

Numerous reports in the popular media speculated on plausible causes for such extreme youth violence—guns were too available; parents were not involved; boys are socialized to repress emotion; violence permeates the culture; and children are desensitized to the effects of violence by television, movies, and videogames. Causal factors have been suspected across all of the nested systems that Bronfenbrenner [1979] described as composing the ecology of child development and all aspects of what Super and Harkness [1986] have termed the developmental niche. However, there have been relatively few empirical investigations of the cultural contributions to youth violence.

In one such study, Lynch and Cicchetti [1998] examined neighborhood influences in the development and functioning of 7- to 12-year-olds. They found that children displayed more externalizing problems when they had a history of abuse and also lived in neighborhoods characterized by high levels of violence. In other words, aspects of children's direct experience (abuse) and the larger environment in which it occurred (violence in the neighborhood, *not* necessarily involving the child or family directly) interacted to predict levels of externalizing or "acting out" behavior.

Regionally based differences in the cultural sanctioning of violence are evident within the United States. Cohen and colleagues, for example, found Southerners to be more accepting of interpersonal violence in certain circumstances. Compared with students from the North, college students from southern states were more likely to respond with physiologic arousal (increased cortisol and testosterone levels) and aggression to insults and perceived threats to their honor [Cohen et al., 1996]. Southern white males, in particular, tended to endorse the use of violence for protection, defense, and the socialization of children [Cohen and Nisbett, 1994].

Of particular relevance to the current study is the socialization of children by violent means through corporal punishment, i.e., the intentional infliction of physical pain in the service of discipline. Endorsement of this practice outside the home by individuals serving in *loco parentis* varies regionally.

Physical punishment has been an integral part of American education since its earliest days [Hyman and Wise, 1979]. As recently as 1976, only Massachusetts and New Jersey prohibited school officials from using corporal punishment to discipline students. Currently, school corporal punishment is banned in 27 states and permitted in 23. The practice is widely allowed by state statute or local district policy in 13 states (AL, AR, CO, ID, IN, KE, LA, MS, MO, NM, SC, TN, TX). Although it is permitted in 10 states, the majority of students attend school in districts that have adopted a ban on corporal punishment (AZ, DE, FL, GA, KS, NC, OH, OK, PA, WY) [National Coalition to Abolish Corporal Punishment in the Schools (NCACPS), 1997]. Southern states are overrepresented among permitting states (62% compared with 32% of total), and northeast states among the prohibiting (30% compared with 18% of total).

Several sources of evidence suggest that this policy may be linked to violence at school and beyond. Hyman [1995] has argued persuasively that the infliction of corporal punishment on children in schools is part of a larger web of punitiveness and authoritarian beliefs in American society. Not only does this cultural dependency on punitive measures for societal control mitigate against efforts to ban corporal punishment from the schools nationally, it may also amplify negative consequences for children who are so punished. Strauss [1994] described this phenomenon as a "cultural spillover," arguing that the spillover of violence from one cultural domain to others accounted for observations that statewide homicide rates and assault rates by children in schools varied with the level of school corporal punishment allowed by the state.

Additional empirical evidence has linked corporal punishment to child abuse and extreme punishment. Maltreatment rates in countries such as Sweden, where corporal punishment of

children in any setting is legally banned, as well as in countries such as Finland, China, and Japan, where the practice is rare, are significantly lower than in the United States [Belsky, 1980; Strauss, 1994; Zigler and Hall, 1989]. Within the United States, higher rates of child abuse fatalities occur in states that permit corporal punishment in the schools [Arcus and Ryan, 1999]. Finally, Streib [cited in Hyman, 1995] found that states reporting the 10 highest rates of school paddlings were also those with the greatest number of youths awaiting capital punishment in the state judicial system.

Although the correlational nature of these data limits causal inference, critics of school corporal punishment have argued that it encourages aggression by (1) promoting the merits of applying violent responses to children's behavior, (2) framing violence as an acceptable phenomenon, and (3) modeling its use by authority figures [e.g., American Academy of Child and Adolescent Psychiatry, 1997; Hyman and Perone, 1998; Society for Adolescent Medicine, 1992].

The chief rebuttal criticism hinges on the complexity of the issue and numerous confounding factors. Three major correlates of the endorsement and use of corporal punishment—poverty, religious views, and geographic region—are also interwoven with each other and with aggression and violence. The southern region of the United States, overrepresented among states permitting school corporal punishment and often referred to as the “Bible belt,” has historically been associated with low per capita income and a high prevalence of fundamentalist religious denominations.

The chronic stresses of impoverishment may exacerbate aggressive tendencies in individuals living under such conditions. Poverty in families has been associated with authoritarian parenting and the physical and emotional neglect of children [Tonge et al., 1975]. Additionally, families in poverty in which there are also several young children, male children, and drug or alcohol problems are among those with the highest rates of physical child abuse [Wolfner and Gelles, 1993].

Poverty is also related to religious affiliation. Fundamentalist or conservative Christian denominations are overrepresented among the poor [McDowell and Friedman, 1979], and these religious traditions promote punitive childrearing strategies that endorse the use of corporal punishment [Ellison et al., 1996; Grasmick and McGill, 1994; Greven, 1991; Kilbourne, 1999]. Prevailing fundamentalist childrearing philosophies may also influence public school education, and they have been used as a basis for opposition to reform initiatives stemming from constructivist (e.g., Piagetian) learning models [Berliner, 1997].

Hence, any investigation of the association between school corporal punishment and school violence needs to account for at least these correlated factors. The current study was so designed to examine the likelihood that states sanctioning violence toward children, as evidenced in the state's school corporal punishment policy, would be ones in which students were more likely to die from school shootings compared with those in which the practice was prohibited. To test this proposal, rates of school shooting fatalities by state according to the state's school corporal punishment policy, and controlling for confounding factors such as poverty level and prevailing religious orientation, were compared both across the nation and in the South.

The goals for this study were two-fold. First, we sought to increase our understanding of at least one aspect of the complex problem of aggression as a serious threat to child health and well-being. Second, we sought to identify a potential point of intervention. Although the current design is correlational, identifying a significant association may be useful toward this end. Since an ecological conception of human development conceives of causality as a bidirectional phenomenon, changing a policy that reflects cultural values may, over time, influence the nature of the prevailing culture.

METHOD

A secondary analysis of existing data was conducted on the rate of school shooting fatalities, school corporal punishment practices, and confounding factors (poverty, religious orientation). The sources of these data are described here and presumed not to be without noise since there is neither systematic collection of school shooting data nor completely uniform reporting of corporal punishment incidents. Each data set used in the current analysis is publicly available for replication and further investigation.

School Corporal Punishment

States were categorized according to whether corporal punishment was permitted [NCACPS, 1997]. The 13 states in which corporal punishment is widely allowed in the schools by state statute or local district policy were called Permitting States. The category Partial States ($n = 10$) comprised states in which school corporal punishment, although permitted, is banned by the majority of school districts in the states. Those remaining, the Prohibiting States ($n = 27$), were ones in which school corporal punishment is prohibited by every school district in the state or by state law. The prevalence of corporal punishment in the school-aged population was used as a second and continuous indicator of the degree to which states endorsed the use of corporal punishment in the schools [US Department of Education, 1997]. These rates were computed for 2 years (1988 and 1995) to examine stability of the estimates and direction of change.

Poverty and Beliefs

The 1995 poverty rate was used to index socioeconomic status for each state as the percentage of the population living under the poverty level [Morgan and Morgan, 1997]. As seen in Table I, permitting states had higher rates of poverty than prohibiting and partial states.

The number of adherents to conservative Christian denominations was computed for each state to account for the prevalence of conservative Christian ideology. Eight Christian denominations rated as conservative in theology and low in the endorsement of both ecumenism and pluralism were identified as conservative denominations: American Lutheran Church, Assemblies of God, Church of Jesus Christ of the Latter Day Saints, Church of the Nazarene, Churches of Christ, Lutheran Church–Missouri Synod, Seventh Day Adventist, and Southern Baptist Convention [Hoge, 1979]. Additional denominations for a total of 63 were identified based on Ellison et al. [1996]. These groups included Independent Baptist, Independent or Open Bible Churches, Alliance Church, Adventist, Pentecostal, Holiness, Apostolic, and other fundamentalist or evangelical churches. The number of adherents in each of these denominations in 1990 was summed

TABLE I. Means (Standard Deviations) for States by School Corporal Punishment Policy[†]

	Prohibit ($n = 27$)	Partial ($n = 10$)	Permit ($n = 13$)	F ($df = 2, 47$)
School corporal punishment, 1988	0.11 ^a (0.20)	1.95 ^b (1.95)	4.29 ^b (3.26)	22.40**
School corporal punishment, 1995	0.00 ^a (0.00)	0.87 ^{a,b} (1.30)	3.74 ^b (4.40)	11.74**
Poverty rate, 1995	11.20 ^a (2.86)	13.11 ^{a,b} (2.43)	16.41 ^b (5.24)	9.36**
Conservative Christian, 1990	18.02 ^a (14.41)	22.56 ^{a,b} (11.63)	31.60 ^b (9.16)	4.99*
School shooting fatalities, 1992–1999	1.41 (2.06)	2.59 (2.89)	4.59 (5.71)	3.63*

[†]Corporal punishment values are as a percentage of the student population. Poverty and conservative Christian rates are as percentages of the population. School shootings are per million students. Means that do not share superscript letters are significantly different from each other using Dunnett's T3 at $\alpha = .05$.

* $P < .05$.

** $P < .001$.

for each state and divided by the total population [Bradley et al., 1992; US Bureau of the Census, 1996]. There was one outlier (Utah, 74%, a prohibiting state).

As seen in Table I, there was a higher prevalence of conservative Christian adherents in permitting states compared with prohibiting and partial states. This result did not change when comparisons were computed on the ranks to minimize the influence of the outlier.

School Shooting Fatalities

There has been a surprising dearth of empirical information on the incidence of school-related violence. In the first systematic survey, Kachur et al. [1996] compiled data for a 2-year period from 1992 to 1994. More recently, the National School Safety Center [NSSC, 1999] conducted a survey of news services to compile information on school-associated violent deaths from the 1992–1993 school year through 1998–1999.

Because of the limitations of the NSSC database, a conservative sampling approach was employed. Cases used in the current study were limited to those most likely to be reported in the news consistently, specifically, student deaths from shootings inside the school or on school grounds ($N = 112$). The 1995 number of school-aged children per state was used to yield an approximation of the odds of death from school shootings for each state [Morgan and Morgan, 1997].

Data Analysis

Two approaches, one categorical and one continuous, were used. The contributions of school corporal punishment to mortality rates by school shooting were identified in analysis of covariance using a type III general linear model with the 1995 poverty rate and 1990 rate of conservative Christian adherents as covariates. Nonparametric comparisons were used when normality assumptions could not be met. Planned comparisons among levels of school corporal punishment were conducted using Dunnett's T_3 , which does not rely on equal variance assumptions. An alpha level of .05 was used, and trends are reported at $P < .10$ because the total number of states ($N = 50$) inherently limited statistical power. Differences in fatality rates were also computed as odds ratios with 95% Wald confidence intervals after Greenland and Rothman [1998]. Odds ratios offer the advantage of utilizing population estimates (e.g., number of school-aged children) as base rates, thus the avoiding the power limitations that occurred when states were the unit of analysis.

In addition, continuous analyses were conducted on the rates of corporal punishment (i.e., number of incidents per 100 students) as predictors of the rates of school shooting fatalities after controlling for poverty level and conservative Christian prevalence in correlational analyses. Analyses were conducted using all 50 states, the 27 partial and permitting states, and the 16 states in the South [US Bureau of the Census, 1994]. Both parametric and rank order analyses were conducted to account for the potential influence of extreme observations, especially when the n decreased in subgroups.

TABLE II. Fatalities From School Shootings by State School Corporal Punishment Policy

	State's school corporal punishment policy		
	Prohibit	Partial	Permit
School shooting fatalities			
Rate per million ^a	1.93	2.22	3.41
Odds ratio:Prohibit (95% confidence interval)	1.00	1.15 (0.65, 1.65)	2.04* (1.62, 2.46)
Odds ratio:partial (95% confidence interval)		1.00	1.77* (1.27, 2.27)

^aRate is per million children enrolled in public elementary and secondary schools, 1995.

* $P < .05$.

TABLE III. Correlations (Pearson r) Among Variables Across All States

	(1)	(2)	(3)	(4)	(5)	(6)
1. Corporal punishment policy ^a	—					
2. Rate of punishment, 1988	.86***	—				
3. Rate of punishment, 1995	.78***	.91***	—			
4. Poverty rate, 1995	.53***	.49***	.58***	—		
5. Rate conservative Christian	.52***	.45**	.50***	.29*	—	
6. School shooting mortality	.36*	.29**	.27 [†]	.02	.02	—

^aSchool corporal punishment policy coded as follows: 0 = Prohibit, 1 = Partial, 2 = Permit.

[†] $P < .10$.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

RESULTS

School shooting fatalities varied as a function of school corporal punishment policy when the associated differences in state rates of poverty and conservative Christian prevalence were covaried ($F [2, 45] = 5.36, P < .01, \eta^2 = .44$). Pairwise comparisons among the three groups did not yield significant differences when unequal variances were accounted for using Dunnett’s T3 post-hoc test. Permitting and partial groups were then combined to compare states that prohibit corporal punishment with those that allow it at all. A Mann-Whitney test on the residuals of

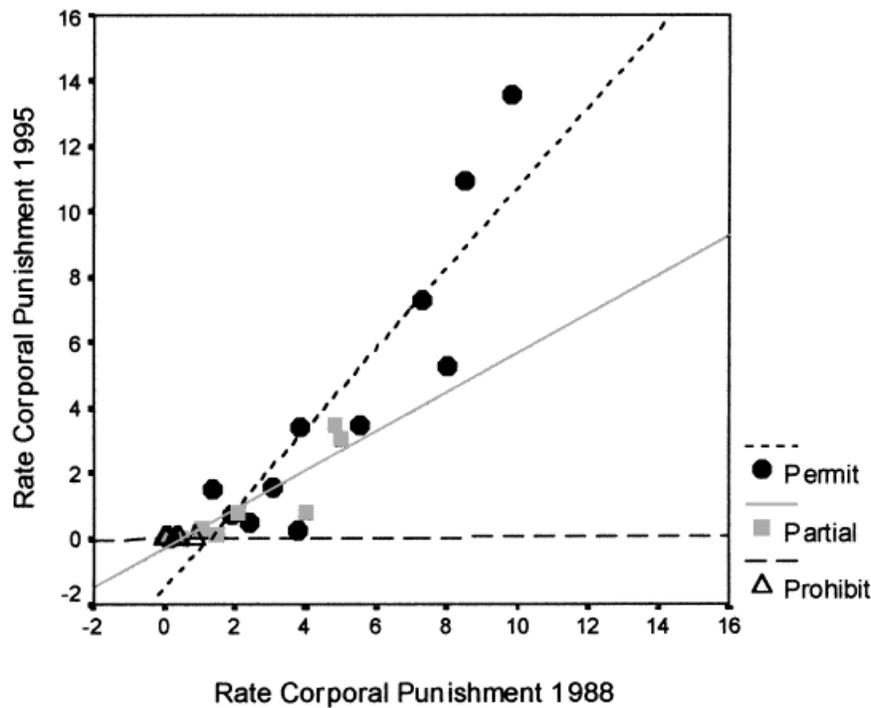


Fig. 1. Correlation between rates of school corporal punishment in 1988 and 1995 for all states by school corporal punishment policy, with regression lines fitted to subgroups.

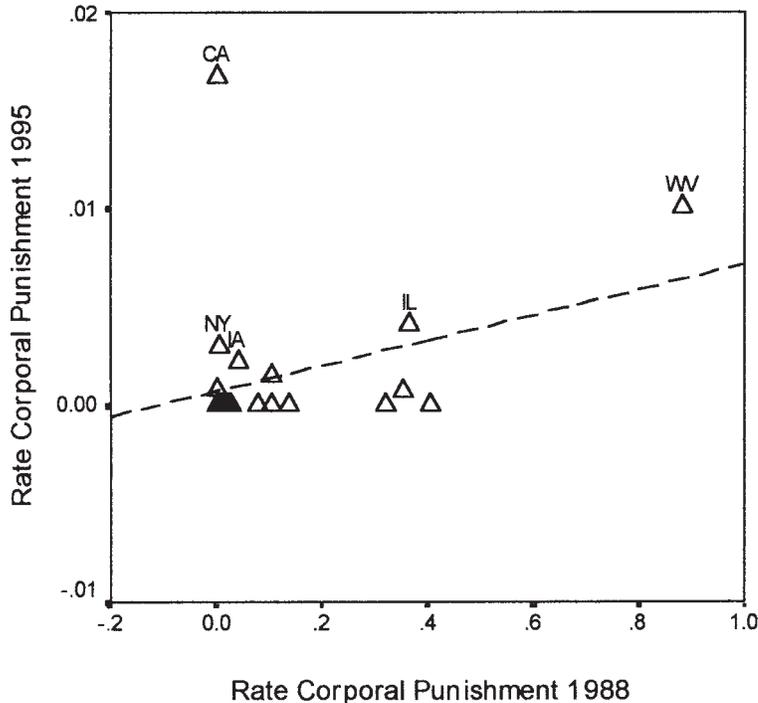


Fig. 2. Correlation between rates of school corporal punishment in 1988 and 1995 for prohibiting states ($n = 27$).

school shooting fatalities (controlling for poverty and conservative religion) yielded a significant association between corporal punishment allowed at all in schools and higher rates of school shooting fatalities ($z = 2.40$, $P < .05$).

Table II summarizes the odds ratios of fatal involvement in a school shooting among permitting, partial, and prohibiting states. The odds were significantly greater in states broadly permitting school corporal punishment at all compared with the others. They were twice as high in permitting compared with prohibiting states and 1.77 times higher compared with partial states. Rates in prohibiting and partial states were equivalent.

Relations among the continuous variables are summarized in Table III. Because the rates of school corporal punishment—i.e., the number of incidents per 100 students in the population—were highly stable from 1988 to 1995 among permitting and partial states ($r [21] = .91$, $P < .001$), the 1995 rate was used in correlation analyses. The correlation across all 50 states is illustrated in Fig. 1. However, small values within a restricted range among prohibiting states yielded little year-to-year stability in school corporal punishment rates ($r [25] = .12$, n.s.). An expanded view of these data is provided in Fig. 2, and an interesting trend is revealed. Four of the five states (NY, IA, IL, and CA) above the line of regression, that is, with higher-than-expected corporal punishment rates for 1995, also had school shooting fatality rates above the median for the prohibiting states (Fisher exact $P = .10$).

School corporal punishment rates made significant partial contributions to school shooting fatality rates after controlling for the rate of poverty and conservative Christian adherents across all states. The more students were physically punished in schools, the higher the student mortality rate from school shootings. This held for all 50 states as well as for the 23 states allowing corporal

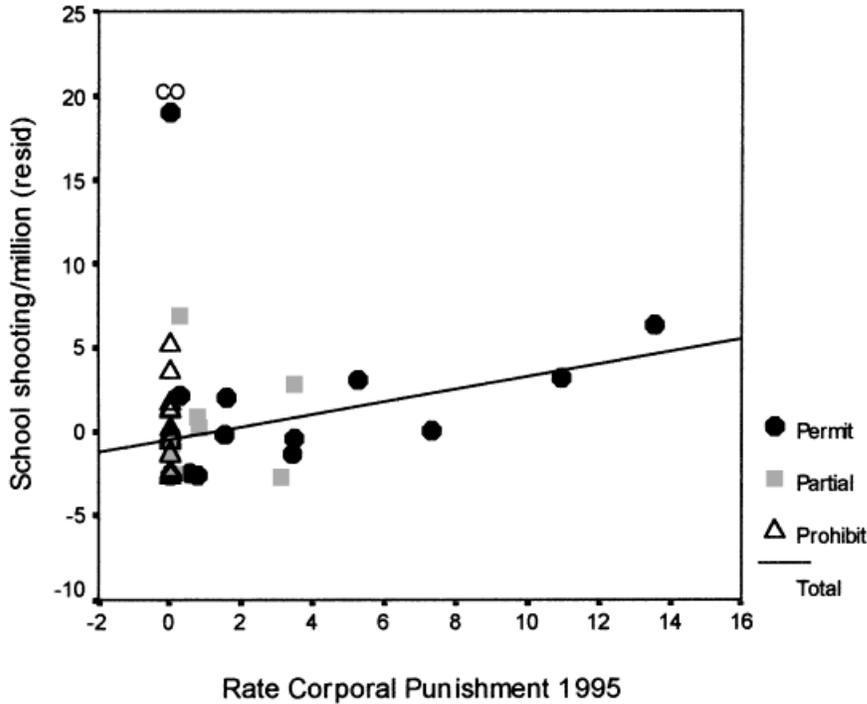


Fig. 3. Partial correlation between the 1995 rate of school corporal punishment and student mortality from school shooting for all 50 states after controlling for the 1995 poverty rate and proportion of conservative Christian adherents per state.

punishment to any degree (see Fig. 3). The effect was even stronger in the Southern region of the United States, as shown in Fig. 4. In addition, scatterplots revealed that outlying data points tended to go in the opposite direction of the overall trend. This tendency resulted in stronger relations emerging in rank order, compared with parametric, comparisons, as summarized in Table IV.

DISCUSSION

These results provide evidence that the sanctioning of corporal punishment in the schools is linked with elevated levels of child-directed violence, even when accounting for associated differences in poverty and prevailing conservative Christian ideology both in the United States as a whole and within the Southern region. Children and youths are more likely to die in school shootings in states permitting schools to practice corporal punishment than in states in which the practice has been prohibited. The more physically punitive discipline is practiced in the schools, the more likely students are likely to die in school shootings.

As with the growing literature linking corporal punishment to child aggression, one limitation of these data is their correlational nature, which does not test causality. Yet, what is methodologically desirable—an experimental design with random assignment of children to physically punitive and nonpunitive schools and communities—is ethically unacceptable. Examining trends over time may be the most telling alternative. Hence, it is notable that those prohibiting states that had reduced the rate of corporal punishment less than expected between 1988 and 1995

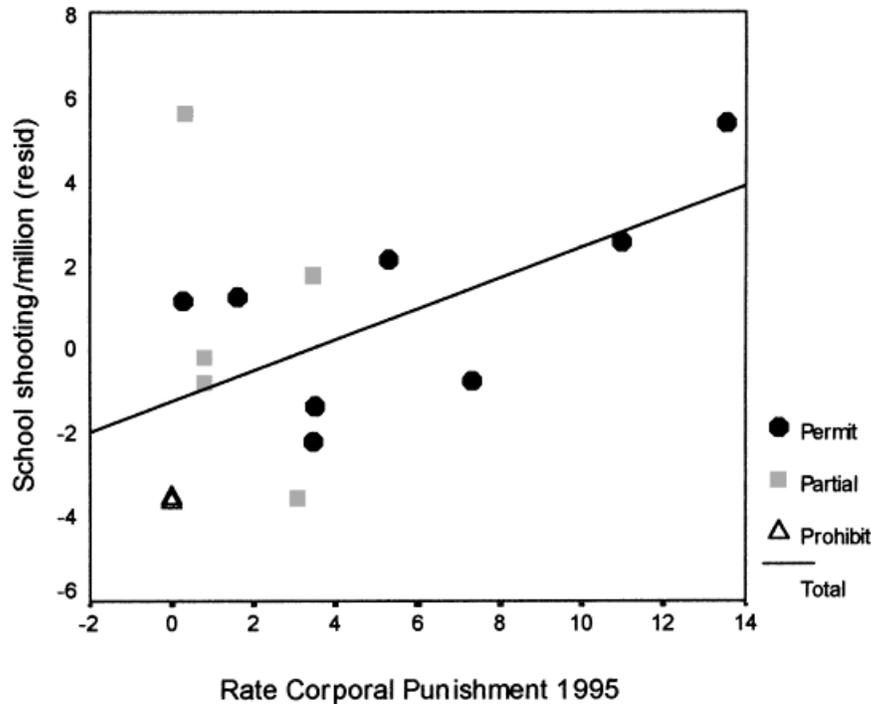


Fig. 4. Partial correlation between the 1995 rate of school corporal punishment and student mortality from school shooting for the 16 states in the South after controlling for the 1995 poverty rate and proportion of conservative Christian adherents per state. The outlier in the upper left quadrant is DE, and prohibiting data points represent 3 states.

tended to have higher-than-average school shooting mortality rates, a result consistent with the causal interpretation offered.

We should not be dissuaded from the difficult task of identifying ecological contributions to the public health and safety problems of aggressive behavior in the lives of children and youths because they do not fit into experimental paradigms or do not involve factors that are easily quantified [see McMichaels, 1999]. Although these data are not conclusive, they suggest clearly that the endorsement of school corporal punishment reflects a set of values that are punitive in nature and create a context conducive to the violence that characterizes school shootings.

TABLE IV. Partial Correlations Between the Rate of School Corporal Punishment (1995) and School Shooting Fatalities per State After Controlling for the 1995 Poverty Rate and Prevalence of Conservative Christian Denominations

States	df	Pearson r	Spearman r
All	46	.34*	.38**
Permitting-partial	19	.41 [†]	.50*
Southern ^a	12	.56*	.76**

^aSouthern states are AL, AR, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, and WV [US Bureau of the Census, 1996].

* $P < .05$.

** $P < .01$.

[†] $P < .10$.

Individual occurrences of fatal school shootings are no doubt multiply determined; however, the sanctioning of violence toward children as an acceptable means of socialization and discipline in public institutions seems to contribute to the likelihood that such incidents will occur. The policy implications of these data are clear and support the positions of numerous child health and welfare organizations that advocate the abolishment of corporal punishment and development of alternative means of discipline and proactive interventions for the effective management of behavior in schools.

ACKNOWLEDGMENTS

I thank D.W. Chambers and G.W. Reed for their critical and always thoughtful comments on earlier drafts of this work.

REFERENCES

- American Academy of Child and Adolescent Psychiatry. 1997. Policy statement: corporal punishment in schools. Available at: <http://www.aacap.org/publications/policy/ps14.htm#TOP>
- Arcus D, Ryan J. 1999. Child abuse correlates of school corporal punishment. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Albuquerque, NM.
- Belsky J. 1980. Child maltreatment: an ecological integration. *Am Psychol* 35:320–335.
- Berliner DC. 1997. Educational psychology meets the Christian Right: differing views of children, schooling, teaching, and learning. *Teachers College Record* 98:381–417.
- Bradley MB, Green NM, Jones DE, Lynn M, McNeil I. 1992. Churches and church membership in the United States. Washington, DC: Glenmary Research Center Available at: <http://www.thearda.com/archive/cms90st.htm>
- Bronfenbrenner U. 1979. *The ecology of human development*. Cambridge, MA: Harvard University Press.
- Cohen D, Nisbett RE. 1994. Self-protection and the culture of honor: explaining southern violence. *Pers Soc Psychol Bull* 20:551–568.
- Cohen D, Brian F, Bowdle BF, Nisbett RE, Schwarz N. 1996. Insult, aggression, and the southern culture of honor: an “experimental ethnography.” *J Pers Soc Psychol* 70:945–961.
- Egan T. 1999. Terror in Littleton: the reasons; violence by youths: looking for answers. *New York Times*, April 22. Available at: <http://archives.nytimes.com/archives>
- Ellison CG, Bartkowski JP, Segal ML. 1996. Conservative Protestantism and the parental use of corporal punishment. *Social Forces* 74:1003–1029.
- Grasmick HG, McGill AL. 1994. Religion, attribution style, and punitiveness toward juvenile offenders. *Criminology* 32:23–46.
- Greenland S, Rothman KJ. 1998. Introduction to categorical statistics. In: Rothman KJ, Greenland S, editors. *Modern epidemiology*. Philadelphia: Lippincott-Raven.
- Greven P. 1991. *Spare the child: the religious roots of physical punishment and the psychological impact of physical abuse*. New York: Knopf.
- Hoge DR. 1979. A test of theories of denominational growth and decline. In: Hoge DR, Roozen DA, editors. *Understanding church growth and decline: 1950–1978*. New York: Pilgrim Press.
- Hyman IA. 1995. Corporal punishment, psychological maltreatment, violence, and punitiveness in America: research, advocacy, and public policy. *Appl Prev Psychol* 4:113–130.
- Hyman IA, Perone DC. 1998. The other side of school violence: educator policies and practices that may contribute to student misbehavior. *J School Psychol* 36:7–27.
- Hyman IA, Wise JH, editors. 1979. *Corporal punishment in American education*. Philadelphia: Temple University Press.
- Kachur SP, Stennies GM, Powell KE, Modzeleski W, Stephens R, Murphy R, Kresnow M, Sleet D, Lowry R. 1996. School-associated violent deaths in the United States, 1992 to 1994. *JAMA* 275:1729–1733.
- Kilbourne S. 1999. Placing the convention on the rights of the child in an American context. *Human Rights* 26:27–32.
- Lynch M, Cicchetti D. 1998. An ecological-transactional analysis of children and contexts: the longitudinal interplay among child maltreatment, community violence, and children’s symptomatology. *Dev Psychopathol* 10:235–257.
- McDowell E, Friedman R. 1979. An analysis of editorial opinions regarding corporal punishment: some dynamics of regional differences. In: Hyman IA, Wise JH, editors. *Corporal punishment in American education*. Philadelphia: Temple University Press. p 329–334.

- McMichaels AJ. 1999. Prisoners of the proximate: loosening the constraints on epidemiology in an age of change. *Am J Epidemiol* 149:887–897.
- Morgan K, Morgan S. 1997. State rankings, 1997. Lawrence, KS: Morgan Quinto. Data reproduced in Sweet S. 1999. *Data analysis with SPSS*. Boston: Allyn and Bacon.
- National Coalition to Abolish Corporal Punishment in the Schools (NCAPCS). 1997. Corporal punishment factsheet. Columbus, OH: Author. Available at: http://www.stophitting.com/facts_about_corporal_punishment.htm
- National School Safety Center. 1999. The NSSC's report on school associated violent death. Available at: <http://www.nssc1.org>
- Sheley JF, McGee ZT, Wright JD. 1992. Gun related violence in and around inner city schools. *Am J Dis Child* 146:677–682.
- Sleek S. 1998. Experts scrambling on school shootings. *APA Monitor* 29:1,35–36.
- Society for Adolescent Medicine. 1992. Corporal punishment in schools: a position paper of the Society for Adolescent Medicine. *J Adolesc Health* 13:240–246.
- Strauss MA. 1994. *Beating the devil out of them*. Lexington, MA: DC Heath.
- Super C, Harkness S. 1986. The developmental niche: a conceptualization at the interface of society and the individual. *Int J Behav Dev* 9:545–570.
- Tonge W, James D, Hillam S. 1975. *Families without hope*. Br J Psychiatry Special Edition No. 11. Ashford: Royal College of Psychiatry.
- US Bureau of the Census. 1994. *Geographic areas reference manual*. Available at: <http://www.census.gov/ftp/pub/geo/www/GARM>
- US Bureau of the Census, Housing and Household Economics Division. 1996. *Current population survey: March supplement*. Washington, DC: US Government Printing Office.
- US Department of Education, Office for Civil Rights. 1997. *1994 Elementary and secondary schools Civil Rights compliance report (revised)*. Washington, DC: US Government Printing Office.
- Wolfner GD, Gelles RJ. 1993. A profile of violence toward children: a national study. *Child Abuse Neglect* 17:197–212.
- Zigler E, Hall NW. 1989. Physical child abuse in America: past, present, and future. In: Cicchetti D, Carlson V, editors. *Child maltreatment: theory and research on the causes and consequences of child abuse and neglect*. New York: Cambridge University Press. p 38–75.