Fourth National Incidence Study of Child Abuse and Neglect (NIS–4)

Supplementary Analyses of Race Differences in Child Maltreatment Rates in the NIS–4

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March 2010

Prepared for:

Office of Planning, Research, and Evaluation (OPRE)
and the Children's Bureau
Administration for Children and Families (ACF)
U.S. Department of Health and Human Services (DHHS)
Washington, DC

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Westat, Inc.
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Contract No. GS23F8144H, Order # HHSP233200400058U

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

EXECUTIVE SUMMARY

For the first time in the history of the National Incidence Study of Child Abuse and Neglect, the most recent cycle, the NIS–4, found race differences in maltreatment rates, with Black children experiencing maltreatment at higher rates than White children in several categories. The efforts described in this report attempted to understand this finding by considering possible reasons why the NIS–4 results diverged from the findings in earlier cycles and by using multi-factor logistic modeling to reanalyze the NIS–4 data in order to isolate whether and how race contributed to maltreatment risk independent of the other important risk factors that correlated with race.

The authors examined two possible explanations for why the NIS–4 found statistically reliable race differences in rates of some categories of child maltreatment, in contrast to the findings of previous NIS cycles. They concluded that the finding is at least partly a consequence of the greater precision of the NIS–4 estimates and partly due to the enlarged gap between Black and White children in economic well-being. Income, or socioeconomic status, is the strongest predictor of maltreatment rates, but since the time of the NIS–3, incomes of Black families have not kept pace with the incomes of White families.

Race correlates with a number of other predictors of maltreatment, so it was important to take the effects of these other correlated predictors into account when evaluating the effects of race. The authors attempted to do this by building multi-factor models that incorporated all the statistically reliable predictors of maltreatment in the category. The final multi-factor models revealed that race did have effects on risk in certain maltreatment categories, even after the effects of other important predictors were considered.

Black children were at significantly greater risk than White children of experiencing physical abuse under both the Harm and Endangerment Standards, but in both cases, this race difference depended on SES. The race difference was small or nonexistent among children living in low SES households, but it was notably larger for children in not-low SES households.

In two maltreatment categories, Endangerment Standard emotional maltreatment and overall Endangerment Standard maltreatment, race differences depended on SES and family structure. There were no race differences among children in low SES households, but the maltreatment risk for Black children in not-low SES households was two or more times greater than

the risk for White children in this condition. Black children were also at comparatively elevated risk when living with unmarried parents or a single parent with a partner in the household, whereas the risk for White children in those circumstances was considerably lower. At the same time, White children appeared to have somewhat higher risk than Black children when living with married parents who were not both biologically related to them and when living with a single parent who had no cohabiting partner.

White children had significantly higher risk for Endangerment Standard physical neglect, but this race difference appeared only among children in low SES households. This pattern resembled the earlier findings of multi-factor analyses of the NIS–3 data, which applied in more maltreatment categories in that study (Sedlak and Schultz, 2005).

The present findings are qualified by the limitations of the predictors that were available for the NIS–4 multi-factor analyses, which comprised only general demographic characteristics of the children and their families. The key measure of SES was less than ideal in two respects—the large amount of missing data that required imputation and the fact race differences that emerged in the not-low SES condition could, in part, actually reflect the underlying income differences. Independent evidence indicates that Black and White children very probably have different underlying SES distributions within the NIS–4 non-low SES category, with the not-low SES Black children less well off than the not-low SES White children. If the economic resources of Black and White children had been equivalent in this condition, then the observed pattern of higher risk for Black children under non-low SES conditions may not have emerged. For these reasons, the race differences observed in the not-low SES condition in this report must be interpreted with caution.

1. INTRODUCTION

The National Incidence Study of Child Abuse and Neglect (NIS) is a periodic federal effort that provides estimates of the number of children who are abused and neglected in the United States. NIS gathers data from both (1) child protective service agencies and (2) community professionals who encounter maltreated children during the course of their work in a variety of agencies, including schools, hospitals, law enforcement, day care, and shelters. The NIS integrates the cases obtained from the multiple sources, generating national estimates of the numbers of abused and neglected children that include both those who receive the attention of CPS agencies and those who do not (Sedlak & Schultz, 2005; Sedlak, Mettenburg, Basena, Petta, McPherson, Greene, and Li, 2010).

The NIS has been implemented four times, providing national estimates for children abused and neglected in 1980, 1986, 1993, and 2005-2006 (National Center on Child Abuse and Neglect, 1981; Sedlak, 1991; Sedlak & Broadhurst, 1996; Sedlak et al., 2010). The most recent implementation, NIS–4, was the first time that the study detected race differences in rates of child maltreatment. This paper reports the NIS–4 research team's efforts to understand these unexpected and unprecedented race differences, by examining potential reasons why the findings on race in the NIS–4 diverged from those in earlier NIS cycles and by conducting further analyses of the NIS–4 data to determine whether other risk factors that differentially affect Black and White children could account for the observed findings.[1]

This introductory chapter summarizes the NIS–4 findings on race and examines potential explanations for why they diverge from those of earlier NIS cycles. Chapter 2 presents the rationale for the multi-factor analyses of the NIS–4 data and describes similar analyses of the NIS–3 data, which serve as historical background for the present analyses. In order to conduct the multi-factor analyses, it was necessary to develop a special database that integrated the NIS–4 data on maltreated children with Census data on the general child population. Chapter 3 describes the methodology used to develop this synthetic database and build the multi-factor models to account for risk of maltreatment. Chapter 4 reports on the results of the model-building efforts. Chapter 5 summarizes the conclusions of these efforts, discussing their limitations and implications.

[1] For this report, the analyses of race differences in the NIS–4 included only the Black children and White children because maltreatment rates for these groups differed in nearly all categories where race differences emerged, while the maltreatment rates for Hispanic children nearly always resembled the rates for White children.

1.1 Race Findings in the NIS–4

In contrast to all the earlier NIS cycles, which found no race differences in rates of maltreatment, the NIS–4 found statistically reliable race differences in several maltreatment categories, with Black children having higher rates than White children (Sedlak et al., 2010).[2] The NIS uses two standards to define maltreatment, the Harm Standard and the Endangerment Standard.[3] The NIS–4 findings, given in the *Report to Congress* (Sedlak et al., 2010), indicated that, under both definitional standards, Black children experienced a significantly higher rate of physical abuse, overall abuse, and overall maltreatment. Under the Endangerment Standard, Black children also had significantly higher rates of emotional neglect and overall neglect. Statistically marginal race differences emerged in rates of sexual abuse and overall neglect under the Harm Standard and in rates of physical neglect under the Endangerment Standard.[4]

1.2 Understanding the Discrepant Findings of the NIS–3 and the NIS–4[5]

The fact that the NIS–4 found statistically significant differences between Black and White rates of child maltreatment, contrary to the findings of the first three NIS cycles, warrants further explanation. The NIS–4 research team examined two possible explanations. First, the NIS–4 used much larger samples and generated estimates that were more precise than those of the NIS–3. The greater precision of the NIS–4 estimates may have allowed this latest study to detect race differences in maltreatment rates, even if the underlying patterns of risk and resulting maltreatment have not changed. Second, it is possible that the distribution of risk factors changed in some way. That is, changes in the socioeconomic circumstances of Black and White children during the interval between the two NIS cycles may have contributed to changes in their maltreatment rates. These two explanations are not mutually exclusive.

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[2] Following the practice in the Census, the NIS–4 data forms allowed respondents to indicate all race/ethnicities that applied to a child. The race analyses reported in the NIS–4 Report to Congress (Sedlak et al., 2010) simplified this information and related it to the corresponding simplified Census categories: White non-Hispanic, Black non-Hispanic and Hispanic. Each of the other race categories had too few sample children to support estimates for those groups (i.e., American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific Islander, and mixed race).

[3] The Harm Standard is more stringent, typically requiring that a child be harmed by maltreatment in order to be included in the study estimates. The Endangerment Standard is more lenient, also permitting children to enter the estimates who were endangered by maltreatment. The Endangerment Standard estimates include children who meet the Harm Standard. Chapter 2 in the NIS–4 *Report to Congress* (Sedlak et al., 2010) summarizes these standards. The NIS–4 Analysis Report (Sedlak, Mettenburg, Winglee, Ciarico, and Basena, 2010) gives further details.

[4] Statistically significant differences have a probability of less than 5 percent of having occurred by chance (i.e., reflecting purely random factors), whereas statistically marginal differences have a probability of less than 10 percent of having occurred by chance. Differences that arise from chance or random factors are not statistically reliable and would not likely emerge in an exact replication of the study.

[5] Extensive race analyses were conducted using NIS–3 data (Sedlak and Schultz, 2005). See Chapter 2 for discussion of the results.

Another possibility is that the risk factors relate to maltreatment rates differently now, perhaps due to unmeasured changes in the surrounding social context of other risk-related circumstances or associated protective factors. For instance, if being in a family with more children is more strongly associated with maltreatment than it was in the past (say, for example, because available community and extended-family support systems are weaker or less effective than they were), then even if there were no changes in the racial distribution by family size, the fact that more Black children are in larger families would lead to higher maltreatment rates for that group. It is not possible to examine this hypothesis empirically. Comparisons of the relative strength of different risk factors during the two time periods yield ambiguous results because the NIS–4 data offer greater statistical power. That is, any risk factor may appear to be more strongly related to maltreatment rates in the NIS–4 because of its greater statistical power to detect the association, rather than because of any underlying change in the true strength of the association. Also, the NIS has no independent measures of potentially important mitigating factors in the surrounding social context during the two time periods.

More precise estimates in NIS–4. The NIS–4 sampled more counties and more CPS and sentinel agencies than the NIS–3 and collected considerably more data forms. As a consequence, the NIS–4 estimates were more precise (i.e., had smaller standard errors) than the NIS–3 estimates. Comparison of the NIS–3 findings with the NIS–4 findings (Appendix A) shows that the Black-White differences in NIS–3, while not statistically significant, tended in the same direction as those subsequently found in the NIS–4. The NIS–4 design may have afforded increased statistical power to detect differences due to its lower standard errors, resulting in tighter confidence intervals around the estimates.

Two estimates do not differ significantly if either estimate falls within the confidence interval of the other estimate. At the other extreme, if the confidence intervals do not overlap, then the estimates are statistically different. More precise estimates have smaller (i.e., narrower) confidence intervals. Even if two studies are done simultaneously (which means the true maltreatment rates in the population are actually identical), the confidence intervals will be less likely to overlap in the study that offers more precise estimates. The NIS–3 estimates have rather large confidence intervals, with the Black and White intervals overlapping a great deal and often including the other estimate, whereas the NIS–4 intervals are considerably smaller and, in those maltreatment categories where the races differ, they do not include the other estimate.

Figures 1–1 and 1–2 demonstrate this, displaying the 95-percent confidence intervals on the NIS–3 and NIS–4 estimates for all Harm Standard maltreatment and Harm Standard physical abuse, respectively. Appendix A presents tables showing the NIS–3 and NIS–4 confidence intervals for all maltreatment categories where the NIS–4 found statistically reliable Black/White rate differences.

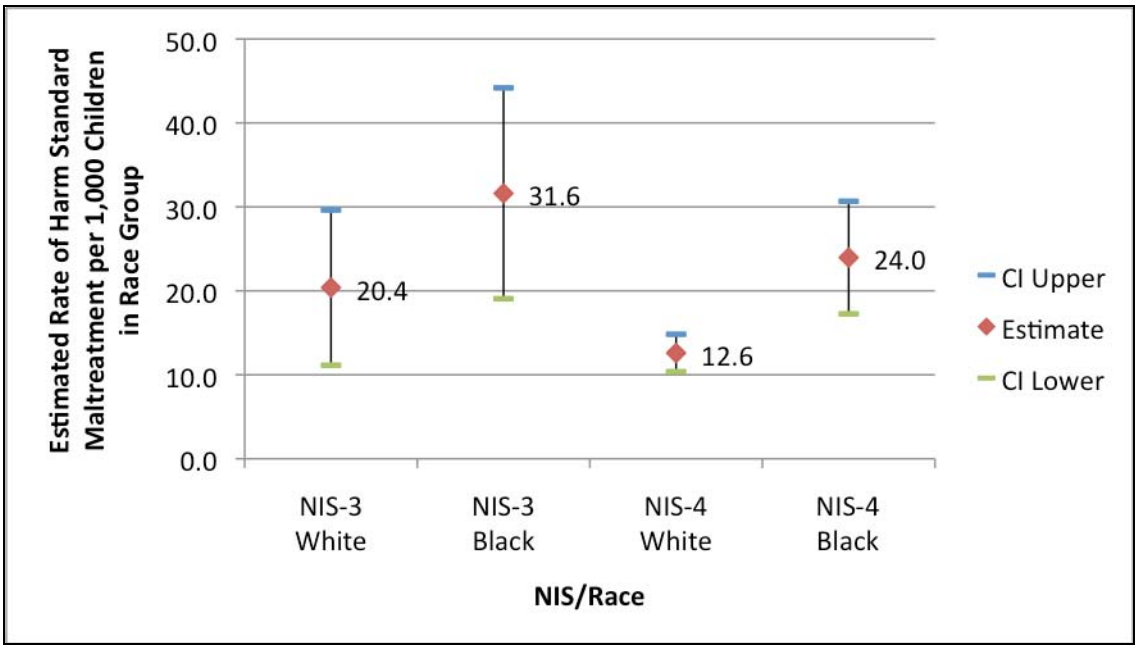

Figure 1–1. Estimated Rates of all Harm Standard Maltreatment for White and Black Children in the NIS–3 and NIS–4, With Their 95-percent Confidence Intervals.

Thus, the greater precision of the NIS–4 estimates (i.e., their smaller confidence intervals) enhanced that study's ability to detect differences and this may have contributed to the NIS–4 findings of race-related differences in maltreatment rates.

Changes in the circumstances of Black and White children. The NIS–4 not only revealed unprecedented race differences in rates of maltreatment, as described above, but the study also demonstrated statistically meaningful changes since the NIS–3 in maltreatment rates for Black and White children. Under both definitional standards, rates of all abuse and of physical abuse decreased for both races, but the decrease was greater for White children. The rate of Harm Standard emotional neglect decreased for White children but increased for Black children, while the rate of Endangerment Standard emotional neglect increased for both race groups, but the increase was greater for Black children.[6] Thus, overall, rates of maltreatment for White children decreased

[6] The race analyses reported in the NIS–4 Report to Congress (Sedlak et al., 2010) included Hispanic children and compared changes across the three race/ethnicity groups. With two exceptions, changes in maltreatment rates for Hispanic children were between the changes for White children and

more or increased less than maltreatment rates for Black children—consistent with the fact that the NIS–4 found higher maltreatment rates for Black children whereas the NIS–3 did not. It is important to note that the NIS–4 detected no statistically reliable race-related changes since the NIS–3 in rates of all maltreatment, all neglect, physical neglect or educational neglect, under both definitional standards.

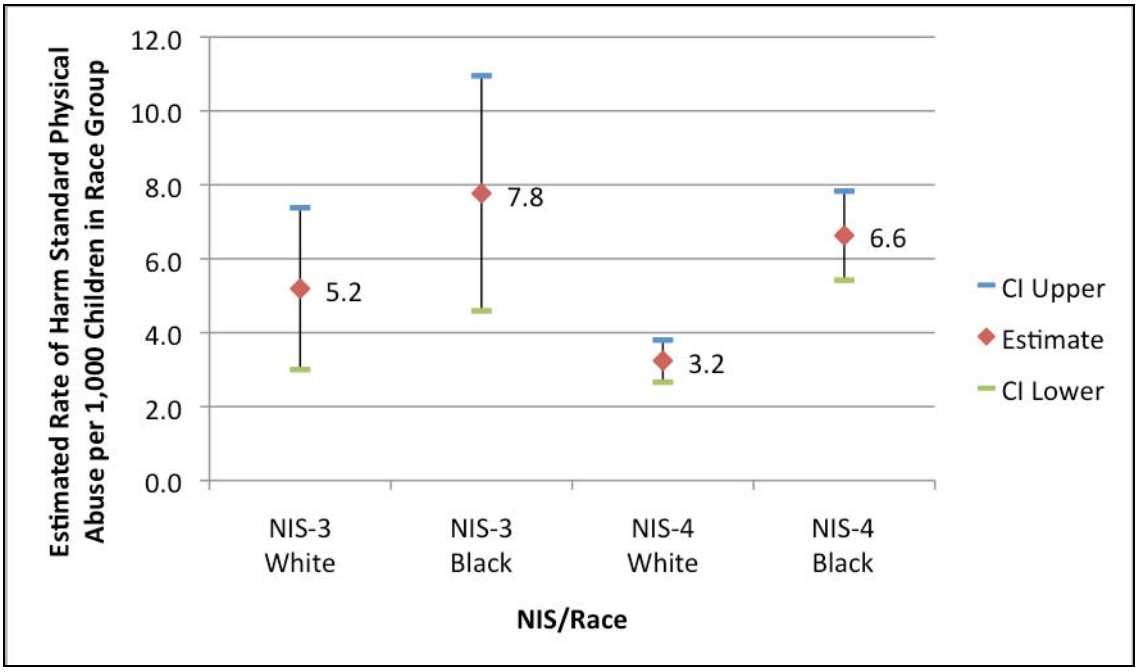

Figure 1–2. Estimated Rates of Harm Standard Physical Abuse for White and Black Children in the NIS–3 and NIS–4, With Their 95-percent Confidence Intervals.

Throughout its history, the NIS has consistently found a powerful relationship between family structural or socioeconomic characteristics and maltreatment rates. Both the NIS–3 and the NIS–4 found that children's risk of maltreatment related significantly to the family's socioeconomic status, parents' employment, family structure, and the number of children in the household (Sedlak & Broadhurst, 1996; Sedlak & Schultz, 2005; Sedlak et al., 2010). At the same time, Black and White children differed significantly on four risk factors at the time of both studies, as illustrated in Table 1–1.

Black children. The exceptions were in the categories of Harm Standard physical abuse and emotional neglect under both standards, where the changes in maltreatment rates for Hispanic children resembled the changes in rates for Black children.

Table 1–1. Differences in Percentages of White and Black Children With Specific Family Risk Conditions, 1993 and 2006.

Family Characteristic	1993		2006	
	% of White Children	% of Black Children	% of White Children	% of Black Children
Family Structure				
Two parents	79.1	35.3	75.9	34.5
Single parent	19.3	57.3	20.8	56.1
No parent	1.5	7.3	3.2	9.4
Single parent with partner[a]	1.5	2.3	3.5	4.4
Single parent, no partner	17.8	55.1	17.3	51.6
Parents' Employment				
Unemployed	16.4	18.8	8.5	12.4
Employed	76.8	51.0	84.2	65
Not in Labor Force	5.2	22.8	4.0	13.2
Family Size				
1 child	23.1	21.1	24.5	24.2
2 children	43.4	31	41.8	33.8
3 children	22.6	24.2	22.6	21.2
4 or more children	10.9	23.8	11	20.7
Parents' Education				
Less than high school	7.0	20.4	4.3	12.7
High school	29.5	36.7	20.4	30.0
Some college	29.9	24.7	29.0	28.3
College graduate	19.6	7.8	25.7	12.5
Advanced degree	12.5	3.1	17.5	6.5
Household Income				
<$15,000	15.7	52.5	8.9	29.8
$15,000-$24,999	12.6	16.1	6.7	17.1
$25,000-$39,999	21.4	13.6	11.9	17.0
$40,000-$54,999	20.0	9.0	13.2	10.8
$55,000-$74,999	16.1	4.8	16.5	10.3
$75,000-$99,999	8.0	2.8	15.6	7.5
>=$100,000	6.2	1.1	27.3	7.5
Other Economic Measures				
Low Socioeconomic Status[b]	21.8	61.6	15.0	45.9
Household participates in poverty program	12.7	46.9	8.2	32.6

Notes: Gray shading indicates that the percentages of Black children and White children differ significantly; differences in Black and White percentages in green shaded cells are statistically marginal.

[a]The definition of this category does not exactly conform to that used in the NIS–4 Report to Congress, because 1993 Census data combined parents' partners with roommates. The comparison here includes opposite-sex parents/partners in both time frames.

[b]The child is classified as in a family of low socioeconomic status if the household income was less than $15,000, the parent(s) were not high school graduates, or the household participated in a poverty program.

Within each year, adjacent cells that are shaded differ statistically. During both study years, significantly lower percentages of Black children were in the lower risk condition of two-parent families, while significantly higher percentages were in the higher risk conditions of single-parent families or not living with any parent. Significantly lower percentages had employed parents, while significantly higher percentages had parents who were not in the labor force—the higher risk condition. During both time periods, higher percentages of Black children lived in the largest families, with 4 or more children, where children had the highest risk of maltreatment. This race difference was statistically significant in 1993 but statistically marginal in 2006. A lower percentage of Black children lived in 2-child households in 1993, another statistically marginal difference.

Throughout its history, the NIS has consistently demonstrated that socioeconomic factors are strongly predictive of child maltreatment. Table 1–1 shows that substantially and significantly higher percentages of Black children lived in families of low socioeconomic status and in households that participated in a poverty program, which are the circumstances associated with higher maltreatment rates. A similar pattern occurs in the distributions of Black and White children by specific categories of household income: During both time periods, the race differences in the extreme ranges are consistent. Significantly higher percentages of Black children were in the lowest income households, while significantly lower percentages were in the highest income households. For children in households with incomes in the intermediate ranges, $40,000 to $74,999, race differences in 1993 favored White children, but no differences were statistically reliable in 2006.

The NIS–4 research team considered the possibility that, since the time of the NIS–3, circumstances may have changed disproportionately for the different races, lowering the maltreatment risk for White children disproportionately relative to that of Black children. In examining Table 1–1, it is apparent that, for most of the characteristics listed, this is not what occurred. Rather, in certain disadvantaging circumstances, where Black children have been historically overrepresented, the racial differences in percentages of children actually *diminished* between 1993 and 2006. The racial gap most notably decreased in the percentages of children living in households that participate in a poverty program (down by 9.8%) and for children whose parents are not in the labor force (down by 8.4%). The gap also decreased, although to a lesser extent, for children whose parents have less than a high school education (down by 5.0%), who live in the largest families (with 4 or more children) (down by 3.2%), and who live with single parents (down by 2.8%). Similarly, the racial gaps in the percentages of children who live in several lower risk circumstances, where Black children have been historically underrepresented, also decreased during the time interval. The percentages of children living with two parents decreased for both races, but

the percentage of Black children in this category decreased less than the percentage of White children in this category, which reduced the racial gap by 2.4%. The percentage of children living with employed parents increased for both races, but the increase was greater for Black children thus reducing the race gap in this category (by 6.6%). The percentage of White children in 2-child families decreased while the percentage of Black children in these families increased, reducing the racial gap by 4.4% in this, the lowest risk category on this measure. The racial gap also decreased by 4.6% among children whose parents had some college, primarily because the percentage of Black children in this circumstance increased more than the percentage of White children. With the exception of other shifts in the racial distributions by income, other changes in Table 1–1 have relatively little effect on the racial gaps.

The race-related shifts in household income are qualitatively different than the changes described above, all of which reduced the racial gap that disadvantaged Black children. Figure 1–3 graphs the Table 1–1 income data to illustrate. All incomes rose during the 1993-2006 time interval, but while the improved household incomes of Black children primarily lifted them out of the lowest income categories, the improvements in household incomes for White children raised them disproportionately into the higher income categories. This is evident in the change in direction for the 2006 distribution of White children, which is the only line in the graph that slopes upward.

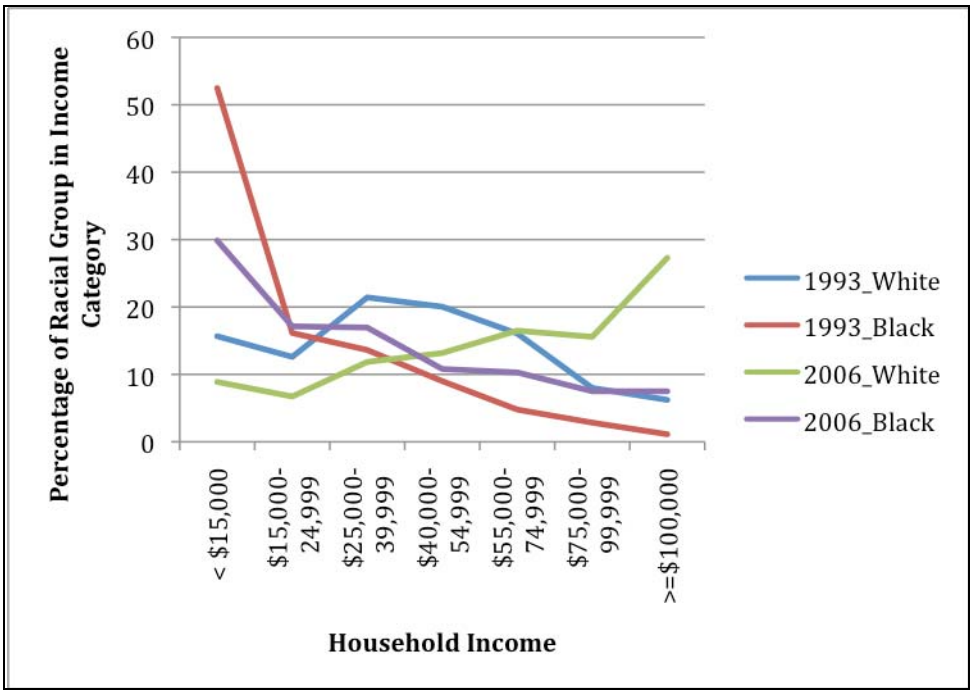

Figure 1–3. Percentages of White Children and of Black Children Who Were Living in Households With Different Incomes in 1993 and in 2006

Census findings on median income as well as other sources also document that, during the time interval between NIS–3 and NIS–4, the socioeconomic status of both Blacks and Whites improved, but the status of Whites improved more than the status of Blacks. Crane and Heaton (2007) reported that while the rising economic tide of the 1990's reduced the nation's poverty rate, the gap between poor children and their middle-class and affluent counterparts actually increased. Nichols (2006) reported that between 2000 and 2004, Black children lost ground relative to White children at a faster rate than in recovery years following past recessions. Census data show that, between 1993 and 2006, median income for all families with children rose by $20,588. However, while incomes of White families with children increased by $26,330, incomes of Black families with children rose by notably less: $16,078. As a result, the gap between the median incomes of these race groups increased substantially, from a difference of $23,556 in 1993 to a difference of $33,808 in 2006 (U.S. Census Bureau, 2009). Figure 1–4 shows that the rise in median family income for Black children over this time period essentially matched the increase in the racial gap in median income.

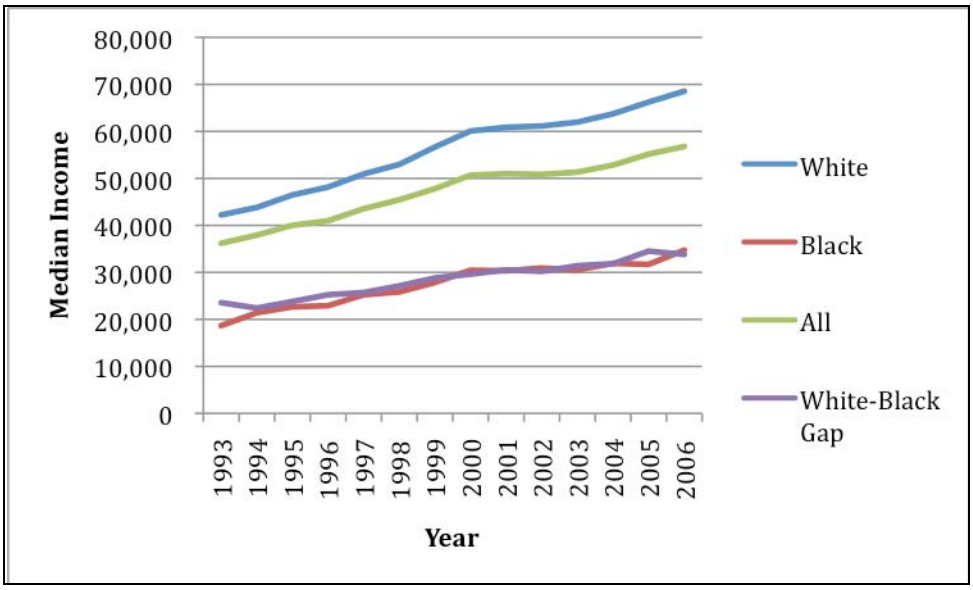

Figure 1–4. Changes in Median Income for Families With Children (derived from data in Table F-9, U.S. Census Bureau, 2009).

Thus, among all the demographic shifts in family characteristics that are related to maltreatment risk, differential changes in family incomes stand out as the one change that could potentially account for the higher relative risk of Black children at the time of the NIS–4.

2. RATIONALE, BACKGROUND, AND PURPOSE OF MULTI-FACTOR ANALYSES OF NIS–4 DATA

The previous chapter informally explored two potential explanations for the NIS–4 findings on race differences in maltreatment rates—the greater precision of the NIS–4 estimates and changes in the distribution of the race groups on important risk factors, such as the economic status of the child's family. While plausible, without more rigorous analytic support, those explanations remain speculative.

The key hypothesis in the remainder of this report is that the observed race differences in the NIS–4 stem from the other risk factors that are associated with race. This implies that the race differences will disappear when the effects of the other important risk factors are taken into account.

2.1 Rationale

Multi-factor analyses are necessary to test the proposed hypothesis because the individual risk factors are not distributed independently in the population; neither can one assume that their effects on maltreatment risk are independent of one another. Table 1–1 shows that the family characteristics are differentially distributed by race. These characteristics are also intercorrelated; that is, parents' employment, family structure, low socioeconomic status, and family are all significantly correlated with each other.[7] This means that children who are in a given category on one measure are more likely to be in a specific category on another measure. To illustrate this, Figure 2–1 shows that children who live with two married parents are much less likely to be in a family of low socioeconomic status.[8] Figure 2–2 indicates that a substantially higher percentage of White children live in households with their married biological parents, whereas a considerably higher percentage of Black children live in households with their single parent who has no partner. Multi-factor analyses take the interlinkages among the risk factors into account. They can also reveal whether one risk factor modifies the way another factor affects maltreatment risk.

[7] NIS–4 analysts assessed this using the Rao-Scott RS3 statistic (Rao and Scott, 1981, 1984).

[8] The classification of family structure in this graph follows that used in the NIS–4 Report to Congress (Sedlak et al., 2010).

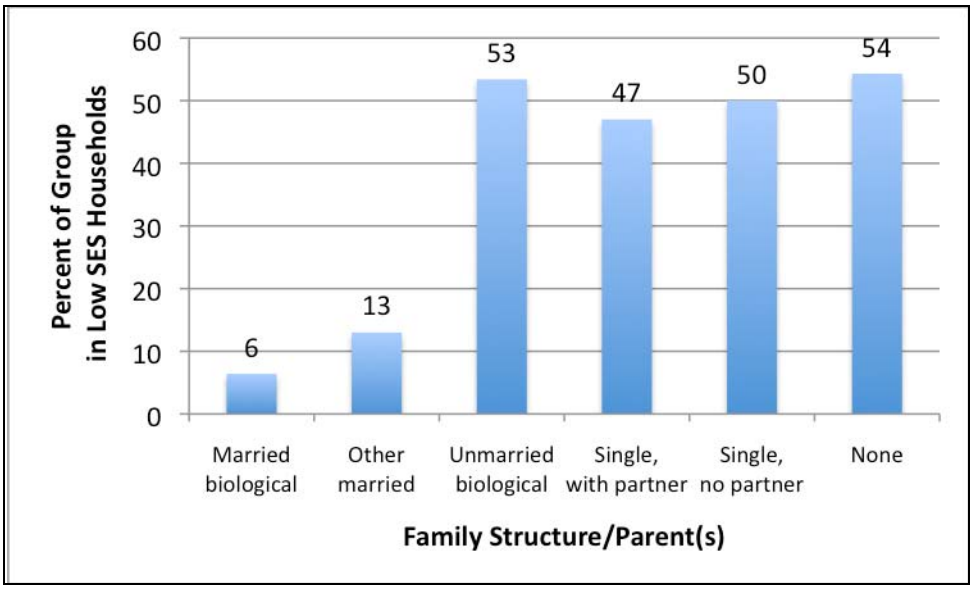

Figure 2–1. Percentage of Children in Low SES Households by Their Family Structure

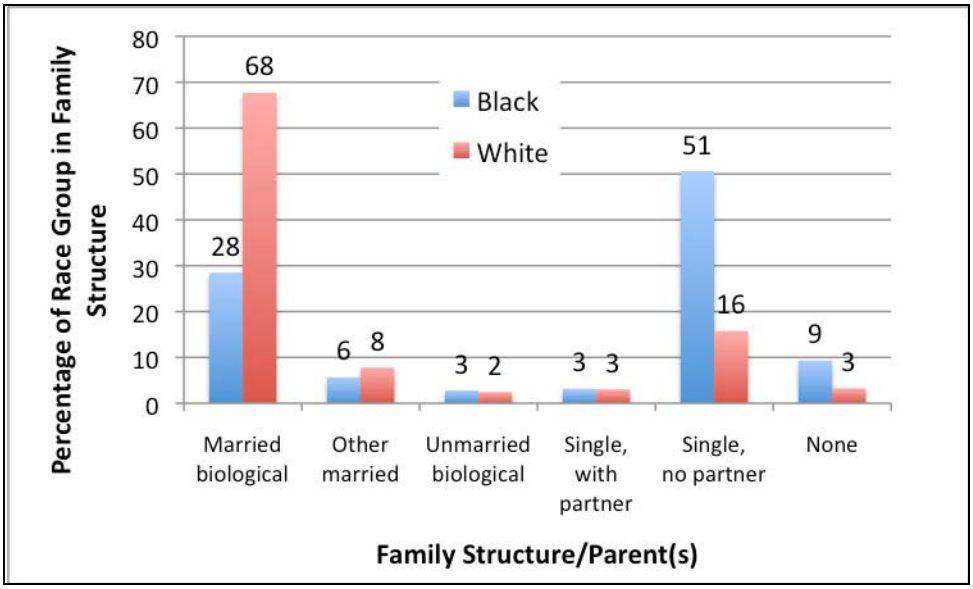

Figure 2–2. Percentage of Black Children and White Children Living in Different Family Structures

2.2 Background

After the NIS–3, Sedlak and Schultz (2005) undertook a similar multi-factor analysis effort to understand the NIS findings on race. However, the foremost question was quite different then, and they used a directional analytic strategy to address it. At that time, the consistent lack of statistically significant race differences in the first three cycles of the NIS was puzzling because a

number of factors correlated with race did reliably predict child maltreatment. Moreover, the fact that the foster care population included a disproportionate number of minority children implied that these children were more often maltreated or that some other dynamics were bringing more minority children into the foster care system. To understand why the NIS–3 found no race effects in these circumstances, Sedlak and Schultz (2005) conducted a series of multi-factor analyses, examining race in the context of the other factors that related to children's risk of maltreatment.

The NIS–3 had found that child's age, sex, number of children in the household, family structure, parental employment status, and household income were risk factors for at least one category of child maltreatment. At the same time, Black and White children had significantly different distributions on a number of risk factors. Black children were more likely than White children to be in low income households, have parents who were unemployed or not in the labor force, live with single parents, and live in households where there were 4 or more children. These four factors were all also significantly correlated with one another. Sedlak and Schultz (2005) sought to learn what race effects could be detected in the NIS–3 data when the influences of these other risk factors were taken into account. They combined the NIS–3 data, which includes only maltreated children, with Census data on the general population of children in the United States in order to construct a nationally representative synthetic database that included records for both maltreated and nonmaltreated children.

As noted above, at the time of this earlier work, no NIS had found any race differences, so Sedlak and Schultz (2005) sought to learn whether race differences would emerge when the influences of other confounding factors were partialed out. Because of this goal, they followed a topically directed approach in their forward stepwise model-building. They began with race as the sole predictor of maltreatment and then examined each additional risk factor independently as expansions of this basic model, both alone and in interaction with race. At each stage of model building, they selected the expansion that maximally revealed race-related patterns in risk.

This strategy yielded a consistent pattern. Where race effects emerged, White children who were living in higher risk situations (e.g., low income families) were maltreated at a greater rate than Black children. However, in all maltreatment categories analyzed, race interacted with other risk factors in determining risk. For instance, race interacted with income in accounting for the risk of all Harm Standard maltreatment. The difference between White and Black children appeared in the lowest income group, with White children in that group more at risk than Black children. At higher income levels, this race difference disappeared. Race interacted with parental employment in

accounting for the risk of physical abuse. White children whose parents were not in the labor force were at greater risk of maltreatment than Black children in similar circumstances. Also, race interacted with family size in accounting for risk of all Harm Standard maltreatment and physical neglect. Among children living in households with four or more children, White children were more likely to be maltreated.

The authors concluded that when these disadvantaging characteristics were taken into account, Black children had a lower risk of being maltreated than White children. At the same time, the various risk conditions still generally raised the maltreatment risk of any children in those circumstances. Thus, the overall NIS–3 finding of no race differences appeared to reflect the fact that more Black children lived under the higher risk conditions (such as in larger households) compared to White children, obviating their relatively lower risk compared to White children in that condition. Because the summative effects of all the disadvantaging factors occurred disproportionately for Black children, the maltreatment rate for Black children rose to a level that was statistically equivalent to the White rate.

2.3 Purpose

As described earlier, for the first time in the history of the NIS, the NIS–4 found race differences in rates of maltreatment. The goal of the work described in the subsequent chapters is to assess the hypothesis that the observed race differences in the NIS–4 actually arise from other risk factors that are associated with race by seeing whether the race differences drop out when the effects of the other important risk factors are taken into account. This is conceptually the reverse of what Sedlak and Schultz (2005) did in their previous multi-factor study on the NIS–3 data. Where they began in the context of no race differences and undertook multi-factor model-building to uncover any latent race differences in the NIS–3 data, the effort here begins in the context of the NIS–4 race difference findings and undertakes multi-factor model-building to discover whether the race differences dissipate in the context of other risk factors. Because the present effort, like the earlier one, builds multi-factor models of maltreatment risk, it used similar methods in constructing the multi-factor database for the analyses. However, because the present effort begins in a different context and has a very different goal, it used a quite different model-building strategy. These points of similarity and difference are noted in the next chapter, which describes the construction of the NIS–4 multi-factor database and procedures used to build the NIS–4 multi-factor risk models.

3. METHODOLOGY

The NIS provides data only on maltreated children. In order to compare the relative maltreatment risk of different groups of children, one needs information about the number of children with the same characteristics in the total population of children, or about nonmaltreated children with the same characteristics. The analyses for the NIS–4 *Report to Congress* used the Census data on the size of a group (e.g., children in a given age range) in the general population. The NIS–4 analysis team divided the estimated number of maltreated children in the group by the Census total and then by 1,000 in order to compute the rate of maltreatment per 1,000 children with that characteristic (e.g., in that age range) in the general population (Sedlak et al., 2010). That approach is feasible with single-factor analyses, where groups are defined by a single characteristic. However, the hypothesis this report addresses requires multi-factor analyses. In order to support these more complex analyses, the NIS–4 research team had to integrate the NIS data with Census data in a multi-factorial framework, linking these two information sources on every combination of characteristics. This paralleled the approach that Sedlak and Schultz used in conducting multi-factor analyses of the NIS–3 data. Having constructed the synthetic multi-factor database, the analysts designed an objective, empirically based approach for building multi-factor models that differed substantially from the directional strategy that Sedlak and Schultz used.

This chapter first summarizes the database construction and then describes the model-building strategy. Finally, the last section explains the follow-up calculations used to further examine any race differences that emerged in the final multi-factor models.

3.1 Construction of the Synthetic Database

The NIS–4 multi-factor analyses required a synthetic database that combined information from two sources: (1) the NIS–4 nationally representative data on children who experienced countable maltreatment during the NIS–4 study year, 2005-2006, and (2) data on children in the general population from the March 2006 supplement to the Current Population Survey (U.S. Bureau of the Census, 2006). The NIS–4 data included records on all children who were classified as maltreated under the standardized study definitions of maltreatment. Only the March supplement of the Current Population Survey provides information on parental employment, so that source was preferred for the general population information.

To develop the synthetic database, the NIS–4 analysts defined common measures in both the NIS–4 and Census data, imputed values for NIS–4 children with missing data on these measures, and then integrated the two sources to generate records for nonmaltreated children.

Equivalent measures. Before combining the NIS–4 data with the Census data, the NIS–4 team had to define common variables with substantively equivalent meanings and classification schemes in the two data sources. This entailed deriving new measures in both the NIS–4 and Census databases. In addition, although the NIS–4 data already provided measures at the child level of analysis, developing comparable measures in the Census data often meant combining information across both person-level and household-level data items with complex derivation rules. For example, in order to extract child-level information from the Census about parents' employment, analysts had to (a) determine from the person-level data which records corresponded to dependent children living in households, then (b) for each of these children, locate the associated record for their household to identify the person codes for their parents, if any were present, and finally (c) locate the person records for the identified parents to determine their employment status.

The variables included in the unified synthetic database were the same as those used in the NIS–4: child's sex, child's age, child's race and ethnicity, family structure and living arrangement, parents' employment, number of children in the household, and socioeconomic status. Table 3–1 lists these measures and gives the classification categories for each.

All classification categories followed the definitions used for the analyses reported in the NIS–4 *Report to Congress*. As noted in that report, the categorization of children by their parents' employment was hierarchical. First, all children who had any parent unemployed, either currently or during the past year, was classified as "Parent(s) Unemployed." Second, among the remaining children, those with any parent employed comprised the "Parent(s) Employed" category. Then, of the children still unclassified, those with parent(s) not in the labor force (e.g., retired homemaker, not working and not looking for work, disabled, in the hospital, or in jail) were assigned to that category. Finally, children with no parent living in their household were assigned to a separate "No Parent Present" category on the parental employment measure.

Previous NIS cycles had demonstrated a strong association between family income and children's maltreatment risk. Unfortunately, the NIS–4 had considerable missing data on income, so the analysis team had to devise a strategy to index socioeconomic status with the data available: household income, parents' education, and household participation in a poverty program (such as

food stamps or Temporary Assistance to Needy Families, TANF). In order to maximize the number of children who could be classified directly using the available data, the NIS–4 team created an inclusive socioeconomic status (SES) measure that defined a child as living in a low-SES family on the basis of any of these three measures. That is, children were classified as living in low-SES households if their parent(s)' highest education level was less than high school, their household had an annual income below $15,000, or any household member participated in a poverty program.

Table 3–1. Measures in the NIS–4 Synthetic Database

Measure	Classification Categories
Child's age (6 levels)	Birth-2, 3-5, 6-8, 9-11, 12-14, 15-17
Child's sex (2 levels)	Male, Female
Child's race/ethnicity (4 levels)	Non-Hispanic White, Non-Hispanic Black, Hispanic, Other[9]
Number of children in household (4 levels)	1 child, 2 children, 3 children, 4 or more children
Family structure (6 levels)	Married biological parents, Other married parents, Unmarried parents, Single parent with partner, Single parent without partner, No parent present
Parents' employment status (4 levels)	Any parent unemployed, Parent(s) employed, Parent(s) not in the labor force, No parent present
Socioeconomic status (2 levels)	Low, not low

Imputation. Construction of the synthetic database required that all children be classified on all variables, so it was necessary to impute values for children with missing data on any of the seven common measures. The NIS–4 had a considerable amount of missing data on two measures. Parents' employment was missing for 42.4% of the children, and SES was missing for 44.9% of the children. In imputing values for missing demographic data on countable children in the

[9] The "Other" race and ethnicity category included American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, and mixed race children.

NIS, the NIS–4 team made special efforts to preserve the covariance structure of the measures, using a method known as Chi-Square Automatic Interaction Detector (CHAID) analysis. In order to impute each measure, the team applied CHAID to form homogenous subgroups of records for imputation according to their category of countable maltreatment, its severity, and the Census region and metropolitan status of the child's county of residence. Then, within each imputation class, the team applied a hot-deck procedure to select a random sample of records to serve as donors for records with missing values. The known values of the measure on the donor records were randomly assigned to those records in the imputation class with missing data on the measure. This approach maintained both the covariance structure within the demographic variables and the relationship between the demographic predictors and the maltreatment measures.

Imputation started with the variable with the smallest proportion of missing values, in this case, child's sex (3.4% missing). Once a measure was imputed, it had no missing values and was used to identify imputation classes for the next measure with missing data. Appendix B describes the imputation methodology in greater detail. The Census data did not require imputation.[10]

Database integration. Using the seven equivalent variables listed in Table 3–1, the NIS–4 analysts entered both the Census and the NIS data into the full seven-way cross-classification matrix defined by the variables. They developed two estimates within each cell: (1) from the Census data, an estimate of the number of children in the general population with the combination of characteristics defined by the cell, and (2) from the NIS, an estimate of the total number of children with those characteristics who experienced countable maltreatment.

The team derived an estimate of the number of nonmaltreated children in each cell by subtracting the estimated number of maltreated children (2) from the estimated general population total (1). For any cell in which the NIS estimate was higher than the Census estimate, analysts set the non-maltreated total to 0. The next step was to construct synthetic records for non-maltreated children in the matrix, weighted to represent the number of non-maltreated children with each combination of characteristics. Finally, in order to support accurate computations of variance and model significance tests, the NIS–4 team developed replicate weights for the synthetic non-maltreated child records by replicating the subtraction procedure for each of the replicate weights on the NIS–4 records in the cells.

[10] Appendix B includes a description of how the small number of Census records with missing data were resolved.

The resulting database includes 16,366 records—12,408 NIS–4 records on maltreated children and 3,958 synthetic records on non-maltreated children. It is nationally representative of children in households in the United States in 2006, reflecting an estimated total of 74,040,548 children. Appendix C describes the creation of the synthetic database in more detail.

3.2 Model-building Procedures

Before beginning the model-building, the authors made several adjustments to the synthetic data, subsetting it to Black and White children and then into separate databases for children with parents and for all children. They also simplified the codes for some of the measures, as detailed below.

Model-building then proceeded in two phases. During the first phase, the authors took advantage of automated model-building procedures to build starting models for input to the second phase. These first-phase models do not consider the clustering in the data due to the NIS–4 multi-stage sample design, so they are too liberal in the set of predictors they identify and their model fit statistics are not accurate. The second phase trimmed these first-phase models, using appropriate variance measures and objective exclusion criteria.

Synthetic database adjustments. To simplify the race analyses and focus them on the main NIS–4 finding of interest—the significant difference in the maltreatment rates of Black and White children, the authors subset the database for model building to an extract that included only the Black and White children. This extract comprised 10,794 records—8,728 NIS–4 records on maltreated children and 2,066 synthetic records on non-maltreated children. The final synthetic database represented all the Black and White children in the United States in 2006—a weighted total of 53,775,594 children (10,929,648 Black children and 42,845,946 White children).

In order for all children to have values on all the predictor variables, both the parents' employment and family structure measures included a level for children with "No Parent Present" (Table 3–1). Because the "No Parent" levels of both measures include the same children and do not occur in combination with any of the other levels of the alternate measure, they could not be used together in the same model with all their levels. To address this, the NIS–4 analysis team created two versions of the synthetic database. One version excluded children with no parent in their household, thereby excluding the "no parent" level of both parents' employment and family

structure. This version, which excluded 4.5% of all children, supported model building using the remaining levels of both parents' employment and family structure. The other version, which included all children, supported model building with all 6 levels of the family structure measure, but did not support models with parents' employment.

Model predictors and outcomes. Model development used seven predictor variables, each of which was associated with risk of at least one maltreatment outcome in the NIS–4. The predictor variables are those listed above, in Table 3–1, with two modifications. The following variables were recoded to reduce the number of levels from those given above, making the modeling more efficient:

- Child age (0-5, 6-11, 12-17)
- Number of children in the household (1, 2, 3 or more)

The multi-factor modeling was directed at identifying the unique contribution of race to child maltreatment outcomes when analyzed in the context of other risk factors correlated with race. Analysts fit models for each maltreatment category, under both the Harm and Endangerment Standards. They fit models for both databases, comprising all Black and White children: (1) the database that included children with no parents present, but excluded the employment variable, and (2) the database that included the subset of children with parents present, where the employment variable could be included in the models.

The outcomes modeled here represent the major maltreatment categories used in the NIS. For both Harm and Endangerment Standard maltreatment, the authors modeled:[11]

- All Maltreatment
- Physical Abuse
- Sexual Abuse
- Emotional Maltreatment (*either* emotional abuse or emotional neglect.)
- Physical Neglect

[11] The choice of these maltreatment categories followed the approach used in the NIS–3 multi-factor analyses. They economize on the number of models to be built, and in view of the fact that the Emotional Maltreatment measure combines both abuse and neglect, they omit the summary measures of Overall Abuse and Overall Neglect. Note, however, that unlike the earlier NIS–3 analyses which focused only on children countable under the Harm Standard, these NIS–4 multi-factor analyses examined race effects in risk of maltreatment under both definitional standards.

Model-building Phase I: Starting models. NIS–4 demonstrated main effects on child maltreatment for the 7 predictor variables in Table 3–1, so it was important to include all those factors as predictors of maltreatment in the multi-factor modeling. It is important to recall that the NIS–4 race findings were main effects, not adjusted by any other factors. The modeling discussed here examined race in the context of correlated risk factors.

It would have been unwieldy to test fully articulated models that included all 7 factors, all two-way interactions among the factors, and all three-way and higher order interactions. In addition, even the large size of the synthetic database did not afford sufficient degrees of freedom to test higher-order effects, given the complex NIS–4 sampling design reflected in the data. Thus, the authors limited modeling to main effects and two-way interactions and began the process using an automated model selection procedure

Automated model selection procedures are unavailable for complex survey data, which cannot be assumed to comprise independent observations due to the clustered nature of the data. Automated procedures are available, however, for data obtained by simple random sampling, which consist of independent observations. To facilitate the modeling process, analysts began with an automated procedure, ignoring clustering in the data, to produce a set of starting "best fit" models for input to a subsequent modeling procedure that took the complex NIS sample design into account. It is known that the effect of clustering is to decrease significance; that is, for the same sample size, when the data are assumed to be independent, observed *p*-values for effects are smaller than if the data came from a clustered sample. Thus, modeling clustered data with such a procedure would likely produce models including terms that would drop out when clustering was taken into consideration. Because these "best" models were too liberal, there was no concern that race would be erroneously excluded from the starting models, if indeed it was still an important predictor when other risk factors were considered.

Model-building Phase II: Final models. For each maltreatment category, analysts started with the "best" model that resulted from the Phase I automated modeling procedures and then implemented a backward stepwise logistic regression approach to fit the most parsimonious model, this time accounting for the clustered nature of the data.[12,13] Since the Phase I forward

[12] WesVar, statistical analysis software for use with complex survey data, uses replication methods to produce correct variance estimates in these contexts, taking clustering into account (Westat, 2007).

[13] Sedlak and Schultz (2005) were limited to using selective forward modeling in their analyses due to the smaller sample design of the NIS–3. The NIS–4 afforded sufficient degrees of freedom to enable the preferred backwards stepwise approach.

selection procedure was allowed to choose effects from the entire pool of all main effects and two-way interactions among the 7 study variables (including the main effect of race and all its two-way interactions), one can be confident that race had little predictive or explanatory value for maltreatment in categories where the final models did not include race.

3.3 Follow-up Analyses

The final regression models provide information about the relative contribution of each factor in the model to the outcome measure. Each regression coefficient in a final model (Appendix E) gives detail about the influence of a given factor holding all the other predictor terms in the model constant. Obtaining the final models and regression coefficients is often the stopping point for regression analyses; analysts look at the value of the coefficients and interpret the effects. However, a regression coefficient for the main effect of a predictor does not tell the complete story because the population is not evenly distributed across the other model parameters and these unequal distributions can influence the overall observed result. Moreover, when there are interaction terms in the model, it can be difficult to understand what is going on in the data by simply graphing the interaction with the input data, since this ignores the effects of the other important risk factors. That is, graphing the isolated interaction using the input data does not show what the model is describing, because the model takes the effects of the other factors into account, whereas the simple input data graph does not. In the present case, one might construct a graph of what appears to be a "race" difference that actually simply reflects the different distributions of White and Black children on other important predictors in the model.

For any final multi-factor models that included race as a significant predictor, whether alone or in interaction with another predictor, the authors further examined the race effects by computing the model-based marginal probabilities of maltreatment while equalizing the race distribution across the unrelated predictor variables.

Each final model is a mathematical formula that indicates the measures that are important predictors of the maltreatment in question and specifies how each measure contributes to a child's risk of maltreatment. In categories where race entered the final model in the current analyses, either alone or in an interaction with another predictor, the authors computed model-based maltreatment rates in order to understand the effect that race had, when all the other predictors in the model are taken into account.

In presenting the relationships reflected in multi-factor logistic models, the effects of any one factor or relationship can only be specified by making explicit assumptions about the child in terms of all the other predictive factors in the model. In order to compute the race-related differences in marginal probabilities from a logistic model, the authors first applied the model parameters to compute the value of the logit for every combination of predictor characteristics in the model. Then, they transformed the logit value into a probability value by exponentiating the logit, and then transforming the result to make *p* the subject of the formula. This yielded the model-based cell-level probability of maltreatment in the cell.

The next step assumed a hypothetical population in which there were an equal number of Black and White children in every cell in the fully crossed matrix in the synthetic database that was specified by the predictors in the final model. This hypothetical population equalized the distribution of race across all factors in the model. Then, the authors applied the model-based probability of maltreatment in each cell, as described above, to the hypothetical equal-distribution population in order to compute marginal probabilities. These marginal probabilities are completely independent of any race-related differences in distributions on the other factors in the model.

The marginal probabilities give an undistorted view of what the model parameters indicate about race differences in risk of maltreatment. The graphs of the marginal probabilities in the next chapter show the race differences that remain after all the other predictors are taken into account and in an equitable world where all the risk factors associated with race are evenly distributed between the races. This entirely removes the effects of other disadvantaging factors from the assessment, to illuminate clearly the race differences identified by the model, after accounting for the effects of all other covariates.

However, because the marginal probabilities are based on a hypothetical distribution, they artificially inflate the overall level of probability in the population by giving equal weight to sparsely populated high risk and to densely populated low risk cells. To remove this artificial inflation, the authors adjusted the marginal probabilities by multiplying them by a constant. The constant, developed separately for each maltreatment category, was set to the value that ensured that the overall marginal probability for the population of Black and White children matched the estimated imputed probability of maltreatment as computed from the synthetic database of Black and White children.

4. MULTI-FACTOR MODELS

The multi-factor modeling presented here addresses the question of whether, given the NIS–4 race effects, the other important predictors of maltreatment risk can account for, or aid in understanding, the overall NIS–4 race differences in maltreatment rates.

The first section below presents the model-fit statistics for the final multi-factor models for Harm Standard maltreatment for both all Black and White children and for Black and White children with parents present. The next section presents the model-fit statistics for the Endangerment Standard final multi-factor models. Appendix E contains the full regression model results, including the model parameter estimates, for all maltreatment categories on both databases.

In understanding what the models indicate about race differences in NIS–4, the primary issue is whether race (here, Black versus White) emerged as a significant predictor in a given model, either alone or in interaction with another predictor. In cases where race did enter the final multi-factor model for a specific maltreatment category, the next issue to consider is what effect race has, according to the model, when all other important predictors of maltreatment are taken into account. To address this question, the authors generated model-based marginal probabilities and graphed the significant race effects. These graphs display what the model parameters indicate about the race effects, controlling for the other significant risk factors in the model and assuming that there are no inequities in how the races are distributed on any of the risk factors.

Note that, because the authors imputed missing data, as described in Chapter 3 and detailed in Appendix B, and because the marginal probabilities are calibrated to the overall imputed maltreatment rates, the probabilities in these graphs are slightly higher than the rates given in the NIS–4 *Report to Congress*. This is because that report computed subgroup rates that excluded maltreated children with missing data on a specific demographic characteristic (e.g., children with missing data on race were omitted from the analyses on race differences). Imputation assigned these maltreated children to demographic groups corresponding to their imputed values.[14] Bear in mind that the imputation process respected the correlations between race and other important risk factors.

[14] For example, race was missing for 8.8 percent of the children who experienced Endangerment Standard neglect in the NIS–4. After imputation, the synthetic database included more Black and White maltreated children than the original NIS–4 analysis database. This shifted the estimated (imputed) rates of maltreatment upward relative to the original rates of maltreatment. For example, the estimated rate of Endangerment Standard maltreatment for Black children rose from an estimated 49.6 children per 1,000 to an imputed estimate of 61.0 children per 1,000, while the White maltreatment rate in this category rose from an estimated 28.6 children per 1,000 to an imputed estimate of 33.2 children per 1,000.

Since disproportionately more Black children have other disadvantaging characteristics, it is not surprising that imputation typically made a greater difference in their maltreatment rate across the maltreatment categories.

For each category of maltreatment, the following sections revisit the findings on Black versus White differences in maltreatment rates in the NIS–4 *Report to Congress* and then indicate the findings for any overall difference in Black versus White in their estimated imputed rates in the synthetic database. In maltreatment categories where the final risk model included significant race effects, readers should not compare the model-based effects displayed in the graphs against the findings in the NIS–4 *Report to Congress*. Rather, the marginal probabilities in the graphs must be understood in the context of the estimated imputed rates in the synthetic database and should be interpreted as what the final model conveys about the race differences that remain after all other predictors under consideration have been taken into account and in a world where the races were distributed equitably on all the risk factors.

4.1 Harm Standard Maltreatment

Although race was allowed to enter the models for every maltreatment category, physical abuse was the only category of Harm Standard maltreatment where the final model included a significant effect of race on maltreatment risk. As documented below, for every other category of maltreatment, race did not enter or remain in the final model; that is, Black and White children did not differ in their risk of other categories of Harm Standard maltreatment.

All Harm Standard maltreatment. The NIS–4 *Report to Congress* reported a significant race effect for all Harm Standard maltreatment. The rate for Black children (24.0 children per 1,000) was nearly twice the rate for White children (12.6 per 1,000). In the synthetic database, where the imputed rates are all slightly higher, the estimated imputed rate for Black children was 27.3 per 1,000, which is significantly higher than the estimated imputed rate for White children (13.7 per 1,000). However, the final multi-factor logistic model indicated that, when the other important predictors of risk are taken into account, race did not affect the overall Harm Standard maltreatment rate for either all Black and White children or the subpopulation of Black and White children with parents present.

Table 4–1 presents the final multi-factor model for all Black and White children. Socioeconomic status (SES) was the strongest risk factor, followed by its interaction with family structure. Appendix E (Table E–1) provides the model parameters.

When children without parents were excluded, thus allowing parents' employment to enter the model as a predictor, the final model included the same factors shown in Table 4–1, with the addition of parents' employment and its interaction with SES. Appendix E (Table E–2) provides that full model (model-fit statistics and model parameters). Here, and throughout the remainder of this report, the alternate models for the subgroup of children with parents are not given in the text because they do not alter the principal results regarding race differences in maltreatment risk.

Table 4–1. Multi-Factor Model Predicting All Harm Standard Maltreatment for All Black and White Children

Test	F value	Numerator df	Denominator df	$p \leq$
Overall fit	80.57	15	48	.001
Socioeconomic status	331.71	1	62	.001
Family structure	19.82	5	58	.001
Child age	11.35	2	61	.001
Number of children	6.83	2	61	.002
Family structure x socioeconomic status	26.66	5	58	.001

Both the full-population model and the model for children with parents indicate that the best predictors of children's risk of all Harm Standard maltreatment are characteristics that are correlated with race, rather than race *per se*. In both models, SES was a very strong predictor of maltreatment risk. This result resembles Sedlak and Schultz's (2005) findings.

Harm Standard physical abuse. The NIS–4 found a significant race difference in risk of Harm Standard physical abuse (Sedlak et al., 2010). The rate for Black children (6.6 per 1,000) was notably higher than the rate for White children (3.2 per 1,000). The races also differed significantly in their estimated imputed rates of this maltreatment in the synthetic database; the estimated imputed rate for Black children was 7.7 per 1,000, whereas the rate for White children was 3.5 per 1,000.

The final multi-factor logistic model also indicated that race played a significant role in risk for physical abuse, even in the context of the other risk factors. Table 4–2 gives the overall

model for Harm Standard physical abuse for all Black and White children. Appendix E (Table E-3) provides the parameter estimates.

Table 4–2. Multi-factor Model Predicting Harm Standard Physical Abuse for All Black and White Children.

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall Fit	45.22	15	48	.001
Family Structure	23.37	5	58	.001
Socioeconomic Status	50.80	1	62	.001
Child's Race	10.11	1	62	.002
Child's Age	5.27	2	61	.008
Child's Race x Socioeconomic Status	4.01	1	62	.049
Family Structure x Socioeconomic Status	14.95	5	58	.001

Both race and the interaction of race with SES were significant in this final model. Moreover, considering the model F's, it appears that the influence of SES is much larger than that of child's race. As described in the previous chapter, the authors examined these effects further by computing the marginal probabilities of Harm Standard physical abuse by race and SES. The marginal probabilities take the effects of all other model predictors into account while also equalizing the race distribution across the predictor variables, as described in the previous chapter. Equalizing the race distributions here is important because, as presented in Chapter 1, Black and White children have substantially different distributions on a number of predictors, and these other predictors also interact with each other in determining risk of maltreatment (i.e., Table 4–2 indicates that family structure interacts with SES in determining risk of Harm Standard physical abuse).

Figure 4–1 displays the race by SES interaction using the model-based marginal probabilities for the race by SES interaction for Harm Standard physical abuse, also showing the approximate 95% confidence intervals for these computed probabilities.[15]

[15] Analysts computed standard errors for the marginal probabilities and used these to create confidence intervals under the assumption of a normal distribution. Note that the normality assumption is not strictly correct; therefore the confidence intervals are approximate.

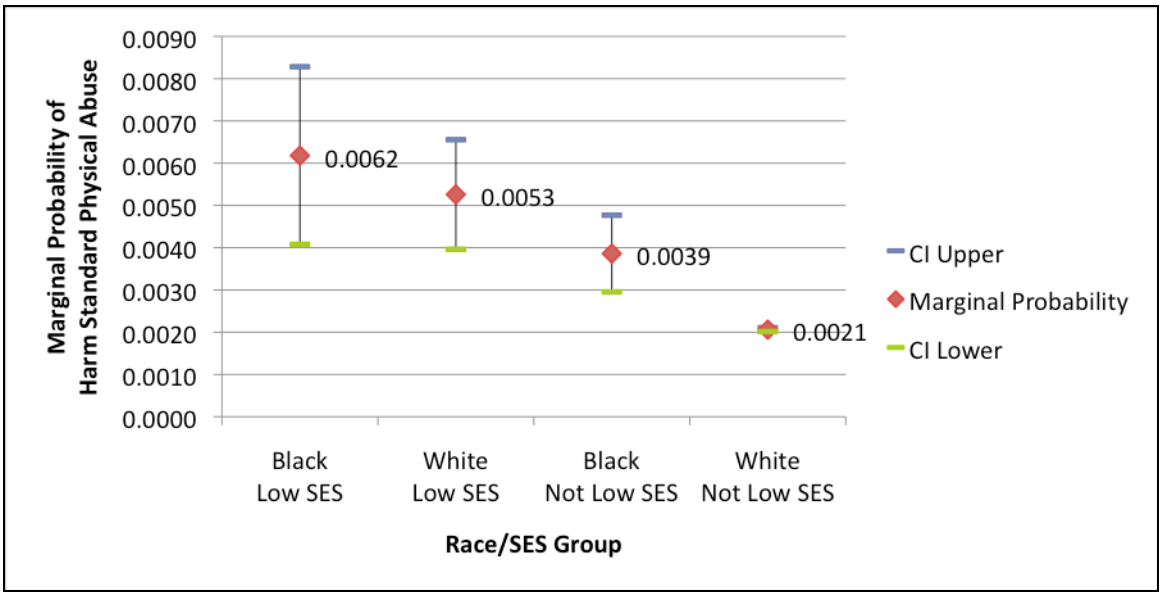

Figure 4–1. Model-based Marginal Probabilities of Harm Standard Physical Abuse (and Approximate Confidence Intervals) by Child's Race and SES

The figure reveals that even when it is assumed that Black children and White children are spread in equal numbers across all the levels of all the other model variables, the race by SES interaction in Harm Standard physical abuse still has significant explanatory power. Also note that low SES elevated the risk of Harm Standard physical abuse for both Black and White children. The graph shows that when Black and White children were both living in low SES circumstances, the higher-risk situation, the difference between their marginal probabilities of maltreatment was comparatively smaller, at less than one tenth of one percent (.0062 versus .0053), and the confidence intervals of the estimated probabilities are large and overlapping, indicating that the races do not differ in their risk in the low SES condition, the condition where children have a higher risk of maltreatment. Appendix F provides the race-related marginal probabilities and their confidence intervals.

In contrast, when SES was not low, the difference between Black children and White children was twice as large, at 1.8 percent (i.e., .0039 versus .0021), and the approximate confidence intervals on the estimates in this SES condition do not overlap, indicating that, among children who do not live in low SES families, Black children have significantly higher risk of experiencing Harm Standard physical abuse than White children.

These results signify that, when the two races' distributions on correlated risk factors are equalized, the race effect occurs only in the not-low SES condition. This effect, reflected in the final

multi-factor model (Table 4–2) as the race interaction with SES, was weaker than the other effects in the model and just barely within the 95% probability level for statistical significance ($F = 4.01$; $p \leq .049$). Chapter 5 considers the implications of this residual race effect.

When the authors excluded children without parents to allow parents' employment to enter the model, the result was a final model similar to that above (Table 4–2), but the relatively weak race by SES interaction dropped out. In this population, there was simply an overall race difference: all Black children with parents present were at greater risk for Harm Standard physical abuse than corresponding White children. Table 4–3 presents the final overall model. Appendix E (Table E–4) provides the model parameters.

Table 4–3. Multi-factor Model Predicting Harm Standard Physical Abuse for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	52.26	12	51	.001
Family Structure	21.73	4	59	.001
Socioeconomic Status	55.07	1	62	.001
Child's Race	6.75	1	62	.012
Child's Age	4.07	2	61	.022
Family Structure x Socioeconomic Status	21.92	4	59	.001

It is noteworthy that parents' employment did not emerge as a risk factor in this model, despite the fact that it had the opportunity to do so. Also, it is unclear why the interaction of race with SES dropped out of the model when children without parents were excluded. It is possible that the decreased statistical power resulting from the slightly smaller (-4.5%) database accounted for it. Generally, results based on the full sample are more reliable than those based on partial samples.

Harm Standard sexual abuse. The NIS–4 *Report to Congress* (Sedlak et al., 2010) indicated that there was a statistically marginal race effect for Harm Standard sexual abuse (2.6 per 1,000 Black children versus 1.4 per 1,000 White children). In the synthetic database, the races differed significantly in their estimated imputed rates of this maltreatment; the estimated imputed rate for Black children was 3.2 per 1,000, whereas the rate for White children was 1.5 per 1,000. However, race was not significant in the final multi-factor models predicting the risk of sexual abuse, whether the data included or excluded children without parents. As Table 4–4 shows, the significant factors related to sexual abuse were the child's sex, SES, family structure, the interactions of SES

with number of children, child's age, and family structure, the interaction between child's sex and the number of children, and the interaction between family structure and the child's age. Appendix E (Tables E–5 and E–6) provides the final models and model parameters for all Black and White children and for Black and White children living with parents, respectively.

Table 4–4. Multi-factor Model Predicting Harm Standard Sexual Abuse for All Black and White Children.

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	28.55	32	31	.001
Family structure	17.08	5	58	.001
Child's sex	61.50	1	62	.001
Socioeconomic status	15.81	1	62	.001
Child age	1.05	2	61	.357
Number of children	0.51	2	61	.601
Child's sex x number of children	3.37	2	61	.041
Socioeconomic status x number of children	6.45	2	61	.003
Family structure x child age	3.07	10	53	.004
Socioeconomic status x child age	3.52	2	61	.036
Family structure x socioeconomic status	6.52	5	58	.001

Harm Standard emotional maltreatment. The NIS–4 did not find race effects on risk of Harm Standard emotional maltreatment (Sedlak et al., 2010), although in the synthetic database, the estimated imputed rates for Black children (6.2 per 1,000) and White children (4.2 per 1,000) did differ significantly. Nevertheless, no race effects emerged in the multi-factor logistic regression models when the other important predictors of this maltreatment were taken into account. Table 4–5 below presents the final overall model of Harm Standard emotional maltreatment for all Black and White children. The significant risk factors were the child's age, family structure, and socioeconomic status. For all Black and White children, the interactions between SES and both child's age and family structure were significant. When children with no parents present were excluded, the SES by age interaction dropped out. Appendix E (Tables E–7 and E–8) provides the model parameters.

Table 4–5. Multi-factor Model Predicting Harm Standard Emotional Maltreatment for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	26.57	15	48	.001
Family structure	10.70	5	58	.001
Child age	26.68	2	61	.001
Socioeconomic status	60.48	1	62	.001
Socioeconomic status x child age	3.19	2	61	.048
Family structure x socioeconomic status	5.41	5	58	.001

Harm Standard physical neglect. The NIS–4 did not find any statistically reliable race difference in risk of Harm Standard physical neglect (Sedlak et al., 2010). Although the estimated imputed rates in the synthetic database did differ significantly (6.2 per 1,000 Black children versus 3.1 per 1,000 White children), the multi-factor models did not find any effects of race on risk of this maltreatment. In the final logistic regression model predicting risk of Harm Standard physical neglect based on all Black and White children (Table 4–6), only SES, family structure, and their interaction were significant. Excluding children with no parents present, thereby allowing the parent employment variable into the models, only SES, parent employment, and their interaction were required to explain physical neglect. Appendix E (Tables E–9 and E–10) gives the model parameters for both groups of children.

Table 4–6. Multi-factor Model Predicting Harm Standard Physical Neglect for All Black and White Children.

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	17.20	11	52	.001
Socioeconomic status	111.69	1	62	.001
Family structure	3.13	5	58	.014
Family structure x socioeconomic status	15.58	5	58	.001

Summary of Harm Standard findings. A clear pattern that emerged from the Harm Standard multi-factor model building analyses was that SES and family structure were much more powerful predictors of the risk of child maltreatment than was race. Race emerged as a significant factor in only one Harm Standard maltreatment category, physical abuse. After eliminating the contaminating influence of risk factors correlated with race through deriving the marginal probabilities of maltreatment for race and SES, the predictive value of SES appeared strong, while that of race was relatively small, but still evident. Black children were at somewhat greater risk of

physical abuse overall, and the race difference in risk was greater among children classified as not living in a low socioeconomic status household.

4.2 Endangerment Standard Maltreatment

The Endangerment Standard is more lenient than the Harm Standard, in that it allows the study to count children who are not yet directly harmed by maltreatment, but who are deemed to be in danger of harm from maltreatment. Four of the five multi-factor models for Endangerment Standard maltreatment included a significant race factor. The final models accounting for the risk of Endangerment Standard maltreatment are more complex than the final models for Harm Standard maltreatment. Because the present study is concerned with race effects, and the race effects did not differ for any category of Endangerment Standard maltreatment when children without parents were excluded, this section presents only the models based on all Black and White children, with no further discussion of the subset excluding children without parents. Appendix E provides the full models and model parameters for both groups of children.

All Endangerment Standard maltreatment. The NIS–4 found a race effect for all Endangerment Standard maltreatment. Black children experienced Endangerment Standard maltreatment of some type at the rate of 49.6 per 1,000, whereas the rate for White children was 28.6 per 1,000 (Sedlak et al., 2010). Similarly, the synthetic data produced significantly different estimated imputed rates of Endangerment Standard maltreatment for Black children (61.0 per 1,000) and White children (33.2 per 1,000). The final multi-factor logistic model for this maltreatment category also found that race related to risk of maltreatment, but while the overall effect of race was marginal when the other important predictors were taken into account, there were race differences that varied significantly depending on both family structure and SES. Table 4–7 presents the model-fit statistics for all Black and White children, and Appendix E (Tables E–11 and E–12) provides the model parameters for this model and the model statistics and parameters for Black and White children living with parents.

Table 4–7. Multi-factor Model Predicting All Endangerment Standard Maltreatment for All Black and White Children.

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall Fit	118.76	30	33	.001
Socioeconomic Status	269.94	1	62	.001
Family Structure	48.42	5	58	.001
Child's Race	3.58	1	62	.063
Number of Children	4.53	2	61	.015
Child's Race x Socioeconomic Status	41.57	1	62	.001
Child's Race x Family Structure	5.29	5	58	.001
Family Structure x Socioeconomic Status	55.51	5	58	.001
Family Structure x Number of Children	2.64	10	53	.011

The authors explored both the race by SES and the race by family structure interactions by computing and graphing the model-based marginal probabilities.[16] Figure 4–2 displays the marginal probabilities for all Endangerment Standard maltreatment by race and SES. Under low SES, White and Black children experienced essentially the same level of risk of Endangerment Standard maltreatment. However, in families where SES was not low, the risk of Endangerment Standard maltreatment appears to be twice as high for Black children as for White children. The confidence intervals in this case suggest wider variation in these patterns than observed above in Figure 4–1, but readers should bear in mind that these confidence intervals are approximate.

[16] The earlier discussion of confidence intervals in Chapter 1 offered guidelines for understanding their implications in making simple comparisons between two estimates. However, in interpreting the interactions in the graphs in this chapter, the patterns can signify meaningful differences even when confidence intervals overlap substantially, as they do in Figure 4-2. This is because (1) the model shows that this interaction is significant, which means that the graph displays significantly different risk patterns for Black children and White children; and (2) these confidence intervals are approximate at best, because the data undoubtedly violate their assumption of normal distributions. In understanding the graphs in this chapter, one should not attempt to interpret the overall interaction by focusing on a single family structure. Rather, the recommended approach is to observe where the largest differences occur and where patterns reverse direction. Nevertheless, interpretations of the race by family structure interactions must be cautious because they involve twelve different conditions, and the sparse distribution of cases in some of these conditions can reduce the reliability of individual cell estimates.

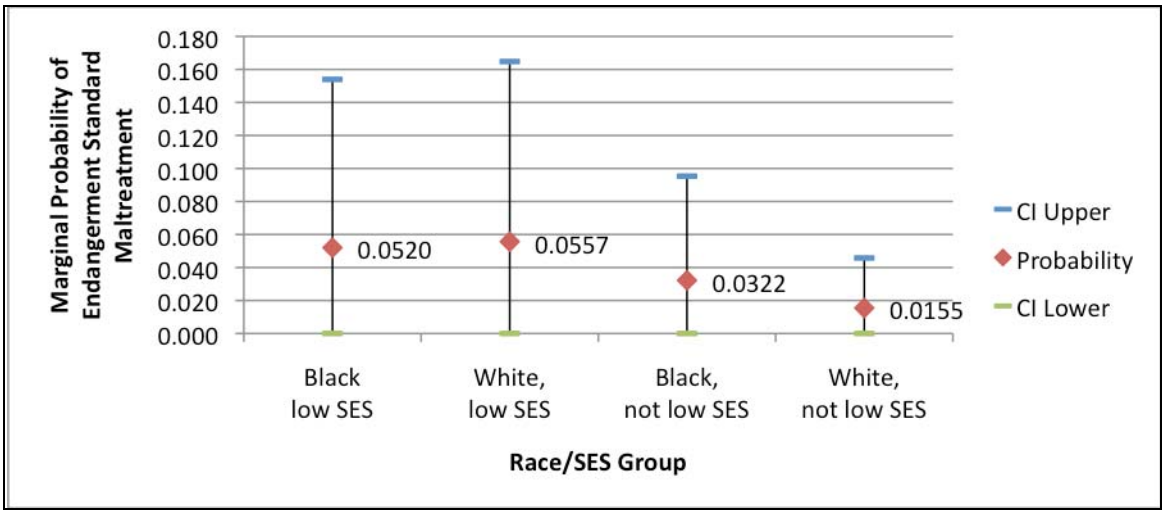

Figure 4–2. Model-based Marginal Probabilities of All Endangerment Standard Maltreatment (and Approximate Confidence Intervals) by Child's Race and Socioeconomic Status

The interaction between race and family structure with respect to all Endangerment Standard maltreatment is more complex. Figure 4–3 includes two graphs that show the model-based marginal probabilities for this interaction. The top section displays conditions where children live with two parents, while the bottom section displays the single-parent and no-parent conditions. The graph indicates that Black and White children experienced elevated risk under different living arrangements, and that the race difference was negligible under some conditions. White children had a notably higher probability of maltreatment when they lived with married parents who were not both biologically related to them and a slightly higher maltreatment rate when they lived with a single parent who had no cohabiting partner, whereas Black children had a considerably higher maltreatment probabilities when they lived with their unmarried parents and when they lived with a single parent living with a partner. The races do not appear to have different probabilities of Endangerment Standard maltreatment among children living with their married biological parents or among children who do not live with any parent.

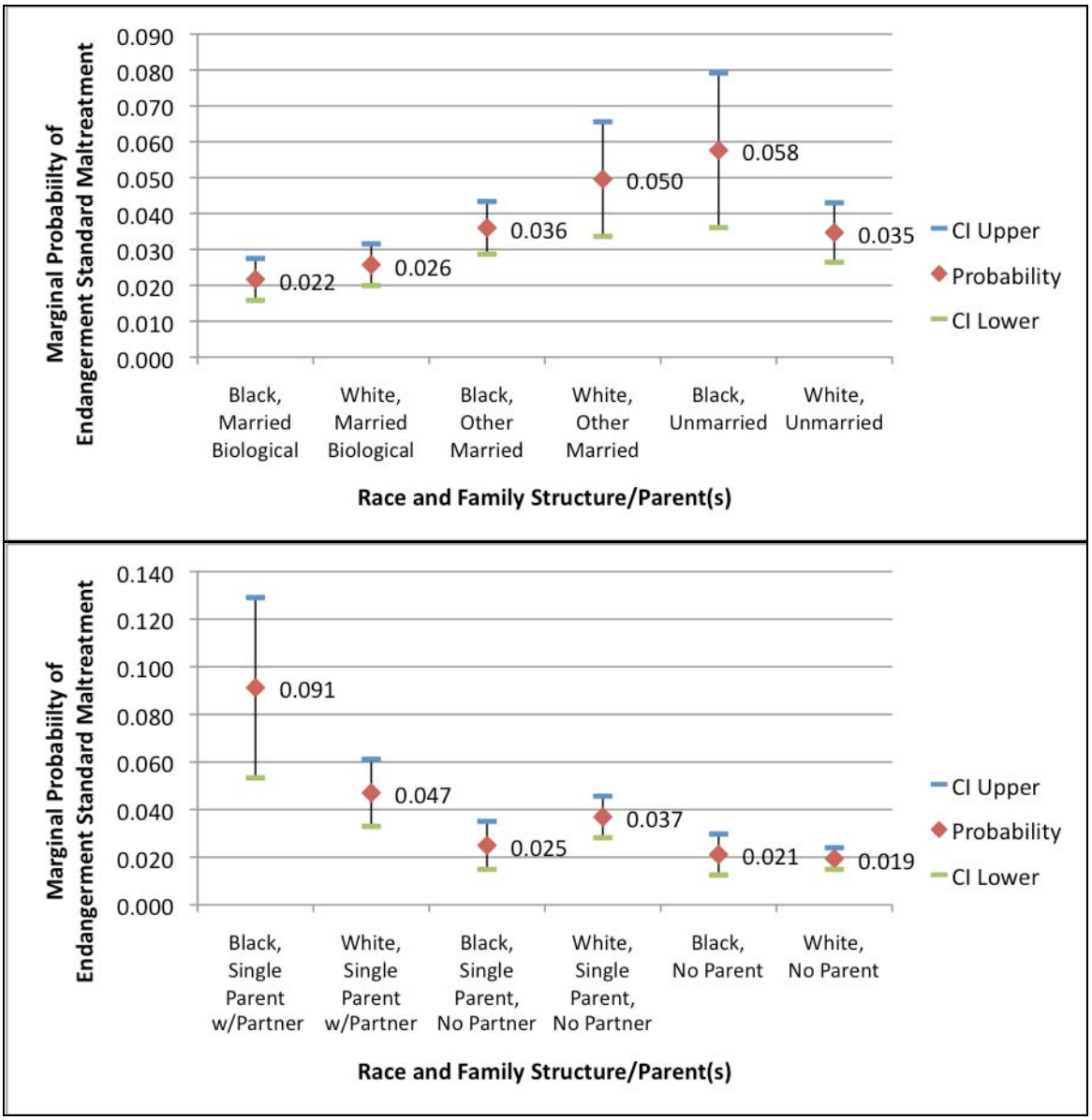

Figure 4–3. Model-based Marginal Probabilities of All Endangerment Standard Maltreatment (and Approximate Confidence Intervals) by Child's Race and Family Structure

Endangerment Standard physical abuse. The NIS–4 found a race difference in rates of Endangerment Standard physical abuse (Sedlak et al., 2010). The rate for Black children (9.7 per 1,000) was significantly higher than the rate for White children (4.6 per 1,000). The estimated imputed rates in the synthetic database also differ significantly and, as expected, they are slightly higher (11.4 per 1,000 for Black children and 5.2 per 1,000 for White children). The multi-factor logistic regression models also revealed that a significant race difference remained even when other

important risk factors were taken into account, but that the effect of race depended significantly on both household SES and family structure.

Table 4–8 gives the multi-factor model-fit statistics predicting Endangerment Standard physical abuse for all Black and White children. Appendix E (Tables E–13 and E–14) provides the model parameters for all Black and White children and the model statistics and parameters for Black and White children with parents present. The model shows significant effects for race and its interaction with SES and family structure, the same race effects seen above for all Endangerment Standard maltreatment.

Table 4–8. Multi-factor Model Predicting Endangerment Standard Physical Abuse for All Black and White Children.

Test	F value	Numera-tor df	Denom-inator df	$p \leq$
Overall fit	55.69	37	26	.001
Family Structure	28.77	5	58	.001
Socioeconomic Status	50.40	1	62	.001
Child's Race	20.10	1	62	.001
Number of Children	1.09	2	61	.344
Child's Sex	5.32	1	62	.024
Child's Age	4.94	2	61	.010
Family Structure x Socioeconomic Status	17.06	5	58	.001
Child's Race x Family Structure	2.81	5	58	.024
Child's Sex x Child's Age	5.54	2	61	.006
Socioeconomic Status x Number of Children	5.30	2	61	.008
Family Structure x Number of Children	2.43	10	53	.018
Child's Race x Socioeconomic Status	13.53	1	62	.001

Figure 4–4 displays the marginal probabilities for the race by SES interaction, also indicating their 95% confidence intervals. This graph shows that, when race distributions on other factors are equivalent, Black children have higher risk than White children in both SES conditions, but that the risk difference is notably larger for children categorized as not in low SES households.

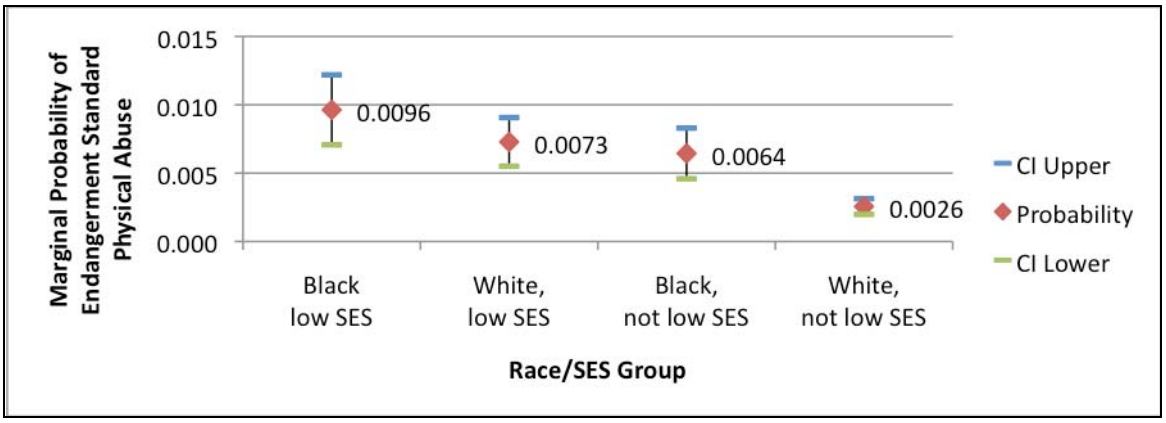

Figure 4–4. Model-based Marginal Probabilities of Endangerment Standard Physical Abuse (and Approximate Confidence Intervals) by Race and SES

The model statistics in Table 4–8 show a significant interaction between race and family structure, indicating that the relationship between child's race and risk of Endangerment Standard physical abuse also significantly depends on family structure. Figure 4–5 displays this relationship in two graphs, using the model-based marginal probabilities of the maltreatment rate in each condition. Inspection of these marginal probabilities suggests that Black children's risk for physical abuse is considerably elevated in comparison to that of White children among children who live with unmarried parents or with a single parent with a cohabiting partner in the household. One must be careful not to overinterpret this pattern, but it does indicate that the risk to Black children under these living circumstances was considerably elevated over not only White children's risk but also that of Black children living with either single parents without partners or married biological parents. There also appears to be tendency for Black children to have higher risk of Endangerment Standard physical abuse when living with married parents who are not both related to them biologically, but risk levels in the other conditions show negligible race differences.

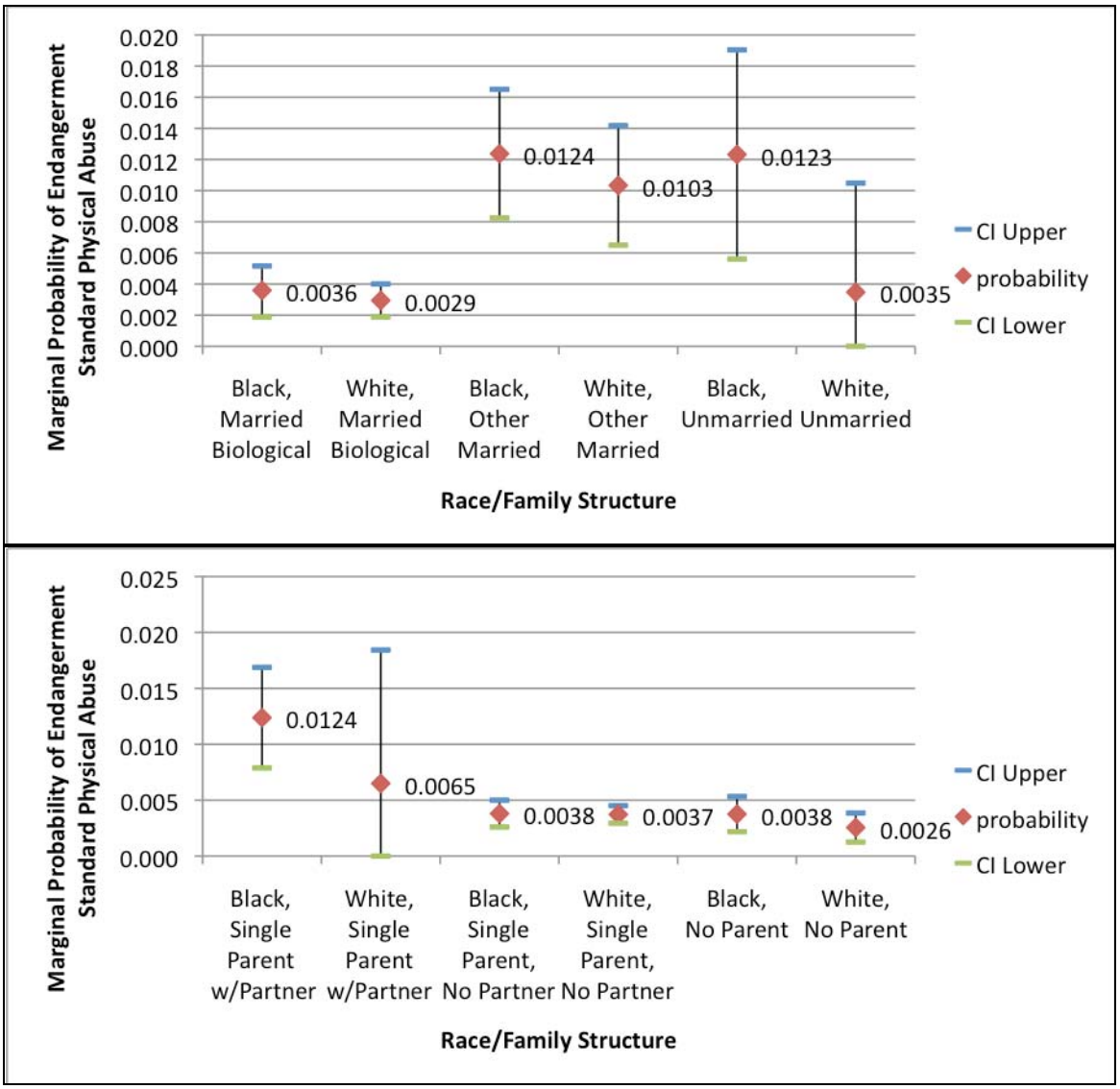

Figure 4–5. Model-based Marginal Probabilities of Endangerment Standard Physical Abuse (and Approximate Confidence Intervals) by Child's Race and Family Structure

Endangerment Standard sexual abuse. Analyses of the NIS–4 data for the *Report to Congress* did not find any race differences for Endangerment Standard sexual abuse (Sedlak et al., 2010), although analysis of the synthetic database did show that Black children had a slightly but significantly higher imputed maltreatment rate (3.8 per 1,000) compared to White children (2.0 per 1,000). Nevertheless, race was not a predictor of Endangerment Standard sexual abuse in the final multi-factor logistic regression model. Table 4–9 presents the model-fit statistics for the model that predicts this maltreatment for all Black and White children. Appendix E (Tables E–15 and E–16) gives the parameter estimates as well as the model-fit statistics and parameters for those Black and White children who lived with parents. In addition to the child's sex, the risk factors for sexual abuse

were family structure, SES, number of children in the household, and the interactions of SES with number of children and with family structure.

Table 4–9. Multi-factor Model Predicting Endangerment Standard Sexual Abuse for All Black and White Children.

Test	F value	Numera-tor df	Denom-inator df	$p \leq$
Overall fit	30.75	16	47	.001
Family Structure	17.89	5	58	.001
Child's Sex	40.10	1	62	.001
Socioeconomic Status	22.76	1	62	.001
Number of Children	2.58	2	61	.084
Socioeconomic Status x Number of Children	4.01	2	61	.023
Socioeconomic Status x Family Structure	9.75	5	58	.001

Endangerment Standard emotional maltreatment. The NIS–4 found that Black children experienced Endangerment Standard emotional neglect at a higher rate (18.2 per 1,000) than White children (12.1 per 1,000), but did not find any race difference in rates of emotional abuse (Sedlak et al., 2010). As described earlier, the analyses presented here used a measure that combined emotional abuse and neglect. Preliminary examination of the synthetic database showed that Black children had a significantly higher imputed rate of emotional maltreatment on this combined measure (26.2 Black children per 1,000 versus 16.1 White children per 1,000). Table 4–10 presents the model-fit statistics for the multi-factor logistic model predicting the risk of emotional maltreatment for all Black and White children. Appendix E (Tables E–17 and E–18) provides the model parameters for this model as well as the model-fit statistics and model-parameters for the final model for Black and White children with parents present in their household.

Table 4–10. Multi-factor Model Predicting Endangerment Standard Emotional Maltreatment for All Black and White Children.

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	106.73	25	38	.001
Socioeconomic Status	142.03	1	62	.001
Family Structure	48.86	5	58	.001
Child's Race	2.23	1	62	.141
Number of Children	4.17	2	61	.020
Family Structure x Number of Children	2.59	10	53	.012
Child's Race x Family Structure	7.36	5	58	.001
Child's Race x Socioeconomic Status	48.97	1	62	.001

Table 4–10 shows that, similar to the final models for all Endangerment Standard maltreatment and for Endangerment Standard physical abuse, this final model for Endangerment Standard emotional maltreatment included significant interactions between race and SES and between race and family structure. However, similar to the final model for all Endangerment Standard maltreatment, but unlike that for Endangerment Standard physical abuse, the overall race effect is not significant.

Figure 4–6 displays the model-based marginal probabilities for the race by SES interaction in predicting risk of Endangerment Standard emotional maltreatment. Examination of this plot reveals that the interaction of race and SES for emotional maltreatment is similar to the pattern in overall Endangerment Standard maltreatment. Black children and White children were maltreated at similar rates in low SES households, but Black children were at higher risk in the more favorable SES category.

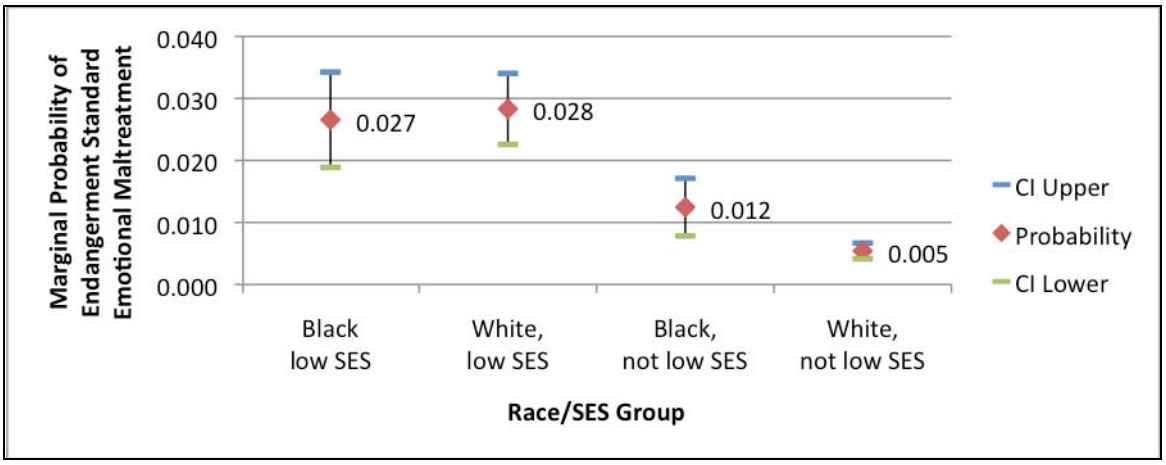

Figure 4–6. Model-based Marginal Probabilities of Endangerment Standard Emotional Maltreatment (and Approximate Confidence Intervals) by Child's Race and SES

The race by family structure interaction appears in Figure 4–7, given as the model-based marginal probabilities. This pattern also resembles that observed above for overall Endangerment Standard maltreatment. It shows that Black children were at comparatively elevated risk for emotional maltreatment when living with unmarried parents or a single parent with a partner in the household, whereas the risk for White children in those circumstances was considerably lower. At the same time, White children appeared to have somewhat higher risk than Black children when living with married parents who were not both biologically related to them and when living with a single parent who had no cohabiting partner. Negligible race differences appear among children living with their married biological parents or with no parent.

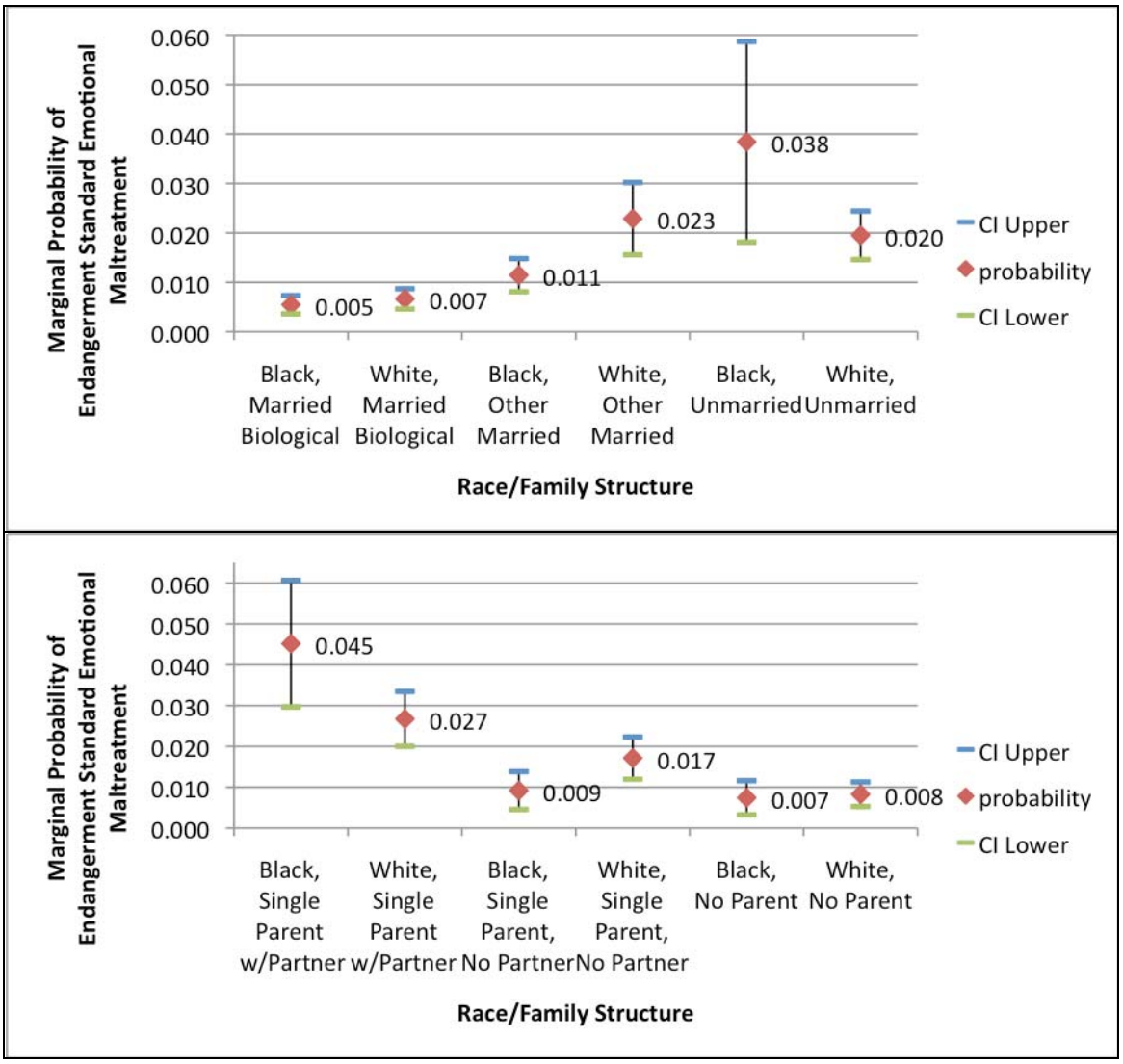

Figure 4–7. Model-based Marginal Probabilities of Endangerment Standard Emotional Maltreatment (and Approximate Confidence Intervals) by Child's Race and Family Structure

Endangerment Standard physical neglect. The NIS–4 found a statistically marginal race effect on Endangerment Standard physical neglect (Sedlak et al., 2010), with Black children experiencing this maltreatment at a higher rate (17.9 per 1,000) than White children (12.2 per 1,000). Analysis of the synthetic database found significantly different imputed rates of 22.3 per 1,000 for Black children and 14.6 per 1,000 for White children. Table 4–11 provides the model-fit statistics for the final multi-factor logistic regression model on all Black and White children, and Appendix E gives the parameter estimates (Table E–19) as well as the model statistics and parameter for the model based on the subset of children living with parents (Table E–20).

Table 4–11. Multi-factor Logistic Model Predicting Endangerment Standard Physical Neglect for All Black and White Children.

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	95.56	27	36	.001
Socioeconomic Status	101.46	1	62	.001
Family Structure	28.54	5	58	.001
Number of Children	13.38	2	61	.001
Child's Race	4.47	1	62	.039
Child's Age	1.17	2	61	.317
Child's Race x Socioeconomic Status	13.52	1	62	.001
Family Structure x Child's Age	3.12	10	53	.003
Family Structure x Socioeconomic Status	29.29	5	58	.001

The model-fit statistics indicate a significant effect of race and indicate that the race interacts with SES. In this case, the model parameters reveal that the overall race effect is actually opposite to the effects reported above in other maltreatment categories. That is, taking the effects of the other important predictors into account, White children were physically neglected at a higher rate than Black children. However, this difference depends on SES. Figure 4–8 gives the marginal probabilities for the race by SES interaction, which reflect the model parameters clearly, unclouded by differences in race distributions in the real world and unaffected by the other important risk predictors in the model.

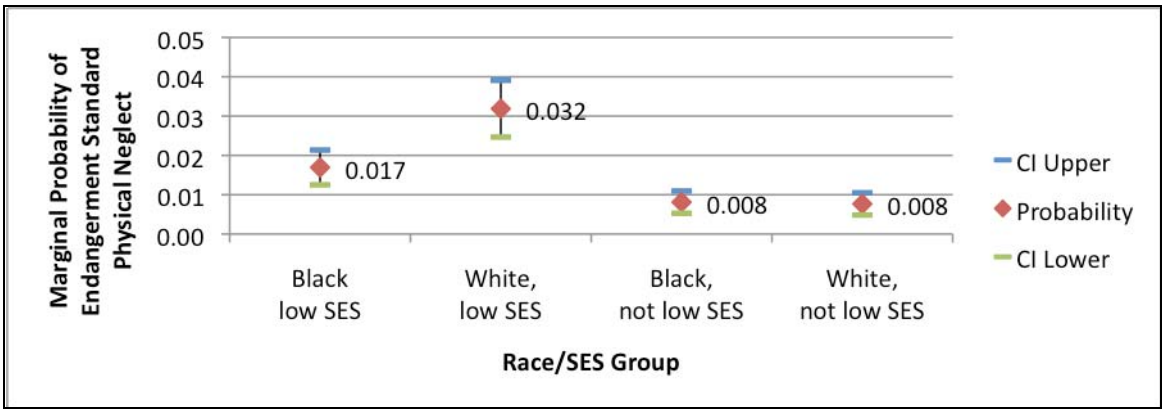

Figure 4–8. Model-based Marginal Probabilities of Endangerment Standard Physical Neglect (and Approximate Confidence Intervals) by Child's Race and SES

The pattern in this figure departs from the race by SES interactions found for other maltreatment categories, given above. Here, the races differ in risk in the low SES condition, with

White children at much greater risk than Black children in this circumstances, but no race difference appears under somewhat better socioeconomic circumstances.

Summary of Endangerment Standard findings. Endangerment Standard maltreatment presents a more complex picture than Harm Standard maltreatment. Apart from sexual abuse, where there were no race effects, the final multi-factor models for the remaining maltreatment categories all included interactions between race and SES, and all but one also included an interaction between race and family structure.

Three maltreatment categories involved race by SES interactions, and two of these yielded a similar pattern: in overall Endangerment Standard maltreatment and in emotional maltreatment, Black and White children had similar levels of risk in low socioeconomic circumstances, but Black children were at greater risk than White children when they were not in low socioeconomic circumstances. In physical abuse, race appeared to contribute more to risk, with Black children at higher risk than White children in both SES conditions. The race by SES interaction in this category indicates that the race difference was greater among children not in low SES households. Finally, a quite different pattern emerged in the model predicting risk of Endangerment Standard physical neglect: White children were at higher risk for this maltreatment than Black children, a difference that occurred only in the low SES households.

The race by family structure interactions were also complex. They suggest that, with overall Endangerment Standard maltreatment, physical abuse, and emotional maltreatment, Black children were at notably greater risk of maltreatment when there were two unmarried adults in the household—either unmarried biological parents or a single parent with a cohabiting partner. These circumstances elevated Black children's risk relative to White children living in similar arrangements and relative to Black children living in other family arrangements. In Endangerment Standard maltreatment overall and in emotional maltreatment, White children were at greater risk than Black children when living with married parents who were not both biologically related to the child and when living with a single parent alone, with no cohabiting partner. The races did not differ in their risk of any maltreatment when children lived with their married biological parents or with no parent.

5. DISCUSSION

For the first time in the history of the National Incidence Study of Child Abuse and Neglect, the most recent cycle, the NIS–4, found race differences in maltreatment rates, with Black children experiencing maltreatment at higher rates than White children in several categories. The efforts described in this report attempted to understand this finding by considering possible reasons why the NIS–4 results diverged from the findings in earlier cycles and by using multi-factor logistic modeling to reanalyze the NIS–4 data in order to isolate whether and how race contributed to maltreatment risk independent of the other important risk factors that correlated with race. These efforts focused on understanding the NIS–4 race effects and on why the race effect often varied depending on two other risk factors—socioeconomic status and family structure.

5.1 Differences Between NIS–3 and NIS–4

The authors examined two possible explanations for why the NIS–4 found statistically reliable race differences in rates of some categories of child maltreatment, in contrast to the findings of previous NIS cycles: the greater statistical power of the NIS–4 and the fact that the changes in other risk factors since the time of the NIS–3 were not equivalent for Black and White children.

Greater precision of the NIS–4 estimates. The NIS–3 maltreatment rates for Black and White children show nonsignificant differences that are in the same direction as the statistically reliable NIS–4 race differences. At the same time, the NIS–4 samples were considerably larger than the samples used in earlier NIS cycles and, as a result, the NIS–4 estimates were more precise. The greater precision of the NIS–4 estimates could have allowed this latest study to detect race differences in maltreatment rates, even if the same underlying patterns of risk and resulting maltreatment may have held previously. This explanation remains plausible for the different race findings across the NIS cycles.

Differential changes in other, correlated risk factors. The NIS–4 *Report to Congress* indicated that, generally, observed changes in maltreatment rates physical abuse and emotional neglect decreased more or increased less for White children compared to changes in the corresponding maltreatment rates for Black children (Sedlak et al., 2010). Concurrently, there were statistically reliable changes in the distributions of Black children and White children on a number of

family characteristics, including family structure, parents' employment, family size, parents' education, and household income. The authors examined the demographic changes and concluded that—with the exception of income—the observed shifts could not explain why race differences in maltreatment appear greater in the NIS–4. Except for income, the changes on all characteristics considered actually *decreased* the racial gap across the risk conditions. In the case of income, however, the racial gap increased. The graphs in Figures 1-3 and 1-4 displayed this pattern. Incomes of all race groups rose during the 1993-2006 time period, but the improvements in household incomes for White children far outpaced those of the Black children. As a result, although the income improvements for Black children raised them from the lowest income categories, the improvements for White children moved them disproportionately into the higher income categories. Census data on changes in median family income over the entire course of the 1993-2006 time period show that Black families' median incomes increased at the same pace as the racial gap, while White families' median incomes moved progressively upward.

At the same time, income (or socioeconomic status in the NIS–4) has consistently been the factor most strongly associated with risk in all categories of maltreatment but sexual abuse, where it ranks below child's sex as a predictor of maltreatment. Thus, examination of demographic shifts since the time of the NIS–3 suggest that differential changes in the economic circumstances of Black and White children could account both for the NIS–4 findings on race differences in maltreatment rates and for the observed race-related differences in changes in maltreatment rates since the time of the NIS–3.[17]

5.2 Race Differences in the NIS–4 Isolated from Other, Correlated Risk Factors

The authors built multi-factor logistic regression models to assess whether any race differences in maltreatment risk remained after the effects of the other, correlated risk factors were taken into account. The results, detailed and summarized in the previous chapter, indicated that race continued to contribute as a predictor of risk in 5 maltreatment categories—physical abuse under both the Harm and Endangerment Standards, overall Endangerment Standard maltreatment, and Endangerment Standard emotional maltreatment and physical neglect. However, in nearly all cases,

[17] There may, of course, have been other race-related changes in risk factors that the present analyses could not examine. This is especially true for race differences in family structure and living arrangement. At the time of the NIS–3, census data could not distinguish the 6 levels of family structure and living arrangement that the NIS–4 identified.

the effect of the child's race on maltreatment risk depended on the SES of the child's household, and in 3 of these maltreatment categories, the effect of race depended on family structure as well.

Socioeconomic status. Across maltreatment categories, socioeconomic status was a key risk factor for maltreatment. Apart from sexual abuse, where the child's sex was always the strongest predictor, SES was the strongest predictor in all maltreatment categories. In almost all maltreatment categories where race entered the final model, it interacted with SES. In most cases, the races showed no or smaller differences in risk in the low SES condition, but Black children had higher risk in households that were not low SES. The one exception to this typical pattern, was in the category of Endangerment Standard physical neglect, where the race and SES interaction indicated that White children were at higher risk than Black children in the low SES households, but the races did not differ in households not low in SES.

Of necessity, these analyses used the NIS–4 definition of low SES. As mentioned earlier, in order to minimize missing data, this measure classified children as low SES based any one of three characteristics: household income below $15,000, parents' highest education level less than high school, or household participation in any poverty program. This poses a problem for interpreting the results of the present analyses, because Black children and White children have very different distributions *within* the "not low SES" category. Black and White children in non-low SES households live in very different circumstances. In Chapter 1, Figure 1-3 showed the percentages of each race at different income levels, demonstrating a marked racial inequality in families with incomes greater than $15,000. In 2006, more than one-third of Black children (34%) lived in households with incomes greater than $15,000 but below $40,000, compared to less than one-fifth of White children (19%). Almost three-fourths of White children (73%) lived in homes where the income was above $40,000, compared to just over one-third of Black children (36%). About 43% of White children lived in homes where the income was $75,000 or more, compared to just 15% of Black children. Thus, the Black children in households that were "not low SES" were predominantly at the lower end of the income range in this category; they lived in households with incomes well below those of White children in the "not low SES" category.

The NIS–4 also used parents' education as a proxy indicator of SES in lieu of household income. A report issued by the National Center for Children in Poverty (Koball, Chau, and Douglas-Hill, 2006), using 2005 Census data, indicated that the relationship between income and parents' education differs for Black and White children. Among children whose parents had some college education, 44% of Black children lived in low-income families as compared to only 18% of

White children. [18] Thus, parents' education is not an equivalent proxy for SES for Black children and White children. Considering that more Black children with more highly educated parents are actually in low income households, the NIS–4 low SES measure may have over-assigned Black children with missing income data to the not-low SES category.

The consequence of both of these disparities is the same: the NIS–4 not-low SES category does not adequately equalize the races on this dimension.[19] However, recognizing that Black and White children very probably have different underlying SES distributions within the NIS–4 non-low SES category can aid interpretation of the present findings. As summarized above, in all maltreatment categories where race entered the final risk model, it interacted with SES, and in almost cases (except for Endangerment Standard physical neglect), the interaction showed that Black children had higher maltreatment rates than White children in the not-low SES condition, whereas in the low SES condition the race difference was attenuated or nonexistent. It is possible that, had the NIS–4 defined SES differently, such as by using a higher income cut-off point, or if the NIS–4 had less missing data on children's household income, these analyses may not have yielded any race by SES interaction at all. That is, had the non-low SES Black children been as well-off as the non-low SES White children, the observed pattern of higher risk for Black children under non-low SES conditions may not have emerged. Although this interpretation is speculative, it is informed by the documented powerful influence that SES (or income) has on rates of child maltreatment[20] and the very likely difference between the Black and White children whom the NIS–4 definition assigned to the same SES level. This reasoning implies that nearly all the multi-factor findings on the interaction of race and SES arise not because Black children in not-low SES households are at greater risk for maltreatment because they are Black; they are at greater risk because they are poorer than the White children in these households.

This interpretation does not explain the race by SES interaction in Endangerment Standard physical neglect, where White children experienced higher risk than Black children in the low SES condition, while the races did not differ in the not-low SES condition. Although this result departs from all other race by SES interactions in the multi-factor models presented here, it does resemble a finding reported by Sedlak and Schultz (2005) in their analyses of the NIS–3 data.

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[18] The National Center for Children in Poverty (Koball, Chau, and Douglas-Hall, 2006) defined the low income threshold for a family of four in 2006 as $40,000 (twice the federal poverty line).

[19] Future research might explore whether a similar series of analyses using a different definition of SES would produce different results.

[20] The NIS–4 found that low-SES children were 7 times more likely to be maltreated than their counterparts (Sedlak et al, 2010).

Despite several differences,[21] their analyses produced a similar interaction for risk of all Harm physical neglect, emotional maltreatment, and overall maltreatment, in which White children were maltreated at significantly higher rates than Black children in the poorest families (with household incomes below $15,000).

In discussing these surprising NIS–3 findings, Hill (2006) noted that stronger extended family networks in Black families and communities may serve as a protective factor for Black children, and other researchers have reported similar patterns for child maltreatment rates at the community level (Korbin, Coulton, Chard, et al., 1998) and for spousal violence (Cazenave and Straus, 1979). However, research has yet to determine whether, when, and how such protective factors can tip the balance of risk in the low income or low SES households toward higher risks for White children compared to Black children in that condition. Until these dynamics are better understood, it is difficult to explain why the present analyses found this pattern only in Endangerment Standard physical neglect and not in the other maltreatment categories where Sedlak and Schultz reported it.

Family structure. The present analyses also found a complex race by family structure interaction for three categories of Endangerment Standard maltreatment: overall maltreatment, physical abuse, and emotional maltreatment. The authors computed marginal probabilities of maltreatment in the different conditions, which took into account the effects of all other risk factors in the model and assumed that Black and White children were distributed equivalently across all risk conditions. Because of the many cells involved in the race by family structure interaction, it is important to avoid overinterpreting the patterns. Nevertheless, it is clear that family structure affects maltreatment risk differently for Black and White children.

The resulting patterns indicate that risk of maltreatment is elevated for Black children living with two unmarried adults—whether both are the child's biological parents or a single parent has an unmarried partner. Black children in these conditions appear to have elevated risk of maltreatment relative to the risk for White children in the same circumstances and relative to the risk for Black children in other living arrangements. In two Endangerment Standard maltreatment categories, overall maltreatment and emotional maltreatment, it also appeared that the risk for White children was higher than the risk for Black children when living with either a single parent who had no partner or with married parents who were not their biological parents. Risk levels for White

[21] They analyzed Harm Standard maltreatment categories only, their final models did not include family structure or child's age, as the model here did, and they used income rather than a composite SES measure as in the present case.

children and Black children did not appear to differ for children who were living with their married biological parents or with no parent.

The finding that family structure relates to risk of child maltreatment is not new. Nearly two decades ago, Wilson, Daly, and Weghorst (1980) reported increased risk for children living in households with a parent and a surrogate parent (whether stepparent or cohabiting partner) compared to children in mother-only households. The NIS–3 documented a higher risk for children in single-parent households in 1993, but did not distinguish between those whose parent had a cohabiting partner and those whose single parent had no partner in the household.

Until very recently, the United States Census data did not obtain the information needed to distinguish between children in households with unmarried biological parents and those living with a parent and that parent's unrelated cohabiting partner. The NIS–4 (Sedlak et al., 2010) provides the first national data on child maltreatment rates in 6 types of family structure, distinguishing single parents with partners from those without partners, parents who are biologically related to a household child from nonbiological parents, and married biological parents from unmarried biological parents.

The *Report to Congress* indicated that children living with a single parent with a partner in the household experienced Harm Standard abuse at a rate 11 times greater than children living with two biological parents. What is new about the multi-factor findings here is that, holding all other risk factors constant, it appears that Black children in this living arrangement are at much greater risk of maltreatment than White children living in this circumstance or than Black children who live in other family structures. Nevertheless, this pattern probably does not account for the overall higher risk of Black children in the single-factor analyses, because similar percentages of Black and White children live in these family structures (Figure 2-2 in Chapter 2). It should be noted that race-related differences in risk across the family structures probably reflect differences in the context associated with these structures in Black and White communities. Future research is needed to uncover how the associated context shapes the differential risk across family structures.

5.3 Limitations

The multi-factor risk models convey the race effects that remain after the effects on risk of all the other model predictors are taken into account, but their results are constrained by the measures available to the model-building procedures in the first place.

The key limitation of the present efforts and the results they yield is the number and range of the risk factors that were available to enter the models. Only 7 demographic characteristics were available in both the NIS and Census data to enter the synthetic database that was needed for the logistic models. This set of predictors may mark circumstances that are associated with children's risk of maltreatment, but it certainly excludes a number of other important risk factors that have no available measures in these sources, such as neighborhood characteristics, social isolation, alcohol or drug use, or mental illness.

Despite the fact that socioeconomic status is the most powerful predictor of maltreatment in the entire set available in NIS, it was less than ideal for the present study for two reasons: it had extensive missing data, and it appears that the not-low SES condition, as defined in the NIS–4, had different meanings for Black children than it did for White children.

First, due to extensive missing data, the NIS–4 analysts had to impute SES for almost half of the maltreated child records. Although the NIS–4 analysts used state-of-the-art imputation methods, they essentially relied on the patterns and correlations in the records with complete information and extrapolated these to assign values to records with missing data. If there are biases in the patterns of missing data, with certain values more likely to be missing than other values, then the assumption that the missing data should look like the complete data would not be valid. The NIS data do not offer independent means to assess the extent of any such bias, but its potential does qualify the present findings.

Second, the SES measure was very rudimentary and probably obscured important race differences across the ranges of household incomes grouped together in the not-low SES condition. In fact, the NIS–4 definition of SES classified almost one-third of Black children whom the National Center for Children in Poverty (Koball, Chau, and Douglas-Hall, 2006) called "low income" into the not-low SES households.[22] This means that the NIS–4 SES measure is not truly

[22] This results from its very low income cut-off, considering that children in households with incomes of $15,000 or more are not low in SES. Based on 2005 Census data, Koball, Chau, and Douglas-Hall (2006) defined "low income" as households below $40,000, which is twice the poverty level

independent of race, as it should be for the model findings to have unambiguous interpretations. What appear to be race differences in the model results may arise from the differences in SES that remain associated with race in the measure used, which, as the earlier discussion suggested, could be the reason why race differences generally appeared only, or more strongly, in the not-low SES condition.[23] If this was the case, then with a better measure of SES, the final multi-factor models may have included fewer race effects.

5.4 Conclusions

The fact that the NIS–4 found race differences while early NIS cycles did not is likely, at least partly, a consequence of the greater precision of the NIS–4 estimates and partly due to the enlarged gap between Black and White children in economic well-being. Income, or socioeconomic status, is the strongest predictor of maltreatment rates, but since the time of the NIS–3, incomes of Black families have not kept pace with the incomes of White families.

Race correlates with a number of other predictors of maltreatment, so it was important to take the effects of these other correlated predictors into account when evaluating the effects of race. The authors attempted to do this by building multi-factor models that incorporated all the statistically reliable predictors of maltreatment in the category. The final multi-factor models revealed that race did have effects on risk in certain maltreatment categories, even after the effects of other important predictors were considered.

Black children were at significantly greater risk than White children of experiencing physical abuse under both the Harm and Endangerment Standards, but in both cases, this race difference depended on SES. The race difference was small or nonexistent among children living in low SES households, but it was notably larger for children in not-low SES households.

In two maltreatment categories, Endangerment Standard emotional maltreatment and overall Endangerment Standard maltreatment, race differences depended on SES and family structure. There were no race differences among children in low SES households, but the

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for a family of four. Using this income cut-off would reclassify nearly 995 of the 12,408 maltreated child records in the NIS–4 data into the low SES condition (734 of whom were included in the present analyses).

[23] Parents' employment was another measure that was less than ideal. It strictly reflected the employment status of the child's parents, so children who had no parent in the household received no value on this measure. Thus, the present analyses had to omit those children in order to include the measure.

maltreatment risk for Black children in not-low SES households was two or more times greater than the risk for White children in this condition. Black children were also at comparatively elevated risk when living with unmarried parents or a single parent with a partner in the household, whereas the risk for White children in those circumstances was considerably lower. At the same time, White children appeared to have somewhat higher risk than Black children when living with married parents who were not both biologically related to them and when living with a single parent who had no cohabiting partner.

White children had significantly higher risk for Endangerment Standard physical neglect, but this race difference appeared only among children in low SES households. This pattern resembled the earlier findings of multi-factor analyses of the NIS–3 data, which applied in more maltreatment categories in that study (Sedlak and Schultz, 2005).

The present findings are qualified by the limitations of the predictors that were available for the NIS–4 multi-factor analyses, which comprised only general demographic characteristics of the children and their families. The key measure of SES was less than ideal in two respects—the large amount of missing data that required imputation and the fact race differences that emerged in the not-low SES condition could, in part, actually reflect the underlying income differences. For these reasons, the race differences observed in the not-low SES condition in this report must be interpreted with caution.

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Appendix A

Confidence Intervals for NIS–3 and NIS–4 Maltreatment Estimates for Black and White Children

Table A–1. Estimated Rates of Harm Standard Maltreatment and Their 95-percent Confidence Intervals for White and Black Children in the NIS–3 and NIS–4

Maltreatment Category	NIS–3		NIS–4	
	White Rate per 1,000 *(CI)*	Black Rate per 1,000 *(CI)*	White Rate per 1,000 *(CI)*	Black Rate per 1,000 *(CI)*
Any maltreatment	20.39 *(11.14–29.63)*	31.61 *(19.06–44.17)*	12.60 *(10.37–14.83)*	23.97 *(17.26–30.67)*
Any abuse	10.48 *(6.15–14.82)*	12.51 *(6.73–18.29)*	5.99 *(5.09–6.9)*	10.41 *(8.35–12.40)*
Physical abuse	5.19 *(3.00–7.38)*	7.77 *(4.59–10.95)*	3.24 *(2.66–3.8)*	6.63 *(5.42–7.83)*
Sexual Abuse	3.17 *(1.63–4.71)*	3.44 *(-.09–6.97)*	1.36 *(1.08–1.63)*	2.61 *(1.54–3.68)*
Any neglect	10.91 *(5.31–16.51)*	19.62 *(11.09–28.14)*	7.4 *(5.62–9.29)*	14.65 *(8.49–20.82)*

Notes: Gray shaded cells contain estimates that differ significantly; the differences between estimates in the green shaded cells are statistically marginal. CI = confidence interval. The 95-percent confidence interval indicates the precision of the estimate, specifying the range in which the estimate would fall in 95 out of 100 comparable replications of the study. White rates presented here differ somewhat from those in the NIS–3 report. The NIS–3 final report did not separate Hispanic and non-Hispanic White children. The rates here are based on non-Hispanic Whites and non-Hispanic Blacks only.

Table A–2. Estimated Rates of Endangerment Standard Maltreatment and Their 95-percent Confidence Intervals for White and Black Children in the NIS–3 and NIS–4

Maltreatment Category	NIS–3		NIS–4	
	White Rate per 1,000 *(CI)*	Black Rate per 1,000 *(CI)*	White Rate per 1,000 *(CI)*	Black Rate per 1,000 *(CI)*
Any maltreatment	36.50 *(21.93–51.06)*	54.96 *(33.61–76.30)*	28.58 *(24.43–32.73)*	49.55 *(39.25–59.85)*
Any abuse	17.32 *(9.64–25.00)*	19.05 *(11.34–26.77)*	8.73 *(7.57–9.89)*	14.91 *(12.30–17.51)*
Physical abuse	8.60 *(4.95–12.25)*	11.34 *(6.70–15.98)*	4.63 *(3.88–5.39)*	9.66 *(8.04–11.29)*
Any neglect	24.45 *(14.44–34.46)*	41.09 *(24.59–57.60)*	22.42 *(18.65–26.19)*	36.83 *(28.10–45.55)*
Physical neglect	16.62 *(10.28–22.97)*	27.58 *(16.17–38.99)*	12.20 *(9.75–14.66)*	17.87 *(13.69–22.05)*
Emotional neglect	8.64 *(4.73–12.55)*	9.10 *(4.82–13.38)*	12.13 *(10.10–14.17)*	18.16 *(14.77–21.55)*

Notes: Gray shaded cells contain estimates that differ significantly; the differences between estimates in the green shaded cells are statistically marginal. CI = confidence interval. The 95-percent confidence interval indicates the precision of the estimate, specifying the range in which the estimate would fall in 95 out of 100 comparable replications of the study. White rates presented here differ somewhat from those in the NIS–3 report. The NIS–3 final report did not separate Hispanic and non-Hispanic White children. The rates here are based on non-Hispanic Whites and non-Hispanic Blacks only.

Appendix B

Imputation of Missing Demographic Data Items

This appendix describes the imputation of the risk analysis demographic variables for the maltreated children in the NIS-4 database. The imputation procedure attempted to preserve the covariance structure of the data as much as possible. NIS–4 analysts carried out the imputation of each demographic variable in two stages. The first stage was a modeling effort. Using the known values of the variable to be imputed and a set of covariates, analysts developed a model to identify subgroups of data records that differed most distinctly on the values of the variable to be imputed. The second stage of the process used these subgroups as classes in a hot-deck procedure to impute the missing values of the variable.

All demographic variables had some missing values, but the percentage of records with missing values varied greatly across the variables. Table B-1 shows the demographic variables that had to be imputed and the percentage of NIS–4 maltreated child records where their values were missing. The proportion of missing values ranged from 3.4 percent for child's sex to 44.9 percent for socioeconomic status.

Table B–1. Demographic Variables for the Multi-factor Model-building Effort and Percentage of Their Values Missing

Variable	Percent Missing
Child's sex	3.4
Number of children in the household	3.8
Any parent present	4.4
Family structure	5.7
Child's age	6.8
Child's race	8.8
Parental employment	42.4
Socioeconomic status	44.9

The imputation process started with imputation of the variable with the lowest percentage of missing data, child's sex. To impute child's sex, analysts first developed a predictive model for child's sex using an Automatic Interaction Detector (AID) type of algorithm. This modeling algorithm is described in more detail below. Modeling included only those child records

with known sex. Study outcome variables as well as geographic variables served as potential predictors in this modeling effort. Table B-2 lists these variables.

Table B–2. Study Outcome Variables and Geographic Variables Included as Potential Predictors in Imputation

Variable	Categories
Study Outcome Variables	
Sexual abuse	Harm Standard countable; only Endangerment Standard countable; not countable
Physical abuse	Harm Standard countable; only Endangerment Standard countable; not countable
Emotional abuse	Harm Standard countable; only Endangerment Standard countable; not countable
Physical neglect	Harm Standard countable; only Endangerment Standard countable; not countable
Educational neglect	Harm Standard countable; only Endangerment Standard countable; not countable
Emotional neglect	Harm Standard countable; only Endangerment Standard countable; not countable
Severity	Serious harm; moderate harm; inferred harm; endangered; serious harm only from Endangerment Standard maltreatment; moderate harm only from Endangerment Standard maltreatment; inferred harm only from Endangerment Standard maltreatment; endangered by Endangerment Standard maltreatment; other
Geographic Variables	
Census region	Northeast; Midwest; South; West
Metropolitan status	MSA with a population of 1 million or more; MSA with a population of less than 1 million; Non-MSA

For child's sex, the first imputed variable, none of the demographic variables were included as predictors in the modeling effort because of their missing values. The model identified homogeneous subsets of data records with respect to child's sex. In the second stage, analysts imputed child's sex by randomly assigning values to the cases where it was missing within each subset of records.

Imputation of the variables in Table B-1 followed a series of cycles, with each variable imputed in an independent cycle. After imputing child's sex, we imputed the number of children in the household, which had the next smallest missing proportion. Since all records that previously had

missing values for child's sex had imputed values at this stage, we included it in the potential predictor set along with the outcome and geographic variables. The imputation process continued in this manner, sequentially imputing each demographic variable listed in Table B-1 and then adding it to the list of predictors for imputing the next variable. The last variable imputed was socioeconomic status, which had the largest percentage of records with missing values. Note that this meant that all the other demographic variables served as potential predictors in the imputation modeling for socioeconomic status, since all were imputed prior to this variable. Doing this not only preserved the covariance structure between the demographic and outcome variables but also preserved the covariance structure among the demographic variables.

The modeling process identified the imputation classes using a procedure known as Chi-Square Automatic Interaction Detector, or CHAID (Magidson, 1988; Ripley, 1996). This approach performs segmentation modeling—a statistical stepwise procedure that divides a set of records into segments (subgroups) that differ with respect to a designated criterion. The CHAID procedure creates a hierarchical tree-like structure that partitions the data records with known values on the target variable (i.e., the variable needing imputation) into homogenous subsets with respect to the selected target variable. To accomplish this, it progressively builds the segmentation model. It first merges values of the predictors that are statistically homogeneous with respect to the target variable and maintains all other heterogeneous values. It then selects the predictor in the model with the smallest *p*-value as the best predictor and thus forms the first branch in the decision tree. It continues applying the same process within the subgroups (nodes) defined by the "best" predictor chosen in the preceding step. This process continues until no additional significant predictors are found or until a specified minimum node size is reached; in this case, the specified the minimum node size was 30. The subgroups of data records (nodes of the tree) that CHAID identified then serve as imputation classes in the second stage of an imputation cycle.

The second imputation stage assigns values for the target variable on the records where it is missing. For imputing missing values on the NIS-4 records, analysts used Westat's imputation software, WESDECK (Krenzke & Judkins, 2008). WESDECK performs a hot-deck imputation. Hot-deck imputation fills in missing values on incomplete records using values from similar, but complete records of the same dataset.[24] WESDECK draws a random sample of records with known values within each imputation class to serve as donors. Then, the known values of the variable on the donor records are assigned randomly to the records in the imputation class with missing values.

[24] There are a variety of hot-deck methods (Ford, 1983; Sande, 1983). WESDECK is a proprietary software package developed by Westat that has several advantages (Winglee, Ryaboy, and Judkins, 1993).

This approach assumes that, within each imputation class, the values of the variable are missing at random; that is, it assumes that the probability of having a known value on the variable is independent of the level of the value itself within an imputation class. This is a reasonable assumption, because the process developed the imputation classes by identifying homogeneous subsets of data with respect to the variable being imputed. One important feature of WESDECK is that it allows analysts to restrict the number of times the same donor contributes to different recipients. The multiple use of the donors can result in an increase in the variance of the survey estimates (Kalton and Kish, 1984). The present imputation restricted the number of donations from a donor to 2.

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Appendix C

Construction of the Synthetic Database for Use in Building Multi-factor Logistic Models

In order to support the development of multivariate logistic models on factors related to risk of child abuse and neglect, it was necessary to construct a special analysis database. This database is a combination of the countable maltreated child population from the Fourth National Incidence Study of Child Abuse and Neglect (NIS-4) and the records representing the nonmaltreated child population. The NIS–4 analysts developed records for nonmaltreated children by subtracting the maltreated children from the full child population in the United States, using data from the U.S. Bureau of the Census.

Selection of the Census database source. Researchers chose to use the March 2006 supplement of the Current Population Survey (CPS) from the U.S. Bureau of the Census to develop the population count of nonmaltreated children. Careful consideration was taken in selecting the Census supplement that would most accurately reflect the NIS-4 reference periods, which covered both the fall of 2005 and spring of 2006. The two options considered were (1) to combining the March 2005 and March 2006 supplements and use an average of their weighted counts, or (2) to use only the March 2006 supplement. The ultimate decision was to use only the 2006 data as the most appropriate. Although differences between the 2005 and 2006 data on the key measures were very small, the measure of parental employment was pivotal.[25] The NIS–4 asked about the parents' employment both "in past year" and "at time of maltreatment," with the time of maltreatment being close to the time of completing the data form as well as included in the past year (i.e., last 12 months). Thus, NIS respondents indicated the employment of children's parents at the time of maltreatment and in the past year, which effectively covered the interval from the beginning of September 2004 (i.e., 12 months prior to the beginning of the first NIS reference period) to the beginning of May 2006 (i.e., at the end of the last NIS reference period). The Current Population Survey asks respondents about their employment status during the preceding calendar year and during the week prior to the interview. Therefore, if both 2005 and 2006 Current Population Surveys had been used, the general population data would have used an employment measure that covered the full 2004 calendar year, which would have extended well beyond the period of time referenced by the answers on employment status in the NIS-4 data.

[25] Differences for all marginal distributions were less than 1% except for children in households with the highest level of the income ($55,000 or more), a group that increased in size in the March 2006 CPS by 2.13% compared to the previous year.

Development of the 2006 Census extract database. Before constructing the synthetic database, the NIS–4 analysts had to create a March 2006 child extract with the key variables needed. Children from the March 2006 CPS were identified as being under the age of 18, not living in group quarters and not coded as the 'reference person of family' or 'spouse of reference person'. If family relationship was 'both parents present', 'mother only present' or 'father only present', education and employment variables were merged onto the child record from the corresponding parent record(s). The Census collects information on income and poverty program participation at the household level and includes it on each family member's record. Analysts derived the predictor variables of child's sex, child's age, child's race, number of children in the household, socioeconomic status, and family structure. The derivation of socioeconomic status at the child level combined information on parent's education, household income, and household poverty program participation. Initial review of the frequencies on these measures suggested that the Census data might require imputation. Information was missing on parents' education and parents' employment status for 1,036,545 children. Review of these records showed that the children were either living in a home without parents (982,662 children) or were part of a subfamily in which the Census classified their family relationship as 'not in the universe of parents' (53,883 children). For the former, analysts resolved the missing data by setting the derived parents' education and parents' employment status to the "no parent present" category, which correctly reflected the child's family structure. For the latter, where children were part of a subfamily in a household, the parent record indicator on the child record helped to resolve the family structure. That is, if the family relationship was 'not in the universe of parents,' but a corresponding parent's record was found, the education and employment variables from that corresponding record were used. This resolved missing data for both education and employment status and no imputation of the CPS data was necessary. The interim CPS file representing the general population of children comprised 73,735,720 child level records, but the family structure measure was not yet final.

Although the March 2006 CPS supplement offered the most equivalent measures needed for the NIS analyses, it had a key weakness: it did not distinguish between children living with their unmarried parents and children living with a single parent with a cohabiting partner. As a result, analysts could not construct all 6 levels of the family structure variable from the 2006 Census data, as the NIS–4 defined this measure. The 2007 Census data did have the information needed for this definition. The solution was to base the assignment of family structure in the 2006 data on the distribution of this measure in the March 2007 CPS. To complete the CPS data file, analysts developed the final family structure variable in two steps. By first constructing it in the March 2007 CPS data and then matching the 2007 and 2006 data on all the other variables and assigning the

2007 family structure distributions to the corresponding (matched) cells in the March 2006 CPS. However, this process did not apply to children who had been assigned to the "no parent present" category. Those children were appropriately coded in the 2006 and they retained that code in the final family structure. The matching process and extrapolation process did not apply to them.

The matching process occurred in two rounds. The first round matched the bulk of the cells on the key analysis variables of child's sex, child's age, child's race, parents' employment status, socioeconomic status and number of children in the household. Round 2 matched only on child's sex, child's age and child's race and picked up any 2006 non-matches from the first round. In each database, analysts summed the weights for every unique combination of the first round matching variables. Excluding cases coded as 'no parents present,' the March 2006 CPS produced 1,092 summarized cells to match with the March 2007 CPS.[26] Child records coded as 'no parents present' summarized separately to 371 cells. The same process was applied to the March 2007 CPS data except that cells were determined based on the unique combinations of the first round matching variables plus family structure. This produced 3,582 cells to match with the March 2006 CPS.[27] Analysts calculated the weighted percent distribution for family structure (excluding level 6, 'neither parent present') within each cell. The final step of the first round match was to merge the like cells from 2006 and 2007, adding the codes for family structure to the March 2006 CPS and apportion the 2006 weight based on the calculated distribution from 2007. Round 1 resulted in matches for 1,061 cells from the 2006 side. Because there were multiple values of family structure from 2007 for each 2006 cell, this produced a match file of 3,536 cells. From the 2006 side, 31 cells did not match. Subsequent steps dropped the 46 cells from the 2007 side that did not match.

The second round assigned values of family structure to the records in unmatched cells in a similar manner, except that it applied a simplified classification, matching cells solely on child's sex, child's age and child's race. The weights on the 31 unmatched 2006 cells from the first round then produced 23 cells for matching to the March 2007 CPS. The summarized 2007 data including family structure produced 240 cells for matching. The like cells from 2006 and 2007 were merged together and codes for family structure were added. This match produced 115 cells and the 2006 weight was apportioned based on the 2007 distribution of family structure. The 115 cells were merged back with the 31 unmatched from the 2006 side and their weights were further apportioned

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[26] The 2006 CPS has 62,628 cases that meet the study criteria for children less than 18 years of age. Of these cases, 2,736 are coded as 'no parents present'. 59,892 cases remained to be matched with the March 2007 CPS.

[27] The 2007 CPS has 61,536 cases that meet the study criteria for children less than 18 years of age. Of these cases, 2,130 are coded as 'no parents present' or 'not in universe of parents'. 59,406 cases remained to be matched with the March 2006 CPS.

based on the distribution of parental employment status, lower socioeconomic status, and number of children in the household within child's sex, child's age, child's race and family structure. This completed the process of adding a family structure measure to the March 2006 CPS and produced the final March 2006 CPS extract database.

Construction of the synthetic database. In order to construct the synthetic database for use in the multi-factor model-building work, it was necessary to first create a synthetic database of nonmaltreated children and then combine this with the countable maltreated children from the NIS-4. The 7 child and family characteristics that were required for the analyses define a 7-way matrix. The child-level records in both the final Census extract and the NIS–4 data have unique cell assignments in this matrix based on their coded characteristics. The number of nonmaltreated children in the population was calculated by subtracting the known number of maltreated children with a given set of characteristics (i.e., the weighted NIS records in a given cell), from the total general population of children with same set of characteristics (i.e., the weighted records in the final March 2006 CPS extract in the corresponding cell).

The weighted cells in the 7-way matrix of the final Census data extract each represented the children in the U.S. population who all possess that unique combination of the seven characteristics. A similar matrix defined the fully imputed NIS-4 data, subset to include only the children with countable maltreatment (a weighted total of 2,905,838 maltreated children). The two databases were merged together by all seven predictor variables and the NIS-4 weighted total was subtracted from the CPS weighted total in each cell.[6] If the resultant weighted remainder, or nonmaltreated child population, in a given cell was negative, the nonmaltreated child population in that cell was set to zero. That is, analysts considered that all children with that particular set of characteristics in the child population were maltreated because the estimated number of maltreated children in the NIS-4 (an estimate that is qualified by sampling error) was greater than the number of children in the general population for that cell. Cells with negative remainders summed to a total of (negative) 94,631 nonmaltreated children in the nation. This process resulted in a database with weighted records that summed to 71,148,090 non-maltreated children. Finally, the non-maltreated database was concatenated with the NIS-4 database of countable maltreated children to create the synthetic database that included both maltreated and nonmaltreated children with known characteristics in 7 domains (listed in Table 3-1 and Appendix Table B-1). Analysts carried selected maltreatment variables from the NIS-4 data over to the new synthetic database and created dummy

[6] Both the NIS–4 annualized full-sample child weights and NIS–4 annualized replicated child weights were subtracted from the Census estimate in each cell..

variables for each level of the predictor variables for use in regression modeling. The final synthetic database represented a total of 74,040,548 maltreated and non-maltreated children.[7]

[7] Children with unique sets of characteristics on the seven predictor variables were found in the NIS-4 but not found in the general population of children. This resulted in a population of maltreated and non-maltreated children that exceeded the March 2006 CPS total by 318,208 children.

Appendix D

Procedures for Generating Marginal Probabilities from Final Logistic Models

D.1 Derivation of Unadjusted Marginal Probabilities for Specific Subgroups from a Given Logistic Model

Given a logistic model, the method of using the model parameters to derive probabilities for specific subgroups of children defined according to their unique combination of characteristics is as follows:

Assume that the model in question involves m parameters or characteristics, that B_i is the model coefficient for characteristic *i*, and that X_i functions as the selector for the characteristic in question. That is,

$$X_i = \begin{array}{l} 1 \text{ if the characteristic is selected} \\ 0 \text{ otherwise} \end{array}$$

Then

$$y = \sum_{i=0}^{m} B_i X_i = B_0 + \sum_{i=1}^{m} (B_i X_i)$$

Thus, each parameter coefficient is multiplied by its selector and the products are summed across all parameters in the model. The rightmost expression above indicates that the parameter for the intercept is always selected. When a parameter B_i is associated with an interaction term, then the value of X_i is automatically given as the product of the X_i values for the individual factors that are involved in the interaction.

The value y is the logit, and it can be transformed into a probability value as follows:

$$z = \exp(y)$$

and

$$p = \frac{z}{1 + z}$$

An example will illustrate the approach. Consider the procedure used to derive the unadjusted probability of Harm Standard physical abuse for children who are Black, between 6 and 11 years old, and living in low SES households with their unmarried parents. The final logistic model (Table E-3b) had 16 parameters, including the intercept and 5 interaction terms. These are listed in the first column of Table D-1, and their model coefficients (i.e., parameter estimates) are given in the second column.

Table D–1. Example Calculation of the Predicted Probability of a Specific Type of Child Experiencing Harm Standard Physical Abuse

Parameter	Parameter Estimate (B_i)	Selector Value (X_i)	Product (B_iX_i)
Intercept	-6.81083	1	-6.81083
Other married parents	1.83465	0	0
Unmarried parents	1.65535	1	1.65535
Single parent with partner	2.18824	0	0
Single parent no partner	1.37032	0	0
No parent present	1.00161	0	0
Low SES	2.23084	1	2.23084
Black	0.63403	1	0.63403
Birth-5 years	-0.17208	0	0
6-11 years	0.21723	1	0.21723
Black x low SES	-0.46944	1	-0.46944
Other married parents x low SES	-0.86435	0	0
Unmarried parents x low SES	-1.73282	1	-1.73282
Single parent with partner x low SES	-1.56647	0	0
Single parent no partner x low SES	-1.8294	0	0
No parent present x low SES	-1.31977	0	0
		Logit	-4.27564
		Unadjusted Probability	.0137

The third column in Table D-1 specifies the value that must be assigned to the selector factor in order to describe the type of child of interest. Note that the intercept is automatically selected (i.e., assigned a value of 1). The characteristic "unmarried parents" is also selected via a value of 1 in this column. In order to specify that the child is living in a low SES household, that parameter is assigned a selector value of 1 as well. Because the child is Black and between the ages of 6 and 11, those parameters are also selected. The non-applicable single-factor selectors are set to

zero. Then, the selector factors for the remaining parameters, which are all interaction terms, are automatically calculated by multiplying the selector terms for their component factors. For example, the selector for "Other married parents x low SES" is computed by multiplying the selector for "Other married parents," which is zero, by the selector for "low SES," which is 1. The product, zero, is entered for this interaction term. Similarly, the selector term for "Unmarried parents x low SES" is computed by multiplying the selector factor for "Unmarried parents," which is 1, by the selector factor for "low SES," which is also 1. The product, 1, is entered as the selector for this interaction term. The selectors for the remaining interaction terms are computed in a like manner, which in this example sets them all to zero.

The last column in Table D-1 shows the product derived by multiplying the coefficient for the parameter by the value of the selector factor within each row. By summing the products in the last column, one calculates the value of the logit. The unadjusted probability itself is then derived from the logit according to the last two formulae given above.

D.2 Computing Adjusted Marginal Probabilities for the Interactions Graphed in Chapter 4

In order to construct a graph from the parameters of a final logistic model, one must compute the unadjusted probabilities for all cells specified in the model. Thus, in order to graph the race by SES interaction for the final multi-factor model predicting children's risk of Harm Standard physical abuse (given in Figure 4-1), the authors first computed the unadjusted probabilities for each of the 72 cells in the matrix defined by the predictors in the model: family structure (6) x SES (2) x Race (2) x Age (3). Next, they computed the simple average across the cells in the 4 categories defined by the interaction term: Black-low SES, White-low SES, Black-not low SES, and White-not low SES. Finally, the resulting unadjusted average probabilities were multiplied by a constant term in order to ensure that the overall probability of Harm Standard physical abuse generated by the model exactly matched the probability of this maltreatment category computed directly from the synthetic database.

Appendix E

Final Logistic Regression Models for All Maltreatment Categories

Table E–1a. Model-fit Statistics for the Multi-factor Logistic Model Predicting All Harm Standard Maltreatment for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	80.573	15	48	.001
SES	331.713	1	62	.001
Family structure	19.818	5	58	.001
Number of children	6.834	2	61	.002
Child's age	11.349	2	61	.001
Family structure x SES	26.658	5	58	.001

Table E–1b. Model Parameters for the Multi-factor Logistic Model Predicting All Harm Standard Maltreatment for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-5.57902	0.10800	-51.75	.001
Low SES	2.74331	0.14500	18.98	.001
Other married parents	1.43087	0.15900	8.99	.001
Unmarried parents	1.89881	0.28900	6.58	.001
Single parent with partner	2.17212	0.22300	9.74	.001
Single parent no partner	1.83573	0.17300	10.61	.001
No parent present	1.66000	0.22400	7.42	.001
1 child	0.24217	0.08200	2.96	.004
3 or more children	0.25803	0.10600	2.44	.018
Birth-5 years	-0.63542	0.13300	-4.79	.001
6-11 years	-0.2056	0.10500	-1.95	.056
Other married parents x low SES	-0.91537	0.20500	-4.46	.001
Unmarried parents x low SES	-2.17162	0.33800	-6.43	.001
Single parent with partner x low SES	-1.61578	0.25100	-6.43	.001
Single parent no partner x low SES	-2.08958	0.20200	-10.35	.001
No parent present x low SES	-2.22733	0.25000	-8.89	.001

Table E–2a. Model-fit Statistics for the Multi-factor Logistic Model Predicting All Harm Standard Maltreatment for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	74.256	17	46	.001
SES	35.851	1	62	.001
Family structure	23.331	4	59	.001
Parent's employment	14.761	2	61	.001
Child's age	9.699	2	61	.001
Number of children	6.528	2	61	.003
Family structure x SES	30.653	4	59	.001
SES x parent's employment	8.251	2	61	.001

Table E–2b. Model Parameters for the Multi-factor Logistic Model Predicting All Harm Standard Maltreatment for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-5.64448	0.11300	-49.99	.001
Low SES	2.75436	0.15300	18.05	.001
Other married parents	1.4099	0.15900	8.88	.001
Unmarried parents	1.78766	0.27900	6.42	.001
Single parent with partner	2.12272	0.22500	9.43	.001
Single parent no partner	1.73037	0.15900	10.91	.001
Any parent unemployed	0.31913	0.23900	1.34	.186
Parent(s) not in labor force	1.53964	0.29000	5.32	.001
Birth-5 years	-0.61086	0.13800	-4.43	.001
6-11 years	-0.19486	0.11000	-1.77	.081
1 child	0.25089	0.09300	2.70	.009
3 or more children	0.27778	0.10900	2.54	.014
Other married parents x low SES	-0.89461	0.20700	-4.32	.001
Unmarried parents x low SES	-2.06116	0.34300	-6.00	.001
Single parent with partner x low SES	-1.55785	0.24700	-6.30	.001
Single parent no partner x low SES	-1.98131	0.20100	-9.84	.001
Low SES x any parent unemployed	-0.20126	0.25700	-0.78	.437
Low SES x parent(s) not in labor force	-1.54529	0.381	-4.054	.001

Table E–3a. Model-fit Statistics for the Multi-factor Logistic Model Predicting All Harm Standard Physical Abuse for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	45.218	15	48	.001
Family structure	23.368	5	58	.001
SES	50.799	1	62	.001
Race	10.113	1	62	.002
Child's age	5.272	2	61	.008
Race x SES	4.014	1	62	.049
Family structure x SES	14.951	5	58	.001

Table E–3b. Model Parameters for the Multi-factor Logistic Model Predicting All Harm Standard Physical Abuse for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-6.81083	0.19700	-34.60	.001
Other married parents	1.83465	0.25900	7.09	.001
Unmarried parents	1.65535	0.34700	4.77	.001
Single parent with partner	2.18824	0.24000	9.13	.001
Single parent no partner	1.37032	0.16200	8.46	.001
No parent present	1.00161	0.26400	3.79	.001
Low SES	2.23084	0.22900	9.74	.001
Black	0.63403	0.14900	4.25	.001
Birth-5 years	-0.17208	0.12000	-1.43	.158
6-11 years	0.21723	0.10300	2.10	.040
Black x low SES	-0.46944	0.23400	-2.00	.049
Other married parents x low SES	-0.86435	0.29200	-2.96	.004
Unmarried parents x low SES	-1.73282	0.35400	-4.89	.001
Single parent with partner x low SES	-1.56647	0.26000	-6.04	.001
Single parent no partner x low SES	-1.8294	0.27000	-6.77	.001
No parent present x low SES	-1.31977	0.37900	-3.48	.001

Table E–4a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Harm Standard Physical Abuse for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	52.262	12	51	.001
Family structure	21.734	4	59	.001
SES	55.073	1	62	.001
Race	6.747	1	62	.012
Child's age	4.066	2	61	.022
Family structure x SES	21.917	4	59	.001

Table E–4b. Model Parameters for the Multi-factor Logistic Model Predicting Harm Standard Physical Abuse for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-6.73425	0.19200	-34.99	.001
Other married parents	1.84313	0.25800	7.14	.001
Unmarried parents	1.72189	0.34200	5.03	.001
Single parent with partner	2.20056	0.24100	9.13	.001
Single parent no partner	1.4434	0.15500	9.29	.001
Low SES	2.14676	0.22700	9.46	.001
Black	0.36791	0.14200	2.60	.012
Birth-5 years	-0.21404	0.12800	-1.67	.100
6-11 years	0.14716	0.11600	1.27	.209
Other married parents x low SES	-0.89048	0.29000	-3.07	.003
Unmarried parents x low SES	-1.79752	0.35200	-5.11	.001
Single parent with partner x low SES	-1.60068	0.26400	-6.07	.001
Single parent no partner x low SES	-1.98518	0.24100	-8.25	.001

Table E–5a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Harm Standard Sexual Abuse for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	28.549	32	31	.001
Family structure	17.084	5	58	.001
Child's sex	61.498	1	62	.001
SES	15.81	1	62	.001
Child's age	1.047	2	61	.357
Number of children	0.513	2	61	.601
Child's sex x number of children	3.369	2	61	.041
SES x number of children	6.447	2	61	.003
Family structure x child's age	3.073	10	53	.004
SES x child's age	3.522	2	61	.036
Family structure x SES	6.518	5	58	.001

Table E–5b. Model Parameters for the Multi-factor Logistic Model Predicting Harm Standard Sexual Abuse for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Birth-5 years	-0.7816	0.36800	-2.12	.038
6-11 years	-0.73586	0.35000	-2.10	.040
1 child	-0.7142	0.28600	-2.50	.015
3 or more children	-0.10225	0.25500	-0.40	.690
Male x 1 child	0.88132	0.53800	1.64	.107
Male x 3 or more children	1.4427	0.55100	2.62	.011
Low SES x 1 child	0.19875	0.50300	0.40	.694
Low SES x 3 or more children	-1.02276	0.45800	-2.24	.029
Other married parents x birth-5 years	1.32132	0.60500	2.18	.033
Other married parents x 6-11 years	0.27075	0.38500	0.70	.484
Unmarried parents x birth-5 years	1.49955	1.32300	1.13	.261
Unmarried parents x 6-11 years	0.92696	0.94400	0.98	.330
Single parent with partner x birth-5 years	1.25038	0.76100	1.64	.105
Single parent with partner x 6-11 years	-1.01171	0.83800	-1.21	.232
Single parent no partner x birth-5 years	1.37328	0.53200	2.58	.012
Single parent no partner x 6-11 years	0.45001	0.45200	1.00	.323
No parent present x birth-5 years	0.40954	0.58000	0.71	.483
No parent present x 6-11 years	1.32977	0.62000	2.15	.036
Low SES x birth-5 years	-0.7013	0.27500	-2.55	.013
Low SES x 6-11 years	0.21049	0.36700	0.57	.568

Table E–5b. Continued.

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Other married parents x low SES	-0.33336	0.41100	-0.81	.421
Unmarried parents x low SES	-3.56688	1.07700	-3.31	.002
Single parent with partner x low SES	-1.71742	0.89700	-1.92	.060
Single parent no partner x low SES	-2.05576	0.55800	-3.69	.001
No parent present x low SES	-2.39073	0.60800	-3.93	.001

Table E–6a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Harm Standard Sexual Abuse for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	34.06	26	37	.001
Family structure	20.608	4	59	.001
Child's sex	51.167	1	62	.001
SES	12.544	1	62	.001
Number of children	1.279	2	61	.286
Child's age	0.661	2	61	.520
Child's sex x child's age	3.461	2	61	.038
Family structure x child's age	2.651	8	55	.016
SES x number of children	4.762	2	61	.012
Family structure x SES	6.464	4	59	.001

Table E–6b. Model Parameters for the Multi-factor Logistic Model Predicting Harm Standard Sexual Abuse for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-7.20688	0.36600	-19.71	.001
Other married parents	1.7236	0.37700	4.58	.001
Unmarried parents	2.29519	0.86000	2.67	.010
Single parent with partner	3.44599	0.91400	3.77	.001
Single parent no partner	1.80899	0.36700	4.93	.001
Male	-2.39412	0.34000	-7.05	.001
Low SES	2.91302	0.44300	6.57	.001
1 child	-0.53248	0.30800	-1.73	.089
3 or more children	0.18413	0.30400	0.61	.547
Birth-5 years	-1.25883	0.33900	-3.72	.001
6-11 years	-0.9026	0.34700	-2.60	.012
Male x birth-5 years	1.05165	0.50300	2.09	.041
Male x 6-11 years	1.49304	0.60500	2.47	.016
Other married parents x birth-5 years	1.24085	0.61600	2.02	.048
Other married parents x 6-11 years	0.28875	0.39000	0.74	.462
Unmarried parents x birth-5 years	1.68529	1.45900	1.16	.252
Unmarried parents x 6-11 years	0.88904	0.95600	0.93	.356
Single parent with partner x birth-5 years	1.13258	0.81900	1.38	.172
Single parent with partner x 6-11 years	-0.94455	0.87100	-1.09	.282
Single parent no partner x birth-5 years	1.21283	0.52900	2.29	.025

Table E–6b. Continued.

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Single parent no partner x 6-11 years	0.49291	0.43000	1.15	.256
Low SES x 1 child	0.25444	0.55900	0.46	.651
Low SES x 3 or more children	-1.00343	0.52300	-1.92	.060
Other married parents x low SES	-0.29359	0.44200	-0.67	.509
Unmarried parents x low SES	-3.94261	1.33500	-2.95	.004
Single parent with partner x low SES	-1.90561	0.97700	-1.95	.056
Single parent no partner x low SES	-2.1231	0.55700	-3.81	.001

Table E–7a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Harm Standard Emotional Maltreatment for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	26.568	15	48	.001
Family structure	10.704	5	58	.001
Child's age	26.675	2	61	.001
SES	60.478	1	62	.001
SES x child's age	3.194	2	61	.048
Family structure x SES	5.409	5	58	.001

Table E–7b. Model Parameters for the Multi-factor Logistic Model Predicting Harm Standard Emotional Maltreatment for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-6.36219	0.20500	-31.03	.001
Other married parents	1.47141	0.30300	4.86	.001
Unmarried parents	1.88842	0.70600	2.68	.010
Single parent with partner	1.94822	0.39900	4.88	.001
Single parent no partner	1.49821	0.22900	6.56	.001
No parent present	1.87264	0.46600	4.02	.001
Birth-5 years	-2.09953	0.30600	-6.85	.001
6-11 years	-0.36169	0.30800	-1.17	.245
Low SES	2.22186	0.31700	7.01	.001
Low SES x birth-5 years	0.89362	0.35400	2.52	.014
Low SES x 6-11 years	0.08722	0.35000	0.25	.804
Other married parents x low SES	-0.49263	0.46200	-1.07	.291
Unmarried parents x low SES	-1.39107	0.81100	-1.72	.091
Single parent with partner x low SES	-0.84504	0.42900	-1.97	.053
Single parent no partner x low SES	-1.48488	0.36800	-4.04	.001
No parent present x low SES	-2.78509	0.56100	-4.96	.001

Table E–8a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Harm Standard Emotional Maltreatment for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	31.334	11	52	.001
Child's age	16.33	2	61	.001
Family structure	12.844	4	59	.001
SES	75.343	1	62	.001
Family structure x SES	4.556	4	59	.003

Table E–8b. Model Parameters for the Multi-factor Logistic Model Predicting Harm Standard Emotional Maltreatment for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-6.4715	0.20400	-31.70	.001
Birth-5 years	-1.3954	0.24400	-5.72	.001
6-11 years	-0.25381	0.15000	-1.69	.096
Other married parents	1.53536	0.30000	5.11	.001
Unmarried parents	1.81119	0.69900	2.59	.012
Single parent with partner	1.97221	0.40000	4.93	.001
Single parent no partner	1.54068	0.23400	6.58	.001
Low SES	2.36077	0.31200	7.56	.001
Other married parents x low SES	-0.58185	0.47100	-1.24	.221
Unmarried parents x low SES	-1.26338	0.78400	-1.61	.112
Single parent with partner x low SES	-0.88257	0.42900	-2.06	.044
Single parent no partner x low SES	-1.53497	0.37500	-4.10	.001

Table E–9a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Harm Standard Physical Neglect for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	17.204	11	52	.001
SES	111.686	1	62	.001
Family structure	3.132	5	58	.014
Family structure x SES	15.575	5	58	.001

Table E–9b. Model Parameters for the Multi-factor Logistic Model Predicting Harm Standard Physical Neglect for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-7.54708	0.26300	-28.67	.001
Low SES	3.60797	0.30800	11.70	.001
Other married parents	1.47176	0.40300	3.65	.001
Unmarried parents	1.88298	0.43900	4.29	.001
Single parent with partner	1.87946	0.40200	4.68	.001
Single parent no partner	2.0598	0.25500	8.07	.001
No parent present	2.43285	0.51600	4.72	.001
Other married parents x low SES	-1.88128	0.51300	-3.66	.001
Unmarried parents x low SES	-2.42518	0.52800	-4.59	.001
Single parent with partner x low SES	-2.2618	0.53300	-4.25	.001
Single parent no partner x low SES	-2.60408	0.35400	-7.35	.001
No parent present x low SES	-3.60918	0.48600	-7.43	.001

Table E–10a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Harm Standard Physical Neglect for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	58.96	5	58	.001
SES	51.345	1	62	.001
Parent's employment	15.659	2	61	.001
SES x parent's employment	11.305	2	61	.001

Table E–10b. Model Parameters for the Multi-factor Logistic Model Predicting Harm Standard Physical Neglect for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-6.869	0.21700	-31.64	.001
Low SES	2.34273	0.24000	9.78	.001
Any parent unemployed	1.11391	0.37200	2.99	.004
Parent(s) not in labor force	2.22893	0.33200	6.72	.001
Low SES x any parent unemployed	-0.53162	0.44500	-1.19	.237
Low SES x parent(s) not in labor force	-2.16782	0.47100	-4.60	.001

Table E–11a. Model-fit Statistics for the Multi-factor Logistic Model Predicting All Endangerment Standard Maltreatment for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	118.76	30	33	.001
SES	269.94	1	62	.001
Family structure	48.42	5	58	.001
Race	3.58	1	62	.063
Number of children	4.53	2	61	.015
Race x SES	41.57	1	62	.001
Race x family structure	5.29	5	58	.001
Family structure x SES	55.51	5	58	.001
Family structure x number of children	2.64	10	53	.011

Table E–11b. Model Parameters for the Multi-factor Logistic Model Predicting All Endangerment Standard Maltreatment for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-5.04	0.10000	-50.40	.001
Low SES	2.89	0.11200	25.75	.001
Other married parents	1.53	0.16000	9.58	.001
Unmarried parents	2.14	0.33300	6.43	.001
Single parent with partner	2.52	0.19000	13.28	.001
Single parent no partner	1.68	0.09800	17.18	.001
No parent present	1.55	0.28600	5.43	.001
Black	0.49	0.17300	2.86	.006
1 child	0.13	0.16900	0.76	.453
3 or more children	0.32	0.16400	1.97	.053
Black x low SES	-0.76	0.11700	-6.45	.001
Other married parents x Black	-0.25	0.22800	-1.12	.269
Unmarried parents x Black	0.55	0.24100	2.27	.027
Single parent with partner x Black	0.79	0.40400	1.95	.056
Single parent no partner x Black	-0.43	0.23600	-1.82	.074
No parent present x Black	0.04	0.23200	0.16	.873
Other married parents x low SES	-0.66	0.22000	-3.00	.004
Unmarried parents x low SES	-1.91	0.29300	-6.53	.001
Single parent with partner x low SES	-1.81	0.22300	-8.11	.001
Single parent no partner x low SES	-1.74	0.12600	-13.85	.001
No parent present x low SES	-2.13	0.19000	-11.24	.001
Other married parents x 1 child	-0.35	0.30700	-1.13	.264

Table E–11b. Continued

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Other married parents x 3 or more children	-0.14	0.23000	-0.60	.550
Unmarried parents x 1 child	-0.38	0.26400	-1.45	.153
Unmarried parents x 3 or more children	-0.25	0.28300	-0.90	.371
Single parent with partner x 1 child	-0.75	0.28000	-2.68	.009
Single parent with partner x 3 or more children	-0.27	0.36300	-0.75	.458
Single parent no partner x 1 child	0.17	0.15700	1.07	.287
Single parent no partner x 3 or more children	0.36	0.18500	1.95	.056
No parent present x 1 child	-0.12	0.31700	-0.37	.709
No parent present x 3 or more children	-0.16	0.26900	-0.61	.546

Table E–12a. Model-fit Statistics for the Multi-factor Logistic Model Predicting All Endangerment Standard Maltreatment for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	244.47	43	23	.001
SES	42.70	1	65	.001
Family structure	22.11	4	62	.001
Child's age	2.18	2	64	.121
Number of children	5.17	2	64	.008
Parent's employment	32.48	2	64	.001
Race	3.46	1	65	.067
Family structure x number of children	3.39	8	58	.003
Family structure x SES	45.70	4	62	.001
Race x SES	45.38	1	65	.001
Race x family structure	6.66	4	62	.001
Family structure x parent's employment	2.94	8	58	.008
Child's age x parent's employment	3.44	4	62	.013
SES x parent's employment	24.73	2	64	.001

Table E–12b. Model Parameters for the Multi-factor Logistic Model Predicting All Endangerment Standard Maltreatment for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-5.15	0.10000	-51.39	.001
Low SES	2.84	0.14300	19.84	.001
Other married parents	1.55	0.18500	8.37	.001
Unmarried parents	2.11	0.33600	6.27	.001
Single parent with partner	2.52	0.18000	14.05	.001
Single parent no partner	1.60	0.10700	14.89	.001
Birth-5 years	-0.03	0.10800	-0.28	.784
6-11 years	0.07	0.08700	0.77	.442
1 child	0.12	0.17300	0.72	.475
3 or more children	0.34	0.16200	2.09	.040
Any parent unemployed	0.29	0.17900	1.64	.107
Parent(s) not in labor force	2.35	0.33700	6.98	.001
Black	0.49	0.17800	2.73	.008
Other married parents x 1 child	-0.34	0.30700	-1.10	.277
Other married parents x 3 or more children	-0.17	0.23300	-0.75	.458
Unmarried parents x 1 child	-0.37	0.26500	-1.39	.168
Unmarried parents x 3 or more children	-0.25	0.28200	-0.88	.383

Table E–12b. Continued

Single parent with partner x 1 child	-0.79	0.28500	-2.76	.007
Single parent with partner x 3 or more children	-0.30	0.35300	-0.86	.395
Single parent no partner x 1 child	0.18	0.16200	1.09	.280
Single parent no partner x 3 or more children	0.33	0.18500	1.80	.077
Other married parents x low SES	-0.54	0.23300	-2.31	.024
Unmarried parents x low SES	-1.72	0.30700	-5.61	.001
Single parent with partner x low SES	-1.63	0.21700	-7.53	.001
Single parent no partner x low SES	-1.53	0.12900	-11.84	.001
Black x low SES	-0.87	0.12900	-6.74	.001
Other married parents x Black	-0.19	0.22100	-0.86	.391
Unmarried parents x Black	0.63	0.23800	2.62	.011
Single parent with partner x Black	0.85	0.41200	2.06	.044
Single parent no partner x Black	-0.34	0.23300	-1.45	.152
Other married parents x any parent unemployed	-0.13	0.29100	-0.44	.659
Other married parents x parent(s) not in labor force	-0.84	0.24100	-3.47	.001
Unmarried parents x any parent unemployed	0.06	0.26100	0.22	.830
Unmarried parents x parent(s) not in labor force	-1.28	0.38100	-3.37	.001
Single parent with partner x any parent unemployed	0.09	0.27100	0.34	.736
Single parent with partner x parent(s) not in labor force	-1.20	0.38100	-3.15	.003
Single parent no partner x any parent unemployed	-0.08	0.19400	-0.41	.684
Single parent no partner x parent(s) not in labor force	-0.94	0.25300	-3.73	.001
Birth-5 years x any parent unemployed	0.06	0.14700	0.44	.663
Birth-5 years x parent(s) not in labor force	0.45	0.17600	2.57	.012
6-11 years x any parent unemployed	0.28	0.15200	1.83	.073
6-11 years x parent(s) not in labor force	0.07	0.16600	0.43	.666
Low SES x any parent unemployed	-0.22	0.20200	-1.07	.290
Low SES x parent(s) not in labor force	-1.58	0.23400	-6.75	.001

Table E–13a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Endangerment Standard Physical Abuse for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	55.69	37	26	.001
Family structure	28.77	5	58	.001
SES	50.40	1	62	.001
Race	20.10	1	62	.001
Number of children	1.09	2	61	.344
Child's sex	5.32	1	62	.024
Child's age	4.94	2	61	.010
Family structure x SES	17.06	5	58	.001
Race x family structure	2.81	5	58	.024
Child's sex x child's age	5.54	2	61	.006
SES x number of children	5.30	2	61	.008
Family structure x number of children	2.43	10	53	.018
Race x SES	13.53	1	62	.001

Table E–13b. Model Parameters for the Multi-factor Logistic Model Predicting Endangerment Standard Physical Abuse for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-6.50	0.22800	-28.47	.001
Other married parents	2.24	0.33400	6.70	.001
Unmarried parents	1.74	0.52500	3.32	.002
Single parent with partner	2.14	0.25500	8.40	.001
Single parent no partner	1.72	0.23200	7.40	.001
No parent present	1.30	0.30000	4.35	.001
Low SES	1.95	0.26700	7.32	.001
Black	0.73	0.28400	2.57	.013
1 child	0.31	0.32200	0.95	.347
3 or more children	-0.09	0.26000	-0.34	.734
Child's sex	-0.28	0.14100	-1.97	.053
Birth-5 years	-0.51	0.13600	-3.75	.001
6-11 years	-0.12	0.11700	-1.02	.312
Other married parents x low SES	-0.74	0.22800	-3.25	.002
Unmarried parents x low SES	-1.49	0.40400	-3.70	.001
Single parent with partner x low SES	-1.56	0.22900	-6.81	.001
Single parent no partner x low SES	-1.80	0.23000	-7.86	.001
No parent present x low SES	-1.36	0.36600	-3.72	.001

Table E–13b. Continued

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Other married parents x Black	-0.09	0.28400	-0.31	.755
Unmarried parents x Black	0.93	0.43900	2.12	.038
Single parent with partner x Black	0.29	0.31100	0.94	.352
Single parent no partner x Black	-0.39	0.31100	-1.25	.216
No parent present x Black	0.04	0.46100	0.10	.925
Male x birth-5 years	0.82	0.27300	2.99	.004
Male x 6-11 years	0.63	0.20200	3.13	.003
Low SES x 1 child	0.74	0.22500	3.27	.002
Low SES x 3 or more children	0.15	0.27200	0.56	.576
Other married parents x 1 child	-0.65	0.52200	-1.25	.215
Other married parents x 3 or more children	0.01	0.38900	0.02	.985
Unmarried parents x 1 child	-0.66	0.59900	-1.11	.273
Unmarried parents x 3 or more children	-0.18	0.54100	-0.34	.734
Single parent with partner x 1 child	-0.40	0.41600	-0.97	.334
Single parent with partner x 3 or more children	0.38	0.34900	1.10	.275
Single parent no partner x 1 child	-0.52	0.38200	-1.36	.179
Single parent no partner x 3 or more children	0.51	0.31900	1.60	.115
No parent present x 1 child	-0.70	0.43500	-1.62	.111
No parent present x 3 or more children	-0.02	0.41100	-0.04	.968
Black x low SES	-0.60	0.16200	-3.68	.001

Table E–14a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Endangerment Standard Physical Abuse for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	38.47	32	42	.001
Family structure	34.92	4	70	.001
SES	9.61	1	73	.003
Number of children	2.82	2	72	.066
Race	18.15	1	73	.001
Parent's employment	6.04	2	72	.004
Child's age	2.96	2	72	.058
Child's sex	5.61	1	73	.021
Race x SES	13.60	1	73	.001
SES x parent's employment	3.56	2	72	.034
Child's sex x child's age	4.29	2	72	.017
Race x family structure	3.32	4	70	.015
SES x number of children	4.32	2	72	.017
Number of children x parent's employment	3.44	4	70	.013
Family structure x SES	16.80	4	70	.001

Table E–14b. Model Parameters for the Multi-factor Logistic Model Predicting Endangerment Standard Physical Abuse for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-6.41	0.2500	-25.62	.001
Other married parents	2.07	0.1970	10.50	.001
Unmarried parents	1.48	0.4490	3.31	.001
Single parent with partner	2.15	0.2030	10.61	.001
Single parent no partner	1.66	0.2050	8.12	.001
Low SES	2.06	0.2680	7.68	.001
1 child	-0.11	0.1560	-0.68	.500
3 or more children	0.02	0.2210	0.11	.916
Black	0.71	0.2820	2.53	.013
Any parent unemployed	-0.38	0.3080	-1.24	.219
Parent(s) not in labor force	0.93	0.4060	2.29	.025
Birth-5 years	-0.54	0.1400	-3.87	.001
6-11 years	-0.15	0.1210	-1.23	.224
Male	-0.24	0.1470	-1.66	.101
Black x low SES	-0.58	0.1560	-3.69	.001

Table E–14b. Continued

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Low SES x any parent unemployed	-0.26	0.2660	-0.96	.340
Low SES x parent(s) not in labor force	-1.18	0.4400	-2.69	.009
Malexbirth-5 years	0.81	0.2840	2.85	.006
Malex6-11 years	0.55	0.2240	2.44	.017
Other married parents x Black	-0.07	0.2840	-0.25	.801
Unmarried parents x Black	0.95	0.4390	2.16	.034
Single parent with partner x Black	0.30	0.3110	0.96	.339
Single parent no partner x Black	-0.31	0.3100	-1.01	.315
Low SES x 1 child	0.76	0.2590	2.94	.004
Low SES x 3 or more children	0.10	0.2700	0.35	.726
1 child x any parent unemployed	-0.23	0.3720	-0.63	.531
1 child x parent(s) not in labor force	-0.18	0.3290	-0.54	.592
3 or more children x any parent unemployed	0.63	0.2140	2.96	.004
3 or more children x parent(s) not in labor force	0.33	0.4090	0.80	.425
Other married parents x low SES	-0.74	0.2250	-3.30	.001
Unmarried parents x low SES	-1.46	0.4180	-3.50	.001
Single parent with partner x low SES	-1.49	0.2320	-6.45	.001
Single parent no partner x low SES	-1.67	0.2340	-7.15	.001

Table E–15a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Endangerment Standard Sexual Abuse for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	30.75	16	47	.001
Family structure	17.89	5	58	.001
Child's sex	40.10	1	62	.001
SES	22.76	1	62	.001
Number of children	2.58	2	61	.084
SES x number of children	4.01	2	61	.023
Family structure x SES	9.75	5	58	.001

Table E–15b. Model Parameters for the Multi-factor Logistic Model Predicting Endangerment Standard Sexual Abuse for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-7.55	0.25900	-29.20	.001
Other married parents	2.13	0.27400	7.77	.001
Unmarried parents	2.98	0.85600	3.49	.001
Single parent with partner	3.55	0.66000	5.38	.001
Single parent no partner	2.32	0.30700	7.58	.001
No parent present	2.64	0.44300	5.95	.001
Male	-1.23	0.19500	-6.33	.001
Low SES	2.95	0.34500	8.56	.001
1 child	-0.45	0.22000	-2.03	.047
3 or more children	0.02	0.24100	0.07	.943
Low SESx1 child	0.07	0.39400	0.18	.859
Low SESx3 or more children	-0.77	0.36300	-2.13	.037
Other married parents x low SES	-0.46	0.39600	-1.15	.254
Unmarried parents x low SES	-3.34	0.92000	-3.63	.001
Single parent with partner x low SES	-2.09	0.78500	-2.66	.010
Single parent no partner x low SES	-2.20	0.43000	-5.13	.001
No parent present x low SES	-2.22	0.53500	-4.14	.001

Table E–16a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Endangerment Standard Sexual Abuse for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	38.51	16	47	.001
Family structure	22.68	4	59	.001
Child's sex	40.72	1	62	.001
SES	25.94	1	62	.001
Parent's employment	4.45	2	61	.016
Number of children	1.88	2	61	.162
SES x number of children	3.95	2	61	.024
Family structure x SES	11.26	4	59	.001

Table E–16b. Model Parameters for the Multi-factor Logistic Model Predicting Endangerment Standard Sexual Abuse for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-7.49	0.25900	28.95	.001
Other married parents	2.14	0.27500	-7.80	.001
Unmarried parents	2.98	0.85700	-3.48	.001
Single parent with partner	3.53	0.65900	-5.35	.001
Single parent no partner	2.30	0.30700	-7.48	.001
Male	-1.30	0.20400	6.38	.001
Low SES	3.01	0.35900	-8.38	.001
Any parent unemployed	-0.59	0.21300	2.77	.007
Parent(s) not in labor force	0.18	0.27300	-0.65	.519
1 child	-0.43	0.24000	1.80	.077
3 or more children	0.01	0.25300	-0.04	.969
Low SES x 1 child	0.18	0.43300	-0.41	.681
Low SES x 3 or more children	-0.79	0.40500	1.96	.055
Other married parents x low SES	-0.44	0.39800	1.11	.271
Unmarried parents x low SES	-3.41	0.91700	3.72	.001
Single parent with partner x low SES	-2.15	0.76800	2.80	.007
Single parent no partner x low SES	-2.23	0.43300	5.14	.001

Table E–17a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Endangerment Standard Emotional Maltreatment for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	106.73	25	38	.001
SES	142.03	1	62	.001
Family structure	48.86	5	58	.001
Race	2.23	1	62	.141
Number of children	4.17	2	61	.020
Family structure x number of children	2.59	10	53	.012
Race x family structure	7.36	5	58	.001
Race x SES	48.97	1	62	.001

Table E–17b. Model Parameters for the Multi-factor Logistic Model Predicting Endangerment Standard Emotional Maltreatment for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-5.34	0.11500	-46.28	.001
Low SES	1.73	0.13900	12.45	.001
Other married parents	1.40	0.24300	5.75	.001
Unmarried parents	1.18	0.21400	5.51	.001
Single parent with partner	1.58	0.22800	6.95	.001
Single parent no partner	0.65	0.11600	5.59	.001
No parent present	0.36	0.39900	0.91	.366
Black	0.50	0.15700	3.20	.002
1 child	-0.39	0.17200	-2.29	.025
3 or more children	0.41	0.14200	2.87	.006
Other married parentsx1 child	-0.01	0.38300	-0.03	.973
Other married parentsx3 or more children	-0.21	0.24400	-0.87	.388
Unmarried parents x 1 child	0.26	0.41100	0.63	.532
Unmarried parents x 3 or more children	-0.28	0.28700	-0.99	.325
Single parent with partner x 3 or more children	0.04	0.39700	0.09	.926
Single parent with partner x 3 or more children	-0.28	0.29700	-0.95	.346
Single parent no partner x 3 or more children	0.75	0.32100	2.35	.022
Single parent no partner x 3 or more children	0.30	0.25000	1.20	.235
No parent present x 1 child	0.14	0.50100	0.29	.775
No parent present x 3 or more children	-0.43	0.36000	-1.20	.237

Table E–17b. Continued

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Other married parents x Black	-0.54	0.23500	-2.32	.024
Unmarried parents x Black	0.92	0.32700	2.82	.006
Single parent with partner x Black	0.76	0.29600	2.58	.012
Single parent no partner x Black	-0.46	0.23000	-2.00	.050
No parent present x Black	0.09	0.37100	0.23	.818
Black x low SES	-0.91	0.13000	-7.00	.001

Table E–18a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Endangerment Standard Emotional Maltreatment for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	448.37	55	9	.001
SES	73.36	1	63	.001
Family structure	38.62	4	60	.001
Race	0.90	1	63	.347
Number of children	6.51	2	62	.003
Parent's employment	11.21	2	62	.001
Child's age	1.49	2	62	.232
SES x parent's employment	13.78	2	62	.001
Family structure x number of children	2.44	8	56	.024
Family structure x parent's employment	6.09	8	56	.001
Race x family structure	6.61	4	60	.001
Race x SES	23.17	1	63	.001
Number of children x parent's employment	4.27	4	60	.004
Family structure x child's age	2.15	8	56	.045
Child's age x parent's employment	2.72	4	60	.038
Family structure x SES	16.66	4	60	.001

Table E–18b. Model Parameters for the Multi-factor Logistic Model Predicting Endangerment Standard Emotional Maltreatment for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-5.84	0.14200	-41.27	.001
Low SES	2.48	0.14100	17.56	.001
Other married parents	1.70	0.24300	7.01	.001
Unmarried parents	2.58	0.38100	6.78	.001
Single parent with partner	2.71	0.22100	12.28	.001
Single parent no partner	1.56	0.18800	8.27	.001
Black	0.32	0.19000	1.67	.100
1 child	-0.29	0.18900	-1.55	.126
3 or more children	0.19	0.15100	1.26	.212
Any parent unemployed	0.57	0.24800	2.29	.026
Parent(s) not in labor force	1.85	0.36600	5.05	.001
Birth-5 years	0.02	0.17300	0.14	.886
6-11 years	0.37	0.14600	2.52	.014
Low SES x any parent unemployed	-0.20	0.21100	-0.94	.350

Table E–18b. Continued

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Low SES x parent(s) not in labor force	-1.12	0.21700	-5.18	.001
Other married parents x 1 child	-0.04	0.40000	-0.11	.914
Other married parents x 3 or more children	-0.16	0.24500	-0.64	.524
Unmarried parents x 1 child	0.27	0.40600	0.67	.509
Unmarried parents x 3 or more children	-0.16	0.27700	-0.57	.573
Single parent with partner x 1 child	-0.06	0.41100	-0.14	.891
Single parent with partner x 3 or more children	-0.08	0.28900	-0.29	.777
Single parent no partner x 1 child	0.64	0.33600	1.92	.059
Single parent no partner x 3 or more children	0.50	0.24300	2.07	.042
Other married parents x any parent unemployed	-0.68	0.42000	-1.63	.108
Other married parents x parent(s) not in labor force	-0.76	0.30200	-2.52	.014
Unmarried parents x any parent unemployed	-0.09	0.32700	-0.27	.788
Unmarried parents x parent(s) not in labor force	-1.36	0.37900	-3.59	.001
Single parent with partner x any parent unemployed	-0.17	0.34600	-0.50	.620
Single parent with partner x parent(s) not in labor force	-1.46	0.28600	-5.12	.001
Single parent no partner x any parent unemployed	-0.53	0.30900	-1.70	.094
Single parent no partner x parent(s) not in labor force	-1.02	0.23700	-4.31	.001
Other married parents x Black	-0.47	0.24400	-1.92	.060
Unmarried parents x Black	0.81	0.35500	2.29	.026
Single parent with partner x Black	0.76	0.29500	2.57	.013
Single parent no partner x Black	-0.43	0.22300	-1.91	.060
Black x low SES	-0.66	0.13800	-4.81	.001
1 child x any parent unemployed	-0.33	0.27700	-1.19	.238
3 or more children x parent(s) not in labor force	0.03	0.28800	0.12	.907
3 or more children x any parent unemployed	0.43	0.16400	2.62	.011
3 or more children x parent(s) not in labor force	-0.29	0.24600	-1.17	.245
Other married parents x birth-5 years	0.02	0.50700	0.03	.973

Table E–18b. Continued

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Other married parents x 6-11 years	-0.22	0.22600	-0.98	.332
Unmarried parents x birth-5 years	-0.93	0.38900	-2.38	.020
Unmarried parents x 6-11 years	-0.83	0.42900	-1.93	.058
Single parent with partner x birth-5 years	-0.53	0.36000	-1.47	.147
Single parent with partner x 6-11 years	-0.41	0.28800	-1.43	.156
Single parent no partner x birth-5 years	-0.32	0.25700	-1.23	.224
Single parent no partner x 6-11 years	-0.57	0.16600	-3.42	.001
Birth-5 years x any parent unemployed	0.02	0.19500	0.11	.917
Birth-5 years x parent(s) not in labor force	0.81	0.31500	2.56	.013
6-11 years x any parent unemployed	0.06	0.21000	0.30	.765
6-11 years x parent(s) not in labor force	0.56	0.21700	2.60	.012
Other married parents x low SES	-0.29	0.27600	-1.05	.299
Unmarried parents x low SES	-1.12	0.37100	-3.03	.004
Single parent with partner x low SES	-1.40	0.23500	-5.96	.001
Single parent no partner x low SES	-1.16	0.17900	-6.48	.001

Table E–19a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Endangerment Standard Physical Neglect for All Black and White Children

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	95.56	27	36	.001
SES	101.46	1	62	.001
Family structure	28.54	5	58	.001
Number of children	13.38	2	61	.001
Race	4.47	1	62	.039
Child's age	1.17	2	61	.317
Race x SES	13.52	1	62	.001
Family structure x child's age	3.12	10	53	.003
Family structure x SES	29.29	5	58	.001

Table E–19b. Model Parameters for the Multi-factor Logistic Model Predicting Endangerment Standard Physical Neglect for All Black and White Children

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-6.50	0.24400	-26.68	.001
Low SES	3.08	0.18900	16.27	.001
Other married parents	1.24	0.30400	4.06	.001
Unmarried parents	2.88	0.33500	8.58	.001
Single parent with partner	2.26	0.36900	6.11	.001
Single parent no partner	1.85	0.22100	8.37	.001
No parent present	2.10	0.39000	5.39	.001
1 child	0.09	0.17000	0.53	.601
3 or more children	0.59	0.13100	4.48	.001
Black	0.06	0.19500	0.30	.766
Birth-5 years	0.54	0.23900	2.24	.029
6-11 years	0.61	0.30500	2.01	.049
Black x low SES	-0.73	0.19900	-3.68	.001
Other married parents x birth-5 years	-0.45	0.40300	-1.12	.268
Other married parentsx6-11 years	-0.33	0.28800	-1.14	.260
Unmarried parents x birth-5 years	-1.38	0.36100	-3.81	.001
Unmarried parentsx6-11 years	-1.19	0.53900	-2.20	.031
Single parent with partner x birth-5 years	-0.10	0.33400	-0.30	.765
Single parent with partner x 6-11 years	0.12	0.30900	0.39	.699
Single parent no partner x birth-5 years	-0.13	0.26400	-0.48	.630
Single parent no partner x 6-11 years	-0.29	0.30600	-0.94	.352
No parent present x birth-5 years	-0.29	0.38800	-0.75	.457

Table E–19b. Continued

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
No parent present x 6-11 years	-0.50	0.40400	-1.25	.216
Other married parents x low SES	-0.83	0.21900	-3.78	.001
Unmarried parents x low SES	-1.62	0.51200	-3.16	.002
Single parent with partner x low SES	-1.96	0.24400	-8.03	.001
Single parent no partner x low SES	-1.58	0.17300	-9.12	.001
No parent present x low SES	-2.57	0.31600	-8.13	.001

Table E–20a. Model-fit Statistics for the Multi-factor Logistic Model Predicting Endangerment Standard Physical Neglect for Black and White Children Living With Parents

Test	F value	Numerator df	Denom-inator df	$p \leq$
Overall fit	191.43	35	31	.001
SES	37.09	1	65	.001
Family structure	12.69	4	62	.001
Child's age	1.80	2	64	.174
Number of children	13.71	2	64	.001
Parent's employment	40.92	2	64	.001
Race	6.31	1	65	.014
SES x parent's employment	36.96	2	64	.001
Race x SES	14.22	1	65	.001
Family structure x parent's employment	2.46	8	58	.023
Family structure x child's age	3.52	8	58	.002
Family structure x SES	21.56	4	62	.001

Table E–20b. Model Parameters for the Multi-factor Logistic Model Predicting Endangerment Standard Physical Neglect for Black and White Children Living With Parents

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Intercept	-6.66	0.27900	-23.84	.001
Low SES	3.05	0.20700	14.78	.001
Other married parents	1.11	0.34000	3.26	.002
Unmarried parents	2.66	0.37200	7.15	.001
Single parent with partner	2.28	0.37500	6.07	.001
Single parent no partner	1.80	0.25500	7.06	.001
Birth-5 years	0.55	0.24000	2.27	.026
6-11 years	0.61	0.30700	2.00	.050
1 child	0.05	0.18900	0.29	.774
3 or more children	0.61	0.13400	4.52	.001
Any parent unemployed	0.88	0.24500	3.59	.001
Parent(s) not in labor force	2.42	0.36300	6.67	.001
Black	0.06	0.19100	0.29	.771
Low SES x any parent unemployed	-0.48	0.30700	-1.57	.120
Low SES x parent(s) not in labor force	-1.66	0.20000	-8.29	.001
Black x low SES	-0.82	0.21600	-3.77	.001
Other married parents x any parent unemployed	0.21	0.45400	0.45	.652
Other married parents x parent(s) not in labor force	0.06	0.38200	0.17	.867

Table E–20b. Continued

Parameter	Parameter Estimate	Standard Error of Estimate	Test for h0:	$p \leq$
Unmarried parents x any parent unemployed	0.60	0.44100	1.36	.179
Unmarried parents x parent(s) not in labor force	-0.98	0.43300	-2.27	.027
Single parent with partner x any parent unemployed	-0.06	0.28600	-0.20	.842
Single parent with partner x parent(s) not in labor force	-1.01	0.56500	-1.78	.079
Single parent no partner x any parent unemployed	0.02	0.29900	0.06	.951
Single parent no partner x parent(s) not in labor force	-0.73	0.38500	-1.90	.062
Other married parents x birth-5 years	-0.47	0.38800	-1.21	.232
Other married parents x 6-11 years	-0.32	0.29200	-1.10	.278
Unmarried parents x birth-5 years	-1.40	0.38700	-3.62	.001
Unmarried parents x 6-11 years	-1.11	0.53900	-2.07	.042
Single parent with partner x birth-5 years	-0.12	0.34700	-0.35	.730
Single parent with partner x 6-11 years	0.11	0.32100	0.34	.734
Single parent no partner x birth-5 years	-0.16	0.27000	-0.58	.567
Single parent no partner x 6-11 years	-0.30	0.30900	-0.96	.341
Other married parents x low SES	-0.79	0.22600	-3.50	.001
Unmarried parents x low SES	-1.46	0.52100	-2.80	.007
Single parent with partner x low SES	-1.79	0.25600	-6.99	.001
Single parent no partner x low SES	-1.42	0.17400	-8.17	.001

Appendix F

Model-Based Marginal Probabilities and 95%-Confidence Intervals for Race-Related Findings for all Black and White Children

Table F–1. Model-based Marginal Probabilities for the Race by SES Interaction Effect on Harm Standard Physical Abuse of All Black and White Children

SES	Black Children	White Children
	Estimated p *(95% C.I.)*	Estimated p *(95% C.I.)*
Low	.0062 *(.0041–.00083)*	.0053 *(.0040–.0066)*
Not Low	.0039 *(.0030–.0048)*	.0021 *(.0020–.0021)*

Table F–2. Model-based Marginal Probabilities for the Race by SES Interaction Effect on All Endangerment Standard Maltreatment of All Black and White Children

SES	Black Children	White Children
	Estimated p *(95% C.I.)*	Estimated p *(95% C.I.)*
Low	.0520 *(0–.1540)*	.0557 *(0–.1648)*
Not Low	.0322 *(0–0.0954)*	.0155 *(0–0.0458)*

Table F–3. Model-based Marginal Probabilities for the Race by Family Structure Interaction Effect on All Endangerment Standard Maltreatment of All Black and White Children

Family Structure	Black Children	White Children
	Estimated p *(95% C.I.)*	Estimated p *(95% C.I.)*
Married Biological Parents	.0217 *(.0158–.0275)*	.0257 *(.0199–.0315)*
Other Married Parents	.0360 *(.0287–.0434)*	.0496 *(.0336–.0656)*
Unmarried Parents	.0576 *(.0361–.0792)*	.0347 *(.0264–.0430)*
Single Parent with Partner	.0912 *(.0534–.1291)*	.0470 *(.0329–.0611)*
Single Parent No Partner	.0250 *(.0149–.0351)*	.0369 *(.0282–.0456)*
No Parent Present	.0212 (.0125–.0298)	.0194 *(.0149–.0240)*

Table F–4. Model-based Marginal Probabilities for the Race by SES Interaction Effect on Endangerment Standard Physical Abuse of All Black and White Children

SES	Black Children	White Children
	Estimated p *(95% C.I.)*	Estimated p *(95% C.I.)*
Low	.0096 *(.0071–.0122)*	.0073 *(.0055–.0091)*
Not Low	0.0064 *(.0046–.0083)*	0.0026 *(.0020–.0031)*

Table F–5. Model-based Marginal Probabilities for the Race by Family Structure Interaction Effect on Endangerment Standard Physical Abuse of All Black and White Children

Family Structure	Black Children	White Children
	Estimated p *(95% C.I.)*	Estimated p *(95% C.I.)*
Married Biological Parents	.0036 *(.0019–.0052)*	.0029 *(.0019–.0040)*
Other Married Parents	.0124 *(.0082–.0165)*	.0103 *(.0065–.0142)*
Unmarried Parents	.0123 *(.0056–.0190)*	.0035 *(0–.0105)*
Single Parent with Partner	.0124 *(.0079–.0169)*	.0065 *(0–.0184)*
Single Parent No Partner	.0038 *(.0026–.0050)*	.0037 *(.0029–.0045)*
No Parent Present	.0038 *(.0022–.0053)*	.0026 *(.0013–.0039)*

Table F–6. Model-based Marginal Probabilities for the Race by SES Interaction Effect on Endangerment Standard Emotional Maltreatment of All Black and White Children

SES	Black Children	White Children
	Estimated p *(95% C.I.)*	Estimated p *(95% C.I.)*
Low	.0266 *(.0189–.0343)*	.0283 *(.0226–.0340)*
Not Low	.0125 *(.0078–.0171)*	.0054 *(.0041–.0067)*

Table F–7. Model-based Marginal Probabilities for the Race by Family Structure Interaction Effect on Endangerment Standard Emotional Maltreatment of All Black and White Children

Family Structure	Black Children	White Children
	Estimated p *(95% C.I.)*	Estimated p *(95% C.I.)*
Married Biological Parents	.0055 *(.0036–.0073)*	.0067 *(.0046–.0087)*
Other Married Parents	.0115 *(.0081–.0148)*	.0229 *(.0156–.0302)*
Unmarried Parents	.0384 *(.0181–.0587)*	.0195 *(.0146–.0244)*
Single Parent with Partner	.0452 *(.0297–.0607)*	.0267 *(.0200–.0334)*
Single Parent No Partner	.0092 *(.0046–.0138)*	.0171 *(.0120–.0223)*
No Parent Present	.0074 *(.0032–.0116)*	.0083 *(.0053–.0113)*

Table F–8. Model-based Marginal Probabilities for the Race by SES Interaction Effect on Endangerment Standard Physical Neglect of All Black and White Children

SES	Black Children	White Children
	Estimated p *(95% C.I.)*	Estimated p *(95% C.I.)*
Low	.0170 *(.0125–.0214)*	.0319 *(.0246–.0391)*
Not Low	.0081 *(.0053–.0109)*	.0077 *(.0048–.0105)*