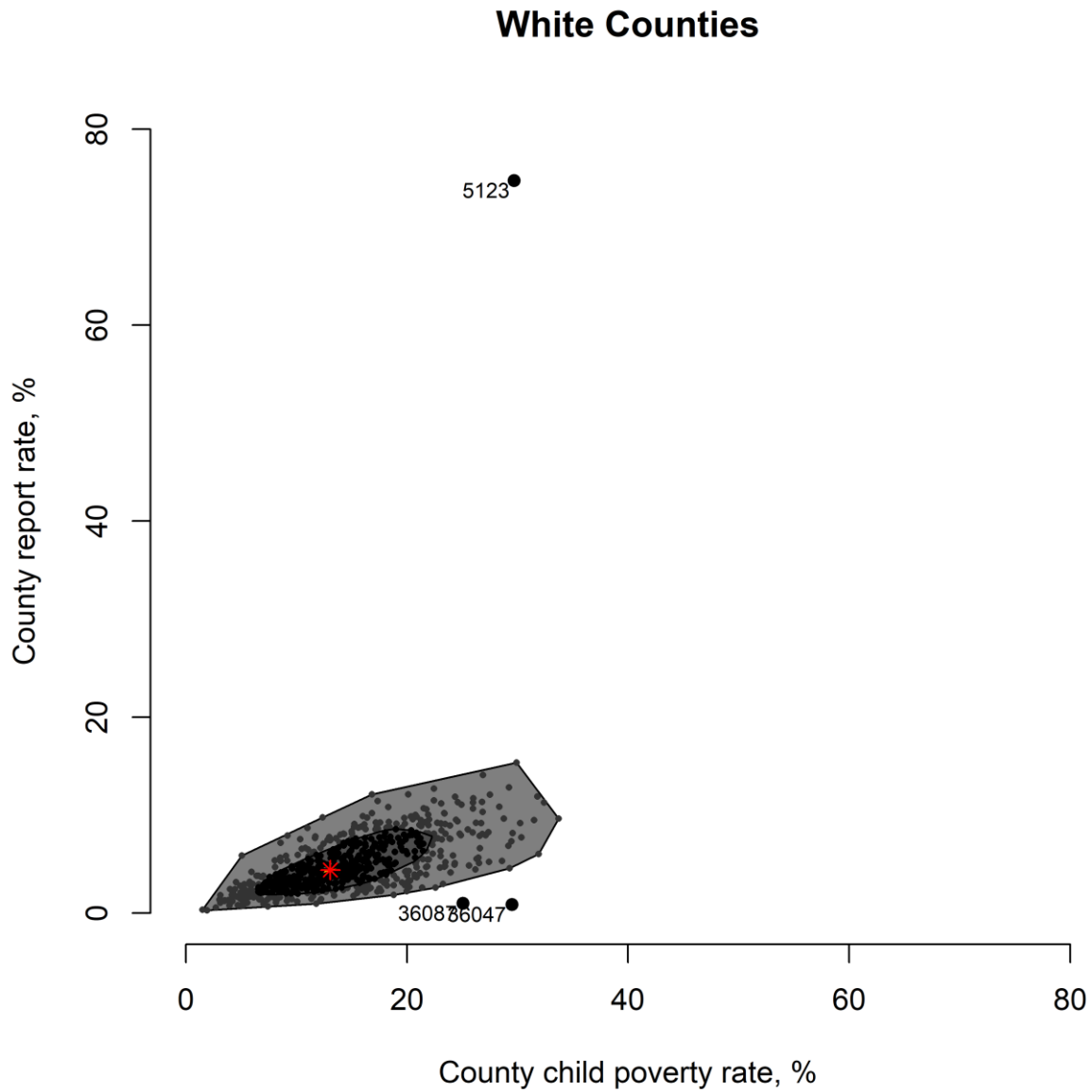
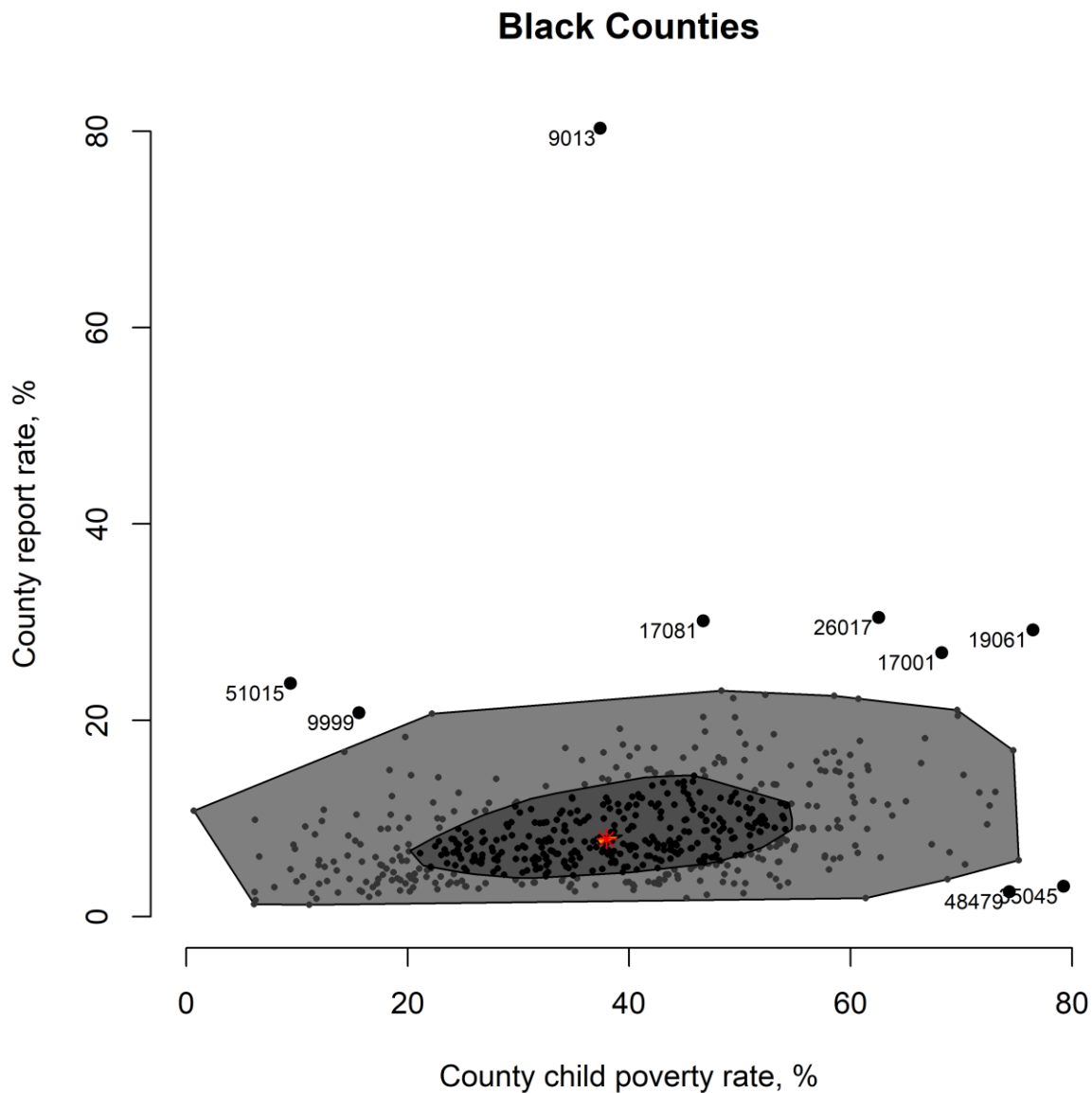


Figure S2. Scatter plot and bagplot of White-specific counties.



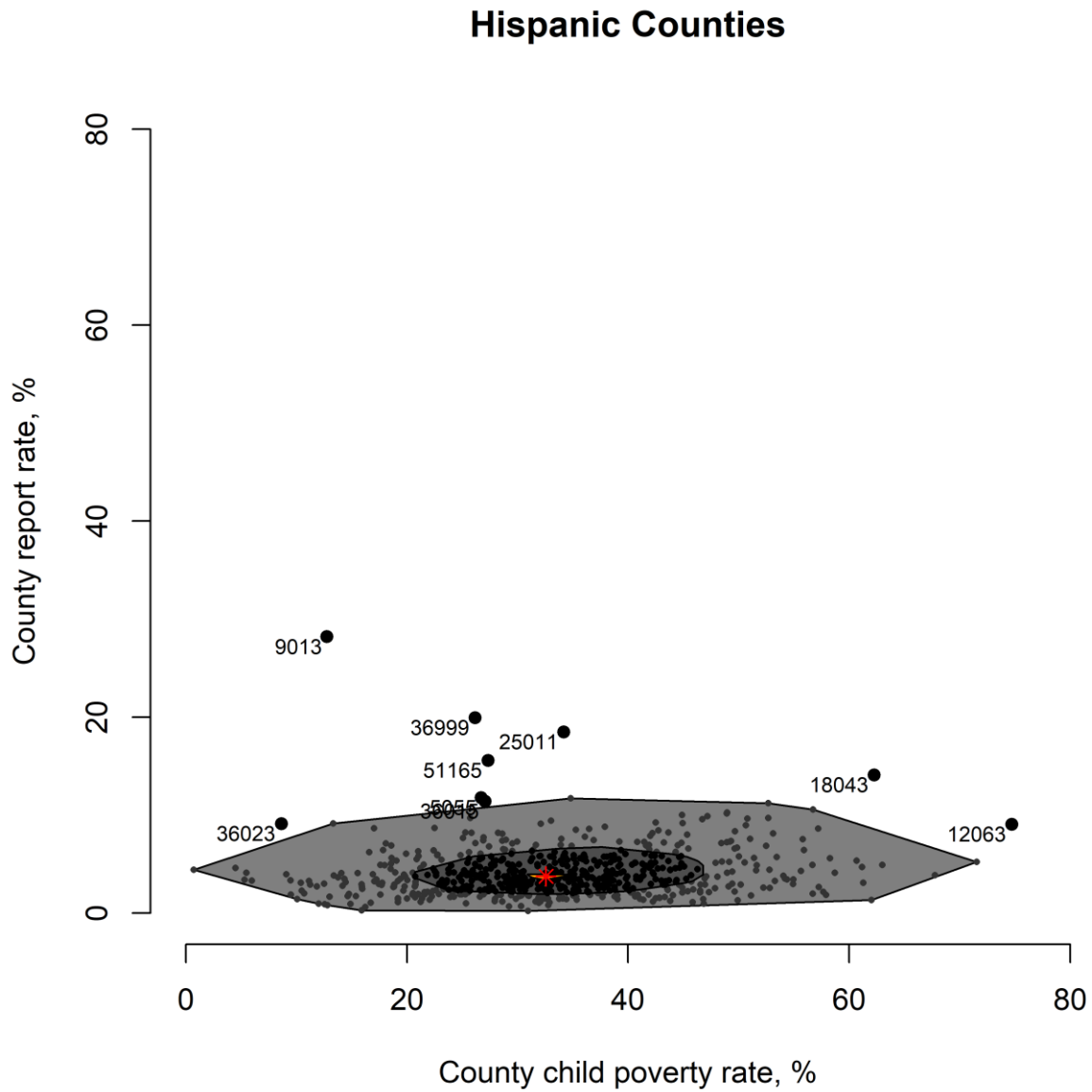
Note. A county with > 100% White report rate is excluded from this plot. Outliers are labeled with FIPS county code. See Table S2 for the list of outliers. The asterisk (*) is the depth median [31]. The inner polygon is a “bag” containing 50% of counties (cf. a box of a box plot) [31]. The outer polygon is a “loop” containing counties inside a “fence” which is given by magnifying the bag by a factor 3 (cf. whiskers of a box plot) [31]. Counties outside the loop are considered as outliers.

Figure S3. Scatter plot and bagplot of Black-specific counties.



Note. 79 counties with ≤ 300 Black children and 2 counties with $> 100\%$ Black report rate are excluded from this plot. Outliers are labeled with FIPS county code. See Table S2 for the list of outliers.

Figure S4. Scatter plot and bagplot of Hispanic-specific counties.



Note. 22 counties with ≤ 300 Hispanic children are excluded from this plot. Outliers are labeled with FIPS county code. See Table S2 for the list of outliers.

Sensitivity Analyses

We conducted sensitivity analyses of the poverty-maltreatment relationship for Black- and Hispanic-specific data, while varying the exclusion cut-points of the race/ethnicity-specific child population from 100 to 2,000 (Table S3). First, we excluded counties with race/ethnicity-specific child population lower than an indicated cut-point. Then, counties with race/ethnicity-specific maltreatment rates over 100% were excluded. Finally, we identified outliers based on a bagplot, and we excluded them.

For each dataset, we conducted additive multilevel modeling to estimate the county-level relationship between child poverty and official maltreatment by race/ethnicity (see the next section of this Supplement for greater detail). We depict the results for all reports in Figure S5 and for confirmed reports in Figure S6. The estimated relationships were mostly consistent across different cut-points. The results for the “100” and “200” cut-points, however, trended unstable in some occasions, especially when an outcome was a rare event such as sexual abuse reports and confirmed reports. The “300” cut-point showed reasonably stable poverty-maltreatment relationships for both reports and confirmed reports in all maltreatment types, while keeping more counties than higher cut-points. We therefore used the “300” cut-point for Black- and Hispanic-specific data. This is not applicable to White-specific data, as all counties in our data had a sufficient number (over 2,000) of White children.

Table S3. Sample size of Black- and Hispanic-specific data for sensitivity analyses.

Dataset	Initial sample size	# of excluded counties due to			Final sample size
		population lower than indicated	report rate > 100%	outlier ^a	
Black-specific counties					
> 100 Black children	662	26	3	16	617
> 200 Black children	662	54	2	10	596
> 300 Black children	662	79	2	9	572
> 500 Black children	662	108	1	5	548
>1000 Black children	662	182	1	1	478
>2000 Black children	662	259	0	0	403
Hispanic-specific counties					
> 100 Hispanic children	662	2	0	11	649
> 200 Hispanic children	662	11	0	10	641
> 300 Hispanic children	662	22	0	9	631
> 500 Hispanic children	662	48	0	5	609
>1000 Hispanic children	662	108	0	6	548
>2000 Hispanic children	662	191	0	6	465

^a based on bagplot.

Figure S5. Sensitivity analyses for predicted maltreatment report rates by child poverty rates.

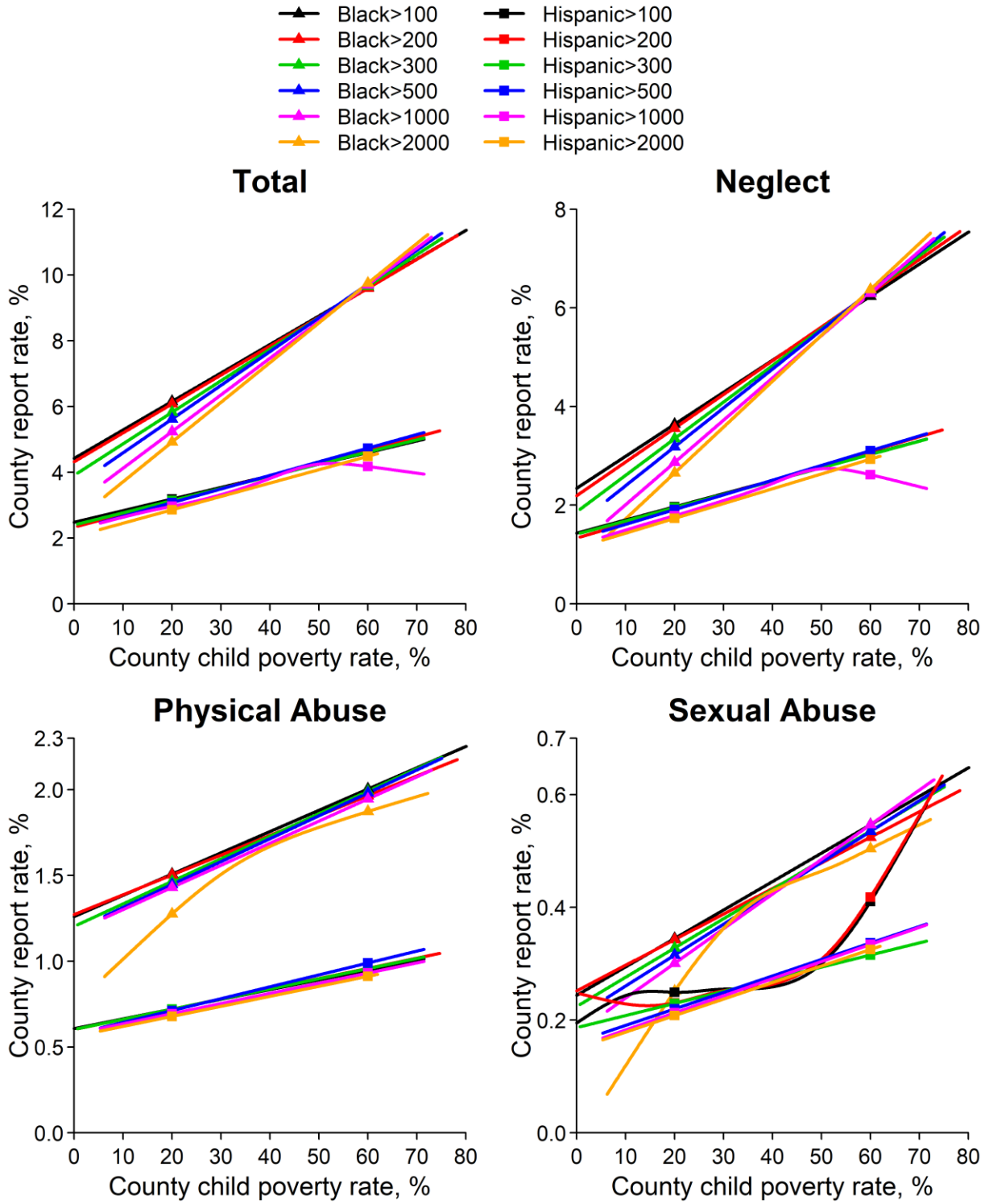
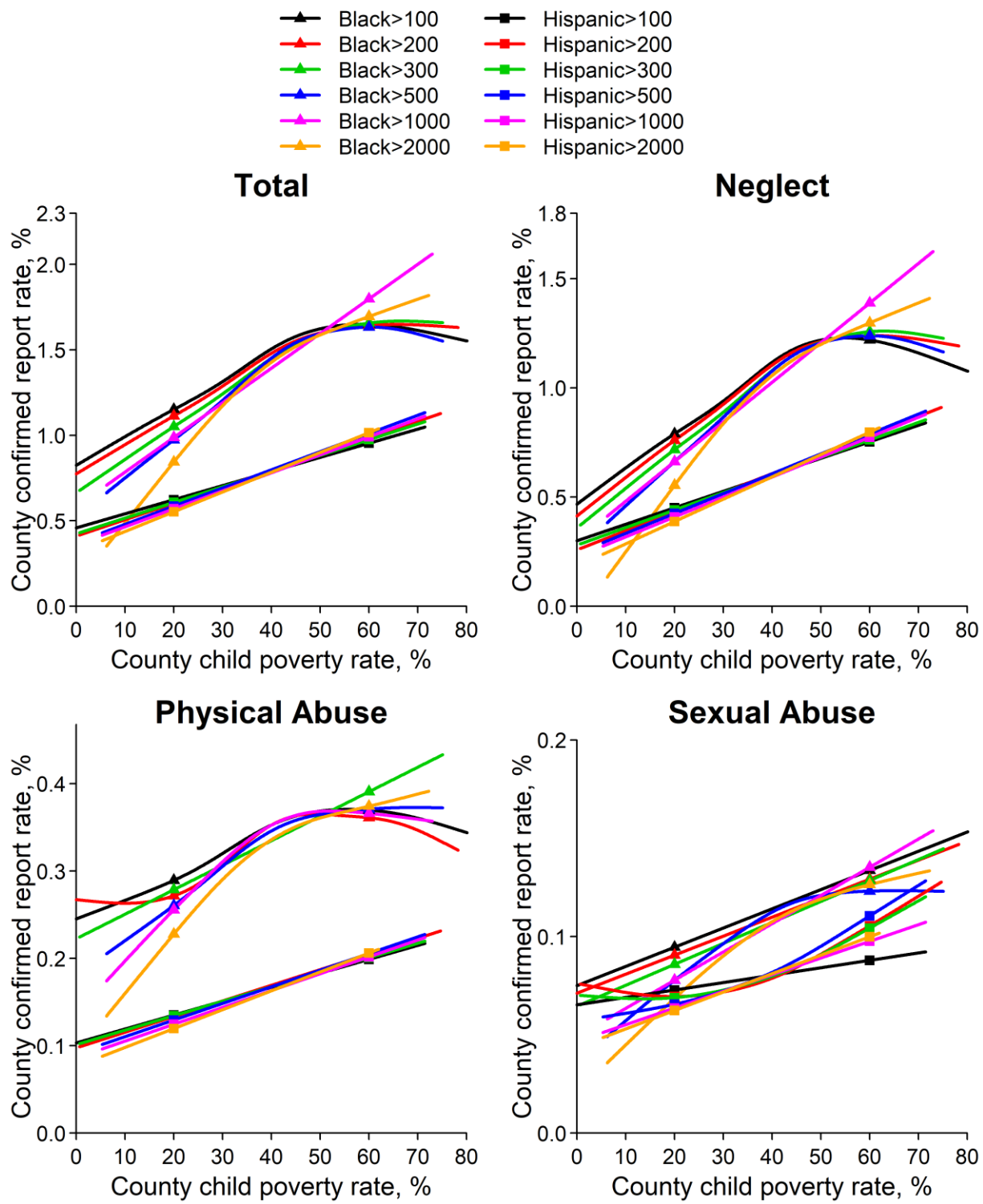


Figure S6. Sensitivity analyses for predicted confirmed maltreatment report rates by child poverty rates.



Analytic Strategy and Additive Mixed Modeling Results

We used Additive Mixed Modeling (AMM) to estimate county official maltreatment rates using county child poverty rates by race/ethnicity. The basic form of the models is:

$$Y_{ij} = \alpha + f(X_{ij}) + \alpha_i + \varepsilon_{ij}$$

where Y_{ij} is the race/ethnicity-specific maltreatment report (or confirmed report) rate of j th county in i th state, α is the intercept, $f(X_{ij})$ is the smoothing function of the race/ethnicity-specific child poverty rate, α_i is the random intercept, and ε_{ij} is the residual term. We used the “mgcv” package (version 1.8-22) of R 3.4.1 for analyses.(32)

We used additive models to explore any curvilinear relationship between maltreatment rates and child poverty rates. An advantage of the “mgcv” package is that it can automatically determine the optimal amount of smoothing based on a process called cross-validation.(32) Among various built-in options for the smoothing function, a thin plate regression spline (TP) is the default and known to perform the best with regard to model fit and mean squared error. A cubic regression spline (CR) generally performs the next best. For the current study, TP and CR gave nearly identical results. We reported the results by the default option (i.e. TP).

Mixed (i.e. multilevel) models were applied due to the nested data structure. Counties are nested in states and are not independent from state-level contexts (e.g. state definitions, policies, and procedures for child maltreatment). This nested data structure leads to two problems that cannot be handled by traditional models. The first one is that even if states show similar within-state relationships between maltreatment reports and child poverty, such relationships can be disguised in between-state comparisons because county-level maltreatment report rates can be shifted simply by nesting in a certain state. Traditional models ignore such a nested data structure and accordingly can produce misleading county-level relationships. Second, the independent observations assumption of many traditional models is violated with nested data structures, which can lead to severe type I errors. The high observed intraclass correlation coefficients (ICC) ranged from 0.34 to 0.62 empirically supported the existence of the nested data structure (Table S4). That is, states accounted for 34% to 62% of the variability in the race/ethnicity-specific county maltreatment rates. Mixed models can appropriately handle data with a nested structure.

Table S4. Intraclass correlation coefficients.

	Intraclass correlation coefficient		
	White	Black	Hispanic
Maltreatment report rate			
Total	.4506	.4111	.5281
Neglect	.4618	.4895	.5897
Physical abuse	.6158	.5949	.5734
Sexual abuse	.6072	.5909	.5370
Confirmed report rates			
Total	.3417	.4307	.5692
Neglect	.3678	.4612	.5879
Physical abuse	.4815	.4352	.4906
Sexual abuse	.5556	.4717	.3587

Table S5. Estimated county maltreatment report rates by county child poverty rates based on additive mixed models, 2009-2013, US.

Maltreatment report rate in percent (95% CI)						
Pov	Total			Neglect		
	White	Black	Hispanic	White	Black	Hispanic
5%	1.54 (1.07-2.02)	4.39 (3.40- 5.37)	2.58 (2.06-3.11)	0.74 (0.33-1.14)	2.23 (1.39-3.08)	1.55 (1.09-2.00)
10%	3.18 (2.76-3.61)	4.86 (3.94- 5.79)	2.77 (2.27-3.26)	1.96 (1.59-2.32)	2.60 (1.80-3.41)	1.68 (1.25-2.11)
15%	4.63 (4.20-5.05)	5.34 (4.47- 6.22)	2.95 (2.48-3.42)	3.00 (2.63-3.37)	2.98 (2.20-3.75)	1.82 (1.40-2.23)
20%	5.83 (5.39-6.27)	5.82 (4.99- 6.66)	3.14 (2.68-3.59)	3.86 (3.48-4.25)	3.35 (2.60-4.09)	1.95 (1.55-2.35)
25%	6.91 (6.43-7.40)	6.30 (5.50- 7.11)	3.32 (2.88-3.76)	4.69 (4.28-5.10)	3.72 (2.99-4.44)	2.08 (1.69-2.48)
30%	7.90 (7.27-8.52)	6.78 (6.00- 7.56)	3.51 (3.07-3.94)	5.44 (4.92-5.96)	4.09 (3.38-4.80)	2.22 (1.83-2.61)
35%	NA	7.26 (6.49- 8.03)	3.69 (3.25-4.13)	NA	4.46 (3.76-5.16)	2.35 (1.96-2.74)
40%	NA	7.74 (6.97- 8.51)	3.88 (3.43-4.32)	NA	4.83 (4.13-5.53)	2.49 (2.09-2.88)
45%	NA	8.22 (7.44- 9.01)	4.06 (3.60-4.52)	NA	5.20 (4.49-5.91)	2.62 (2.22-3.03)
50%	NA	8.70 (7.89- 9.51)	4.25 (3.77-4.73)	NA	5.57 (4.84-6.30)	2.76 (2.34-3.18)
55%	NA	9.18 (8.34-10.02)	4.43 (3.93-4.94)	NA	5.94 (5.19-6.69)	2.89 (2.45-3.33)
60%	NA	9.66 (8.77-10.55)	4.62 (4.08-5.15)	NA	6.31 (5.53-7.09)	3.03 (2.57-3.49)
65%	NA	10.14 (9.20-11.08)	4.80 (4.23-5.37)	NA	6.68 (5.87-7.50)	3.16 (2.68-3.65)
70%	NA	10.62 (9.62-11.61)	4.99 (4.38-5.59)	NA	7.06 (6.20-7.91)	3.30 (2.78-3.81)

Pov	Physical abuse			Sexual abuse		
	White	Black	Hispanic	White	Black	Hispanic
5%	0.44 (0.30-0.57)	1.27 (0.99-1.54)	0.63 (0.50-0.76)	0.12 (0.06-0.18)	0.25 (0.16-0.34)	0.20 (0.15-0.25)
10%	0.73 (0.61-0.86)	1.33 (1.07-1.60)	0.66 (0.54-0.79)	0.25 (0.19-0.31)	0.28 (0.19-0.36)	0.21 (0.16-0.26)
15%	0.97 (0.84-1.09)	1.40 (1.14-1.66)	0.69 (0.57-0.81)	0.35 (0.29-0.41)	0.30 (0.22-0.39)	0.22 (0.17-0.26)
20%	1.14 (1.01-1.27)	1.47 (1.22-1.71)	0.72 (0.60-0.84)	0.43 (0.37-0.49)	0.33 (0.24-0.41)	0.23 (0.19-0.27)
25%	1.31 (1.17-1.45)	1.53 (1.29-1.77)	0.75 (0.64-0.86)	0.50 (0.44-0.56)	0.35 (0.27-0.44)	0.24 (0.20-0.28)
30%	1.46 (1.29-1.62)	1.60 (1.36-1.84)	0.78 (0.67-0.89)	0.56 (0.48-0.63)	0.38 (0.30-0.46)	0.25 (0.21-0.29)
35%	NA	1.66 (1.42-1.90)	0.81 (0.70-0.92)	NA	0.41 (0.33-0.49)	0.26 (0.22-0.30)
40%	NA	1.73 (1.49-1.97)	0.84 (0.72-0.95)	NA	0.43 (0.35-0.51)	0.27 (0.23-0.32)
45%	NA	1.79 (1.55-2.03)	0.87 (0.75-0.99)	NA	0.46 (0.38-0.54)	0.28 (0.24-0.33)
50%	NA	1.86 (1.62-2.10)	0.90 (0.78-1.02)	NA	0.48 (0.40-0.57)	0.29 (0.25-0.34)
55%	NA	1.93 (1.67-2.18)	0.93 (0.80-1.05)	NA	0.51 (0.43-0.59)	0.30 (0.26-0.35)
60%	NA	1.99 (1.73-2.25)	0.96 (0.82-1.09)	NA	0.54 (0.45-0.62)	0.32 (0.26-0.37)
65%	NA	2.06 (1.79-2.32)	0.99 (0.85-1.13)	NA	0.56 (0.47-0.65)	0.33 (0.27-0.38)
70%	NA	2.12 (1.84-2.40)	1.02 (0.87-1.16)	NA	0.59 (0.49-0.68)	0.34 (0.28-0.39)

Note: Pov = child poverty rate. NA = not available because no race/ethnicity-specific county had the poverty level being assigned for the given row.

Table S6. Estimated county confirmed maltreatment report rates by county child poverty rates based on additive mixed models, 2009-2013, US.

Confirmed maltreatment report rate in percent (95% CI)						
Pov	Total			Neglect		
	White	Black	Hispanic	White	Black	Hispanic
5%	0.26 (0.15-0.38)	0.76 (0.40-1.12)	0.47 (0.31-0.63)	0.15 (0.04-0.26)	0.45 (0.12-0.78)	0.32 (0.17-0.47)
10%	0.55 (0.45-0.65)	0.86 (0.57-1.15)	0.52 (0.36-0.67)	0.39 (0.30-0.49)	0.54 (0.27-0.81)	0.36 (0.22-0.50)
15%	0.81 (0.71-0.91)	0.96 (0.70-1.21)	0.56 (0.42-0.71)	0.61 (0.51-0.70)	0.63 (0.40-0.86)	0.40 (0.27-0.54)
20%	1.03 (0.92-1.14)	1.05 (0.82-1.29)	0.61 (0.47-0.75)	0.79 (0.69-0.89)	0.72 (0.50-0.93)	0.44 (0.31-0.57)
25%	1.23 (1.11-1.35)	1.14 (0.92-1.37)	0.65 (0.52-0.79)	0.95 (0.84-1.06)	0.80 (0.59-1.01)	0.48 (0.35-0.61)
30%	1.43 (1.27-1.58)	1.24 (1.02-1.47)	0.70 (0.56-0.83)	1.10 (0.96-1.25)	0.89 (0.68-1.09)	0.52 (0.39-0.65)
35%	NA	1.35 (1.12-1.57)	0.74 (0.61-0.88)	NA	0.98 (0.78-1.19)	0.56 (0.43-0.69)
40%	NA	1.45 (1.23-1.67)	0.79 (0.65-0.93)	NA	1.08 (0.88-1.28)	0.60 (0.47-0.73)
45%	NA	1.53 (1.31-1.76)	0.84 (0.69-0.98)	NA	1.16 (0.95-1.36)	0.64 (0.51-0.77)
50%	NA	1.59 (1.36-1.82)	0.88 (0.73-1.03)	NA	1.21 (1.00-1.42)	0.68 (0.54-0.82)
55%	NA	1.63 (1.39-1.87)	0.93 (0.77-1.08)	NA	1.24 (1.02-1.46)	0.72 (0.58-0.86)
60%	NA	1.66 (1.40-1.91)	0.97 (0.81-1.14)	NA	1.26 (1.02-1.49)	0.76 (0.61-0.91)
65%	NA	1.67 (1.38-1.95)	1.02 (0.85-1.19)	NA	1.26 (1.00-1.52)	0.80 (0.64-0.96)
70%	NA	1.67 (1.33-2.00)	1.07 (0.88-1.25)	NA	1.25 (0.94-1.55)	0.84 (0.67-1.01)

Pov	Physical abuse			Sexual abuse		
	White	Black	Hispanic	White	Black	Hispanic
5%	0.06 (0.03-0.09)	0.24 (0.17-0.30)	0.11 (0.07-0.15)	0.04 (0.02-0.05)	0.07 (0.04-0.10)	0.07 (0.05-0.09)
10%	0.12 (0.10-0.15)	0.25 (0.19-0.31)	0.12 (0.08-0.15)	0.06 (0.05-0.08)	0.08 (0.05-0.10)	0.07 (0.05-0.09)
15%	0.17 (0.15-0.20)	0.26 (0.21-0.32)	0.13 (0.09-0.16)	0.09 (0.07-0.11)	0.08 (0.06-0.10)	0.07 (0.05-0.08)
20%	0.21 (0.19-0.24)	0.28 (0.22-0.33)	0.13 (0.10-0.17)	0.11 (0.10-0.13)	0.09 (0.06-0.11)	0.07 (0.05-0.08)
25%	0.25 (0.22-0.28)	0.29 (0.24-0.35)	0.14 (0.11-0.17)	0.14 (0.12-0.16)	0.09 (0.07-0.11)	0.07 (0.06-0.08)
30%	0.29 (0.25-0.33)	0.31 (0.25-0.36)	0.15 (0.12-0.18)	0.16 (0.14-0.18)	0.10 (0.08-0.12)	0.07 (0.06-0.09)
35%	NA	0.32 (0.27-0.37)	0.16 (0.13-0.19)	NA	0.10 (0.08-0.12)	0.08 (0.06-0.09)
40%	NA	0.33 (0.28-0.39)	0.17 (0.14-0.20)	NA	0.11 (0.09-0.13)	0.08 (0.07-0.09)
45%	NA	0.35 (0.30-0.40)	0.18 (0.14-0.21)	NA	0.11 (0.09-0.13)	0.08 (0.07-0.10)
50%	NA	0.36 (0.31-0.42)	0.18 (0.15-0.22)	NA	0.12 (0.10-0.14)	0.09 (0.07-0.11)
55%	NA	0.38 (0.32-0.43)	0.19 (0.16-0.23)	NA	0.12 (0.10-0.15)	0.10 (0.08-0.12)
60%	NA	0.39 (0.33-0.45)	0.20 (0.16-0.24)	NA	0.13 (0.10-0.15)	0.10 (0.08-0.13)
65%	NA	0.40 (0.34-0.47)	0.21 (0.17-0.25)	NA	0.13 (0.11-0.16)	0.11 (0.08-0.14)
70%	NA	0.42 (0.35-0.48)	0.22 (0.17-0.26)	NA	0.14 (0.11-0.17)	0.12 (0.09-0.15)

Note: Pov = child poverty rate. NA = not available because no race/ethnicity-specific county had the poverty level being assigned for the given row.

Table S7. Results of additive mixed models for county maltreatment report rate by county child poverty rate.

	Total				Neglect			
	EDF	F	p	R ²	EDF	F	p	R ²
White: s(child poverty)	2.69	301.8	<2e-16	0.489	2.71	250.5	<2e-16	0.386
Black: s(child poverty)	1.00	100.7	<2e-16	0.148	1.00	102.6	<2e-16	0.091
Hispanic: s(child poverty)	1.00	46.3	2.27e-11	0.047	1.00	38.2	1.12e-09	0.032
	Physical abuse				Sexual abuse			
	EDF	F	p	R ²	EDF	F	p	R ²
White: s(child poverty)	2.82	139.9	<2e-16	0.231	2.91	136.0	<2e-16	0.194
Black: s(child poverty)	1.00	36.6	2.57e-09	0.027	1.00	51.8	1.79e-12	0.042
Hispanic: s(child poverty)	1.00	21.4	4.46e-06	0.000	1.00	17.1	4.07e-05	0.006

Note. EDF = effective degrees of freedom of the smoother for race/ethnicity-specific county child poverty rate (the value of 1 indicates a linear relationship between child poverty rate and child maltreatment report rate; the higher the value, the more non-linear is the relationship). The county-level relationships of child poverty with total and type-specific maltreatment reports were highly linear for Blacks and Hispanics (EDF = 1), but non-linear for Whites (EDF ranged 2.69-2.91). The *F* values and corresponding *p* values of the child poverty smoothers indicate that in all 12 models (by race/ethnicity and maltreatment type), maltreatment report rates vary by child poverty levels in a statistically meaningful manner. R² = model fit estimate indicating the explained proportion of deviance by the model.

Table S8. Results of additive mixed models for county confirmed maltreatment report rate by county child poverty rate.

	Total				Neglect			
	EDF	F	p	R ²	EDF	F	p	R ²
White: s(child poverty)	2.00	161.6	<2e-16	0.263	2.05	132.9	<2e-16	0.195
Black: s(child poverty)	2.32	19.2	4.03e-09	0.026	2.50	19.4	1.56e-09	0.012
Hispanic: s(child poverty)	1.00	33.4	1.16e-08	0.013	1.00	38.2	1.12e-09	0.032
	Physical abuse				Sexual abuse			
	EDF	F	p	R ²	EDF	F	p	R ²
White: s(child poverty)	2.21	99.6	<2e-16	0.171	1.53	163.6	<2e-16	0.161
Black: s(child poverty)	1.00	20.1	9e-06	0.021	1.00	19.3	1.36e-05	0.036
Hispanic: s(child poverty)	1.00	16.4	5.75e-05	0.000	1.85	7.9	0.0046	0.014

Note. EDF = effective degrees of freedom of the smoother for race/ethnicity-specific county child poverty rate (the value of 1 indicates a linear relationship between child poverty rate and confirmed maltreatment report rate; the higher the value, the more non-linear is the relationship). The *F* values and corresponding *p* values of the child poverty smoothers indicate that in all 12 models (by race/ethnicity and maltreatment type), confirmed maltreatment report rates vary by child poverty levels in a statistically meaningful manner. R² = model fit estimate indicating the explained proportion of deviance by the model.

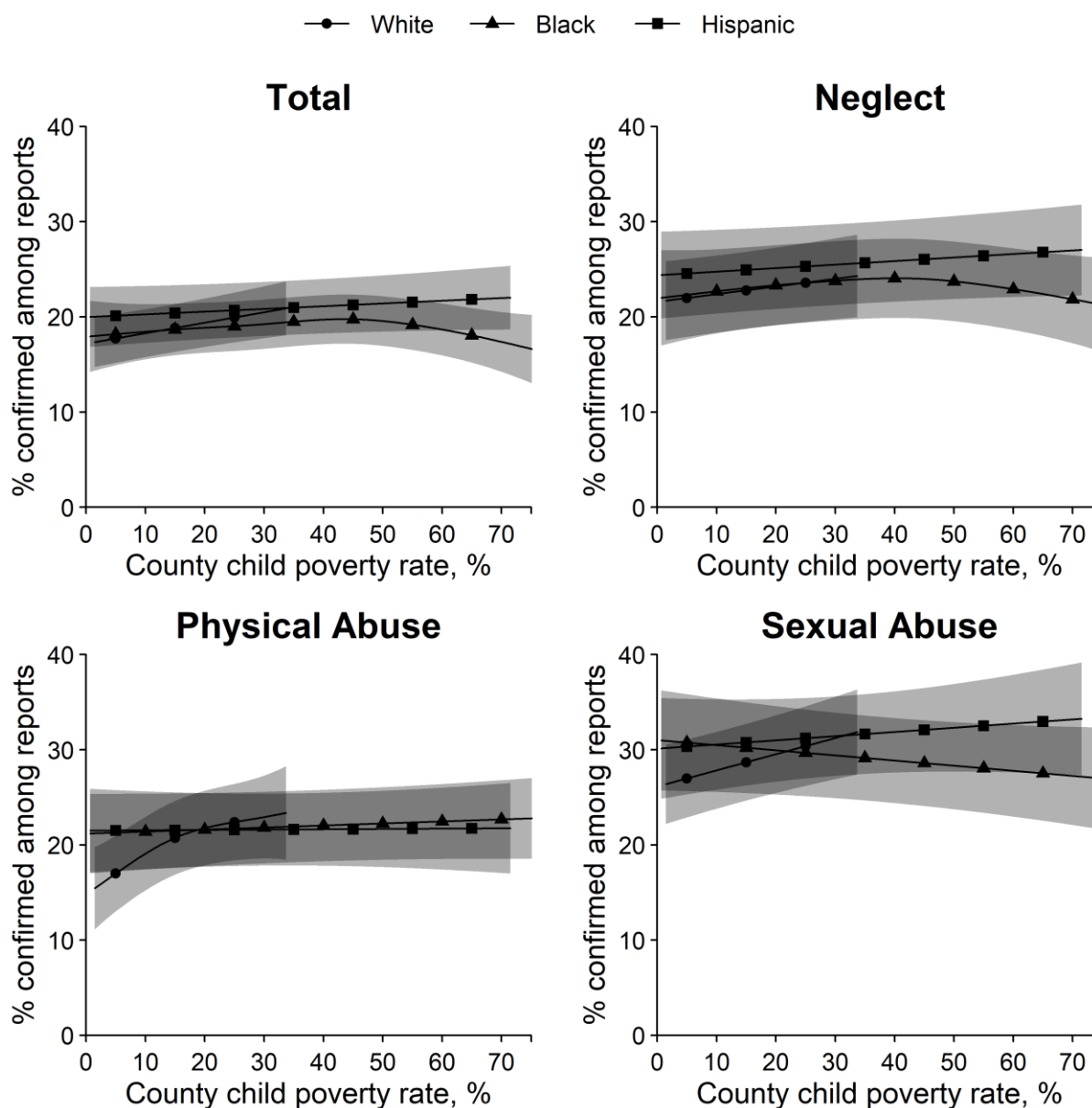
Conditional Confirmed Report Rate

Up to this point, we have presented data on reports and confirmed reports only as a function of their occurrence within the general population. Another way to look at confirmed reports is to understand what proportion of all reports transition to confirmed reports. We term this the “conditional confirmed report rate”. In this section we present conditional confirmed report rates (% of all reports which are confirmed among reported children by race/ethnicity per county) in Figure S7 and Table S9. Our data show slightly higher conditional confirmed report rates among higher poverty levels among Whites only.

Compared with the results for all report rates and confirmed report rates (Figure 1 and 2), the estimated *conditional* confirmed report rates varied little, or modestly at best, by race/ethnicity and child poverty (Figure S7). For Whites, the probability of confirming reported cases somewhat increased with the increase of child poverty rates. This appeared to make White slopes for confirmed reports (Figure 2) slightly steeper than those for all reports (Figure 1). For Blacks and Hispanics, the estimated *conditional* confirmed report rates were mostly stable across child poverty levels, while Blacks showed a downward slope at high poverty levels for any type and neglect (Figure S7). This may be reflected in the slightly curved Black slopes for any type and neglect confirmed reports (Figure 2).

There could be several reasons why confirmation rates change as poverty changes. The threshold for reporting could be higher (or lower) in poor areas, yielding a more (or less) potentially serious set of referrals and a higher substantiation rate. There could be differences in decision-making among CPS workers related to client SES. There could be a different set of underlying problems in cases from richer and poorer communities, with these leading to different confirmation levels. Our data do not provide information which can help us determine which of these potential causes may be operative.

Figure S7. Estimated county conditional confirmed report rates by county child poverty rates based on additive mixed models, 2009-2013, US.



Note. % confirmed among reports = % confirmed among reported children by race/ethnicity per county. Shaded areas are 95% confidence intervals of predicted values. All rates are annualized (i.e. per-year %). The horizontal ranges of race-specific graphs correspond to the range of race-specific county child poverty rates (i.e. 1.50%-33.71% for Whites, 0.67%-75.19% for Blacks, and 0.69%-71.56% for Hispanics).

Table S9. Results of additive mixed models for county conditional confirmed maltreatment report rate by county child poverty rate.

	Total				Neglect			
	EDF	F	p	R ²	EDF	F	p	R ²
White: s(child poverty)	1.00	11.62	.0007	.000	1.00	4.39	.0366	.000
Black: s(child poverty)	2.63	3.51	.0805	.000	2.15	2.63	.0910	.000
Hispanic: s(child poverty)	1.00	1.66	.1990	.000	1.00	1.88	.1710	.000
	Physical abuse				Sexual abuse			
	EDF	F	p	R ²	EDF	F	p	R ²
White: s(child poverty)	2.04	18.52	1.36e-08	.004	1.00	23.63	.0004	.000
Black: s(child poverty)	1.00	0.69	.4070	.001	1.00	1.93	.1660	.000
Hispanic: s(child poverty)	1.00	0.01	.9240	.000	1.00	0.70	.4040	.000

Note. EDF = effective degrees of freedom of the smoother for race/ethnicity-specific county child poverty rate (the value of 1 indicates a linear relationship between child poverty rate and conditional confirmed report rate; the higher the value, the more non-linear is the relationship). The *F* values and corresponding *p* values of the child poverty smoothers indicate whether conditional confirmed report rates vary by child poverty levels in a statistically meaningful manner. R² = model fit estimate indicating the explained proportion of deviance by the model.