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## Social Inequality

# Child maltreatment risk as a function of poverty and race/ethnicity in the USA

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### Abstract

**Background:** Child maltreatment is a pressing social problem in the USA and internationally. There are increasing calls for the use of a public health approach to child maltreatment, but the effective adoption of such an approach requires a sound foundation of epidemiological data. This study estimates for the first time, using national data, total and type-specific official maltreatment risks while simultaneously considering environmental poverty and race/ethnicity.

**Methods:** National official maltreatment data (2009–13) were linked to census data. We used additive mixed models to estimate race/ethnicity-specific rates of official maltreatment (total and subtypes) as a function of county-level child poverty rates. The additive model coupled with the multilevel design provided empirically sound estimates while handling both curvilinearity and the nested data structure.

**Results:** With increasing county child poverty rates, total and type-specific official maltreatment rates increased in all race/ethnicity groups. At similar poverty levels, White maltreatment rates trended higher than Blacks and Hispanics showed lower rates, especially where the data were most sufficient. For example, at the 25% poverty level, total maltreatment report rates were 6.91% [95% confidence interval (CI): 6.43%–7.40%] for Whites, 6.30% (5.50%–7.11%) for Blacks and 3.32% (2.88%–3.76%) for Hispanics.

**Conclusions:** We find strong positive associations between official child maltreatment and environmental poverty in all race/ethnicity groups. Our data suggest that Black/White disproportionality in official maltreatment is largely driven by Black/White differences in poverty. Our findings also support the presence of a ‘Hispanic paradox’ in official maltreatment, where Hispanics have lower risks compared with similarly economically situated Whites and Blacks.

**Key words:** Child maltreatment, poverty, racial disparity, Hispanic paradox

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### Key Messages

- For the first time, we present nationwide distributions of official child maltreatment by environmental poverty while simultaneously disaggregating by race/ethnicity and maltreatment subtype.
- With increasing county child poverty rates, total and type-specific official maltreatment rates increased in all race/ethnicity groups. At similar poverty levels, White report rates trended higher than Blacks whereas Hispanics showed lower report rates, especially where the data were most sufficient.
- From a policy perspective, our data confirm emerging local findings showing that Black/White racial disproportionality in official maltreatment is almost certainly a reflection of economic issues, rather than bias in the child welfare systems.
- Our findings provide strong support for the existence of the 'Hispanic paradox' in official child maltreatment data at the national level.

## Introduction

Child maltreatment is a pressing public health problem.<sup>1,2</sup> Annually, about 4% of US children are reported to child protection services agencies (CPS).<sup>3</sup> During childhood, over 38% of US children are estimated to experience at least one maltreatment event.<sup>4</sup> Child maltreatment has been associated with a wide range of negative behavioural, psychological and health outcomes.<sup>1,2</sup> These negative outcomes include atypical early brain development, especially regarding core stress response systems, higher risk of various health and behavioural problems and higher mortality risk from childhood through adulthood.<sup>5–10</sup>

A large body of literature shows that there is a strong social gradient in child maltreatment across both the socioeconomic status (SES) spectrum and racial categories.<sup>11–13</sup> According to the fourth National Incidence Study, maltreatment risk was 5.8 times higher for children in lower SES families. In the absence of SES controls, maltreatment risk was observed in the same study to be 1.7 times higher for Blacks than for Whites.<sup>13</sup> Similar gradients are also observed in official CPS data. A study based in a large urban county in Ohio found that the maltreatment report rate was 6.1 times greater for children in poverty-related programmes than for other children, and was 2.8 times greater for Blacks than for Whites.<sup>14</sup> Another study based in California found that the future risk of maltreatment reporting was 2.5 times higher for newborns on Medicaid than for non-recipients, and was 2.3 times higher for Blacks than for Whites.<sup>15</sup>

Given the extreme economic stratification in our society, it is difficult to understand the relationship between race and public health outcomes without controlling for income.<sup>16–18</sup> In the child maltreatment literature, practically all recent studies have demonstrated that when SES is controlled for, apparent Black/White disparity in both official and surveyed maltreatment disappears whereas the SES gradient remains strong.<sup>14,15,19–23</sup>

Despite recent advances in this area, we lack a national-level understanding of official maltreatment while taking both SES and race/ethnicity into account. This is the first study using nationwide data to estimate the risk of official maltreatment among US children while considering environmental poverty and race/ethnicity simultaneously.

## Methods

We used additive mixed models to estimate race/ethnicity-specific relationships between official maltreatment and child poverty at the county level. Estimates were broken down by maltreatment types (i.e. total, neglect, physical abuse and sexual abuse). Although we presented estimates for both all reports (i.e. screened-in referrals for CPS investigation or assessment) and confirmed reports (i.e. substantiated or indicated reports by CPS), using all reports is increasingly becoming the standard in recent empirical work. Evidence has shown that across various negative outcomes, children in not-confirmed cases generally face the same current and future risks as children in confirmed cases.<sup>24–28</sup> This suggests that including only confirmed reports largely lowers sensitivity with little improvement in specificity.

Since CPS data generally lack reliable poverty information, we used the smallest available geographical identifier present in the CPS data (i.e. county) to link to available poverty information in census data. CPS data were obtained from the 2009–13 National Child Abuse and Neglect Data System (NCANDS).<sup>29</sup> NCANDS is the federal archive for CPS cases. CPS agencies exist in all US states and territories and accept maltreatment reports from professionals (e.g. health, mental health and social service professionals) and nonprofessionals (e.g. neighbours, friends and relatives). Child poverty data were obtained from the 2009–13 American Community Survey (ACS) 5-year estimates (i.e. per-year average).<sup>30</sup>

## Measures

We derived county-level rates of official maltreatment and child poverty by race/ethnicity. We assigned race/ethnicity values from NCANDS corresponding to the ACS classification: (i) non-Hispanic White race alone; (ii) Black race alone, including Hispanic; and (iii) Hispanic ethnicity, including all racial groups. Unfortunately, ACS currently provides no count for non-Hispanic Black ‘children’. The Black category consists mainly of non-Hispanic Black children, as evidenced by the fact that less than 3% of the Black-alone population (‘all ages’) identify themselves as Hispanics in ACS. We omitted other categories from the analysis (e.g. Asian, Native American) due to insufficient population levels within counties.

### County official maltreatment rate

We computed official maltreatment rates per 100 children by race/ethnicity, both at the report ( $\frac{\# \text{ reported}}{\text{County child population}} \times 100$ ) and confirmed report ( $\frac{\# \text{ confirmed}}{\text{County child population}} \times 100$ ) levels. Since ACS provides annualized data, we also annualized NCANDS data (i.e., per-year average of 2009-13). To prevent overestimation, a child was counted only once per year, even if multiple reports existed during a given year. For type-specific rates, we counted children within three major subtypes: neglect, physical abuse and sexual abuse. We included children within each specific type present regardless of presence of other types.

Race/ethnicity-specific child poverty rates per county were computed based on 2009-13 ACS table B17020, representing annualized county rates.

### Data preparation

We merged NCANDS and ACS at the county level. NCANDS suppressed the county identifier (ID) of counties with < 1000 maltreatment cases for confidentiality, grouping all suppressed counties under a single identifier within each state. To maximize data utility, we aggregated suppressed counties into a combined area for each state. From the full 3143 US counties, 74 counties were excluded due to missing data (e.g. no race/ethnicity information). Among the remaining 3069 counties, 616 counties were identified and 2453 counties were suppressed in NCANDS. We aggregated suppressed counties into 46 combined areas, one per each of 46 states. The identified counties housed 73.84% of US children, and the suppressed counties housed 22.27% of US children. Altogether, our merged database had 662 area units covering 97.65% of US counties, housing 96.11% of US children.

From the merged database, we constructed race/ethnicity-specific data. While doing this, we first excluded counties with  $\leq 300$  race/ethnicity-specific children, to ensure reliable counts of both poor children and reported children in a county. Then, we excluded counties with rates exceeding the theoretical boundary (i.e. 100%) and outlier counties identified by a bagplot.<sup>31</sup> The White-specific data had 658 areas covering 97.52% of US counties, housing 94.14% of US White children. The Black-specific data had 572 areas covering 94.34% of US counties, housing 96.25% of US Black children. The Hispanic specific data had 631 areas covering 96.31% of US counties, housing 98.29% of US Hispanic children. (See the Supplement for greater details, available as [Supplementary data](#) at *IJE* online.)

### Analytical strategy

We used additive mixed modelling (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,  $\alpha$  is the intercept,  $f(X_{ij})$  is the smoothing function of the race/ethnicity-specific child poverty rate,  $\alpha_i$  is the random intercept and  $\varepsilon_{ij}$  is the residual term. We used additive models to explore any curvilinear relationship between maltreatment rates and child poverty rates. 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). The high observed intraclass correlation coefficients (ICC) ranged from 0.34 to 0.62, empirically supporting the existence of the nested data structure (Table S4, available as [Supplementary data](#) at *IJE* online.). 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. We used the ‘mgcv’ package (version 1.8-22) of R 3.4.1 for analyses.<sup>32</sup> (See the Supplement for more details.)

## Results

### Demographics

Table 1 provides descriptive statistics. Black counties had the highest mean child poverty rate at 38.38% [standard

**Table 1.** Annual county child poverty rate and official maltreatment rate, 2009-13, USA

	White (N = 658)		Black (N = 572)		Hispanic (N = 631)	
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range
Child poverty rate, %	14.42 (6.26)	1.50 to 33.71	38.38 (14.15)	0.67 to 75.19	33.29 (11.03)	0.69 to 71.56
Maltreatment report rate, %						
Total	4.88 (2.69)	0.28 to 15.34	8.38 (4.16)	1.19 to 23.03	3.96 (2.02)	0.21 to 11.70
Neglect	3.32 (2.17)	0.05 to 13.17	5.38 (3.59)	0.09 to 21.79	2.63 (1.90)	0.04 to 10.74
Physical abuse	0.94 (0.64)	0.02 to 3.85	1.73 (1.10)	0.03 to 6.69	0.81 (0.49)	0.03 to 3.05
Sexual abuse	0.36 (0.27)	0.01 to 1.61	0.47 (0.36)	0.00 to 2.97	0.29 (0.21)	0.00 to 1.69
Confirmed report rate, %						
Total	0.83 (0.57)	0.01 to 4.38	1.46 (1.07)	0.04 to 7.00	0.75 (0.61)	0.07 to 3.95
Neglect	0.65 (0.52)	0.01 to 3.74	1.10 (0.99)	0.00 to 6.73	0.59 (0.59)	0.00 to 3.90
Physical abuse	0.17 (0.14)	0.00 to 1.26	0.35 (0.26)	0.00 to 1.93	0.16 (0.14)	0.00 to 1.08
Sexual abuse	0.09 (0.08)	0.00 to 0.59	0.11 (0.10)	0.00 to 0.93	0.08 (0.07)	0.00 to 0.63

All rates are annualized (i.e. per-year average of 2009-13). White-specific data (N = 658) include 612 'uncombined' counties and 46 'combined' counties covering 2453 counties. Altogether, White-specific data cover 3065 counties (97.52% of US counties) where 91.14% of US White children reside. Black-specific data (N = 572) include 529 'uncombined' counties and 43 'combined' counties covering 2436 counties. Altogether, Black-specific data cover 2965 counties (94.34% of US counties) where 96.25% of US Black children reside. Hispanic-specific data (N = 631) include 586 'uncombined' counties and 45 'combined' counties covering 2441 counties. Altogether, Hispanic-specific data cover 3027 counties (96.31% of US counties) where 98.29% of US Hispanic children reside.

deviation (SD) = 14.15, range = 0.67 to 75.19], followed by Hispanics at 33.29% (SD = 11.03, range = 0.69 to 71.56) and Whites at 14.42% (SD = 6.26, range = 1.50 to 33.71). The distribution of counties was largely concentrated at low child poverty levels for Whites (Figure S2, available as Supplementary data at *IJE* online), whereas the distribution spread more out toward high child poverty levels for Blacks and Hispanics (Figures S3 and S4, available as Supplementary data at *IJE* online.). The mean county rate of total maltreatment reports was highest at 8.38% (SD = 4.16, range = 1.19 to 23.03) for Blacks, followed by Whites at 4.88% (SD = 2.69, range = 0.28 to 15.34) and Hispanics at 3.96% (SD = 2.02, range = 0.21 to 11.70). This order in race/ethnicity was maintained within subtypes and for confirmed reports, but was less discernable for sexual abuse.

### Maltreatment risks by child poverty risks

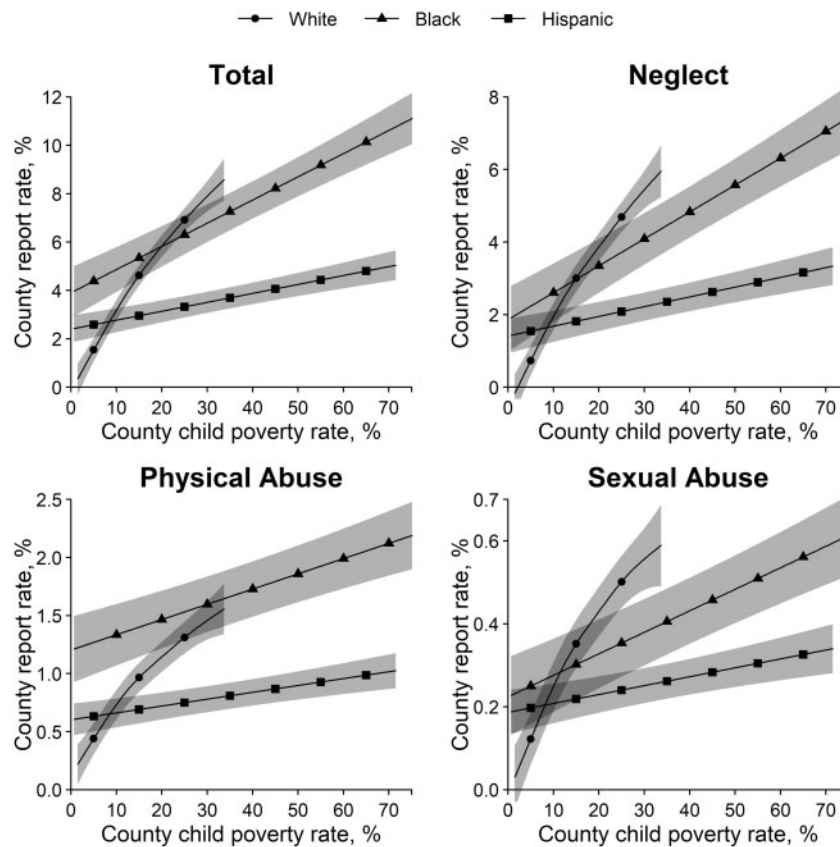
The estimated total and type-specific official maltreatment rates by AMM are depicted in Figure 1 (all reports) and Figure 2 (confirmed reports). Further AMM results are available in the Supplement (Tables S5-S8, available as Supplementary data at *IJE* online.). In total and for all subtypes for both reports and confirmed reports, Whites showed steeper upward slopes than Blacks. Hispanics had less steep slopes than either Whites or Blacks. At higher child poverty levels (> 15%), Whites trended to have official maltreatment rates similar to or even higher than those of Blacks, which was more discernable for neglect and sexual abuse. In general, Hispanics showed lower official maltreatment rates than others both in total and for subtypes.

For example, at the 25% county child poverty level, the total maltreatment report rate was 6.91% (95% CI: 6.43%–7.40%) for Whites, 6.30% (5.50%–7.11%) for Blacks and 3.32% (2.88%–3.76%) for Hispanics. At lower child poverty levels (< 15%), Whites trended to have lower official maltreatment rates than others. Whereas there are 54.84% of White counties (housing 62.22% of White children) at these low poverty levels, there are too few Black counties (5.42% of Black counties housing 2.84% of Black children) and Hispanic counties (4.75% of Hispanic counties housing 2.04% of Hispanic children) to make valid comparisons.

### Discussion

This study represents the first effort to examine the nationwide distribution of official maltreatment cases in the USA while simultaneously considering environmental poverty and race/ethnicity. This study identified strong positive county-level associations between official maltreatment and poverty. We identified these within subtypes and for both reports and confirmed reports in all race/ethnic groups. Although the current study is limited to the county level, our findings converge well with previous local family-level findings,<sup>11–15</sup> including an experimental study which found that a random increase of family income lowered maltreatment report risk.<sup>19</sup>

We did note some small differences in the percentages of reports which were confirmed as a function of SES and race/ethnicity. These findings, although not part of our original research questions, are discussed in more detail in the Supplement.



**Figure 1.** Estimated county child maltreatment report rates by county child poverty rates based on additive mixed models, 2009–2013, US.

Note. County report rate = % reported among all 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).

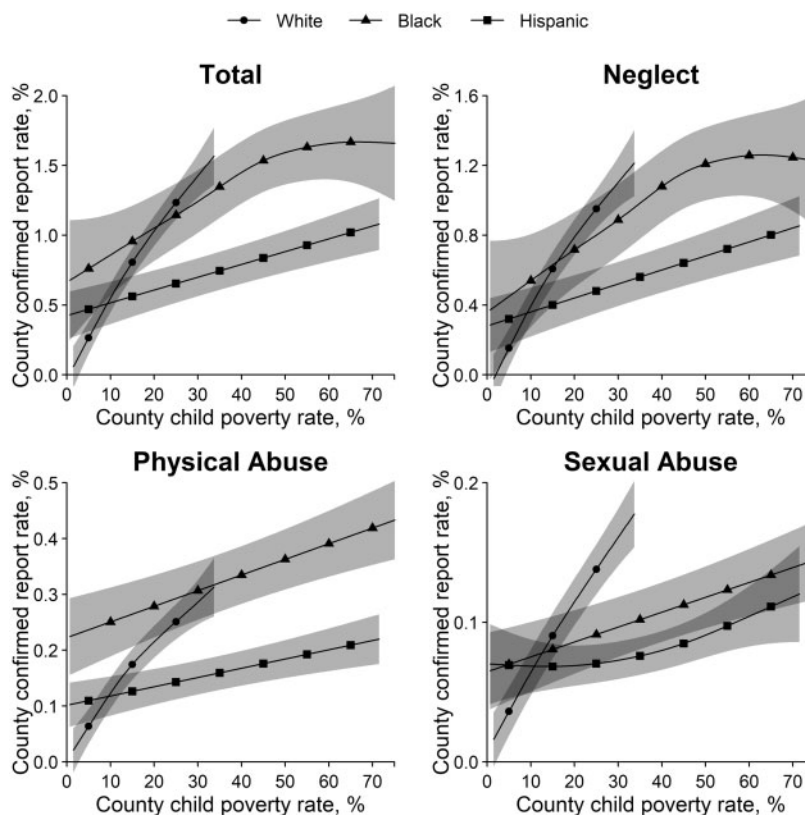
### Race/ethnicity and child maltreatment

We draw two main conclusions from the findings regarding Black/White disparity in official maltreatment. First, when controlling for environmental poverty, Blacks generally showed the same or lower total and type-specific official maltreatment risks when compared with Whites, especially where Black-specific data were not sparse. This finding is very different from our bivariate results (Table 1) and from previous research which shows Black over-representation while not controlling for SES.<sup>11–15</sup> The disappearance of this large Black/White disparity after controlling for environmental poverty suggests that the nationwide racial disparity in official maltreatment is largely due to the disproportional poverty risks between Blacks and Whites. Second, in our data, Blacks tend to show lower risks for neglect and sexual abuse than Whites at high child poverty levels (Figures 1 and 2). This finding suggests that there may be a small tendency for a differential sensitivity between Blacks and Whites relative to neglect and sexual abuse. Once again, although our national-level findings are limited to the county level, these findings are consistent with previous local family-level findings.<sup>14,15,19–23</sup>

This study strongly supports recent work suggesting the existence of the ‘Hispanic paradox’ in child maltreatment.<sup>12,22,33</sup> We found that Hispanics had markedly lower rates of official maltreatment once SES was controlled. The public health literature suggests that the Hispanic paradox in child health may be due to social and cultural protective factors present among Hispanics, such as familism, religiosity and strong social supports.<sup>22</sup>

### Poverty and child maltreatment

A possible explanation for the relationship between poverty and official maltreatment is that poverty increases actual maltreatment risks, which results in more reports being made among the poor. In most states, neglect cannot be established if failure to provide for a child’s needs is due only to poverty. Poverty may still contribute to neglect indirectly. For example, a poor family may lack necessary resources to buffer other risks.<sup>34–36</sup> Other forms of child neglect, such as those associated with health and safety hazards stemming from inadequate housing, are also more likely to be found in poor families.<sup>11,35,36</sup> From an



**Figure 2.** Estimated county child maltreatment confirmed report rates by county child poverty rates based on additive mixed models, 2009–2013, US. Note. County confirmed report rate = % confirmed among all 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).

economic perspective, it has been suggested that poorer parents may be more likely to under-invest in their children because of lower expected returns from investment, which may lead to higher neglect risks.<sup>34</sup>

With regard to physical abuse, poorer parents may have fewer resources to manage their children's behaviours, especially lacking pecuniary incentives, which would make them use more non-pecuniary means such as corporal punishment.<sup>37</sup> Eventually, this may result in higher physical abuse risks. Theory suggests that stress can mediate poverty effects on both neglect and physical abuse. Under very high stress, parents may become depressed and temporarily withdraw from their caretaking role,<sup>11</sup> possibly resulting in higher neglect risks. For families stressed by extreme poverty, even trivial irritations from children may be more likely to trigger anger, leading to the potential for abusive behaviors.<sup>11,35</sup>

Regarding sexual abuse, poverty may hinder potential perpetrators' ability to adopt socially accepted means of satisfying their sexual needs.<sup>38</sup> It is also possible that poverty and single parenthood may make it more difficult to supervise children and protect them from potential perpetrators.<sup>38</sup> In addition, it has been suggested that poverty

may be emotionally challenging for children, limiting their ability to resist potential perpetrators.<sup>38</sup>

An alternative explanation is that the association between poverty and maltreatment reporting is largely due to reporting bias, which may artificially and unnecessarily bring more poor children to the attention of CPS. The emerging scientific consensus, however, suggests that the relationship between poverty and maltreatment reporting is largely due to increased actual maltreatment risks among the poor, rather than due to reporting bias.<sup>11–13,39</sup> Further elaboration of the mechanisms through which poverty increases maltreatment risk and maltreatment reporting is clearly necessary.

### Strengths and limitations

This study has several strengths worth noting. This study established, for the first time, race/ethnicity-specific linkages between nationwide official maltreatment data and census data. The joint consideration of race/ethnicity and socioeconomic factors relative to national distributions of official maltreatment was only possible through these linkages. This also allowed our data to cover 94% to 98% of

race/ethnicity-specific US counties, housing 94% to 98% of race/ethnicity-specific US children. Other strengths are methodological in nature. The additive mixed models provided empirically sound estimates while handling both curvilinearity and the nested data structure. Despite these strengths, several limitations warrant further comment and must be considered in interpreting our findings.

First, our findings are restricted to county-level relationships between child poverty and official maltreatment. Although previous findings robustly support similar family-level relationships, one should not interpret our findings beyond the county level.

Second, our findings are limited to race/ethnicity-specific bivariate associations between child poverty and official maltreatment. Exploring other possible variables which can further contribute to explain nationwide distributions of official maltreatment is beyond the scope of the present work. Such exploration would be a longer-term task involving a series of future studies, and our study may serve as methodological backdrop (e.g. demonstrating race/ethnicity-specific data linkage and combining suppressed-ID counties) providing theoretical grounding for the centrality of poverty in maltreatment.

Third, our findings are based on officially reported maltreatment cases only. Many child maltreatment incidents go unreported to CPS.<sup>13</sup> The social gradient based on all (not reported only) maltreatment events might be different from our estimates, especially if there is a non-random distribution of unreported events across the socioeconomic spectrum. We see this as a relatively minor limitation, because the strong socioeconomic gradient in our official maltreatment data triangulates well with previous findings based on very different data sources which could not be subject to such bias, including self-reports, mortality data and surveys.<sup>11–13</sup> It would be wise, however, to restrict generalization to reported rather than all maltreatment.

Fourth, this study did not construct a ‘multiple type’ category because children who belonged to this category were too small in number to ensure stable counts at the county level. Although our understanding of maltreatment type combinations is still progressing,<sup>40</sup> it is possible that, for example, a neglect-only case may be different from a neglect case involving other types of maltreatment as well.

Finally, we cannot further break down Hispanic children by their parental nativity, due to the lack of such information in official maltreatment data. Hispanic children with foreign-born parents have shown lower risks for official maltreatment than those with US-born parents.<sup>12,22</sup> This pattern is often interpreted as a decay of the ‘healthy immigrant effect’ due to acculturation.<sup>12,22</sup> Given the low poverty rates among Hispanic children with US-born parents compared with those with foreign-born parents (e.g. 27.6%

versus 40.2% in 2010),<sup>41</sup> the weaker socioeconomic gradient among Hispanics than other racial groups in our data (Figures 1 and 2) could be because Hispanic counties with lower child poverty rates have more US-born Hispanic parents and therefore less robust healthy immigrant effects.

## Implications

One key theoretical implication of our findings is the centrality of poverty as a risk factor of official child maltreatment. National official maltreatment data clearly show that in all race/ethnicity groups, poverty is correlated with higher rates of official maltreatment. That is, regardless of race/ethnicity, there is a strong and consistent socioeconomic gradient in official maltreatment at the county level. Conversely, the nationwide Black/White disparity in official maltreatment mostly disappears or even reverses when the county-level risk of child poverty is controlled. This suggests that the observed racial disparity in official maltreatment is largely driven by the racial disparity in poverty risks.

Another theoretical implication of the current work is that the Hispanic paradox applies to child maltreatment. While controlling for environmental poverty, Hispanics face lower risks of official maltreatment than do Blacks or Whites in most cases.

As we translate epidemiology into intervention, we see a pressing need to address child poverty and relevant issues in any public health response to reported maltreatment. In addition, targeting the underlying racial disparity in poverty risks may advance efforts to resolve the large racial disparity found in official child maltreatment reporting.

## Supplementary Data

Supplementary data are available at *IJE* online.

Conflict of interest: None declared.

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