



ELSEVIER

Contents lists available at ScienceDirect

Journal of Criminal Justice

journal homepage: www.elsevier.com/locate/jcrimjus

Examining the race, poverty, and crime nexus adding Asian Americans and biosocial processes

Anthony Walsh^a, Ilhong Yun^{b,*}

^a Department of Criminal Justice, Boise state University, Boise, ID, USA 83724

^b Department of Police Administration, Chosun University, Gwangju, South Korea

A B S T R A C T

This article examines race, poverty, and criminal behavior ignoring criminological orthodoxy adding two features that spoil the politically correct mantra that black crime results from white racism. Adding East Asians, who surpass white Americans in almost every index of prosocial behavior despite experiencing a history of prejudice and discrimination aimed at them, casts serious doubt on that contention. To be consistent with structural arguments for black poverty and crime, proponents would have to attribute Asian successes and low crime rates to pro-Asian bias on the part of whites to their own detriment. The second addition is biosocial science. This perspective links criminology to other more advanced disciplines and research methodologies and uses their theories, techniques, and technology, such as allostasis, epigenetics, DNA analysis and neuroimaging. No group has suffered more from poverty and crime than African Americans, and no group will benefit more from a forthright examination of its causes.

1. Mainstream explanations for African American crime

LaFree and Russell (1993, P. 273) once famously remarked that: “All roads in American criminology eventually lead to issues of race.” These roads almost always lead to black/white crime comparisons, with the disproportionate criminal activity of the former being laid at the door of a racist society dominated by the latter. Any other explanation is strictly taboo, a situation which has led to “an unproductive mix of controversy and silence” (Sampson & Wilson, 2000, p. 149). Asian Americans are routinely ignored in discussions of racial issues because, as African American economist and philosopher Thomas Sowell (2015) suggests, doing so aids the case for claims of racial discrimination against blacks. He writes that when schools punish black students more than white students, or lenders turn down more black applicants than white applicants, the media sees discrimination, ignoring the fact that schools punish white students more than Asian students, and lenders turn down whites more often than Asians, and adds: “Most statistics on such things omit Asians, rather than spoil a politically correct story.” Asian Americans have suffered widespread prejudice and discrimination in the U.S. but not only do they commit far less crime than African Americans and enjoy higher income, they also commit less crime and enjoy higher mean household income than whites. This spoils a good politically correct criminological story.

In their book *A Theory of African American Offending* (hereafter,

TAAO), Unnever and Gabbidon (2011, p. 1) maintain that black crime is a response to “living within a conflicted racially stratified society.” They document the huge overrepresentation of blacks in violent crime and put it down to black male perceptions of racial injustice and to the extent to which they believe in the “*criminalblackman* stereotype.” Unnever (2014) gives as an example of this negative stereotyping a survey indicating that whites consider blacks five times more violent than themselves, which is actually a large underestimation rather than a “stereotype” Steffensmeier, Feldmeyer, Harris, and Ulmer (2011) point out the black homicide rate is 12.7 times higher than the white non-Hispanic rate. More importantly for this article, from UCR crime (FBI, 2014) and population (U.S. Census Bureau, 2014) data for 2013, we calculated that the black homicide rate was 17.3 times larger than the Asian rate, and according to the Radford University serial killer data base (Aamodt, 2014), of the 318 known serial killers in the U.S. between 2000 and 2010, 56.6% were black, 31.8% white, 10.7% Hispanic, and 0.06% Asian.

TAAO borrows key risk factors from various criminological theories and trace them all to racism. From labeling theory, it asserts that many blacks take on the *criminalblackman* label as part of their self-identity. From control theories, TAAO avers that perceptions of discrimination weaken social bonds and deplete self-regulatory resources by inducing anger. From general strain theory, it maintains that racism generates negative emotionality, which in turn results in crime, and from social

* Corresponding author.

E-mail addresses: twalsh@boisestate.edu (A. Walsh), ilhongyun@chosun.ac.kr (I. Yun).

<http://dx.doi.org/10.1016/j.jcrimjus.2017.05.017>

Received 23 February 2017; Accepted 15 May 2017

0047-2352/ © 2017 Elsevier Ltd. All rights reserved.

learning theory these things lead to associations with others who share the same worldview.

Unnever (2014) tested core hypotheses from TAAO among a sample of 3570 blacks and found that arrest, substance abuse, low self-control, anger, and depression were related to perceptions of racial discrimination, acceptance of the violent black man label, and a racialized worldview. All dependent variables were found to be significantly related to both perceptions of racial discrimination and acceptance of the violent black man label. Racial discrimination was measured by responses to questions in which the word “unfairly” was underlined: “Have you ever been unfairly” fired, not hired, denied a bank loan, stopped by the police, and so on. It is unlikely that people of any race responding affirmatively to such questions would admit they were treated fairly. We have no argument with the findings that many blacks (38% of respondents) feel they have been discriminated against, or that most (74%) expressed some belief in the “Blacks are Violent” measure. Nor do we deny that such perceptions might lead to negative outcomes, but we view these things through a different lens. A pervasive belief that one’s woes are the result of forces outside of ourselves leads to what African American scholar John McWhorter (2000) views as a stultifying surrender to the cult of victimhood that sabotages self-reliance and excuses failure. As for the *criminalblackman* label, Elijah Anderson (1994, p. 89) tells us that “bad ass” reputation is so valued that: “Many inner city young men...will risk their lives to attain it.” Anderson (1999, p. 107) also tells us that such attitudes are spawned in black neighborhoods with a hostile oppositional culture that spurns mainstream values, as in “the rap music that encourages its young listeners to kill cops, to rape, and the like.”

Anderson’s explanations are framed in cultural terms, but cultural explanations are considered thinly veiled racist (Almgren, 2005) because the carriers and perpetrators of culture are people, and to invoke culture is to “blame the victim.” As Patterson (2014, p. 2) puts it: cultural explanations are subject to “outright contradiction—bad, even racist, when used to understand the poor or minority behavior; good, and desperately grasped, when used to explain the racial IQ gap.” For instance, Rank, Yoon, and Hirschl (2003, p. 6) list features such as “birth outside of marriage, families with large numbers of children, and having children at an early age,” and blame them on structural failure; they do not explain why these behaviors are structural rather than the products of human choice.

While choices people make are guided and constrained by culture, and culture is influenced by structure, we should never ignore human agency. The leading contemporary figure in human ecology, Robert Sampson, insists that interacting individuals create the conditions in which they live in real time, and that the structure versus culture argument produces a false dichotomy because they are mutual creations of each other. They argue that culture is not simply an “adaptation to structure in a one-way causal flow, but an intrasubjective organizing mechanism that shapes unfolding social processes and that is constituent of social structure. From this perspective culture is simultaneously an emergent product and a producer of social organization, interaction, and hence structure” (Sampson & Bean, 2006, p. 29). Moffitt and Beckley (2015, p. 122) agree, noting that that criminogenic environments are selectively created by people engaging in antisocial behavior: “Thus, selection effects account for much of the observed correlations between crime and many of its putative environmental risk factors.”

2. The Asian American experience in the U.S.

East Asians, particularly the Chinese, have also suffered racism in the U.S. Although unlike blacks the Chinese came to the United States voluntarily, they were less than welcome. They became the targets of legal and extralegal harassment, subjected to special taxes (the foreign miner’s tax), barred from holding land or citizenship, and beaten, lynched, and driven out of towns across the West. The conditions of their

employment often amounted to what Kitano and Daniels (1995, p. 22) called “a new system of slavery” The Chinese were also subjected to nasty stereotypes: “They were accused of living in filth, harboring disease, being heathens, and, worst of all, being less than human. Their sexual habits were compared to those of animals; questions of character and honesty were constantly raised” (Kitano & Daniels, 1995, pp. 183–184). Despite these hardships and negative stereotypes, the Chinese have never had a reputation for being criminally inclined. Since gaining full access to educational and occupational opportunities (Chinese were not allowed to vote until 1947), the Chinese and other Asian Americans have made great strides and now enjoy median family incomes in excess of that of whites (Pew Research Center, 2013). Moreover, they have done this with far less political clout than African Americans enjoy.¹

If a history of discrimination have not resulted in high crime rates relative to whites among Asian Americans, neither has another alleged risk factor—hyper-ghettoization. Hyper-ghettoization supposedly feeds high concentrations of poverty and crime (Sampson & Wilson, 2000). Yet Patterson (1998) points out that millions of people around the world live in disadvantaged segregated areas without resorting to the kinds of behavior prevalent in our inner cities. Moreover, Wilson & Herrnstein (1985, p. 474) point out that low crime rates among Asians have been explained by hyper-ghettoization: “what is striking is that the argument used...to explain low crime rates among Orientals—namely, being separate from the larger society—has been the same argument used to explain high rates among blacks.” It would be naive to suggest that the lingering effects of slavery and racism have not had at least some effect on the behavior of blacks in America, but this does not explain why they would be so affected by their history of victimization when Asians seem not to be affected at all.²

3. How racist is the modern United States?

It would be naïve to deny that racism does not exist today. Although it is an article of faith in some circles that only whites are racist, a Rasmussen (2013) poll found that more African Americans (31%) thought that “most blacks” are racist compared to 24% who thought the same about whites. Of course, anti-black racism is by no means dead, but we have a national holiday celebrating Martin Luther King, the only individual of any race so honored, and blacks win mayoral races across the U. S. in cities where they are a minority of the population (Thernstrom & Thernstrom, 2009). We have Secretaries of State, Supreme Court Justices, four-star generals, and countless others in high ranking positions in government, military, business, and education. The election of Barack Obama to the Presidency twice speaks volumes about current racial attitudes. Obama garnered more of the white vote in 2008 than white Democratic candidate John Kerry received in the previous presidential election (Caswell, 2009).

However, those with a vested interest in keeping racism alive talk about such things as “symbolic racism” and “laissez-faire racism,” which are supposedly expressed subconsciously. Whites are racist if they endorse traditional values (hard work, personal responsibility, marriage commitment, etc.) or voice resistance to racial preference policies (Hughes, 1997). Another form of racism called “aversive

¹ African Americans probably constitute the most powerful voting bloc in America. Every Democratic President of the United States since 1968 won their elections by virtue of the 80-plus percent of African American voters who voted for them; no Democratic president since 1964 has garnered a majority of the white vote (Thernstrom & Thernstrom, 2009).

² The Jewish experience also destroys a good politically correct story. The Jews are history’s perennial victims of pogroms, discrimination and hyper-ghettoization. They constitute 0.2% of the world’s population but won 14% of the Nobel Prizes in the first half of the 20th century, 29% in the second half, and 32% in the present century, and are the richest group of people in the U.S. and in many other countries (Botticini & Eckstein, 2012). Botticini and Eckstein (2012) argue that they did this not despite of, but because of, their history of victimization.

racism” is capable of capturing the most liberal of whites if they feel culturally advantaged or “a mild discomfort, or fear around blacks” (Zuriff, 2002, p. 121). Lumping together opponents of racial preference programs, supporters of traditional values, and people who feel uncomfortable around blacks assures that just about all whites will be defined as racist. This is a satisfying state of affairs for those whose careers rest on finding racism everywhere they look, but there is real damage done to race relations by conflating Jim Crow racism with these “subconscious” versions.³ The effect on blacks hearing from some sanctimonious academic that all whites are racist can be nothing but negative.

The ultimate form of racism is “institutionalized racism” because it does not matter what attitudes and values whites hold, or whether or not they seek to harm minorities, since “The key issue” remarks Georges-Abeyi, “is result, not intent” (Georges-Abeyie, 1990, p. 28). In this view it is permissible to infer racism from the failure of African Americans to succeed at levels similar to those of other racial groups. Georges-Abeyi defines institutionalized racism as:

the result of overt racism, of de facto practices that often get codified, and thus sanctioned by *de jure* mechanisms. Examples of institutionalized racism include: the hiring of white guards and law enforcement officers; the election of white court officials; the implementation of “objective” Eurocentric testing procedures that select the most Eurocentric non-whites available; and the subsequent institutionalization of seniority procedures that penalize the historically excluded (1990, p. 28).

By definition, institutionalized racism is a racism supported by a legal framework and socially endorsed. De facto racist practices used to be sanctioned by Jim Crow laws, but these disappeared > 50 years ago. Georges-Abeyi does not provide a contemporary example; rather, he offers a laundry list of alleged wrongs that supposedly thwart black ambitions. Evidently, we should never hire or elect whites, use standardized tests to determine who merits what, or utilize the seniority system at work. His complaint about hiring whites in law enforcement is belied by a Bureau of Justice Statistics report stating that blacks constitute 20.1% of the police officers across the United States, which means that they are over-represented (Reaves & Hickman, 2002), and police departments assiduously attempt to hire and promote black officers, even to the extent of using less stringent hiring criteria than are applied to other groups. By way of contrast, Dempsey and Forst (2011) report that in 2000, Asians were 4.2% of the U.S. population but only 1.6% of police officers and sheriff's deputies across the nation.

In her essay on institutional racism, Coramae Mann (1995) expressed outrage that “only” 16% of the delegates at the 1992 Democratic National Convention were black, which means that blacks were actually overrepresented (by 25%) with respect to their proportion in the population. Mann also tells us that 60% of the Southern population was black, as were 68% of the legislators; 4% percent of the Western states were black, as were 4% of the legislators; 17% of the Midwestern region was black, as was 18% of the legislators. Only in the states Northwestern were blacks underrepresented (15% percent of the population; 10% of the legislators). One wonders how Mann could claim any kind of racism from the figures she herself supplies.

A U.S. Office of Personnel Management (USOPM, 2011) study showed that blacks are massively over-represented in all 22 federal agencies and 16 of 17 federal executive departments, and that federal agencies provide their managers with “superbonuses” for hiring,

³ In the early 20th century, Booker T. Washington (1972:30) wrote about “community leaders” with a vested interest in fanning racism: “There is another class of colored people who make a business of keeping the troubles of the Negro race before the public. Having learned that they are able to make a living out of their troubles, they have grown into the settled habit of advertising their wrongs—partly because they want sympathy and partly because it pays. Some of these people do not want the Negro to lose their grievances, because they do not want to lose their jobs.”

training, and promoting non-whites over whites. While constituting just over 10% of the U.S. workforce, blacks are 24% of the employees at Treasury and Veteran's Affairs, 28% of the State Department, 37% of Department of Education, 38% of Housing and Urban Development, 42% of the Equal Opportunity Commission, 53% of the Government Printing Office, 44% and 50%, respectively of the quasi-government organizations, Fannie Mae and Freddie Mac, and 81% of the Court Services and Offender Supervision Agency (CSOSA) (USOPM, 2011). CSOSA lists 100% of its first level managers, 81% mid-level managers, and 63.1% of its senior level managers as black (U.S. Equal Employment Opportunity Commission, 2009).

Despite this, Feagin (2014, p. 187) still insists that: “Being black in U.S. society means always having to be prepared for antiblack actions by whites—in most places and at many times of the day, week, month, or year.” Feagin should know that antiwhite actions by blacks are far more common than “antiblack actions by whites,” but he has made a career out of castigating white society, so why let facts get in the way? Prior to 2008, the Bureau of Justice Statistics (BJS) published reports of interracial crime statistics (Table 42 in each year) that showed this to be the case in all violent crimes in which the race of victim/offender dyads were known. From the 2008 statistics we find that for rape, blacks victimized whites 16.4% of the times while there were no white/black rape victims. For robbery, blacks chose white victims 35.6% of the time, and whites chose blacks 8.2% of the times; for aggravated assault the numbers were black-on-white 17.6%; white-on-black 12.7% (BJS, 2010).⁴ From the 2014 UCR (FBI, 2014) we find that whites (a category that includes Hispanics) murdered 189 blacks in 2013, and blacks murdered 409 whites. Given these figures, Feagin would have been more accurate to write: “Being white in U.S. society means always having to be prepared for antiwhite actions by blacks.” We cannot soberly and honestly assess racial crime differences as long as academics continue to make patently false, wildly exaggerated, and incendiary statements.

4. Is poverty the problem?

If we cannot demonstrate racist intent, can we infer it from black performance vis-à-vis that of other races. Poverty and crime are often linked, but what drives poverty? In 2012 the median household income for Asians was \$68,521; whites \$67,175; Hispanics \$40,007, and for blacks it was \$39,760 (Pew Research Center, 2013). These figures produce a perfect inverse rank-order correlation with crime rates, but crime rates have a perfect *positive* rank-order correlation with the rate of out-of-wedlock births across racial categories, and median income levels have a perfect *inverse* rank-order correlation with out-of-wedlock birth rates. The U.S. Department of Health and Human Services (2011) lists illegitimacy rates of 73.5%, 53.3%, 29%, and 17% for African-, Hispanic-, European-, and Asian-Americans, respectively.

> 25 years ago Ellwood and Crane (1990, p. 81) noted that the prevalence of single-parent families is so high in the black community that: “[A] majority of black children are now virtually assured of growing up in poverty, in large part because of their family status.” The U.S. Census Bureau's (McKinnon & Humes, 2000) breakdown of family types by race and income showed white single-parent households were more than twice as likely as black two-parent households to have an annual income of less than \$25,000 (46% versus 20.8%). To state it in reverse, a black two-parent family is less than half as likely to be poor as a white single parent family. This is powerful evidence against the thesis that black poverty is the result of white racism. To be logically consistent with a racism argument one would also have to claim that the Asian advantage in income level and illegitimacy rate is the result of whites favoring Asians over themselves, which of course no one would

⁴ Since Obama, with his promise of a “transparent administration”, came into office the BJS has stopped reporting interracial crime statistics (Johnson & Corbin, 2015).

believe.⁵

Paterson (1998, p. 41) notes the dialectic synthesis between structure and culture when he traces the sexual mores (culture) of the inner cities back to circumstance imposed on blacks by slavery (structure). In response to slavery: “Afro-American men and women developed a distinctive set of reproductive strategies in their struggle to survive. Tragically, the strategies that were most efficient for survival under the extreme environment of slavery were often the least adaptive to survival in a free, competitive social order.” Likewise, toward the end of the 19th century, W.E.B. Du Bois wrote: “The lax moral habits of the slave regime still show themselves in a large amount of cohabitation without marriage,” and a “lack of respect for the marriage bond” (Du Bois, 1967, p.69). Kenneth Clark (who grew up in ghetto poverty) saw illegitimacy as the root of the “institutionalized pathology of the ghetto...Not only is the pathology of the ghetto self-perpetuating, but one kind of pathology breeds another. The child born in the ghetto is more likely to come into a world of broken homes and illegitimacy; and this family and social instability is conducive to delinquency, drug addiction, and criminal violence” (Clark, 1965, p. 81). And in Martin Luther King’s words, these: “shattering blows on the Negro family have made it fragile, deprived, and often psychopathic” (in Burrell, 2010, p. 15).

Elijah Anderson supports the notions of Du Bois. Paterson, Clark, and King when he states that in the inner-city, access to females is “taken quite seriously as a measure of the boy’s worth;” a young male’s “primary goal is to find as many willing females as possible. The more ‘pussy’ he gets, the more esteem accrues to him” (Anderson, 1999, p. 150). Sampson and Wilson make much the same point when they write of “Ghetto-specific practices such as an overt emphasis on sexuality and macho values” (Sampson & Wilson, 2000, p. 156). Commentaries such as these would be angrily dismissed as racist if made by whites, but Anderson, Clark, Du Bois, King, Patterson, and Wilson are all respected black scholars with impeccable liberal credentials and are thus free to be brutally candid in areas where only the most courageous whites are willing to go.

5. Education and poverty

Many African Americans are disadvantaged in the workplace by educational credentials that do not permit them to compete successfully. This is not the result of denial of opportunity: “Despite unprecedented opportunities for ‘equal’ employment, and the best intentions of liberal politicians, millions of blacks simply lack the basic skills required for employment in a technology-driven economy” (Clarke, 1998, p. 255). This lack of preparation is underlined in racial gaps in SAT scores. As *The Journal of Blacks in Higher Education* (2008, p. 3) pointed out, in 2005: “Whites from families with incomes below \$10,000 had a mean SAT score that was 61 points higher than blacks whose families had incomes of between \$80,000 and \$100,000.”

A widespread belief is that the poor educational performance of blacks is the result of low funding for schools in predominantly black districts. The experience of the so-called magnet schools provides the best evidence that more school spending is not the answer. To improve the education of black students and enforce desegregation, in 1982 a federal judge ordered the Kansas City Missouri School District to implement methods to draw white students into the inner city schools and to provide the funds to do so by doubling property taxes. The school district built 15 new schools and renovated 54 others, increased teacher salaries by 40%, reduced class sizes, and built educational and recreational facilities that rivaled those existing in the most elite universities

⁵ Amidst all this talk of poverty we often forget that there is a thriving black middle class which economist Glen Loury describes as “the most privileged, empowered people of African descent anywhere on the globe,” and about which black economist Walter Williams writes: “Blacks spend enough money each year to make us, if we were a nation, the 14th richest” (in Walsh & Hemmens, 2008, p. 307).

in the country (Gewertz, 2000). At one point, 44% of the K-12 education budget was being spent on the 9% of Missouri’s students enrolled in Kansas City and St. Louis magnet schools (Ciotti, 1998). Yet white students were still from three to five years ahead of black students on standardized tests (Ciotti, 1998). The magnet schools failed in all indicators of performance (Gewertz, 2000), and the 17-year experiment ended in 1999.

The low level of black achievement and high level of poverty can be attributed to the devaluation of education. Anderson (1999, p. 65) points out valuing education and striving for upward mobility is viewed as “dissing” the neighborhood and street people often “mount a policing effort to keep their decent counterparts from ‘selling out’ or ‘acting white.’” Patterson (1998, p. 278) notes that: “there is now such chronic anti-intellectualism among Afro-American youth that those few, by some sociological miracle, become involved in their studies must find ways to camouflage their interests.” Clarke likewise states that: “In black inner-city schools academic success has become an invitation to ridicule or worse” (Clarke, 1998, p. 287). McWhorter (2000, p. 31) also blames black educational failure on the “cult of victimology”, which leads to a “cult of separatism”, and finally to a cult of “anti-intellectualism”. Asian Americans, in contrast, value education very highly and achieve proportionately more undergraduate and graduate degrees, especially in STEM disciplines, than whites (Hartlep, 2013).

6. Poverty, epigenetic modifications, Allostasis, and criminal behavior

The rest of this paper examines African American criminal behavior through a biosocial lens. Theories that rely on social class and poverty to explain crime cannot explain variance in criminal behavior within social class. We are told there are many “decent” families in neighborhoods sharing the same class and poverty status as “street” families, although the cultural ambiance in those neighborhoods is set by the latter (Anderson, 1999). If we look at Asian Americans in those same poverty conditions, we find that even in the heyday of social ecology theory, Asian Americans living in the poorest neighborhoods had low crime rates (Hayner, 1933). More modern theories that tie violence in response to minor slights to deindustrialization and the loss of well-paid factory jobs (Anderson, 1999; Sampson & Wilson, 1995) cannot explain why the same slights led to violence in the 1950s when such jobs were in abundance (Rocque, Posick, & Felix, 2015).

Structure and culture are constituent of each other, and what emerges from the synthesis has effects on human behavior, but it by no means has similar effects on everyone sharing it. Clearly, we have to go beyond raw demographics to explain why some people become criminal while other demographically similarly situated people do not. Too many black children are born into fatherless homes in neighborhoods riddled with violence and poverty for which the children bear no responsibility, and the conditions in which these children grow up require a biosocial analysis of how the environment penetrates the person down to the molecular level. As former president of the American Sociological Association, Douglas Massey (2004, p. 22) explains:

[by] understanding and modeling the interaction between social structure and

allostasis, social scientists should be able to discredit explanations of racial

differences in terms of pure heredity. In an era when scientific understanding

is advancing rapidly through interdisciplinary efforts, social scientists in general

—and sociologists in particular—must abandon the hostility to biological science

and incorporate its knowledge and understanding into their work.

Epigenetics and allostatic processes are central to a biosocial understanding of the impact of environmental adversity because they can alter stress response patterns (Ganzel & Morris, 2011). While gene-

environment interaction ($G \times E$) studies have yielded a trove of information about human health and behavior, $G \times E$ effects are not only about variant alleles interacting with variant environments, but also about environmentally-dependent gene regulation. Rather than it being simply a matter of which allele of a gene a person has, it may be more relevant to determine whether and to what degree a gene is activated (Landecker & Panofsky, 2013). We limit our discussion to the earliest years of life when the brain is most responsive to calibration by the environment. Early experiences organize the infant brain and place it on a trajectory that is difficult to change.

7. Epigenetic processes

Epigenetics is defined as “any process that alters gene activity without changing the DNA sequence” (Weinhold, 2006, p. 163). Despite the fidelity with which DNA replicates itself, the genome is subject to non-mutational changes initiated by a number of factors including environmental experiences. Epigenetic modifications affect the ability of the DNA code to be read and translated into proteins by making the code accessible or inaccessible (Gottlieb, 2007). DNA itself only specifies for transcription into messenger RNA (mRNA) which itself has to be translated by transfer RNA (tRNA) that carries the appropriate amino acids to ribosomal RNA (rRNA) where they are assembled into proteins. Genes are switched on and off by regulatory signals, “which may be internal or external to the organism; e.g., a change in the availability of glucose, an electrical impulse, or a *social interaction*” (Meaney, 2010, p. 50; emphasis added).

The epigenetic regulation of genetic activity is accomplished by a number of processes, but we concentrate on DNA methylation. Methylation prevents gene expression and may be permanent or semi-permanent (it is retained during cell replication) and occurs when the enzyme DNA methyltransferase attaches a methyl group of atoms to a cytosine base (one of the 4 nucleotide “letters” of DNA) (Carey, 2012). The initial process of reading the DNA code for a protein is carried out in the cell nucleus by RNA polymerase (RNAP). When a signal is received to manufacture a protein, RNAP runs along the DNA strand reading the recipe for that protein and fashions a complementary strand of mRNA, which leaves the nucleus and enters the cell's protein factory. A methyl group attached to the cytosine base prevents the code from being read—no transcription order, no protein.

The relevance of epigenetics for criminology centers on the importance of early nurturing. The earliest studies linking methylation to maternal care were done with rodents, with nurturing indexed by the level of pup licking and grooming (LG) and arch-back nursing (ABN) (Weaver et al., 2004). It was found that the offspring of high LG/ABN mothers showed better responses to stress and were generally more socially adept than offspring of low LG/ABN mothers. To determine how much of this was attributable to genes and how much to the nurturing experience, a portion of the pups from each strain was then cross fostered (high LG/ABN mothers fostering pups born to low LG/ABN mothers, and vice versa).

The study showed that the behavior of rodent mothers led to similar epigenetic modifications in pups, regardless of whether pups were her own offspring or cross-fostered, and that these alterations resulted in stable behavioral differences in adulthood. Low nurtured pups showed a high degree of methylation of genes coding for receptors in the hypothalamic-pituitary-gonadal (HPA) axis, the system that regulates stress responses. High methylation of receptors in the hypothalamus renders many of them inoperable, while unmethylated genes produce more hypothalamic receptors, which results in better feedback control of the stress response.

High rates of HPA methylation have been observed in orphanage-raised children. One study compared children raised since birth in orphanages in Russia with children raised by both biological parents. The researchers found that the institutionalized children showed a greater methylation of genetic systems controlling immune response and in

mechanisms important in the development and function of the brain. The research team noted the consistency with previous animal and human studies, “particularly, the presence and level of maternal care are highly responsible for the epigenetic regulation of genes involved in the control of the hypothalamic-pituitary-adrenal system” (Naumova et al., 2012, p. 8).

Wismer-Fries, Ziegler, Kurian, Jacoris, and Pollak (2005) compared Romanian orphans who had been in orphanages an average of 16.6 months before being fostered to American middle-class families with a matched control group of American children reared by their biological parents. The foster children showed significantly lower levels of the neuropeptides vasopressin and oxytocin (the “cuddle chemical”) than controls and also significantly lower levels after experimental interaction with their mothers, which normally increase neuropeptide levels. These results suggest epigenetic down-regulation of neuropeptide receptors in response to a 16-month absence of a species experience-expected practice, namely, tactile comfort and warm attachment experiences (Schury & Kolassa, 2012). Neuropeptides also help to regulate the HPA axis and the autonomic nervous system (ANS), the two interrelated systems controlled by the hypothalamus (where oxytocin and vasopressin are synthesized) that respond to stress (Carter, 2005).

While many biosocial scientists are excited about the promise of epigenetics because it unites nature and nurture in a palpable way, it is in its infancy and specialists caution against “serving epigenetics before its time” (Juengst, Fishman, McGowan, & Settersten, Jr., 2013, p. 427). Methylation is normative and ubiquitous in the genome and only rarely is it induced by environmental experiences. It is asserted that finding environmentally-induced methylated genes with a high degree of certainty requires brain cell tissue rather than saliva or blood as is done in human samples (Mill & Heijmans, 2013; Moffitt & Beckley, 2015). The rat pups in the Weaver et al. (2004) study, for instance, were “sacrificed” in order to examine hypothalamic methylation. However, studies of human brain tissue from suicide victims have found hypermethylation in male suicide victims known to have suffered high levels of abuse as children compared with suicide victims without such history and male controls who died of other causes (McGowan et al., 2009). Furthermore, a recent study (Smith et al., 2015) designed to evaluate whether blood and saliva DNA is suitable for studies of psychiatric disorders compared DNA methylation patterns in saliva and blood samples from 64 African American adults with methylation patterns from brain tissue obtained from a publically available dataset. It was concluded that using DNA from saliva (more so than blood) is a reliable proxy for actual brain tissue to examine methylation.

8. Allostatic load

Allostasis is “stability through change,” and refers to mechanisms enabling a bodily system to adjust to potentially harmful stimuli by retuning the system to different set points rather than the same set points as in homeostasis. Allostatic effects are more easily assessed than epigenetic effects. Adverse experiences such as abuse and neglect influence the function of key neurophysiological systems to change their set points by activating processes that re-regulate them in ways that are adaptive in the short term, but the cumulative cost of long term adjustment leads to allostatic load. Allostatic load is the failure of a system to habituate to repeated stressors, that may lead to serious pathophysiology such as changes in regional epigenetic methylation, neural wiring changes in the brain, immune system dysfunction, psychiatric problems, and other adverse conditions (Schulkin, 2011).

Stress is a functional state of psychophysiological arousal that focuses and energizes us to confront the stressor, but toxic levels lead to disruptive changes to developing brain architecture and the dysregulation of the stress response mechanisms: the HPA axis and the ANS (Gunnar & Quevedo, 2007; Shonkoff & Garner, 2012). The adrenal glands of an organism under stress release cortisol, the fuel that energizes our coping mechanisms by increasing vigilance and activity,

and is therefore functional within the normal range. Frequent HPA axis arousal may lead to allostatic overproduction of cortisol, or *hypercortisolism*. This condition represents a failure to adapt to stress and leads to anxiety and depressive disorders such as PTSD and is most likely to be found in maltreated females (Van Voorhees & Scarpa, 2004).

Alternatively, *Hypocortisolism*, is a downward allostatic adjustment to chronic stress that leads to externalizing problems, and is most likely to be found in maltreated males (Van Voorhees & Scarpa, 2004). Unlike *hypercortisolism*, *hypocortisolism* is a functional adaptation to stress and signals a low level of anxiety and fear. While low levels of anxiety and fear in response to threat prevents system wear and tear, they are also beneficial when contemplating and carrying out criminal activity, and has been linked to early onset of aggressive antisocial behavior (McBurnett, Lahey, Rathouz, & Loeber, 2000) and to criminal behavior in general (Wilson & Scarpa, 2012).

A longitudinal study of 266 individuals (80% black) in violence-plagued Flint, Michigan, found that exposure to frequent violence resulted in hyporesponsivity to stress indexed by cortisol levels over the study period (8 years) in males, but not in females (Aiyer, Heinze, Miller, Stoddard, & Zimmerman, 2014). This supports prior studies (Van Voorhees & Scarpa, 2004) indicating that frequent stress has opposite average effects for males and females, although the study did not assess possible hyperresponsivity in females. The study further found that a strong attachment to fathers attenuated the effect for males, but attachment to mothers did not have this effect. Aiyer et al. (2014) speculated that mothers lacking the support of a spouse: “increases the emotional and psychological stress experienced by mothers, which is likely to detrimentally influence stress regulation in children” (p. 1074).

ANS arousal in response to stress is a more viscerally immediate system of responding to threat than HPA axis arousal. The ANS has two complementary branches: the sympathetic and parasympathetic systems. When an organism perceives a threat the sympathetic branch mobilizes the body for “fight or flight.” The parasympathetic system (“rest and digest”) restores the body to homeostasis after the organism perceives the threat to be over, but allostatic load can lead to permanent ANS hyper- or hypo-arousal. People are born with different genetically determined arousal set points, but our interest is in how set points in the normal range can be altered so they are less responsive to threat. Persons with a down-regulated ANS are more likely to engage in antisocial behavior. It has been known that psychopaths have significantly reduced ANS responses to fear-inducing stimuli (Blair, 2008; Walsh & Wu, 2008).

The reactivity level of the ANS is considered a major determinant of the development of a conscience via the classical conditioning of the social emotions of shame, embarrassment, guilt, and empathy (Gao, Raine, Venerables, Dawson, & Mednick, 2010; Kochanska & Aksan, 2004). A number of studies have shown that young males living in criminogenic environments who remain free of their influences show hyperactive ANS arousal under conditions of threat, thus a hyperarousable ANS is a powerful protective factor against criminal behavior (Lacourse et al., 2006). Youths with ANSs that are highly reactive and reared in criminogenic environments are less likely to commit antisocial acts than youths with hypoarousable ANSs reared in non-criminogenic environments (Brennan et al., 1997). A longitudinal study of a birth cohort found that measures of ANS responsiveness taken at age 3 strongly predicted criminal offending (official records) at age 23 independent of controls for a variety of social adversities (Gao et al., 2010). Gao et al. (2010) maintain that poor fear conditioning is indicative of amygdala and ventral prefrontal cortex dysfunction and that a lack of fear blunts the efficacy of punishment in the socialization process. Low fear and low empathy are the natural allies of crime because they index a willingness to take risks in the pursuit of selfish interests and a lack of concern for the suffering of victims (Walsh & Vaske, 2015; Wiebe, 2011).

Not surprisingly, children raised in poverty and subjected to abuse

and neglect are the most likely to evidence dysregulation of the stress mechanisms (Evans & Kim, 2007). Because inner cities are violent places in general, it is not surprising to find child abuse/neglect to be more prevalent there than elsewhere. The Child Trends Data Bank (CTDB, 2013) reported a rate of maltreatment of 14.2 per thousand for black children in 2012, 8.0 per thousand for white children, and 1.7 for Asian children. Moreover, in 2013, the homicide rate for black infants was 15.8 per 100,000 and 5.4 per 100,000 for white infants (CTDB, 2014). No data were reported for Asians, but since Asians were included in all other analyses it is possible than none occurred.

9. Abuse, neglect, and telomere length

The effects of abuse and neglect may be found all the way down to the molecular level, as on its effects on telomeres. Telomeres are regions of DNA at the end of our chromosomes that protect the ends from deteriorating. Telomeres fray a little each time a cell divides until they can no longer protect the integrity of the chromosome and the cell dies. Telomere length is frequently used as a biomarker of chronic stress. Mitchell et al. (2014) used data from 9-year-old African American boys participating in the Fragile Families and Child Wellbeing Study. They took 20 children who lived in homes with high levels of poverty, high levels of family instability, harsh parenting, and maternal depression, and compared their telomere length with 20 children who lived in affluent, stable families who were not exposed to either harsh parenting or maternal depression. It was found that children living in the most stressful conditions had telomeres on average 40% shorter than those of the children living in the most nurturing settings. This is a remarkable difference given the age of the boys.

Mitchell et al. (2014) also looked at a variety of serotonergic and dopaminergic genes and found that these genes play a large part in how environments affect individuals. Boys from disadvantaged homes with the highest “genetic sensitivity” had shorter telomeres than boys from similarly disadvantaged homes with lower genetic sensitivity scores. That is, they were more affected by the same bad environment than boys with different genotypes. It was also found that boys from advantaged homes with high genetic sensitivity to positive environments had longer telomeres than boys from advantaged homes with less genetic sensitivity. There is thus a GxE effect such that genes serve to amplify the stressful experiences of harsh environments for some children, and magnify the advantage of supportive environments for others.

Another study (Asok, Bernard, Roth, Rosen, & Dozier, 2013) of childhood stress gauged by parental quality and exposure to violence found similar results and hypothesized that HPA axis dysregulation is the mechanism by which damage is done to telomeres. They propose that HPA axis response to acute stressors releases increased levels of cortisol resulting in increased production of free reactive oxygen species (ROS). ROSs are chemically reactive molecules containing oxygen which are normal products of cellular metabolism that are generated by combining the food we eat with oxygen, but too many can cause damage to DNA and cell membranes, and cause irreparable breaks in telomeres. ROSs do their damage by stripping electrons from other atoms in order to gain electrical stability. In doing so they create instability in other atoms making them unstable in turn, causing molecular chaos.

10. Testosterone, serotonin, cortisol, and violence

We now turn our attention to a number of environmental and genetic factors that may explain the black > white > Asian pattern in criminal behavior consistently found wherever the three races coexist (Eysenck & Gudjonsson, 1989; Rushton & Whitney, 2002). Of particular importance is violent behavior since it is violent crime more than property crime that most separates the races. From an evolutionary point of view, the major long-term factor in violence instigation is how much violence a person has been exposed to in the past. As Gaulin and

McBurney (2001, p. 83) explain, when many acts of violence are observed: “there is a feedback effect; each violent act observed makes observers feel more at risk and therefore more likely to resort to pre-emptive violence themselves.” The neurological literature is consistent in suggesting that impulsive aggression is the proximate behavioral expression of a brain wired by consistent exposure to violence (Niehoff, 2003). If our brains are wired in abusive, neglectful, and violent environments we naturally come to expect hostility from others and behave accordingly. But by doing so we invite the very hostility we are on guard for, thus confirming our belief that the world is a dangerous and hostile place and setting in motion a vicious circle of negative expectations and confirmations. This is another example of the dialectic interface of structure and culture with violence being a product and producer of both.

In addition to heightened threat vigilance, chronic exposure to violence desensitizes those exposed to it and makes them callous and indifferent to the suffering of others (Cooley-Quille, Boyd, Frantz, & Walsh, 2001). Desensitization is assessed by fMRI studies showing decreased activity in brain structures that regulate aggression (e.g., anterior cingulate gyrus and prefrontal cortex areas) and increased activity in structures associated with increased aggression such as the amygdala (Murray et al., 2006; Sterzer, Stadler, Krebs, Kleinschmidt, & Poustka, 2003). A survey of children attending an inner city pediatric clinic found that 10% of them had witnessed a shooting or stabbing, and almost all of them had witnessed violence many times in the home or in the streets (Taylor, Zuckerman, Harik, & Groves, 1994). Another study found that 33% of school children in Chicago had witnessed a homicide and 66% had witnessed a serious assault; 32% of Washington, DC children and 51% New Orleans children had been victims of violence, and 72% of Washington, DC and 91% of New Orleans children had witnessed violence (reviewed in Osofsky, 1995).

The triple imbalance hypothesis (TIH) of Van Honk, Harmon-Jones, Morgan, and Schutter (2010) brings together several lines of research on violence and avers that it is facilitated by an imbalance of three neurohormonal systems: the subcortical, cortical-subcortical, and cortical systems. The subcortical imbalance hypothesis maintains that aggression is motivated by imbalances of the steroid hormones cortisol (low) and testosterone (high). High testosterone (T) facilitates dominance striving, and low of cortisol reduces fear and anxiety. T (an anabolic steroid) is the end product of the hypothalamic-pituitary-gonadal (HPG) axis, and cortisol (a catabolic steroid) is the end product of the HPA axis. The two endocrine axes have mutually inhibitory effects on each other. Stress-induced activation of the HPA axis inhibits HPG axis functioning, with high acute doses of cortisol resulting in the reduction of T. Conversely, high T inhibits the adrenal glands' responses to adrenocorticotropic hormone (ACTH) that stimulates the release of cortisol (Brownlee, Moore, & Hackney, 2005). The T-cortisol interplay is part of a system influencing autonomic responses to threats and thus modulates approach-avoidance behaviors. As Terburg, Morgan and van Honk (2009, p. 217) put it: “high testosterone/low cortisol ratios seem to predict approach motivation/reward sensitivity. In these motivational stances, individuals are more likely to confront threat, which could result in aggressive behavior. A high testosterone/cortisol ratio therefore predisposes for socially aggressive behaviors.”

Cortical-subcortical imbalance is the second leg of the TIH. The T-cortisol imbalance down-regulates cortical-subcortical communication, leading to cortical-subcortical imbalance by decreasing the coupling between these brain regions. Thus, information transfer between the orbitofrontal cortex (OFC) and the amygdala is impeded. The dense connections between the OFC and the amygdala underline the critical role of the OFC in guiding and monitoring aggressive responses. The OFC interprets amygdala activity, but the ability of the OFC to appropriately guide emotional behavior depends on balanced input from the amygdala. Poor communication between these systems can result in high levels of reactive aggression. It is apparently this reduced activation of the circuitry of impulse control and self-regulation by which T

increases the propensity toward aggression (Mehta & Beer, 2009).

The third imbalance—cortical imbalance—involves low serotonergic functioning and frontal lobe asymmetry. As with many other brain structures the frontal cortices are bilaterally distributed. These asymmetries are naturally occurring and correlate with individual differences in approach-avoidance tendencies, with left-side dominance predictive of approach behavior and the right with avoidance behavior (Schutter, De Weijer, Meuwese, Morgan, & Van Honk, 2008). A number of studies have shown that anger predicts increased left and decreased right frontal activity (Hewig, Hagemann, Seifert, Naumann, & Bartussek, 2006). Using transcranial magnetic stimulation (TMS) researchers have been able to manipulate cortical excitability by electromagnetic stimulation (reducing or increasing left or right side activity of the frontal cortex) producing emotions indexed by the engagement of the sympathetic and parasympathetic branches of the ANS (Van Honk et al., 2002, p. 86).

These and numerous other studies lead von Hank and his colleagues to propose that extreme left-side imbalance indicates “a state of readiness to respond to social threat with anger and aggression rather than fear and submission.” Van Honk et al. (2010) further propose that low CNS serotonergic functioning promotes reactive aggressive behavior for individuals with a high T-cortisol ratio because low serotonin functioning is associated with impulsiveness and aggression (Dolan, Anderson, & Deakin, 2001). It is also fairly well established that T modulates serotonergic receptor activity in ways that can result in violence by influencing serotonin functioning in the OFC and by enhancing amygdala reactivity to cues of even minor perceived social threats (Roberts, 2011).

T functioning differs among the races. A study of over 4000 males found blacks to have 3.3% more T than whites (Ellis & Nyborg, 1992), and Hu, Odedina, Reams, Lissaker, and Xu (2015) found blacks to have about 17% more than whites. Another study (Lopez et al., 2013), however, found no racial differences. When racial differences are found they may reflect the greater status challenges black males face in their honor subcultures (T rises to meet such challenges) rather than true differences in base levels since no racial differences tend to be found among prepubescent males, older males, males who have attended college, and males raised outside honor subcultures (Mazur & Booth, 1998).

However, levels of circulating free T only inform us of the amount available, not the efficiency with which it is used.⁶ As with any other hormone, T functions according to the efficiency of its receptors. Responsiveness to T is governed by the androgen receptor (AR) gene which has different tri-nucleotide (CAG) polymorphisms (Schildkraut et al., 2007). Males with a shorter repeat version (< 22 repeats) of the AR gene have a greater binding affinity for T, thus making them more receptive to its effects, which “may indicate that low CAG repeats may be associated with criminal behavior (Rajender et al., 2008, p. 371). All studies done thus far indicate that black males have a greater frequency (about 0.76) of the short version of the AR gene than whites (about 0.62) or Asians (about 0.55) (reviewed in Nelson & White, 2002). Among a sample of violent Chinese criminals and controls, Cheng, Hong, Liao, and Tsai (2006) found that criminals had a significantly greater number of short repeats than did the control group, and that the short repeat criminals began their criminal careers earlier than the long repeat criminals. Rajender et al. (2008) compared CAG repeats among 374 violent Indian criminals convicted of murder, rape, or rape/murder and 271 non-criminal controls. Eighty percent of the murderers and 75% of the rapists had the short repeat allele compared to 37% of the controls.

⁶ Testosterone (T) is essentially a prohormone that binds to receptors with modest affinity. T must be converted in target receptors by 5-alpha reductase into dihydrotestosterone, which has a ten-fold better binding affinity (Golan, Tashjian, Armstrong, & Armstrong, 2011). Thus, enzymatic activity is an added complication in the testosterone-violence link.

As the TIH suggests, elevated T is most likely to result in violence when it is present in conjunction with low serotonin. There are average racial differences in the polymorphisms in the serotonin transporter and receptor genes (Galernter, Kranzler, & Cubells, 1997; Lin, 2001), but there is no consensus as to whether these might lead to differential vulnerability of racial differences in criminal behavior. However, experiments with rhesus monkeys have shown that peer raised monkeys (read “fatherless, gang raised children” for humans) have lower concentrations of the serotonin metabolite 5-HIAA (indicating low serotonergic activity in the brain) than parentally raised monkeys (Bennett et al., 2002; Kreamer, Ebert, Schmidt, & McKinney, 1998). Of course, this indexes an environmental rather than a molecular cause of low serotonin, and points to important environmental effects on the functioning of biological systems, particularly the deleterious effects of parental deprivation to which inner city African Americans are especially vulnerable.

As noted previously, children raised in this manner are especially prone to abuse and neglect. Low self-control and negative emotionality are affected by child abuse and neglect, and low serotonin underlies both traits (Caspi et al., 1994). Abused and neglected children raised in violent subcultures are thus likely to experience both elevated levels of testosterone and lowered levels of serotonin (as well as lower cortisol), a combination especially likely to result in violence (Fox, 1998). Because elevated T encourages dominance-seeking behaviors (“juice”), males with high levels tend to put themselves in situations in which their dominance needs can be frustrated. In such instances, low serotonin levels results in the possibility of experiencing negative emotional reactions, and thus to an elevated risk of reactive aggression. High T-low serotonin-low cortisol males in violent subcultures who “try their luck” in elevating their status do so against others with similar chemical profiles and status aspirations, which means that the potential for violent confrontation is always present (Montoya, Terburg, Bos, & Van Honk, 2012).

11. Reward deficiency syndrome: dopamine and addiction

If all roads in criminology lead to race, all roads in addiction lead to dopamine (Blum et al., 2012). Dopamine is one-half of a neurotransmitter system that allows social animals to function in their groups by responding to signals of reward and punishment with socially appropriate approach and avoidance behavior. These responses are governed by two primary systems of behavioral regulation located within separate brain circuits and regulated by different neurotransmitters: the *behavioral activating (or approach) system* (BAS), and the *behavioral inhibition system* (BIS). The BAS and BIS are part of the limbic system with extensive projections into the prefrontal cortex (PFC), the brain’s “command and control center.” The BAS is sensitive to signals of reward from conditioned (e.g., alcohol, gambling) and unconditioned (e.g., food, sex) appetitive stimuli. The BIS is sensitive to conditioned (e.g., violations of social rules) and unconditioned (e.g., heights, snarling creatures) threats of punishment (Corr, 2004).

The BAS is primarily associated with dopamine and the nucleus accumbens, a structure rich in neurons that responds to dopamine by inducing pleasurable feelings (Day & Carelli, 2007). The BIS is associated with serotonin and with structures such as the hippocampus and the amygdala that feed their memory circuits into the PFC (Goldsmith & Davidson, 2004). Dopamine and serotonin are thus powerful regulators of behavioral and cognitive functions, and any aspect of reduced and/or enhanced serotonergic or dopaminergic functioning results in emotional, behavioral, and cognitive dysregulation. The BAS motivates individuals to seek rewarding stimuli driving them to acquire life sustaining necessities and pleasures. The BIS can be likened to a Freudian ego-superego partnership inhibiting a person from going too far in the pursuit of pleasure. A normal BAS combined with a faulty BIS, or vice versa, may lead to reward deficiency syndrome, which is essentially pleasure deprivation in the reward centers of the brain. This

can get a person into physical, social, and legal difficulties, such as addiction to sex, alcohol, and drugs (Walsh, Johnson, & Bolen, 2012).

We receive gratification from the natural pleasures (eating, drinking, sexual activity, bonding) because natural selection has built into our brains’ reward centers to assure that we will like doing things that contribute to our survival and reproduction efforts. Pleasure obtained from unnatural (i.e., evolutionarily novel) sources such as alcohol or drugs hijack the brain because they involve much greater dopamine signaling, thus usurping neural circuits that control responses to natural rewards and grossly distorting them (Hyman (2007).

Two dopaminergic genes that have been extensively studied in relation to addiction and personality traits are the receptor genes DRD2 and DRD4, both of which are polymorphic. The A-1 allele of the DRD2 gene leads to a 30 to 40% reduction in the number of D2 receptors causing a relative insensitivity to dopamine, and is a major contributor to the reward deficiency syndrome (DeLisi, Beaver, Vaughn, & Wright, 2009). Likewise, the 7-repeat allele of the DRD4 gene renders its carriers sub-sensitive to dopamine. To make a very long and complicated story short and simple, carriers of these alleles require more stimulation to activate their reward system than non-carriers, which motivates them to seek experiences and substances that will accomplish this. Such seeking can ultimately lead to a craving and compulsive indulgence in drugs, alcohol, gambling, among other things. As this compulsion (addiction) develops the person becomes embroiled in an allostatic and epigenetic cycle of spiraling dysregulation of the brain reward systems that progressively increases (see George, Koob, & Vendruscolo, 2014; Tuesta & Zhang, 2014, and Walsh et al., 2012, for reviews).⁷

Polymorphisms of the DRD2 and DRD4 differ among races. Beaver et al. (2007) found that significantly more African Americans than Caucasians possessed both the A-1 allele of the DRD2 and the 7-repeat allele of the DRD4, and Ohmoto et al. (2013) report that the frequency of the DRD2 A-1 allele is significantly greater among Americans (not racially differentiated) than among East Asians. As for the DRD4 gene, Ding et al. (2002) found the 7-repeat allele to be virtually absent in East Asian populations. These allelic frequencies patterns appear to fit racial patterns in drug abuse. According to the National Institute of Drug Abuse (2011), there were 1.8 million admissions for treatment of alcohol and drug abuse to facilities across the nation in 2008. Sixty-percent of admissions were white, 21% were African-American, and 1% percent Asian/Pacific Islanders. In proportion to the U.S. population, Asians and whites (particularly Asians) were underrepresented and blacks overrepresented.

12. Fetal alcohol syndrome

Embryonic neurons form at a rate of about 250,000 every minute from a single precursor cell and then sprout axons that reach out to make connections with other neurons to begin the process of building a brain (Toga, Thompson, & Sowell, 2006). Neurons migrate from their birthplace to their eventual home guided by molecular messengers, and it is this migratory phase of maturation that the brain is most vulnerable to insults. If the messenger molecules become contaminated by alien compounds they may send neurons to the wrong area or direct them to self-destruct (Prayer et al., 2006). The most common teratogen is alcohol. When mothers drink while pregnant they introduce their fetuses to neurotoxins that produce a number of neurological disorders, the most serious of which is fetal alcohol syndrome (FAS). The behavioral

⁷ As with testosterone (or any other chemical regulating behavior), there is no simple one-to-one relationship with the DRD2 and DRD4 and behavior. The route to the “pleasure enter” (nucleus accumbens) involves serotonin, enkephalin (an endorphin), and gamma-aminobutyric acid (an inhibitory neurotransmitter) as well as dopamine (Blum et al., 2012). Genetic polymorphisms of small effects on any or all of these substances and/or their receptors can affect the final result. There are also polymorphisms of dopamine transporter genes such as DAT1, and of its enzymatic degraders such as catechol-O-methyltransferase that influence dopamine activity and should be considered.

symptoms of FAS include low IQ, hyperactivity, impulsiveness, and poor social, emotional, and moral development (Jacobson & Jacobson, 2002). Each of these deficits has independent links to criminal behavior, and in the case of FAS, results from damage to the frontal lobes, amygdala, hippocampus, hypothalamus, the serotonergic system, and the myelination process (Goodlett, Horn, & Zhou, 2005; Noble, Mayer-Proschel, & Miller, 2005).

Rates of FAS per 1000 births of all children born between 2001 and 2006 in the state of Oregon were estimated at 0.89 for blacks, 0.26 for whites, and 0.00 for Asians (Oregon Department of Human Services, 2002). A study by the Center for Disease Control (2002) of 437,252 children born between 1995 and 1997 in Alaska, Arizona, Colorado, and New York, found prevalence rates of 1.1 per 1000 birth for blacks, 0.2 for whites, and 0.00 for Asians.

13. Lead exposure

Exposure to lead dust is another teratogenic effect that disproportionately impacts African Americans. The federal guidelines for “acceptable” levels of lead in children is < 10 micrograms per deciliter of blood (< 10 µg/dl), although exposure to lower levels before two-years of age when the brain is most plastic have been shown to have some neurotoxic effects (Needleman, 2004). The median level of lead of one- to five-years-olds in the United States was 1.5 µg/dl in 2006 (Bellinger, 2008). Exposure to lead is known to decrease IQ, with the decrease of an average of 0.5 points for each µg/dl of lead (Koller, Brown, Spurfeon, & Levy, 2004). Toxic levels of lead distort enzymes, interfere with the development of the endogenous opioid system, disrupt the dopamine system, and reduce serotonin and MAOA levels (Wright et al., 2008). The main culprit today is lead dust from paint in older houses found in poor neighborhoods.

An fMRI study found that brain grey matter was inversely and significantly correlated with mean childhood lead concentrations in a sample ($n = 157$) of mostly black young adults taken from the longitudinal Cincinnati Lead Study (Cecil et al., 2008). The mean childhood blood lead concentration was 13.3 µg/dl, which is significantly greater than the 2006 average of 1.5 µg/dl for the general population. Although the grey matter lost was only about 1.2%, it was concentrated in the frontal lobes and the anterior cingulate cortex, vital behavior moderating areas responsible for executive functioning and mood regulation.

A larger sample ($n = 250$; 90% black; mean age 22.5) from the same Cincinnati Lead Study examined the relationship between childhood blood lead and verified criminal arrests. Among the males ever arrested ($n = 136$) the mean number of arrests was 5.2. The primary finding of this study was that after adjusting for covariates for every 5 µg/dl increase there was an increase in the probability of arrest for a violent crime of about 50% (Wright et al., 2008). Although the independent effect of lead in this study was small, it is dependably there, and it is another risk factor found more often in black neighborhoods than in others.

Genetic polymorphisms associated with the vitamin D receptor gene (VDR) modify the effects of lead on the brain (Chakraborty et al., 2008). Lead competes with minerals such as calcium. When children do not get enough calcium in their diet, lead “tricks” the receptors into believing it is calcium and absorbs it. African Americans have lower average calcium intake than whites and are thus more likely to absorb more lead given equal levels of lead in their environments (Heaney, 2006). Certain polymorphisms of the VDR system (an enzyme known as Fok1) make the absorption of calcium more efficient for their carriers, and these polymorphisms are more prevalent among blacks than among whites or Asians (Chakraborty et al., 2008; Haynes et al., 2003). If these polymorphisms render calcium absorption easier, given lead's ability to mimic calcium lead is also more easily absorbed, creating a GxE interaction in which African Americans absorb more lead than similarly exposed members of other racial groups.

14. Breastfeeding

Breastfeeding has many positive developmental effects, including superior cognitive development (Li, Zhao, Mokdad, Barker, & Grummer-Strawn, 2003). In a large study of 13,889 Belarusian breastfeeding mothers, half the mothers were randomly given incentives that encouraged prolonged and exclusive breastfeeding while the remaining half continued their usual maternity hospital and outpatient care. The researchers assessed the children of these mothers six years later and found that the experimental group children had a mean IQ almost six points higher than the control group children and received higher academic ratings from teachers (Kramer et al., 2008). The randomized design allowed researchers to measure breastfeeding effects on cognitive development without biasing confounds such as the known positive relationship between mothers' IQ and the probability of prolonged breastfeeding.

Although confident that the breastfeeding/IQ relationship was causal, Kramer et al. (2008) could not determine if it was due to the constituents of breast milk or to mother/child interactions and the warm skin-to-skin contact experienced during the process of breastfeeding. The authors mentioned the epigenetic effects of licking and grooming of rat pups we discussed earlier and that it may have been this tactile closeness rather than the nutritional benefits of the milk that accelerates positive neurocognitive development the same way in humans that it does in experimental animals. Tactile stimulation of human infants confers enormous benefits on the infant, and is recommended by physicians for the optimal brain development of low birth weight infants and infants who have suffered some kind of head trauma (Elbert & Rockstroh, 2004; Weiss, Wilson, & Morrison, 2004).

Unfortunately, black infants are the least likely to receive the benefits of breastfeeding, and are thus more likely to be deprived of important experience-expected input and a valuable contributor to positive neurocognitive development. According to the Department of Health and Human Services (2004), in 2001 29.3% of black infants were breastfeeding at 6 months versus 43.2% of whites and 53.7% of Asians.

15. Conclusion

This article has examined race, poverty, and criminal behavior in ways that depart from criminological orthodoxy. It has done so by adding two features ignored by mainstream criminology that spoil the politically correct mantra that black crime results from the black experience of living in an unrelentingly racist society. Adding East Asians, who surpass white Americans in almost every index of prosocial behavior despite experiencing a history of prejudice and discrimination aimed at them, casts serious doubt on that contention. Admittedly, Asians were not dragged to this country in chains, but they seem to have realized that their history as targets of prejudice and discrimination is just that—history—and have gotten on with their lives remarkably well and victimize their fellow Americans at lower levels than any other racial/ethnic group. To be consistent with structural arguments for black crime, proponents of such views would have to attribute Asian successes to pro-Asian bias on the part of whites to their own detriment, or to return to cultural or genetic arguments to explain Asian advantage vis-a-vis whites and blacks. They are not likely to do so because that would entail group comparisons along these lines, which they find invidious.

The second added feature is biosocial science which, according to two of criminology's leading luminaries “can lead to a criminology that is rooted more in science and empirical observations and can link criminology to a diverse array of other disciplines and research methodologies” (Wright & Cullen, 2012, p. 237). As Wright and Cullen observe, it can do this because the biosocial approach is integrative and uses the theories, techniques, and technology gifted to it by the more robust natural sciences. Lilly, Cullen, and Ball (2007, p. 291) rightly

contend that the most dramatic developments in science come mostly from new observational techniques (think of the telescope and microscope) rather than new developments in theory. Criminologists now have access to observational techniques in the form of DNA analyses, neuroimaging, and a variety of other sophisticated physical measures. The strength of biosocial approaches is that they take advantage of new observational techniques developed for the natural sciences and incorporate biological concepts and findings that have been derived from them into their theories. Because of this, writes Matt DeLisi (2009, p. 266): “Never before has the sublime interplay between nature and nurture been available for scientific discovery.”

We have acknowledged that African Americans are disadvantaged by the structural and cultural conditions in which they live, but agree with the dean of social ecology theory, Robert Sampson (Sampson & Bean, 2006), that people create these conditions in real time, and that structure and culture are mutually constituted. We examined these disadvantages in terms of stress-induced epigenetic and allostatic processes, and genetic polymorphisms that differ among the races. Growing up in our inner cities often exposes black children to single parenthood, violence, parental abuse, neglect, and substance abuse. These children bear no blame for the conditions in which they find themselves, but as a result of cultural transmission and biological changes to the HPA axis and the ANS wrought by these conditions, grow up to perpetuate them.

According to African American sociologist William Julius Wilson, this constant recycling has led to “the tangle of pathology in the inner city,” which wary social scientists address only in “circumspect ways” (Wilson, 1987, p. 22). They approach the issue in such guarded ways because they fear that dealing forthrightly with matters of race will bring down on them the dreaded racist label. This label has been stapled to such a range of imagined sins that all meaning has been washed out of it, although it continues to be shamelessly applied to avoid having to confront the accused with reasoned arguments. Whatever the reason for avoiding the race/crime issue, it is both ethically and scientifically the wrong thing to do. We agree with LaFree and Russell (1993, p. 279) who argue that the crime/race connection should be studied honestly and courageously because “no group has suffered more than African-Americans by our failure to understand and control street crime.” The corollary of this is that no other group can benefit more from a candid examination of race and crime. This will not, and cannot begin to happen, until we stop misidentifying causes.

References

- Aamodt, M. (2014). Serial killer statistics. *Radford University serial killer database*<http://maamodt.asp.radford.edu/serialkillerinformationcenter/projectdescription.htm>.
- Aiyer, S., Heinze, J., Miller, A., Stoddard, S., & Zimmerman, M. (2014). Exposure to violence predicting cortisol response during adolescence and early adulthood: Understanding moderating factors. *Journal of Youth and Adolescence*, 43, 1066–1079.
- Almgren, G. (2005). The ecological context of interpersonal violence. *Journal of Interpersonal Violence*, 20, 2182–24.
- Anderson, E. (1994). The code of the streets. *The Atlantic Monthly*, 5, 81–94.
- Anderson, E. (1999). *Code of the street: Decency, violence, and the moral life of the inner city*. New York: W.W. Norton.
- Asok, A., Bernard, K., Roth, T., Rosen, J., & Dozier, M. (2013). Parental responsiveness moderates the association between early-life stress and reduced telomere length. *Development and Psychopathology*, 25, 577–585.
- Beaver, K., Wright, J., DeLisi, M., Walsh, A., Vaughn, M., Boisvert, D., & Vaske, J. (2007). A gene \times gene interaction between DRD2 and DRD4 in the etiology of conduct disorder and antisocial behavior. *Behavioral and Brain Functions*, 30, 1–8.
- Bellinger, D. (2008). Neurological and behavioral consequences of childhood lead exposure. *PLoS Medicine*, 5, 690–692.
- Bennett, A., Lesch, K., Heills, A., Long, J., Lorenz, J., Shoaf, S., ... Higley, J. (2002). Early experience and serotonin transporter gene variation interact to influence primate CNS functioning. *Molecular Psychiatry*, 7, 118–122.
- Blair, R. (2008). The amygdala and ventromedial prefrontal cortex: Functional contributions and dysfunctions in psychopathy. *Philosophical Transactions of the Royal Society: Biological Sciences*, 363, 2557–2565.
- Blum, K., Chen, A., Giordano, J., Borsten, J., Chen, T., Hauser, M., ... Barh, D. (2012). The addictive brain: All roads lead to dopamine. *Journal of Psychoactive Drugs*, 44, 134–143.
- Botticini, M., & Eckstein, Z. (2012). *The chosen few: How education shaped Jewish history*. Princeton, NJ: Princeton University Press.
- Brennan, P., Raine, A., Schulsinger, F., Kirkegaard-Sorensen, L., Knop, J., Hutchings, B., ... Mednick, S. (1997). Psychophysiological protective factors for male subjects at high risk for criminal behavior. *American Journal of Psychiatry*, 154, 853–855.
- Brownlee, K., Moore, A., & Hackney, A. (2005). Relationship between circulating cortisol and testosterone: Influences of physical exercise. *Journal of Sports Science and Medicine*, 4, 76–83.
- Bureau of Statistics (2010). *Criminal victimization in the United States, 2008 statistical tables*. Washington, DC: National Institute of Justice.
- Burrell, T. (2010). *Brainwashed: Challenging the myth of black inferiority*. Los Angeles: SmileyBooks.
- Carey, N. (2012). *The epigenetics revolution: How modern biology is rewriting our understanding of genetics, disease, and inheritance*. New York: Columbia University Press.
- Carter, S. (2005). The chemistry of child neglect: Do oxytocin and vasopressin mediate the effects of early experience? *Proceedings of the National Academy of Sciences*, 102, 18247–18248.
- Caspi, A., Moffitt, T., Silva, P., Stouthamer-Loeber, M., Krueger, R., & Schmutte, P. (1994). Are some people crime-prone? Replications of the personality-crime relationship across countries, genders, races, and methods. *Criminology*, 32, 163–194.
- Caswell, B. (2009). The presidency, the vote, and the formation of new coalitions. *Polity*, 41, 388–407.
- Cecil, K., Brubaker, C., Adler, C., Dietrich, K., Altay, M., Egelhoff, J., ... Lanphear, B. (2008). Decreased brain volume in adults with childhood lead exposure. *PLoS Medicine*, 5, 742–750.
- Center for Disease Control (2002). *Fetal alcohol syndrome — Alaska, Arizona, Colorado, and New York, 1995–1997*. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5120a2.htm>.
- Chakraborty, B., Lee, H., Wolujewicz, M., Mallik, J., Sun, G., Dietrich, K., ... Chakraborty, R. (2008). Low dose effect of chronic lead exposure on neuromotor response impairment in children is moderated by genetic polymorphisms. *Journal of Human Ecology*, 23, 183–194.
- Cheng, D., Hong, C., Liao, D., & Tsai, S. (2006). Association study of androgen receptor CAG repeat polymorphism and male violent criminal activity. *Psychoneuroendocrinology*, 31, 548–552.
- Child Trends Data Bank (2013). Child maltreatment. <http://www.childtrends.org/?indicators=child-maltreatment>.
- Child Trends Data Bank (2014). Infant homicides. <http://www.childtrends.org/?indicators=infant-homicide>.
- Ciotti, P. (1998). Money and school performance: Lessons from the Kansas City desegregation experiment. *Policy Analysis*, 298, 1–25.
- Clark, K. (1965). *Dark ghetto: Dilemmas of social power*. New York: Harper & Row.
- Clarke, J. (1998). *The lineaments of wrath: Race, violent crime, and American culture*. New Brunswick, NJ: Transaction Publishers.
- Cooley-Quille, M., Boyd, R., Frantz, E., & Walsh, J. (2001). Emotional and behavioral impact of exposure to community violence in inner-city adolescents. *Journal of Clinical Child Psychology*, 30, 199–206.
- Corr, P. (2004). Reinforcement sensitivity theory and personality. *Neuroscience and Biobehavioral Reviews*, 28, 317–332.
- Day, J., & Carelli, R. (2007). The nucleus accumbens and Pavlovian reward learning. *The Neuroscientist*, 13, 148–159.
- DeLisi, M. (2009). Psychopathy is the unified theory of crime. *Youth Violence and Juvenile Justice*, 7, 257–273.
- DeLisi, M., Beaver, K., Vaughn, M., & Wright, J. (2009). All in the family gene \times environment interaction between DRD2 and criminal father is associated with five antisocial phenotypes. *Criminal Justice and Behavior*, 36, 1187–1197.
- Dempsey, J., & Forst, L. (2011). *An introduction to policing*. Clifton Park, NY: Cengage.
- Department of Health and Human Services (2004). *Breastfeeding practices—Results from the National Immunization Survey*. http://www.cdc.gov/breastfeeding/data/NIS_2004.htm.
- Ding, Y., Chi, H., Grady, D., Morishima, A., Kidd, J., Kidd, K., ... Moyzis, R. (2002). Evidence of positive selection acting at the human dopamine receptor D4 gene locus. *Proceedings of the National Academy of Science*, 99, 309–314.
- Dolan, M., Anderson, I., & Deakin, J. (2001). Relationship between 5-HT function and impulsivity and aggression in male offenders with personality disorders. *British Journal of Psychiatry*, 178, 352–359.
- Du Bois, W. (1967). *The Philadelphia Negro: A social study*. Millwood, NY: Kraus-Thompson.
- Elbert, T., & Rockstroh, B. (2004). Reorganization of human cerebral cortex: The range of changes follow use and injury. *The Neuroscientist*, 10, 129–141.
- Ellis, L., & Nyborg, H. (1992). Racial/ethnic variations in male testosterone levels: A probable contributor to group differences in health. *Steroids*, 57, 72–75.
- Ellwood, D., & Crane, J. (1990). Family changes among black Americans: What do we now? *Journal of Economic Perspectives*, 4, 65–84.
- Evans, G. W., & Kim, P. (2007). Childhood poverty and health: Cumulative risk exposure and stress dysregulation. *Psychological Science*, 18(11), 953–957.
- Eysenck, H., & Gudjonsson, G. (1989). *The causes and cures of criminality*. New York: Plenum.
- Feagin, J. (2014). *Racist America: Roots, current realities, and future reparations* (3rd ed). New York: Routledge.
- Federal Bureau of Investigation (2014). *Crime in the United States: 2013*. Washington D.C.: U.S. Government Printing Office.
- Fox, R. (1998). Testosterone is not alone: Internal secretions and external behavior. *Behavioral and Brain Sciences*, 21, 375–376.
- Galernter, J., Kranzler, H., & Cubells, J. (1997). Serotonin transporter protein (SLC6A4) allele and haplotype frequencies and linkage disequilibria in African- and European-American and Japanese populations in alcohol-dependent subjects. *Human Genetics*,

- 101, 243–246.
- Ganzel, B., & Morris, P. (2011). Allostasis and the developing human brain: Explicit considerations of implicit models. *Development and Psychopathology*, 23, 955–974.
- Gao, Y., Raine, A., Venerables, P., Dawson, M., & Mednick, S. (2010). Association of poor childhood fear conditioning and adult crime. *American Journal of Psychiatry*, 167, 56–60.
- Gaulin, S., & McBurney, D. (2001). *Psychology: An evolutionary approach*. Upper Saddle River, NJ: Prentice Hall.
- George, O., Koob, G., & Vendruscolo, L. (2014). Negative reinforcement via motivational withdrawal is the driving force behind the transition to addiction. *Psychopharmacology*, 231, 3911–3917.
- Georges-Abeyie, D. (1990). Criminal justice processing of non-white minorities. In B. McClean, & D. Milanovic (Eds.), *Racism, empiricism and criminal justice*. Vancouver, BC: Collective Press.
- Gewertz, C. (2000). A hard lesson for Kansas City's troubled schools. *Education week*. Vol. April 22. *Education week* (pp. 1–5).
- Golan, D., Tashjian, A., Armstrong, E., & Armstrong, A. (2011). *Principles of pharmacology: The pathophysiologic basis of drug therapy*. Lippincott Williams & Wilkins.
- Goldsmith, H. H., & Davidson, R. J. (2004). Disambiguating the components of emotion regulation. *Child Development*, 75(2), 361–365.
- Goodlett, C., Horn, K., & Zhou, F. (2005). Alcohol teratogenesis: Mechanisms of damage and strategies for intervention. *Developmental Biology and Medicine*, 230, 394–406.
- Gottlieb, G. (2007). Probabilistic epigenesis. *Developmental Science*, 10(1), 1–11.
- Gunnar, M., & Quevedo, K. (2007). The neurobiology of stress and development. *Annual Review of Psychology*, 58, 145–173.
- Hartlep, N. (2013). *The model minority stereotype: Demystifying Asian American success*. Charlotte, NC: Information Age Publishers.
- Hayner, N. (1933). Delinquency areas in the Puget sound region. *American Journal of Sociology*, 39, 314–328.
- Haynes, E., Kalkwarf, H., Hornung, R., Wenstrup, R., Dietrich, K., & Lanphear, P. (2003). Vitamin receptor FokI polymorphism and blood lead concentration in children. *Environmental Health Perspectives*, 111, 1665–1669.
- Heaney, R. (2006). Low calcium intake among African Americans: Effects on bones and body weight. *Journal of Nutrition*, 136, 1095–1098.
- Hewig, J., Hagemann, D., Seifert, J., Naumann, E., & Bartussek, D.k. (2006). The relation of cortical activity and BIS/BAS on the trait level. *Biological Psychology*, 71, 42–53.
- Hu, H., Odedina, F., Reams, R., Lissaker, C., & Xu, X. (2015). Racial differences in age-related variations of testosterone levels among US males: Potential implications for prostate cancer and personalized medication. *Journal of Racial and Ethnic Health Disparities*, 2, 69–76.
- Hughes, M. (1997). Symbolic racism, old fashioned racism, and whites' opposition to affirmative action. In S. Tuch, & J. Martin (Eds.), *Racial attitudes in the 1990s: Continuity and change* (pp. 45–75). Westport, CT: Praeger.
- Hyman, S. (2007). The neurobiology of addiction: Implications for voluntary control of behavior. *The American Journal of Bioethics*, 7, 8–11.
- Jacobson, J., & Jacobson, S. (2002). Effects of prenatal alcohol exposure on child development. *Alcohol Research & Health*, 26, 282–286.
- Johnson, C., & Corbin, R. (2015). Justice department limits publication of interracial crime statistics during Obama's presidency. <http://gotnews.com/breaking-obamas-justice-dept-limits-publication-of-interracial-crime-stats/>.
- Jungst, E., Fishman, J., McGowan, M., & Settersten, R., Jr. (2013). Serving epigenetics before its time. *Trends in Genetics*, 30, 427–429.
- Kitano, H., & Daniels, R. (1995). *Asian Americans: Emerging minorities*. Englewood Cliffs, NJ: Prentice Hall.
- Kochanska, G., & Aksan, N. (2004). Conscience in childhood: Past, present, and future. *Merrill-Palmer Quarterly*, 50, 299–310.
- Koller, K., Brown, T., Spurgeon, A., & Levy, L. (2004). Recent developments in low-level lead exposure and intellectual impairment in children. *Environmental Health Perspectives*, 112, 987–994.
- Kramer, M., Aboud, F., Mironova, E., Vanilovich, I., Platt, R., Matush, L., ... Shapiro, S. (2008). Breastfeeding and child cognitive development: New evidence from a large randomized trial. *Archives of General Psychiatry*, 65, 578–584.
- Kreamer, G., Ebert, M., Schmidt, D., & McKinney, W. (1998). A longitudinal study of the effect of different social rearing conditions on cerebrospinal fluid norepinephrine and biogenic amine metabolites in rhesus monkeys. *Neuropsychopharmacology*, 2, 175–189.
- Lacourse, E., Nagin, D., Vitaro, F., Côté, S., Arseneault, L., & Tremblay, R. (2006). Prediction of early-onset deviant peer group affiliation: A 12-year longitudinal study. *Archives of General Psychiatry*, 63, 562–568.
- Lafree, G., & Russell, K. (1993). The argument for studying race and crime. *Journal of Criminal Justice Education*, 4, 273–289.
- Landecker, H., & Panofsky, A. (2013). From social structure to gene regulation, and back: A critical introduction to environmental epigenetics for sociology. *Annual Review of Sociology*, 39, 333–357.
- Li, R., Zhao, Z., Mokdad, A., Barker, L., & Grummer-Strawn, L. (2003). Prevalence of breastfeeding in the United States: The 2001 National Immunization Survey. *Pediatrics*, 111, 1198–1201.
- Lilly, J., Cullen, F., & Ball, R. (2007). *Criminological theory: Context and consequences*. Thousand Oaks, CA: Sage.
- Lin, K. (2001). Biological differences in depression and anxiety across races and ethnic groups. *Journal of Clinical Psychiatry*, 62, 13–19.
- Lopez, D., Peskoe, S., Joshu, C., Dobs, A., Feinleib, M., Kanarek, N., ... Platz, E. (2013). Racial/ethnic differences in serum sex steroid hormone concentrations in US adolescent males. *Cancer Causes & Control*, 24, 817–826.
- Mann, C. (1995). The contribution of institutionalized racism to minority crime. In D. Hawkins (Ed.), *Ethnicity, race, and crime: Perspectives across time and space* (pp. 259–280). Albany, NY: State University of New York Press.
- Massey, D. (2004). Segregation and stratification: A biosocial perspective. *Du Bois Review*, 1, 7–25.
- Mazur, A., & Booth, A. (1998). Testosterone and dominance in men. *Behavioral and Brain Sciences*, 21, 353–397.
- McBurnett, K., Lahey, B., Rathouz, P., & Loeber, R. (2000). Low salivary cortisol and persistent aggression in boys referred for disruptive behavior. *Archives of General Psychiatry*, 57, 38–43.
- McGowan, P., Sasaki, A., D'Alessio, C., Dymov, S., Labonté, B., Szyf, M., ... Meaney, M. (2009). Epigenetic regulation of the glucocorticoid receptor in human brain associates with childhood abuse. *Nature Neuroscience*, 12, 342–348.
- McKinnon, J., & Humes, K. (2000). *The black population in the United States*. Washington, DC: U.S. Census Bureau.
- McWhorter, J. (2000). *Losing the race: Self-sabotage in black America*. New York: Free Press.
- Meaney, M. (2010). Epigenetics and the biological definition of gene × environment interactions. *Child Development*, 81, 41–79.
- Mehta, P., & Beer, J. (2009). Neural mechanisms of the testosterone-aggression relation: The role of the orbitofrontal cortex. *Journal of Cognitive Neuroscience*, 22, 2357–2368.
- Mill, J., & Heijmans, B. (2013). From promises to practical strategies in epigenetic epidemiology. *Nature Reviews Genetics*, 14, 585–594.
- Mitchell, C., Hobcraft, J., McLanahan, S., Siegel, S., Berg, A., Brooks-Gunn, J., & Notterman, D. (2014). Social disadvantage, genetic sensitivity, and children's telomere length. *Proceedings of the National Academy of Sciences*, 111, 5944–5949.
- Moffitt, T., & Beckley, A. (2015). Abandon twin research? Embrace epigenetic research? Premature advice for criminologists. *Criminology*, 53, 121–126.
- Montoya, E., Terburg, D., Bos, P., & Van Honk, J. (2012). Testosterone, cortisol, and serotonin as key regulators of social aggression: A review and theoretical perspective. *Motivation and Emotion*, 36, 65–73.
- Murray, J., Liotti, M., Mayberg, H., Pu, Y., Zamarripa, F., & Liu, Y. (2006). Children's brain activations while viewing televised violence revealed by fMRI. *Media Psychology*, 8, 25–37.
- National Institute of Drug Abuse (2011). Drug facts. http://www.drugabuse.gov/sites/default/files/drugfacts_treatmentstats.pdf.
- Naumova, O., Lee, M., Kuposov, R., Szyf, M., Dozier, M., & Grigorenko, E. (2012). Differential patterns of whole-genome DNA methylation in institutionalized children and children raised by their biological parents. *Development and Psychopathology*, 24, 143–155.
- Needleman, H. (2004). Lead poisoning. *Annual Review of Medicine*, 55, 209–222.
- Nelson, K., & White, J. (2002). Androgen receptor CAG repeats and prostate cancer. *American Journal of Epidemiology*, 155, 883–890.
- Niehoff, D. (2003). A vicious circle: The neurobiological foundations of violent behavior. *Modern Psychoanalysis*, 28, 235–245.
- Noble, M., Mayer-Proschel, M., & Miller, R. (2005). The oligodendrocyte. In M. Rao, & M. Jacobson (Eds.), *Developmental Neurobiology* (pp. 151–196). New York: Kluwer/Plenum.
- Ohmoto, M., Sakaishi, K., Hama, A., Morita, A., Nomura, M., & Mitsumoto, Y. (2013). Association between dopamine receptor 2 Taq1A polymorphisms and smoking behavior with an influence of ethnicity: A systematic review and meta-analysis update. *Nicotine & Tobacco Research*, 15, 633–643.
- Oregon Department of Human Services (2002). Gaining knowledge about fetal alcohol syndrome. https://public.health.oregon.gov/HealthyPeopleFamilies/Women/PreconceptionHealth/FetalAlcoholSyndrome/Documents/fas_final_report.pdf.
- Osofsky, J. (1995). The effects of exposure to violence on young children. *American Psychologist*, 50, 782–788.
- Patterson, O. (1998). *Rituals of blood: Consequences of slavery in two American centuries*. Washington, DC: Civitas Counterpoint.
- Patterson, O. (2014). Making sense of culture. *Annual Review of Sociology*, 40, 1–30.
- Pew Research Center (2013). Demographic & economic data, by race. <http://www.pewsocialtrends.org/2013/08/22/chapter-3-demographic-economic-data-by-race/>.
- Prayer, D., Kasprian, G., Krampl, E., Ulm, B., Witzani, L., Prayer, L., & Brugger, P. (2006). MRI of normal fetal brain development. *European Journal of Radiology*, 57, 199–216.
- Rajender, S., Pandu, G., Sharma, J., Ghandi, K., Singh, L., & Thangaraj, K. (2008). Reduced CAG repeats length in androgen receptor gene is associated with violent criminal behavior. *International Journal of Legal Medicine*, 122, 367–372.
- Rank, M., Yoon, H.-S., & Hirschl, T. (2003). American poverty as a structural failing: Evidence and arguments. *Journal of Sociology and Social Welfare*, 30, 3–29.
- Rasmussen Report (2013). More Americans view blacks as racist than whites. *Hispanic*. http://www.rasmussenreports.com/public_content/lifestyle/general_lifestyle/july_2013/more-americans-view-blacks-as-racist-than-whites-hispanics.
- Reaves, B., & Hickman, M. (2002). *Police departments in large cities, 1990–2000*. Bureau of Justice Statistics. Washington, DC: U.S. Printing Office.
- Roberts, A. (2011). The importance of serotonin in orbitofrontal function. *Biological Psychiatry*, 69, 1185–1191.
- Roque, M., Posick, C., & Felix, S. (2015). The role of the brain in urban violent offending: Integrating biology with structural theories of 'the streets'. *Criminal Justice Studies*, 28, 84–103.
- Rushton, J., & Whitney, G. (2002). Cross-national variation in violent crime rates: Race, r-K theory, and income. *Population and Environment*, 23, 501–511.
- Sampson, R., & Bean, L. (2006). Cultural mechanisms and killing fields: A revised theory of community-level racial inequality. In R. Peterson, L. Krivo, & J. Hagan (Eds.), *The many colors of crime: Inequalities of race, ethnicity, and crime in America* (pp. 8–36). New York: New York University Press.
- Sampson, R., & Wilson, W. (2000). Toward a theory of race, crime, and urban inequality. In S. Cooper (Ed.), *Criminology* (pp. 149–160). Madison, WI: Coursewise.
- Sampson, R. J., & Wilson, W. J. (1995). Toward a theory of race, crime, and urban inequality. In J. Hagan, & R. D. Peterson (Eds.), *Crime and Inequality* (pp. 37–54).

- Stanford, CA: Stanford University Press.
- Schildkraut, J., Murphy, S., Palmieri, R., Iversen, E., Moorman, P., Huang, Z., ... Berchuck, A. (2007). Trinucleotide repeat polymorphisms in the androgen receptor gene and risk of ovarian cancer. *Cancer Epidemiology, Biomarkers & Prevention*, 16, 473–480.
- Schulkin, J. (2011). Social allostasis: Anticipatory regulation of the internal milieu. *Frontiers in Evolutionary Neuroscience*, 2, 1–6.
- Schury, K., & Kolassa, I. (2012). Biological memory of childhood maltreatment: Current knowledge and recommendations for future research. *Annals of the New York Academy of Sciences*, 1262, 93–100.
- Schutter, D., De Weijer, A., Meuwese, J., Morgan, B., & Van Honk, J. (2008). Interrelations between motivational stance, cortical excitability, and the frontal electroencephalogram asymmetry of emotion: A transcranial magnetic stimulation study. *Human Brain Mapping*, 29, 574–580.
- Shonkoff, J., & Garner, A. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*, 129, e232–e247.
- Smith, A., Kilaru, V., Klengel, T., Mercer, K., Bradley, B., Conneely, K., ... Binder, E. (2015). DNA extracted from saliva for methylation studies of psychiatric traits: Evidence tissue specificity and relatedness to brain. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics*, 168, 36–44.
- Sowell, T. (2015). **Random thoughts.** <http://townhall.com/columnists/thomassowell/2015/01/27/random-thoughts-n1948441/page/full>.
- Steffensmeier, D., Feldmeyer, B., Harris, C., & Ulmer, J. (2011). Reassessing trends in black violent crime, 1980–2008: Sorting out the “Hispanic effect” in Uniform Crime Reports arrests, National Crime Victimization Survey offender estimates, and US prisoner counts. *Criminology*, 49, 197–251.
- Sterzer, P., Stadler, C., Krebs, A., Kleinschmidt, A., & Poustka, F. (2003). Reduced anterior cingulate activity in adolescents with antisocial conduct disorder confronted with affective pictures. *NeuroImage*, 19(Supplement 1), 123.
- Taylor, L., Zuckerman, B., Harik, V., & Groves, B. (1994). Witnessing violence by young children and their mothers. *Journal of Developmental and Behavioral Pediatrics*, 15, 120–123.
- Terburg, D., Morgan, B., & van Honk, J. (2009). The testosterone–cortisol ratio: A hormonal marker for proneness to social aggression. *International Journal of Law and Psychiatry*, 32, 216–223.
- The Journal of Blacks in Higher Education (2008). The widening racial scoring gap on the SAT college admission test.** January, 2008. <http://www.jbhe.com/features/college-admissions-test.html>.
- Thernstrom, S., & Thernstrom, A. (2009). *America in black and white: One nation, indivisible*. New York: Simon and Schuster.
- Toga, A., Thompson, P., & Sowell, E. (2006). Mapping brain maturation. *Trends in Neuroscience*, 29, 148–159.
- Tuesta, L., & Zhang, Y. (2014). Mechanisms of epigenetic memory and addiction. *The European Molecular Biology Organization Journal*, 33, 1091–1103.
- U.S. Department of Health and Human Services (2011). *Births: Preliminary data for 2010*. Washington, DC: U.S. Government Printing Office.
- U.S. Equal Employment Opportunity Commission (2009). **Court services and offender supervision agency.** <http://www.eeoc.gov/federal/reports/fsp2009/csosa.cfm>.
- U.S. Office of Personnel Management (2011). **The federal workforce.** <https://www.opm.gov/policy-data-oversight/diversity-and-inclusion/reports/feorp2011.pdf>.
- United State Census Bureau (2014). **The American population.** <http://www.census.gov/popest/data/national/totals/2014/index.html>.
- Unnever, J. (2014). A theory of African American offending: A test of core propositions. *Race and Justice*, 2153368714531296.
- Unnever, J., & Gabbidon, S. (2011). *A theory of African American offending: Race, racism, and crime*. New York: Routledge.
- Van Honk, J., Harmon-Jones, E., Morgan, B., & Schutter, D. (2010). Socially explosive minds: The triple imbalance hypothesis of reactive aggression. *Journal of Personality*, 78, 67–94.
- Van Honk, J., Hermans, E., D'Alfonso, A., Schutter, D., Van Doornen, L., & De Haan, E. (2002). A left-prefrontal lateralized, sympathetic mechanism directs attention toward social threat in humans: Evidence from repetitive transcranial magnetic stimulation. *Neuroscience Letters*, 319, 99–102.
- Van Voorhees, E., & Scarpa, A. (2004). The effects of child maltreatment on the hypothalamic-pituitary-adrenal axis. *Trauma, Violence, and Abuse*, 5, 333–352.
- Walsh, A., & Hemmens, C. (2008). *Law, justice, and society: A sociolegal introduction*. New York: Oxford University Press.
- Walsh, A., Johnson, H., & Bolen, J. (2012). Drugs, crime, and the epigenetics of hedonic allostasis. *Journal of Contemporary Criminal Justice*, 28, 314–328.
- Walsh, A., & Vaske, J. (2015). *Feminist criminology through a biosocial lens* (2nd ed). Durham, NC: Carolina Academic Press.
- Walsh, A., & Wu, H.-H. (2008). Differentiating antisocial personality disorder, psychopathy, and sociopathy: Evolutionary, genetic, neurological, and sociological considerations. *Criminal Justice Studies*, 21, 135–152.
- Washington, B. (1972). In L. Harlan (Vol. Ed.), *The booker T. Washington papers. Vol. 1*. Chicago: University of Chicago Press.
- Weaver, I., Cervoni, N., Champagne, F., D'Alessio, A., Sharma, S., Seckl, J., ... Meaney, M. (2004). Epigenetic programming by maternal behavior. *Nature*.
- Weinhold, B. (2006). Epigenetics: The science of change. *Environmental Health Perspectives*, 114:161–167. *Neuroscience*, 7, 847–854.
- Weiss, S., Wilson, P., & Morrison, D. (2004). Maternal tactile stimulation and neurodevelopment of low birth weight infants. *Infancy*, 5, 85–107.
- Wiebe, R. (2011). The nature and utility of low self-control. In K. Beaver, & A. Walsh (Eds.), *The Ashgate research companion to biosocial theories of crime* (pp. 369–395). Farnham, England: Ashgate.
- Wilson, J., & Herrnstein, R. (1985). *Crime and human nature*. New York: Simon & Schuster.
- Wilson, L., & Scarpa, A. (2012). Criminal behavior: The need for an integrative approach that incorporates biological influences. *Journal of Contemporary Criminal Justice*, 28, 366–381.
- Wilson, W. (1987). *The truly disadvantaged*. Chicago: University of Chicago Press.
- Wisner-Fries, A., Ziegler, T., Kurian, J., Jacoris, S., & Pollak, S. (2005). Early experience in humans is associated with changes in neuropeptides critical for regulating social behavior. *Proceedings of the National Academy of Sciences*, 102, 17237–17240.
- Wright, J., & Cullen, F. (2012). The future of biosocial criminology: Beyond scholars' professional ideology. *Journal of Contemporary Criminal Justice*, 28, 237–253.
- Wright, J., Dietrich, K., Ris, M., Hornung, R., Wessel, S., & Lanphear, b. (2008). Association of prenatal and childhood blood lead concentrations with criminal arrests in early childhood. *PLoS Medicine*, 5, 732–740.
- Zuriff, G. (2002). Inventing racism. *The Public Interest*, 146, 114–128.