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**CORPORAL PUNISHMENT BY MOTHERS
AND DEVELOPMENT OF CHILDREN'S COGNITIVE ABILITY:
A LONGITUDINAL STUDY OF TWO NATIONALLY REPRESENTATIVE AGE COHORTS¹**

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ABSTRACT

This study tested the hypothesis that the use of corporal punishment (CP) such as slapping a child's hand or "spanking" is associated with restricted development of cognitive ability among 806 children age 2 to 4 and 704 children age 5 to 9 in the National Longitudinal Study of Youth. Cognitive ability was measured at the start of the study and four years later. The analyses controlled for ten parenting and demographic variables, including mother's emotional support and cognitive stimulation, child's birthweight, age and gender. Children of mothers who used little or no CP at Time 1 gained in cognitive ability relative to children who were not spanked, and this applied to both cohorts. The more CP experienced, the more they fell behind children who were not spanked. If these results are confirmed by other research, and if programs to reduce use of CP are successful, there could be major benefits for children and society as a whole. These benefits are not limited to higher cognitive ability. Recent empirical research suggests that reduced CP is also associated with less juvenile delinquency and lower rates for a number of adult behavior problems.

Keywords: cognitive ability, discipline, intelligence, IQ, parenting, child development, spanking, violence

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In the United States and many other nations, almost all parents use corporal punishment with pre-school age children. For example, Straus and Stewart found that 94% of parents hit toddlers (Straus & Stewart, 1999), which is consistent with many other studies in the 50 years since Sears, Maccoby, & Levin found a rate of 99%. Bryan and Freed (1982) found that 95% of

a sample of community college students had experienced CP. Numerous other studies (e.g. Giles-Sims, Straus, & Sugarman, 1995; Goodenough, 1931 (reprint 1975); Holden, Coleman, & Schmidt, 1995; Wauchope & Straus, 1990) also show extremely high rates of CP. CP therefore appears to be a near universal aspect of the early socialization experience of U.S. children, although to widely varying degrees in individual cases.

Given the prevalence of CP, even a small positive or negative effect of CP can have a large cumulative effect on the well-being of children and the nation as a whole because it applies to almost everyone in a cohort of children. If, for example, CP adversely affects the development of cognitive ability, ending use of CP could result in an increase in the national average level of cognitive ability. Such a scenario is possible in the light of research which has found that talking to children, including infants, is associated with an increase in neural connections in the brain and in cognitive ability (Blakeslee, 1995; Dawson & Fischer, 1994). Those findings led us to theorize about the relation of corporal punishment (CP) to cognitive ability. We reasoned that, to the extent parents use CP such as spanking or slapping a child's hand for touching a forbidden object, parents are less likely to engage in cognitive methods of behavior control such as explaining to the child why the object should not be touched. Conversely, the less CP used by a parent, the more verbal interaction is needed to teach and correct the child, and as just noted, an increased level of verbal interaction enhances cognitive ability.

In addition to limited verbal interaction, CP could adversely affect cognitive ability through other processes. Being slapped or spanked is a frightening and threatening event that children experience as highly stressful (Turner & Finkelhor, 1996). Fright and stress can result in cognitive deficits such as erroneous or limited coding of events and diminished elaboration (Heuer & Reisberg, 1992; Perry, 2006). There is now evidence that frequent and severe CP is associated with adverse changes in brain structure (Tomoda, Suzuki, Rabi, & Sheu, 2008). Moreover, to the extent that CP is experienced as stressful, it is a stress which, for many

children, continues for several years. Those who defend CP typically approve of using CP only with young children, for example ages 2 through 6 (see the Consensus Statements and Personal Statements in Friedman, Schonberg, & Sharkey, 1996). However, CP at these ages may undermine attachment and the bond between the child and the parent (Straus & Hill, In Press) and reduce a child's motivation to learn from parents. Whatever the intervening processes, if CP influences cognitive ability, it has broad implications because at least a third of U.S. children experience CP as infants, 94% as toddlers, and for a third it continues into the early teen years (Straus & Stewart, 1999).

PREVIOUS RESEARCH

We found only two studies that examined the relation of disciplinary practices to cognitive ability. Smith & Brooks-Gunn (1997) studied 715 low birth weight children. Discipline was measured at 12 and 36 months. The Stanford Binet intelligence test was administered at 36 months. They found that the children who experienced "harsh discipline" had the lowest IQ, even after controlling for birth weight, neonatal health status, ethnic group, mothers age, family structure, mother's education, and family income. One limitation of this study is that the harsh discipline measure included scolding the child, and therefore confounds verbal aggression by the parent with CP. Another limitation is that there was no Time 1 (T1) measure of cognitive ability, which prevented measuring change in cognitive ability subsequent to harsh discipline.

Power and Chapieski (1986) interviewed and observed the interaction of 18 upper middle class mothers with their 12 to 15 month old children. They compared children whose mothers relied on CP with children whose mothers rarely or never used CP. The dependent variable was the child's score on the Bayley infant development scale when the children were tested at an average age of 21 months. The children whose mothers relied on CP had Bayley test scores that were exactly at the average for the U.S. (100), which is consistent with the studies just cited showing that almost all parents hit children this age. The cognitive ability of the small proportion of children whose mothers rarely or never used CP, averaged 20 points

higher than the U.S. average. Two limitations of this study are the small number of cases and lack of differentiating "rarely" using CP from "never." The importance of making that distinction stems from the fact that professionals who defend CP typically restrict their approval to rare use of CP (Friedman, et al., 1996). They could argue that the Power and Chapieski study confirms their belief that CP, when used only as a relative rare backup, is effective and harmless, or even beneficial.

In addition, there are two studies that, at least indirectly, are consistent with the theory that CP interferes with cognitive ability because both found CP to be related to characteristics that are related to cognitive ability. A study of a nationally representative sample of U.S. adults used recall data on CP to examine the relation of CP to educational attainment (Straus & Mathur, In Press). This study found that, even after controlling for the education and occupation of the respondent's parents and other potential confounds, the more CP experienced, the lower the percentage who graduated from college. Another similar study, but using a different national sample with similar controls, found that the more CP, the lower the probability of the respondent being in the top fifth of the occupational and income distribution for the U.S. (Straus & Gimpel, 1994).

A meta-analysis by Paolucci and Violato (2004) analyzed 16 studies which tested the relation of CP to a variety of cognitive measures, such as attitudes toward violence, punishment attitudes, and pro- or anti-spanking attitudes. However, the only studies of cognitive ability were the two cited above (Power and Chapieski and Smith & Brooks-Gunn). Finally, while this article was under review, a study 2573 low-income White, African American, and Mexican American children ages 1, 2, and 3 became available. It found that spanking at all three ages predicted lower Bayley mental development scores at age 3 (Berlin et al. in press).

Overall, the three studies which provide direct evidence on a link between CP and slower development of cognitive ability, plus the two studies which provide indirect evidence, together with our theoretical speculations about the processes that could explain why CP results

in restricted cognitive ability, led to the following hypotheses for both the 2-4 and the 5-9 year old cohorts:

1. When analyzed cross-sectionally using the Time 1 data (1986), the more CP experienced, the lower the average cognitive ability relative to other children of the same age.
2. When analyzed developmentally by retesting the cognitive ability of the children four years after the original testing, use of CP at T1 is associated with an average decrease in cognitive ability at T2, relative to other children of the same age.

METHOD

Sample

The sample was drawn from women who were first interviewed in 1979 as part of the National Longitudinal Survey of Youth (NLSY) conducted by the Ohio State University Center for Human Resource Research. This study included an oversample of low income and minority youth. A complete description of the sample is in Baker, Keck, Mott, and Quinlan (1993) . Weights provided by the NLSY can be used to compute descriptive statistics that are nationally representative estimates. However, the focus of this study is a multivariate analysis of relationships between variables. Consequently, we followed the recommendation in the NLSY Child Handbook that, "...if one is to estimate a regression or similar model, weights probably should not be used..." (Baker, et al., 1993, p. 30).

At the start of the study in 1979, the women were age 14 to 21. Starting in 1986, those who had children were interviewed periodically about child rearing practices and child behavior and their children were tested.

Our research was originally based on data for 806 children who were age 2 to 4 (24 to 46 months) at the time of the 1986 survey and for whom all the relevant data was available. We started by studying children age 2-4 because use of CP is sometimes declared to be acceptable only for young children, for example ages 2 to 6 (see the "Personal Statements" and "Consensus Statements" in Friedman & Schonberg, 1996). In addition, the theory underlying

this study is most applicable to young children because development of neural connections is greatest for infants and toddlers. We also chose children this young because, on average, they would have had fewer non-family experiences that could be related to cognitive ability (e.g., school experiences) than older children. Finally, we wanted to limit the number of children born to very young mothers because it could be confounded with cognitive ability. By choosing children age 2 to 4, the average age of the mothers at the birth of the child was 21 (SD 2.6). However, after presenting a preliminary paper on the 2 to 4 year old children we realized we could replicate the test of the hypotheses with a second age cohort of children who were age 5 to 9 at the T1 year because many parents continue CP into this age range (Straus & Stewart, 1999). The most important reason for including the 5-9 year old children is that the personal and consensus statements which emerged from an interdisciplinary conference sponsored by the American Academy Of Pediatrics (Friedman & Schonberg, 1996), advises against using CP with children older than six. Presumably this is because CP of older children is assumed to have a higher risk of resulting in harm than is CP of pre-school age children. If that is correct, it suggests that the adverse effects of CP on cognitive ability should be greater for the 5 to 9 year old children than for the 2 to 4 year old group.

(Insert Table 1 about here)

The 1,510 children in the study were those with no missing data on any of the variables needed for this study. To assess potential selection biases, we compared these 1,510 cases with the all children in those two age groups in the study using ten variables that might be confounded with CP and cognitive ability. Table 1 identifies significant differences for four of these ten variables. It shows that the cases with complete data included slightly fewer white children, fewer mothers who had *not* completed high school, fewer single-parent families, and children with a higher mean birthweight. In view of the fact that the NLSY oversampled minority and low-income mothers, the smaller representation of cases with these characteristics suggests that, except for race, the study sample is demographically more similar to the general

population of 2 to 9-year-old children than the full NLSY sample. To the extent that this is correct, the findings of this study may be more representative of the national population of 2- to 4 and 5 to 9 year-old children than they would with the original NLSY sample.

Measures

Cognitive ability. For both age groups, cognitive ability was measured at both T1 and four years later at T2 using as many of the following tests as were appropriate for each age child: Body Parts Recognition, Memory for Locations, and Motor and Social Development. At T2, in 1990, cognitive ability measure, was the Peabody Individual Achievement Tests (PIAT) for Math, and Reading Recognition (48-95 months) (see Baker, et al., 1993, for information on these tests).

The cognitive ability measures were age-normed and standardized by (1) identifying subsamples of children in 3-month age bands, (2) transforming the raw scores for each 3-month age group into z scores, and (3) transforming the z-score for children of each 3-month age band into standard scores with a mean of 100 and a standard deviation of 15. This creates scores that are consistent with the conventions for scoring many cognitive ability and intelligence tests. The score for each child was the mean of the standardized scores for the cognitive assessments completed by the child. The resulting scores indicate how far above or below the mean level of cognitive ability each child is relative to other children in this study of approximately the same age. As a result of these procedures, the mean cognitive ability scores were approximately 100 at both T1 in 1986 (100.9 SD=14.4) and T2 in 1990 (101.1, SD=15.0).

Corporal punishment. For purposes of this paper, CP is defined as "An act carried out with the intention of causing a child to experience physical pain, but not injury, for purposes of correction or control" (Straus, 2001a). In contrast to cognitive ability for which there was a single T1 measurement, the T1 measurement of CP was done twice. It was measured for one sample week in 1986 and for one sample week in 1988 using two types of data. Each time there was data from observation by the interviewer on whether the mother spanked or hit the

child during the course of the interview. Each time the interviewer also asked "Did you find it necessary to spank your child in the past week?" Mothers who said they had spanked were asked: "About how many times, if any, have you had to spank your child in the past week?" We used these data to create a CP scale that combined the observed and the interview measures for 1986 and 1988. If the mother was observed using CP, it was counted as one instance of CP in addition to any that the mother reported as having occurred in the past week. Next, we grouped the children into four categories: those who experienced no CP in either of the two weeks, and those who experienced either one, two, or three or more instances.

We measured CP during two one-week assessment periods in order to identify children who experienced as close to no-CP as is possible with this data. The fact that a score of zero identifies children who were not spanked in either of the two sample weeks over a 2 year time span, makes it plausible to consider the zero group as children for whom CP was extremely rare or in some cases, nonexistent. Nevertheless, in the light of the extremely high intervention rates needed to properly supervise toddlers (once every 6 to 10 minutes) (Lee & Bates, 1985; Minton, Kagan, & Levine, 1971; Power & Chapieski, 1986), there were innumerable opportunities for the mothers to use CP as one of the disciplinary tactics and, as another national survey found, 94% of parents use CP with toddlers (Straus & Stewart, 1999). Thus, the CP scale used for this study does not eliminate the possibility that the children in the zero category experienced CP on rare occasions.

The interview questions for this study asked the mothers about "spanking" and did not use the term "corporal punishment." This reflects U.S. usage in which "spank" is used for both the specific act of hitting child on the buttocks and in the more general sense of hitting the child in other places (Giles-Sims, et al., 1995). For the most part, this article uses the term "corporal punishment" but from time to time we also use "spank" and "hit" as synonyms.

Maternal cognitive stimulation and emotional support. The measures of maternal cognitive stimulation and emotional support in the NLSY data set are subscales from the

HOME-SF (Home Observation for Measurement of the Environment -- Short Form) inventory, which includes age appropriate subscales for children of different ages (Caldwell & Bradley, 1984). A review by Baker et al (1993) of the extensive methodological analyses of these scales as applied to the NLSY (including confirmatory factor analyses, item analyses, and repeated measurements analyses), indicates that the cognitive stimulation and emotional support scales are internally consistent, temporally stable, and predictive of a variety of child outcomes, including cognitive ability.

The cognitive stimulation subscales included 9 items for children age 0-2 years and 15 items for children 3-5. Examples of cognitive stimulation items are: whether the mother read to the child, whether the mother helped the child learn colors, numbers, shapes or the alphabet; and how many books the child had of his or her own. The emotional support subscales included 9 items for children 0-2 year and 12 items for children 3-5. Examples of emotional support items are: how often the child had dinner with both parents, whether the mother caressed or kissed the child, and whether the mother's voice showed positive feeling toward the child. The cognitive stimulation and emotional support items were scored by the NLSY as dichotomous indicators (0=absent, 1=present). Raw scores were computed by summing the items.

We modified these scales in two ways. First, the emotional support scale provided by the NLSY included the CP variables. We therefore recomputed the emotional support raw score without the CP items. Second, the raw scores for each age group were standardized as ZP scores (a ZP score is a version of a Z score with a mean of 50, a standard deviation of 20, and a range of zero to 100 (see Straus, 1980).

Mother's education. The highest school grade completed by the mother was included in the analysis as a proxy for family socioeconomic status and because it is known to be related to child's cognitive ability (Neisser, et al., 1996). We originally considered creating a composite scale to measure SES that would include mother's occupation and net family income. We decided against this because mother's occupation was so strongly associated with mother's

education that it appeared to be a redundant measure, and because net family income was not associated with either mother's education or occupation, perhaps as a result of over sampling families of low income and non-white ethnicity.

Other control variables. The NLSY data permitted analysis of other child, mother, and family characteristics that could be associated with both CP and cognitive ability and therefore needed to be controlled. These are child's birthweight, child's age, child's ethnicity, child's gender, number of children of the mother in the home, mother's age at child's birth, and father living with the mother at T1. Descriptive statistics for these variables are given in Table 1.

Data Analysis Strategy

Preliminary explorations and analyses. We examined the frequency distributions of the cognitive ability measures for deviation from normality and outliers. Both the T1 (1986) and T2 (1990) distributions were approximately normal, but there were a few outliers (defined as cases more than three standard deviations above or below the mean and discontinuous). These cases were recoded to values just beyond the closest non-outliers case.

Bivariate analyses. We computed zero-order correlations between CP, cognitive ability, and all of the other study variables to assess the construct validity of some of the measures and to identify high correlations that might cause a multicollinearity problem in the multiple regression analyses.

Multiple regression. The hypothesized adverse effect of CP on subsequent cognitive ability was tested using OLS regression. The first model examined the relation of CP and cognitive ability at T1 to cognitive ability at T2. The following ten child and family and child characteristics were included in the model because they might be confounded with CP and cognitive ability: child's birthweight, gender, age, and ethnic group (2 variables: African American versus other, Hispanic American versus other); mother's age at birth of child and education, cognitive stimulation and emotional support by the mother, and number of children at home, and whether the father was living with the mother at T1.

Tests for interactions. An important issue in research on the effects of CP is the role of contextual factors such as the extent to which parents provide emotional support and cognitive stimulation; and the socioeconomic characteristics of the family such as educational level, ethnic group. There is evidence, for example, suggesting that in the context of African American culture and life circumstances, CP may not have an adverse effect (Deater-Deckard & Dodge, 1997; Gunnoe & Mariner, 1997). We therefore estimated a third model which included variables for the interaction with CP of maternal cognitive stimulation, emotional support, and education, and African American versus other ethnic groups. However, because of multicollinearity (as evidenced by a fourfold increase in the standard error for CP), none of these interactions were significant. To avoid multicollinearity, we estimated a series of regression models, one for each of the interactions of CP with each of the independent variables. Each of these models included a term for the interaction of CP with one of the other independent variables, and also the 13 independent variables included in the original full model.

CP by age ANCOVA. We also computed an analysis of covariance. One of the purposes was to examine the adjusted mean change in cognitive ability of children in each of the four CP categories, starting with those who experienced none in the two sample weeks. Another purpose was as a check on the robustness of the regression analysis. This was important because the independent variable was a four category ordinal measure of CP, not a continuous variable as assumed by OLS. Finally, the ANCOVA facilitated examining interaction effects because the output plotted the mean scores for each value of the moderator variables. One of the most important interactions tested was for the age of the child. The importance stems from the belief that CP is acceptable for younger children, or at least not harmful for young children (Friedman & Schonberg, 1996; Gunnoe & Mariner, 1997). To do this, we used a 4 by 2 design which crossed the four CP categories variable by the two age groups. The analysis included the same covariates as were used for the multiple regression analysis.

RESULTS

(Insert Table 2 about here)

Prevalence and Chronicity of Corporal punishment

Table 2 shows the high prevalence of CP in this sample at T1. The first row shows that only 6.6% of the 2-4 year old children were not hit at all in either of the two sample weeks; thus 93% were hit at least once in those two weeks. This is almost identical to the 94% of parents who reported hitting children in this age group in a 1995 national survey of U.S. children (Straus & Stewart, 1999). The percent of 5-9 year old children who were not hit is much greater, but more than half (58.2%) were spanked in that period. The last row of Table 2 shows that, almost half of the 2-4 year old children were hit three or more times in those two weeks. As for the chronicity of spanking, mothers of children age 2-4 years who had spanked in the past week, did so an average of 3.6 times that week. A third of the mothers spanked 4 or more times, and 12.8% spanked 7 or more times that week. The mothers of children age 5-9 who had spanked in the past week reported doing so an average of 2.5 times that week. Moreover, we believe that, because CP is such a taken-for-granted event, parents do not realize how often they do it and these numbers are almost certainly lower bound estimates. One indication of the taken-for-granted nature of spanking children is that, among the children who were 26 months old at the T1, 18% of the mothers hit the child during the course of the interview.

Correlations Between Study Variables

(Insert Table 3 about here)

Table 3 gives the correlation of all the variables in this study with each other. The correlations in the lower left half of Table 3 are for the children age 2-4, and those in the upper right are for the 5-9 year old children. Many important relationships can be examined, but this discussion focuses on two issues of most interest in the context of this study.

CP and cognitive ability. The correlations of most interest are for the hypothesized negative correlation between CP and cognitive ability. The Rows 2 and 3 of column 1 in Table 3 show the hypothesized significant negative correlations at both T1 and T2. The correlations for

the 5-9 year old children in 2nd and 3rd columns of row 1 also are also negative and significant, but substantially higher. For both age groups, the lower correlation of CP with T1 cognitive ability probably occurs because of the low reliability of cognitive assessments at the younger ages (Neisser, et al., 1996).

Emotional support, cognitive stimulation, and cognitive ability. The correlations in rows 4 and 5 with columns 2 and 3 in Table 3 show that emotional support and cognitive ability by the mothers at T1 are correlated with more cognitive ability of the children in both age groups. Because these are well established relationships, the correlations just mentioned show that, despite the presumed low reliability of early cognitive assessment, cognitive ability as measured in this study is associated with other variables in a theoretically and empirically expected pattern. These correlations can therefore be taken as evidence of construct validity of the measures used.

Corporal Punishment And Development of Cognitive Ability

Low cognitive ability (i.e., a “slow” child) could lead parents to use more CP because of frustration in dealing with such children or out of disappointment and resentment. If so, the correlations showing that the CP is associated with lower cognitive ability leave unanswered the question of which is cause and which is effect. We believe there is a bi-directional relationship. On the one hand, parents could be more likely to hit cognitively “slow” children than children with average or higher ability. On the other hand, as pointed out earlier, children experience CP as highly stressful and stress is known to interfere with cognitive functioning and to result in changes in brain functioning (Anda, et al., 2006; Perry, 2006; Tomoda, et al., 2008).

Regardless of the mediating process, we hypothesized that CP slows the rate of further cognitive development, with the result that four years down the road, the children who were hit by their parents may fall behind the average even more. To test this, it is necessary to have data which show that CP is associated with *change* in cognitive ability, and specifically, the more CP experienced, the slower the rate of cognitive ability. Multiple regression was used to

provide the data to test the change hypothesis because controlling for the T1 level of cognitive ability means that the predicted T2 score (the dependent variable) is the difference between the T1 and T2 scores.

(Insert Figure 1 and Table 4 about here)

The results of testing this hypothesis are presented in Table 4 and Figure 1. The regression coefficients in the first row of Table 4 show that each increase of one unit in the four category CP scale is associated with a decrease cognitive ability relative to other children of 1.3 points for children age 2-4 and a decrease of 1.1 points for children age 5-9. These are statistically significant but not large decreases in cognitive ability. This does *not* mean that spanked children became less cognitively adequate. Rather it reflects the fact that that their cognitive ability was measured relative to the performance of other children of the same age. A cognitive ability score of 100 indicates a score at the mean for children of the same age. To maintain a score of 100 over a four year period, a child's cognitive ability must increase during those years at the average pattern. Thus, the decreases associated with CP do not indicate an absolute reduction in cognitive ability, only that CP is associated with failing to keep up with the average development of cognitive ability.

Figure 1, which is based on the analysis of covariance confirms the regression results and provides adjusted mean change in cognitive ability for each of the four categories of CP. It shows that the children whose parents did *not* use CP in the two sample weeks (the "None" group at the left side of the Figure) *gained* in cognitive ability compared to children whose parents used CP. The 2-4 year old children who were not hit in either week gained an average of five and half points, and the 5-9 year old children gained an average of almost two points.

At the other extreme of the CP categories, the 2-4 year old children who were hit three or more times in the two sample weeks neither gained nor lost relative to the norm for children their age. This is consistent with the fact that they are the typical child in this age group (see Table 2 which shows that 48% of the sample were hit three or more times). Thus, 2-4 year old

children who experienced three or more instances of CP were, in effect, the statistical norm for their age, and their cognitive ability also followed the statistical norm, i.e., they stayed at the U.S. average cognitive ability score of 100.

For children age 5-9, the statistical norm for CP was quite different. Instead of most children that age being hit three or more times in those two weeks, as was true of the younger children, “only” 15 percent of the 5-9 year old children were hit three or more times in those two weeks. Still, the majority of children in the 5-9 year age group (58%) were hit at least once in those two weeks. The relation of CP to cognitive ability was similar to the results for the 2-4 year old children: The cognitive ability of the children whose parents did not use CP in either of the two sample weeks was greater than the children who were hit even once in those two weeks. They gained an average of almost two points. On the other hand the 5-9 year old children who were hit once neither fell behind nor gained compared to other children, i.e., their score stayed at about 100. The 5-9 year old children who were hit two or more times in those two weeks fell slightly behind the average child in cognitive ability in the four years following the initial testing.

Child and family characteristics linked to change in cognitive ability. This section describes the other statistically significant relationships in Table 4. The second row of Table 4 shows, as expected, that higher cognitive ability at T1 was related to a more than average increases in child cognitive ability during the years from T1 to T2.

Row 3 of Table 4 shows that, for children of both age groups, maternal cognitive stimulation at T1 is associated with an increase relative to other children in cognitive ability, i.e. more than the average increase that occurs as children mature. The fourth row shows that, contrary to our expectation, and contrary to the bivariate correlation analysis, when all the other variables in the model were controlled, material emotional support was not related to change in cognitive ability.

Row 8 of Table 4 shows that “children of African American mothers” fell behind children

of other race/ethnic groups between T1 and T2, but this was statistically significant only for children who were 5-9 at T1.

Row 10 shows more children in the home is associated with falling behind the development of cognitive ability of other children, and that this applies to both age cohorts studied.

Row 11 shows that for the 2-4 year age group, each additional year in the age of the mother was associated with the child gaining 0.75 cognitive ability points more than the average of other children in the study. For children who were age 5-9 at T1, there was no effect for mother's age.

Rows 12 and 13 show no significant relationship of two variables we expected to be related to cognitive ability, and which are significant at the bivariate level: mother's education and presence of a father in the household. This suggests that the effect of those two variables might be mediated by the other variables in the model, such as cognitive stimulation.

In addition to what the coefficients in Table 4 tell us about cognitive ability, these results are also important from a methodological standpoint because, since they are consistent with much other research on the development of cognitive ability, they provide support for the construct validity of the measure of cognitive stimulation and cognitive ability.

Relative effect of CP compared to other maternal behaviors. The standardized coefficients in the Beta column of Table 4 allow comparing the relative effect of CP and the other two maternal behaviors (cognitive stimulation and emotional support). For children of both age groups, mother's emotional support at T1 is not significantly related to cognitive ability at T2. For children age 2-4, cognitive stimulation has the largest effect on T2 cognitive ability, followed by CP. For children aged 5-9, CP has the largest relation to cognitive ability at T2, but it is only slightly greater than the effect size for cognitive stimulation. Thus, after controlling for other maternal behaviors and the demographic characteristics in Table 4, CP is independently related to a decrease in cognitive ability relative to other children, and in the case of children

age 5-9, CP has the largest effect size.

Does the harmful effect of CP depend on the social context? As noted earlier, there are theoretical and empirical grounds for expecting that the effect of CP depends on the presence or absence of other variables; or as it is sometimes put, the effects of CP may be "context specific." We have already seen that the age of the child makes a difference. CP has a stronger relation to cognitive ability of toddlers than of school age children. We examined each of the other child and family characteristics to see if they reduced or exacerbated the relation of CP to cognitive ability. No significant interactions were found. Thus, none of these characteristics moderated the tendency for CP to be associated with slower cognitive ability. This does not mean that they made no difference. For example, children whose mothers were at the 80th percentile in providing cognitive stimulation had significantly higher cognitive ability, and children of African American mothers had considerably lower cognitive ability scores.

Is "just once" harmless? Defenders of CP believe that CP is harmless if done only rarely. They do not indicate how often "rarely" is, so their belief cannot be tested exactly. For this study, the best approximation to "only rarely" was CP only once in the two sample weeks because only 10.5% were spanked this rarely. We compared the 6.6% of the children who were not hit at all during the two sample weeks with the 10.5% who were hit only once, and also with those hit twice, and three or more times. The cognitive ability of children of mothers who hit them even once in these two weeks was slower than the development of the children whose mothers did not hit them at all, but the difference was just short of being statistically significant (contrast estimate -2.48 , $p .062$). Separate tests for the two age groups found similar results for 5-9 year old children (contrast estimate -2.135 , $p .057$), but a p of $.267$ for the 2-4 year old children. The lack of significance among the 2-4 year old children despite the large difference between the None and the Once group probably reflects the small n in the None category -- only 57 of the 806 children that age experienced no CP in those two T1 weeks. We also tested the difference between Once and Twice and found a significant decrease for both age groups (-

3.154, $p = .03$ for age 2-4; -2.270 , $p = .02$ for age 5-9).

DISCUSSION

This study investigated the extent to which mothers used corporal punishment (CP) on a national sample of 806 children age 2 to 4 and 704 children age 5 to 9 and tested the hypothesis that CP experienced by these children is associated with slower development of cognitive ability over a 4 year period.

Corporal Punishment

Prevalence of corporal punishment. Ninety three percent of the mothers of children age 2-4 and 58% of mothers of children the 5-9 group used CP in the two week referent period. These prevalence rates are consistent with the other studies cited in the introduction to this paper.

Chronicity of corporal punishment. Among those who used CP, it occurred an average of 3.6 times per week. This figure is consistent with the mean of 2.5 per week for toddlers found by Holden, Coleman, & Schmidt (1995), provided one takes into account that Holden *et al.* studied college educated mothers who tend to use less CP than mothers with less education (Day, Peterson, & McCracken, 1998). If the mean of 3.6 per week is extrapolated to a year, it results in an estimated 187 instances per year. This is at least 10 times higher than the mean number of times based on studies that used a one year recall period (Straus & Mouradian, 1998; Straus & Stewart, 1999). We suggest that the much lower chronicity of CP in studies that use a past-year recall period occurs because, for many parents, CP is such an everyday and taken-for-granted occurrence that parents do not realize how often they have done it. This interpretation is consistent with findings from a pioneer study by Goodenough (1931/1975) which found that when mothers used a diary to record their disciplinary tactics, the chronicity of CP was six times greater than when the figure was based on recall during an interview.

Do the mothers in this study represent an abnormal extreme of CP? We described how much CP was used by the mothers in this sample and cited other studies which found similarly

high level of CP because we believe that the public and most service providers and social scientists do not realize the high prevalence and chronicity of CP in the lives of U.S. children. This may be part of the reason content analyses of child development text books found in the 1980's, 1990's and 2000's found that, on average, the books devoted less than a page to this important aspect of the socialization of U.S. children (Straus & Stewart, 1999). We suggest that misperception of the extent of CP is an example of "selective inattention" (Dexter, 1958) by members of a society in which CP is the statistical and cultural norm (Straus & Mathur, 1996). Selective inattention may be one of the mechanisms which enables our society to continue to support CP because it avoids the necessity of facing up to the fact that almost all children are hit, and many are hit frequently. Without the information on prevalence and chronicity, the results on the effects of CP in the two one-week periods could be dismissed as applicable only to an atypical high spanking parents. Indeed this was precisely the reaction to a previous study of NLSY children (Ambati, Ambati, & Rao, 1998).

Variation in corporal punishment. Despite the extremely high prevalence and chronicity of CP, there is still great variation in the amount of CP experienced by U.S. children. In this sample, the 93% prevalence rate for children age 2-4 at T1 means that during the two week referent period, 17% of parents did not hit their child; and among those who did hit that week, a fifth did it once. At the other end of the distribution, 12.8% of the mothers of 2-4 year old children spanked 7 or more times that week, which one can think of as children who experienced CP every day.

Although almost all U.S. children experience at least some CP, the differences in how often mothers use CP provided sufficient variance in CP to test the hypothesis that the more CP experienced by a child, the slower the development of cognitive ability. The results from multiple regression and analysis of covariance were consistent with the hypothesis. We found that 2-4 year old children who experienced no CP in either of the two sample weeks gained a mean of 5.5 cognitive ability points (on a scale with a mean of 100 and a SD of 15) relative to

children whose mothers used CP. Similarly, children in the 5-9 year age group whose mothers did not use CP in either week gained a mean of about two points relative to children whose mothers used CP. Conversely, for both age groups, CP was associated with a decrease from T1 to T2 in cognitive ability test score. These results are consistent with the two previous studies of the relation of CP to cognitive ability (Power & Chapieski, 1986; Smith & Brooks-Gunn, 1997), and with the results of studies which examined the relationship of CP to educational and occupational achievement (Straus & Gimpel, 1994; Straus & Mathur, In Press).

The analysis controlled for ten other variables, including mother's education, cognitive stimulation, and emotional support, and several demographic variables. The significant net effect of CP is remarkable in view of the fact that so many variables were controlled. In addition, the results of our analysis are probably minimum estimates because of the relatively low reliability of cognitive testing of children as young as those in this sample at T1.

Contextual effects. The question of whether there are circumstances or contexts that make the use of CP appropriate has been the subject of much debate. Given the debate and theoretical importance of contextual effects, we tested the interaction of CP with ten variables that can be considered contextual effects, such as the mother's supportiveness, cognitive stimulation, and education, and African American ethnic group. The lack of a significant interaction of CP with maternal supportiveness, cognitive stimulation, or race/ethnic indicates that the relation of CP to slower development of cognitive ability may apply even when done by loving and attentive parents, and even when it occurs among a sector of the population with cultural norms that approve CP. Nevertheless, there are other aspects of parent-child relationships and mode of discipline that were not part of this study and which need to be considered in future research. For example, none of the conditions that Baumrind believes are needed for CP to be appropriate were tested, i.e. that, CP must be "controlled and contingent on the child's behavior; the child is forewarned; the parent uses more positive than negative incentives; spanking is carried out in conjunction with reasoning, with the intention to correct,

not retaliate, and does not escalate to abuse" (Baumrind, 1996: 857).

Limitations

Although we studied a large and nationally representative sample of children, and controlled for many potential confounds, and examined many contextual effects, there are important limitations to keep in mind.

The data are more than 20 years old and many changes in parenting practices have probably taken place during this period, including a decrease in approval of and use of CP with school age and older children. However, as noted in the introduction, there has been virtually no change in use of CP with 2 to 4 year old children. In addition, the issue of this study is not the prevalence of CP, but the effect of CP on children. Even if CP had declined, the effect of CP for those children who experienced is likely to be the same.

CP is confounded with more severe and non-normative assaults on children called "physical abuse" because parents who slap and spank may also engage in severe assaults. Although the adverse effect of CP on cognitive ability might be driven by that confound, a previous study found that only a tiny proportion of U.S. parents who use CP on toddlers engaged in severe assaults (Straus & Stewart, 1999), making this possibility less likely. Moreover, in previous research, where data was available to screen out abusing parents, the adverse effects of CP remained after those cases had been removed (MacMillan, et al., 1999; Straus, 2001a, Chapter 8).

When considering the implications of the findings for parents and for social policy, the relatively small effect size needs to be kept in mind. A small effect size for one variable is consistent with a multiple cause theoretical perspective which assumes that CP is only one of many variables affecting cognitive ability. Nevertheless, if future studies confirm these findings, it means an average gain of about five points. At the individual level, a five point gain in a 100 point cognitive ability test is not a major difference. However, it is a well established principle in epidemiology that reducing a widely prevalent risk factor with small effect size, e.g., spanking,

can have a much greater impact on public health than reducing a risk factor with a large effect size, but low prevalence, such as physical abuse (Rose, 1985; Rosenthal, 1984, p.131).

Therefore, for the nation as whole, an average gain of this size can be extremely important.

There are also important limitations to the CP scale. One problem is that the mother and the observer were asked about instances of "spanking." Consequently the measure includes anything the observer or the mother might mean by spanking. Another problem is that the children who were not spanked in either of the two sample weeks group could have been spanked in the other 50 weeks of the year. Consequently the claim that CP, when used only rarely and as a back-up for other disciplinary strategies, is an acceptable disciplinary technique (Friedman & Schonberg, 1996) might apply to children who experienced no CP in either of the two sample weeks. However, Straus and Mouradian (1998) were able to identify a never-spanked group. They found that this group, rather than being "kids running wild," had the lowest antisocial behavior score.

Part of the theoretical basis for expecting "never-spanked" children to have the highest cognitive ability is the assumption that parents who use little or no CP are more likely to use reasoning and explanation to secure compliance. The negative correlation between CP and cognitive stimulation in Table 3 is consistent with this theory, but a direct test using measures of reasoning and explanation is needed.

The measurement of parent behavior also has limitations. No data on the behavior of the fathers is available for these children. The measure of the mother's emotional support is minimal, which is an important limitation because of the theory that CP is not harmful if done in the context of loving and supportive parenting. Perhaps, use of an instrument such as the Dimensions of Discipline Inventory (Straus & Fauchier, 2007) which enables a more comprehensive assessment of discipline, including five non-punitive methods and the ratio of punitive to positive methods of discipline, would show that CP itself has no negative effects.

Implications For National Level Of Cognitive Ability

A review of data on cognitive ability found an increase in scores on many different intelligence tests in a number of countries (Flynn, 1999; Neisser, 1997). The evidence compiled by Flynn and Neisser leaves little doubt that intelligence test scores have been increasing, and that the increase is not an artifact of the tests used. What is in doubt is why this has occurred. There are a number of plausible contributing factors. For example, there is abundant evidence that children of educated parents obtain higher scores on intelligence tests (Neisser, et al., 1996). Since the level of education of parents has been increasing world-wide, this is likely to be an important part of the explanation. Another strong possibility is that nutrition levels have been improving because better nutrition is associated with greater cognitive ability (Rizzo, Metzger, Dooley, & Cho, 1997).

Reductions in use of CP and their replacement by cognitive forms of correction might also explain part of the world-wide increase in IQ. When parents lessen use of CP, we suggest that they tend to use more cognitive methods of correction and that they tend to also shift from the idea that children should be seen and not heard to encouraging independent exploration, and emphasizing reasoning and explanation, rather than the fear of being spanked, as the reason the child should engage in socially appropriate behavior. If this theory is correct, and if, as we believe to be the case, there has been a world-wide decrease in spanking and other forms of CP, that decrease could have contributed to the world-wide increase in scores on cognitive ability tests.

The 1979 Swedish no-spanking law (Durrant, 1999) has no criminal penalties. The law was intended to state a national standard of child care, to inform both parents and children that CP is not permitted, and to provide help, not punishment of parents who use CP. It is an example of non-punitive methods a nation can use to reduce CP. The European Union and the United Nations committee charged with implementing the charter of children's rights has called on all member nations to prohibit CP. To date, 24 countries have banned CP but the efforts to inform parents and implement the policy vary widely.

We plan to use a recently developed World Corporal Punishment Index (Straus & Medeiros, 2007) and other data to test the hypothesis that, after controlling for other variables which could affect cognitive ability (such as parent's educational level and level of economic development), nations with legal restrictions on use of CP and nations in which survey research shows low approval and low use of CP are also nations with higher average cognitive ability scores.

Policy implications

Although parents of older children in the U.S. now use CP much less frequently and for fewer years, almost all U.S. parents continue to spank and slap toddlers (Straus, 2005; Straus & Stewart, 1999). There is a cruel irony to this because both the theoretical basis and the findings of this study suggest that it is precisely at early stages of development that avoiding and using cognitive modes of correction may be most beneficial for cognitive ability. Moreover, it is even more ironic that most defenders of spanking have reformulated their position to oppose CP of older children and accept spanking of toddlers (see the papers in Friedman & Schonberg, 1996) because that is precisely the age group this study suggests is most vulnerable to adverse cognitive effects. If our findings are confirmed by other studies, media and educational programs explicitly focused on not hitting toddlers and making clear the benefits of avoiding CP could help bring about a reduction in CP and a national enhancement of cognitive ability. Moreover, the potential benefits are not limited to enhanced cognitive ability. Results from four other recent longitudinal studies (summarized in Straus, 2001b) and from older cross-sectional studies summarized in a meta analysis of 88 studies (Gershoff, 2002) suggest that the benefits of reduced CP are likely to include reductions in juvenile delinquency, adult violence, masochistic sex, and a greater probability of completing higher education, earning a higher income, and experiencing lower rates of depression and alcohol abuse.

Figure 1, The More Spanking, The Lower The Child's Cognitive Ability Score Four Years Later.

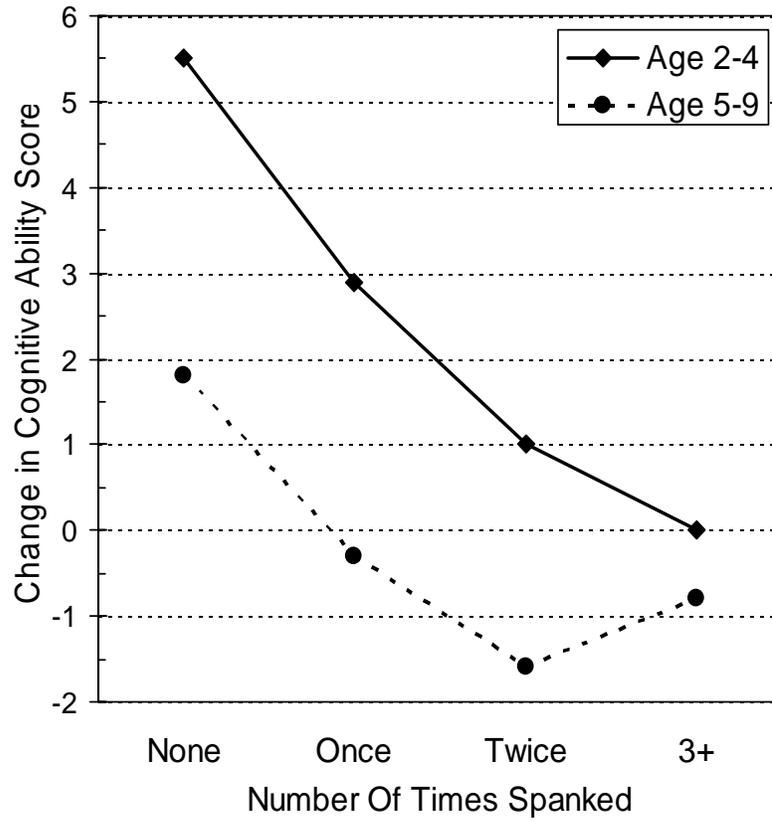


Table 1. Sample Characteristics

Variable	Study Sample	All NLSY
	2-9 Year Olds (N=1510)	2-9 Year Olds (N=3481)
Child's birthweight: Mean ounces (SD)	115.7 (20.0)	114.6 (20.9) *
Child's age: Mean years (SD)	4.6 (2.0)	4.7 (2.1)
Female children	49.5%	49.6%
Euro-American children	44.6%	47.6% **
African-American children	36.9%	32.7%
Hispanic children	18.5%	19.7%
Number of children in home	2.3 (1.1)	2.2 (1.1)
Mother's age at birth of child: Mean (SD)	20.2 (2.5)	20.1 (2.5)
Mother's education:		
<high school	33.5%	41.9% **
high school	47.9%	42.0%
> high school	18.6%	16.0%
Father living with mother	58.2%	53.8% **

* p < .05, ** p < .01 based on t test for means and chi-square for cross tabulations

Table 2. Corporal Punishment Descriptive Statistics

Corporal Punishment Category	2-4 Year Olds (n=806)	5-9 Year Olds (n=704)
No CP in either week	6.6%	41.8%
Once	10.5%	19.2%
Twice	35.2%	23.9%
Three or more times	47.6%	15.2%

Table 3. Zero-Order Correlations Among Study Variables, by Age Group (2-4 Year Olds Below Diagonal, 5-9 Year Olds Above Diagonal)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Corporal Punishment scale	---	-.16**	-.21**	-.02	-.22**	-.04	-.21**	-.07*	-.10*	.11**	-.01	.14**	.008	-.01	-.05
2. Child's cognitive ability (Time1)	-.10**	---	.68**	.21**	.23**	.12**	-.003	.02	.22**	-.13**	-.12**	-.19**	.15**	.28**	.11**
3. Child's cognitive ability (Time2)	-.12**	.35**	---	.24**	.22**	.13**	-.01	.0002	.23**	-.18**	-.06	-.24**	.14**	.24**	.09*
4. Maternal cognitive stimulation	-.08*	.31**	.28**	---	.18**	.06	-.29**	-.009	.21**	-.17**	-.05	-.21**	.25**	.32**	.12**
5. Maternal emotional support	-.15**	.23**	.22**	.35**	---	.12**	.05	-.05	.27**	-.26**	-.02	-.15**	.18**	.19**	.28**
6. Child's birthweight	-.05	.06	.09**	-.003	.07	---	-.08*	-.15**	.28**	-.27**	-.01	-.04	.15**	.08*	.17**
7. Child's age	-.39**	-.005	-.007	.14**	.09*	.01	---	-.03	-.11**	.10**	.005	.13**	-.37**	-.14**	-.16**
8. Gender (0=male, 1=female)	-.03	.11**	.06	.03	.02	-.11*	.02	---	.001	-.01	.01	.03	-.06	-.06	-.01
9. Euro-American (0=no, 1=yes)	-.05	.29**	.23**	.23**	.19**	.12**	-.08*	-.01	---	-.70**	-.38**	-.11**	.20**	.12**	.26**
10. Afr. American (0=no, 1=yes)	.05	-.17**	-.15**	-.18**	-.23**	-.11**	.002	.006	-.67**	---	-.39**	.08*	-.18**	.04	-.35**
11. Hispanic (0=no, 1=yes)	.005	-.17**	-.11**	-.08*	.04	-.02	.10*	.007	-.47**	-.34**	---	.04	-.03	-.21**	.13**
12. Number of children in home	.005	-.15**	-.21**	-.15**	-.13**	.003	.08*	.009	-.07*	.05	.04	---	-.04	-.24**	.04
13. Mother's age at birth of child	.05	.03	.14**	.004	.06	.12**	-.27**	-.03	.18**	-.13**	-.06	.11**	---	.31**	.27**
14. Mother's education	-.02	.18**	.12**	.08*	.08*	-.02	.005	-.01	-.002	.01	-.01	-.17**	.11**	---	.10**
15. Father presence (0=no, 1=yes)	.04	.11**	.13**	.08*	.22**	.09*	-.13**	.001	.29**	-.38**	.06	.07*	.25**	.002	---

* = p < .05, ** = p < .01

Table 4. Multiple Regression to Assess the Relation of Corporal Punishment at Time 1 to Child Cognitive Ability at Time 2,
by Age Group

Independent Variables	<u>2-4 Year Olds (n=806)</u>			<u>5-9 Year Olds (n=704)</u>		
	B (SE)	beta	T	B (SE)	beta	T
1. Corporal Punishment Scale	-1.30 (.59)	-.08	-2.2*	-1.10 (.38)	-.09	-2.9**
2. Child's cognitive ability (T1)	.23 (.04)	.22	6.1***	.63 (.03)	.62	20.9***
3. Maternal cognitive stimulation	.11 (.03)	.15	4.1***	.06 (.02)	.08	2.5*
4. Maternal emotional support	.03 (.03)	.05	1.4	.01 (.02)	.01	0.25
5. Child's birthweight	.04 (.03)	.06	1.7	.02 (.02)	.03	0.88
6. Child's age	-.09 (.68)	-.01	-0.1	.09 (.23)	.01	0.41
7. Gender (0=male, 1=female)	1.28 (.96)	.04	1.3	-.37 (.81)	-.01	-0.45
8. African American (0=no, 1=yes)	-1.60 (1.2)	-.05	-1.3	-2.10 (1.00)	-.07	-2.1*
9. Hispanic (0=no, 1=yes)	-2.40 (1.3)	-.06	-1.8	-.05 (1.2)	.00	-0.1
10. Number of children in home	-2.30 (.50)	-.16	-4.8***	1.00 (.38)	-.08	-2.7**
11. Mother's age at birth of child	.75 (.23)	.11	3.3**	.09 (.23)	.01	0.41
12. Mother's education	.11 (.14)	.03	0.8	.18 (.26)	.02	0.69
13. Father presence (0=no, 1=yes)	1.70 (1.1)	.05	1.5	-.52 (.90)	-.02	-0.58
R ²		.22		.50		

* = $p < .05$, ** = $p < .01$, *** = $p < .001$

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