



## Race, Crime, Intellectual Performance and Food: Poor Nutrition Contributes to Racial Differences in Violence and SAT Scores

Matt Gailliot

### ABSTRACT

**Might differential nutrition contribute to racial differences in violent crime and intellectual performance (SAT scores)? Nutritional intake across the 50 states in the US differed by race, such that states with a higher percentage of Whites and a lower percentage of Blacks had poorer nutritional intake. Crime rates and SAT scores also differed by race, such that violent crime rates were higher in states with a lower percentage of Whites and a higher percentage of Blacks, and Whites scored higher and Blacks scored lower on the SAT than did other racial groups. Nutritional intake partially mediated the link between race and violent crime and fully mediated the link between race and SAT performance. These findings suggest that improving the diet of Black citizens may be a promising avenue toward reducing socially problematic racial disparities in crime and school.**

**Keywords: race differences, crime, nutrition, diet, scholastic performance**

### INTRODUCTION

Poor Nutrition Contributes to Racial Differences in Violence and SAT Scores. The 1990s “Decade of the Brain” moved research on brain processes to the forefront and has stimulated ongoing advances in understanding how the brain influences behavior. Many psychologists now recognize the importance of incorporating brain processes into their theorizing. The brain, however, does not operate in a vacuum but rather is heavily dependent on the rest of the body. As a highly active and plastic organ, it is extensively dependent on the body to supply it with the nutrients it needs to grow and function. In the short run, it requires and consumes glucose from the bloodstream that originates with the body’s food intake. In the long run, it needs a variety of chemicals that enable it to sustain and increase its powers.

The brain’s dependency on the body raises the possibility that nutrition will affect psychological outcomes. That is, optimal brain functioning may be impaired by either current or prior nutritional deficiencies. In plain terms, failure to eat properly can adversely affect the brain, and in principle these effects could result in undesirable behavioral changes. The present study examined racial differences in behavior as a function of nutrition. Specifically, it compared the violent and criminal behavior, as well as the scholastic performance, of Black and White American citizens. The hypothesis was that differences in nutrition are partly responsible for observed race differences on those behavioral outcomes.

There is general agreement that race differences can be observed in crime and academic performance, but the causes of those differences are much debated and disputed. The fact that African-American citizens commit crimes at a higher rate than White citizens has been variously attributed to their victimization in racial discrimination (Hogan, 1995), their economic hardships and social isolation (Wilson, 1987), family disruption and single parenting (Sampson, 1987), stress (Eitle & Turner, 2003), and behavior genetics (Rushton, 1990, 1995). In a similar vein, their lower performance in school and on tests has been attributed to low

socioeconomic status (Felner et al., 1995), stereotype threat and fear of confirming stereotypes (Steele, 1997), lower innate intelligence (Jensen, 1997), and academic disidentification (Osborne, 1997). We are not undertaking to prove or disprove any of those hypotheses, but we seek to add yet another possible explanation to the debate, namely differences in nutrition. In our egalitarian view, any evidence that nutrition contributes to racial differences would be welcome in the context of moving toward a more hopeful future in which race differences can be reduced or eliminated. Insofar as nutritious food can be made generally available in the United States, nutrition would seem to be much more readily changed than any of the other hypothesized causes. In other words, it would be encouraging to think that race differences in crime and test performance can be reduced by eating better.

Our reasoning is based on the following four points. The first is that there are reliable behavioral differences between Black and White American citizens, as already noted. Second, African-Americans are less well nourished than other Americans, including Whites. For example, Ford and Bowman (1999) found evidence that Blacks consumed less Folate than did Whites.

Third, poor nutrition can impair intellectual performance. The evidence on this appears to be consistent and convincing. Malnourishment during childhood has been found to predict numerous cognitive deficits (e.g., impaired attention) years later (e.g., Grantham-McGregor & Ani, 2001; Liu, Raine, Venables, Dalais, & Mednick, 2003; Lozoff, Jimenez, Hagen, Mollen, & Wolf, 2000), and improved nutritional intake has been found to increase intellectual performance and reduce brain wave abnormalities (Gesch, Hammond, Hampson, Eves, & Crowder, 2002; Schoenthaler, Amos, Eysenck, Peritz, & Yudkin, 1991; Schoenthaler & Bier, 2000; Schoenthaler et al., 1997).

Last, poor nutrition can also contribute to increases in criminal behavior. There is some evidence to support this view. For example, a couple studies have found that dietary changes aimed at decreasing fried and junk foods and increasing vitamins have reduced the violent disciplinary problems among incarcerated criminals (Gesch et al., 2002; Schoenthaler et al., 1997).

Our own interest in this topic arose from our research on self-control. Self-control deficits contribute to crime (Gottfredson & Hirschi, 1990), as well as to poor intellectual performance (Schmeichel, Vohs, & Baumeister, 2003). Self-control appears to involve complex brain processes that consume a relatively high quantity of calories (Gailliot, Baumeister, DeWall, Maner, Plant, & Tice, 2006) and therefore should be most effective in a well-nourished body.

The present investigation was not designed specifically to establish the role of self-control, but that was for us the context and impetus. Based on these four assumptions, we formulated the hypothesis that the poorer nutrition of African-American citizens could contribute to their lower academic performance and higher crime rate than White Americans. To provide preliminary tests of this hypothesis, we gathered data comparing the 50 United States on racial composition, crime, nutrition, and Scholastic Aptitude Test scores. To the extent that the hypothesis was correct, differences (by state) in nutrition should mediate the differences in crime rate and SAT.

## METHOD

Nutritional intake data were obtained from the Community Nutrition Mapping Project (CNMP) conducted by the Agricultural Research Service. The CNMP contains average nutritional data for each of the 50 states in the US collected in the Continuing Survey of Food Intakes by Individuals (CSFII) from 1994-1996 that included people of all ages and a supplemental

survey of children 9 years or younger conducted in 1998. The current work examined all variables included in the CNMP that were indicative of nutritional intake, namely the percent of the state population meeting the recommended requirements for Energy Intake, Calcium, Folate, Iron, Magnesium, Niacin, Phosphorus, Protein, Riboflavin, Selenium, Thiamin, Vitamin A (IU), Vitamin A (RE), Vitamin B6, Vitamin C, Vitamin E, Zinc, Copper, Fiber, and Carbohydrates. These variables were averaged to form a single index of nutritional intake quality for each state.

Crime data were from the Statistical Abstract of the US. We analyzed the average number of arrests made during 1994-1996 in each state for violent crimes (murder, aggravated assault, robbery, and forcible rape) and property crimes (burglary, vehicular theft, and theft). Robbery is classified as violent because it means taking things directly from a person, whereas the property crimes are generally committed in the victim's absence.

SAT scores were from the College Board database and included average SAT scores for each state in 1998 (data from 1994-1997 were not available) as a function of race/ethnicity (i.e., American Indian or Alaskan Native, Asian or Pacific Islander, Black, Hispanic, White, or Other).

Demographic data were from the 1994-1996 versions of the Statistical Abstract of the US. Specifically, we included the ethnic/racial distribution (i.e., the percent of Hispanic, White, Black, American Indian/Alaskan Native, and Asian/Pacific Islander populations in each state) and median household income for each state.

## RESULTS

As can be seen from Table 1, nutritional intake was significantly related to the incidence of general violent crime and to the individual crimes of murder, aggravated assault, and burglary and to SAT performance. Crime rates were higher and SAT scores lower in states experiencing poorer nourishment. Moreover, these relationships remained relatively unchanged when controlling for median household income, which suggests that the results likely were not attributable to income or poverty. Having established links between nutrition and crime and SAT performance, we examined whether nutrition would account for or mediate racial differences in crime and SAT performance. The requirements for such mediation (Baron & Kenny, 1986) were met only for White and Black populations. Nutritional intake was significantly related to the percentage of the population of Whites,  $r(50) = .34$ ,  $p < .001$ , and Blacks,  $r(50) = -.54$ ,  $p < .001$ . Poorer nutrition was found in states with fewer White and more Black citizens. This is consistent with our assumption that Black citizens are on average less well nourished than White ones in today's United States.

Relatively high rates of violent crime were found in states with the lowest proportion of White and the highest proportion of Black citizens. Crucially, controlling for nutritional intake reduced the strength of these relationships (see Table 2). Sobel tests for mediation (that controlled for household income) indicated that nutritional intake significantly mediated the link between violent crime and the percent population of Whites,  $z = -2.10$ ,  $p < .05$ , and Blacks,  $z = 2.31$ ,  $p < .05$ . The mediation was partial, consistent with the idea that factors aside from nutrition influence violent crime. Together, these results suggest that violent crime rates might be lower in states with a greater White population because individuals in these states are relatively well nourished, whereas violent crime rates might be higher in states with a greater Black population because individuals in these states are relatively poorly nourished. The race difference in violent crime can be significantly reduced by equalizing the quality of food intake.

We conducted conceptually similar mediational analyses for SAT performance, but because White and Black SAT performance was a within-subjects variable (because the unit of analysis was the state), different analyses were required and a Sobel test could not be performed. Two separate repeated-measures analyses of covariance (ANCOVAs) that controlled for income indicated that Whites ( $M = 1092.62$ ,  $SD = 59.04$ ) scored higher on the SAT than did all other racial/ethnic groups combined ( $M = 1014.87$ ,  $SD = 58.00$ ),  $F(1, 48) = 694.91$ ,  $p < .001$ , and that Blacks ( $M = 909.74$ ,  $SD = 53.90$ ) scored lower on the SAT than did all other racial/ethnic groups combined ( $M = 1052.10$ ,  $SD = 61.70$ ),  $F(1, 48) = 676.73$ ,  $p < .001$ . Both of these differences dropped out of the significant range, however, when the analysis controlled for nutritional intake (for Whites,  $F = 3.32$ ,  $p = .08$ ; for Blacks,  $F = 2.08$ ,  $p = .16$ ). To be sure, there remained trends in the same direction, but the drop in  $F$  values was substantial, which provides evidence of partial mediation. Thus, differences in nutritional intake accounted for a large part of racial differences in SAT performance.

## DISCUSSION

The present findings indicate significant links between nutrition, crime, and SAT performance. Specifically, states having poorer general nutrition were marked by higher crime rates and lower SAT scores. These links do not appear to be due simply to poverty. If poverty were the explanation, then controlling for median household income should have eliminated the significant correlations, but it did not. If anything, the results became stronger when we controlled for income. The correlation between nutrition and robbery rates increased from nonsignificant to significant, and the correlation between nutrition and SAT approximately doubled the percent of variance accounted for, when we controlled for income. Thus, independent of poverty, it appears that nutrition strongly predicts crime and academic test scores.

The effects were mainly found for violent crime rather than property crime. We conducted five analyses involving violent crime rates (murder, aggravated assault, robbery, rape, and the composite), and all except rape showed significant links to nutrition. The link to rape may have failed because the statistics are problematic due to erratic reporting, or it is possible that the motivational basis for rape differs from that of the other violent crimes. In contrast to the generally strong links to violent crime, nutrition mostly failed to predict rates of property crime, with the odd exception of burglary (and burglary was the only variable to drop by a level of significance when income was controlled). One might have predicted the opposite pattern, on the assumption that badly nourished or starving people steal so as to get money to buy food. But that does not appear to be correct.

Perhaps the best way to summarize the first set of results is that poor nutrition contributes mainly to committing crimes against persons rather than crimes against property. Compared to well-fed persons, undernourished persons seem to have a more antagonistic way of treating other people. It is possible that poor nutrition contributes to irritability or in some other way increases aggressive impulses (see Liu, Raine, Venables, & Mednick, 2004). Again, a line of reasoning based on strictly pragmatic concerns might have predicted the opposite, on the basis of hunger leading to property crimes as people seek to gain money to feed themselves and their families, but the data suggest that the primary impact of poor nutrition is on interpersonal relations.

This points to a more complex explanation, such as poor nutrition affecting the brain and thereby reducing self-control, which in turn produces more interpersonal violence (e.g., Gottfredson & Hirschi, 1990).

Race differences were the main focus of this investigation. There was evidence of racial differences. Specifically, states with higher Black and lower White proportions of the population had poorer nutrition, more crime, and lower SAT scores.

Our most important and novel finding was that nutrition partially mediated the behavioural differences. The links between state racial composition and crime were significantly weaker after controlling for nutrition, although they remained significant, and other analyses confirmed partial mediation by nutrition. Put more simply, poor nutrition accounted for part of the link between race and crime.

Turning to the scholastic testing, we found that controlling for nutrition eliminated the racial differences. The initial analyses found that White students performed better than other racial groups and Blacks performed worse on the SAT — but when we controlled for nutrition, these differences diminished to the level of nonsignificant trends.

The present findings are correlational, and so they cannot test causal hypotheses. For example, it is impossible from the present findings to assert whether poor nutrition impairs scholastic performance or whether factors associated with impaired scholastic performance lead to poor dietary habits. However, prior work has indicated a causal role for nutrition (e.g., Gesch et al., 2002; Schoenthaler et al., 1997), which suggests causality. We have also ruled out the most plausible alternative explanation (income) by showing that the findings remained quite strong after controlling for household income. Therefore, the most likely causal explanation is that the relatively poorer nutrition of Black as compared to White citizens contributes to their higher crime rate and lower SAT scores.

Race differences in crime and educational performance have long presented a significant social problem to American society. The present findings offer a note of hope for reducing those differences. Insofar as nutrition contributes to those problematic behavioral differences, they may be more amenable to amelioration than has sometimes been hoped, because nutrition may be easier to improve than many of the other hypothesized causes. In particular, nutrition is something that at-risk families themselves may be able to control and improve more readily than other factors. Meanwhile, both research and social engineering policies should explore whether interventions to improve the nutrition levels of malnourished families can lead to a reduction in crime and improvements in school performance.

At the broadest level, the present findings are consistent with the general move toward a new understanding of mind-body dynamics that is even wider than the important contributions of cognitive neuroscience. Interpersonal behavior in human society depends on brain and psychological processes, which in turn are affected by bodily energy processes that depend on long-term food intake. The present findings offer one small indication that a person's ability to solve mathematical problems, use language effectively, and refrain from committing violent acts against other persons depends in part on the quality of food the person has been eating.

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**Table 1**

	<u>Nutritional Intake</u>	<u>Nutritional Intake (controlling for income)</u>
Violent Crime	-.34*	-.37**
Murder	-.49**	-.44**
Aggravated assault	-.38**	-.37**
Robbery	-.20	-.32*
Forcible rape	-.14	-.15
Property Crime	-.12	-.13
Burglary	-.38**	-.33*
Vehicular theft	-.09	-.22
Theft	.00	-.01
SAT scores	.33*	.50**

\*\*  $p < .01$

\*  $p < .05$

**Table 2**

<u>Percent population of</u>	<u>Violent Crime (controlling for income)</u>	<u>Violent Crime (controlling for income and nutrition)</u>
Whites	-.60**	-.53**
Blacks	.62**	.53**

\*\*  $p < .01$

\*  $p < .05$