

The Correlation between Hunting and Crime: A Comment

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One of the major goals of social science is to find relationships between various sets of behaviors; that is, to see what behaviors co-occur. The co-occurrence of behaviors *may* be evidence for a causal path and may ultimately lead to strategies for reducing undesirable behaviors and enhancing desirable ones. In the following article, three recent studies (Eskridge, 1985; Clifton 1994a, 1994b) that explore the question of the co-occurrence of hunting/trapping and various criminal behaviors are critiqued. The methods of these studies are examined because how they evaluated the relationship between hunting and crime influenced their results.

Clifton's method involved constructing ratios of the number of hunters to the number of crimes committed in counties for two states (New York and Ohio). His procedure for controlling the influence of population density (splitting the counties into those above the median for population density and those below) has no statistical rationale to support its use. Eskridge, although conducting appropriate statistical analyses, made conclusions that did not take into account the unique features of his data. These concerns are addressed in the critique to follow. Additionally, the present author reanalyzed Clifton's data by conducting correlational procedures that suitably controlled for the influence of population density as well as income on the relationship between hunting/trapping and crime. It was found that hunting/trapping did not co-occur (correlate) with various criminal acts when population density and income were controlled.

Clifton gathered data on the number of hunting license sales in each county in New York and the incidence rates of various crimes that occurred in each county during 1992. Descriptive statements about the ratios of hunters to pedophiles were made because "[r]atios are most meaningful in comparing large numbers to large numbers...and median figures may be more accurate than averages" because of the skewing influence of New York City, hunting, crime rate and population values (Clifton, 1994a, p. 7). A similar procedure was utilized to analyze data from counties in Ohio (Clifton, 1994b).

Comparisons of hunting license sales and crime rates were conducted after splitting counties based on population density (population density is known to influence both variables). Clifton concluded that there is a strong positive association between hunting and various crimes, especially pedophilia, other sex crimes and family violence. He offered the observations made upon the median split figures as evidence for a common personality characteristic between hunters/trappers and pedophiles, that of "dominionism" which is a "desire for mastery and control" (Clifton, 1994a, p. 7).

In another study (Eskridge, 1985), hunting license sales in all fifty states were correlated with reported rates of robbery, rape, murder, aggravated assault, and overall crime rate. These correlational analyses revealed a much different finding than that of Clifton. Eskridge found that hunting license sales tended to be inversely related to crime rates in almost every category and for almost every state. When population density was controlled in an analysis of covariance, the relationship became even more strongly negative. Eskridge tentatively concluded that "the overall hunting experience...may have some type of cathartic impact and calming influence upon hunters that makes them less inclined to resort to the use of violence" (1985, p. 9).

While all three studies attempted to answer the same question about the influence of hunting on criminal behavior, each derived opposing conclusions. The reasons for this may involve the methodological differences across the studies.

Clifton (1994a) noted the influence of extreme high values contributed by the New York City boroughs in population and crime rates and the extreme low values of hunting licenses. As extreme values they skew the distributions of these variables, making a correlational analysis inappropriate. But rather than reduce the data to a comparison of proportions above and below a median split for population density (to control its influence), it is reasonable to eliminate the extreme values from the analysis. Extreme values can be considered "outliers" and not representative measures of the variable(s) of interest. Upon transforming the remaining data to normalize its distribution, Pearson Product Moment (PPM) correlation coefficients could then be calculated to capture the nature of the relationship (if any) between hunting and (violent) crime.

In the reanalysis of Clifton's data, the log function of the variables that show skewed distributions (after removing the outliers New York City boroughs and Nassau county) was used as data. They normalized (achieved skew values of less

than + 1.00), and the relationship between population density and hunting and crime rates was explored. Indeed, population density correlated significantly with hunting, $r(54) = -.900$, $p = .0001$; child sexual assault, $r(54) = -.659$, $p = .001$; and sex crimes in general, $r(54) = -.634$, $p = .011$.

Since hunting and population density were related, it was appropriate to calculate partial correlations between hunting and various crime rates with population controlled. Table 1 presents partial correlation coefficients for hunting license sales and crime rates in New York counties. It can be seen that the relationships between hunting and crimes (with the exception of rape) were not significantly related when population density was controlled in the reanalysis. It is interesting to note that in the first Clifton study (1994a) the association between incidence of rape and hunting was not impressive (after "controlling" for the effect of population density via a median split of that variable) while, in the current reanalysis, it was the only correlation that was significant in the expected direction.

Also, Clifton (1994b) constructed ratios of hunters to crime rates for counties in Ohio above the median in both per capita income and resident hunting license sales. Here, population density and income were "controlled" by becoming the criteria for selecting the counties for analysis. Ratios of the proportion of hunters and child abuse crimes were compared. Clifton concluded "the number of hunters in a county more accurately predicts the level of child abuse than either population density or median income" (p. 1). However, the same flawed procedure that was applied to the New York data resulted in this erroneous conclusion.

In the reanalysis conducted by the present author, skewed distributions were normalized (log functions reduced skew values to less than + 1.00) and correlational exploration of the relationships between hunting, income, population density and child abuse were conducted. Hunting was not correlated significantly with any type of child abuse in the counties when population density was controlled. By restricting the counties selected for analysis, the range of values for hunting and violent crimes was also restricted. Restriction of range artificially lowered the strength of the relationship measured by the correlation analysis.

If such a relationship exists, it would be revealed by including the widest range of values for the variables of interest. Clifton remarked that "[t]he most accurate comparison minimizes distortion by comparing medians to medians" (1994b, p. 9). By converting ratio scaled data to ranks, variability was reduced because the actual differences between the data points were eliminated by assigning

Table 1. Partial Correlation Coefficients between Hunting License Sales, Trapping License Sales and Various Crimes with Population Density Controlled

	Partial Correlation	p[1]
Hunting Correlated with:		
Aggravated Assault	.130	.346
Child Sexual Assault	.228	.094
Sex Crimes (excl. rape and prostitution)	.175	.202
Rape	.407	.002[2]
Child Abuse	.124	.368
Wife Abuse	-.112	.991
Husband Abuse	-.050	.718
Family Violence	-.001	.992
Trapping Correlated with:		
Child Sexual Assault	-.074	.592
Sex Crimes (excl. rape and prostitution)	.132	.338
Rape	.227	.096
Family Violence	-.144	.293

[1] based on degrees of freedom = 53.
[2] significant at $p<.05$.

ranks. There is especially a loss of information when counties were combined in groups of 11 and ranked on moderator variables (income, population density) thought to influence the relationship between hunting and crime. Even with the loss of information, it would still be possible to calculate PPM correlations because the PPM is mathematically similar to the Spearman (the correlational technique appropriate for ranked data).

Clifton concluded that counties with above average income and hunting have much higher child abuse crime rates than below average counties. When the data were reanalyzed via correlational procedures on the combined counties (ranked on population), hunting and income were significantly negatively related, $r(6) = -.9732$, $p=.001$. Also, income was significantly negatively related to child abuse, $r(6) = -.8407$, $p=.001$. When hunting was correlated with abuse, a positive significant relationship was revealed, $r(6) = .8505$, $p=.002$. However, when income

(a moderator variable) was controlled in the partial correlation, a nonsignificant relationship between hunting and abuse occurred, $r(6) = .331$, p=.468. This points to income as the most significant predictor in the incidence of both forms of violence – hunting and child abuse. Table 2 presents correlation coefficients and partial correlation coefficients for the number of hunters and various child abuse crimes.

Table 2. Correlation Coefficients and Partial Correlation Coefficients for Number of Hunters and Child Abuse Crimes

Type of Crime	Correlation	p[1]
Physical Abuse	.3378	.157
Sexual Abuse	.3059	.203
	Partial Correlation	p[2]
All Types of Abuse	.2571	.303
Neglect	.1406	.578
Emotional Maltreatment	.4086	.092

[1] based on degrees of freedom = 17.
[2] based on degrees of freedom = 16.

When data are ratio in nature, such as the number of hunters in a county, incidence of crime, and income, it is recommended that analyses attempt to retain the maximal amount of information offered by ratio scaling to accurately measure the strength and type of relationship between variables. Correlational analyses utilize the amount of shared variability between two variables to measure the strength of their relationship. If variability is reduced by converting amounts into ranks, which is essentially what Clifton did by using median splits and ranking counties by income, hunters and population, information is lost and relationships between variables might be misrepresented. When Clifton's data were reanalyzed by the present author, rather than reduce the data to ranks, it was normalized in instances where skews were present and partial correlations more appropriately dealt with the influence of population density on the otherwise spurious relationship between hunting and crime.

Eskridge (1985) conducted correlational analyses on the ratio-scaled variables of hunting license sales and crime rates in states across the country. Many of the analyses yielded very strong negative relationships between hunting and crime. However, for any of the crimes assumed to be similar to the categories utilized in the *AP* articles, no consistent pattern emerged. Although most of the coefficients were negative, at least one region exhibited a positive relationship. When all 50 states were included in the analysis, correlation coefficients were negative and many were significant at the .05 level, with r^2 ranging from .005 to .25 (9 of the 15 values were below .20).

When Eskridge analyzed his data at the county level, a curious trend appeared. Of the 15 states analyzed, all except Wisconsin showed negative relationships between hunting and crimes. Wisconsin exhibited rather strong positive relationships (range from .6451 to .8963). When all counties in the 15 states were taken in aggregate (N = 1193), coefficients were significant at $p<.05$ and r^2 ranged from .0004 to .02.

From Eskridge's analyses and his conclusions, it can be surmised that statistical significance was achieved while practical significance was negligible. The large database used (FBI Uniform Crime Report) allowed sample sizes to create statistical significance while the variance accounted for in the statewide analyses was less than five percent in all cases. For the regions, while several negative relationships between crime and hunting captured a fifth of the variance (including overall crime rate at $r^2 = .24$), there was still much of the variance in crime left unexplained.

Both Clifton (1994a, 1994b) and Eskridge (1985) explored the possible relationships between hunting and crime, intuitively hypothesized to be positively related. However, when the present author reanalyzed Clifton's data via simple and partial correlational procedures, there appeared to be no meaningful relationships among these violent acts. It may be that, like much of human behavior, violence is multiply determined, thus requiring the measurement of a wide variety of behaviors and living conditions (region of residence, population density, income) that can reasonably be assumed to interact with hunting, trapping and crime. Both research projects were exploratory in nature, suggesting relationships that seem spurious to the methods and moderator variables involved. The question of what "causes" violent behavior, be it rape, child abuse or big game hunting, can be best approached via true experiments where manipulation of hypothesized causal factors and

control of moderator variables eliminates rival explanations and provides strong evidence of causality.

In the face of ethical and logistic constraints on conducting experiments about violent behavior, correlational alternatives that provide stronger causal inference than simple correlations can be applied. Path analysis, for example, requires the collection of many key variables thought to contribute to the explanation of variance in the variable of interest, in this case, violent behavior. This statistical technique orders the variables in a causal sequence based upon the strength of their intercorrelations. Path analysis can demonstrate the "path" by which multiple influences induce behavior. Before making conclusions on the causes of violence, exploration of multiple determinants should be conducted.

Note

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