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Nature and Nurture by Definition Means Both: A Response to Males

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Abstract

Recognition of the interplay between nature and nurture is decades old in fields such as psychiatry, but other fields in the social sciences continue to be hampered by the idea that social and biological variables compete for explanatory relevance. In a recent study of the adolescent brain and risk taking, Males critiqued biologically oriented approaches as "biodeterminist" compared to environmentally friendly approaches. Here the authors suggest that the use of biological and social variables, or nature and nurture, is not only uncontroversial but also essential for understanding psychopathology, externalizing, and antisocial behaviors. Moreover, biosocial scientific inquiry has led to progressive state policy in the case of *Roper v. Simmons*, precisely the opposite outcome that critics of biologically friendly research often claim.

Keywords

adolescence, brain, nature, nurture, risk taking, neurological development

Males' (2009) recent article on the adolescent brain and risk taking was interesting to read, particularly his treatment of research that uses the brain,

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neurological development, or neurological functioning to partially explain variations in human behavior, specifically externalizing and antisocial forms of behavior. The heart of his article—appearing in the section "Biodeterminism's Cautionary History"—deserves repeating:

> Biodeterminist claims are the most profound and potentially dangerous that scientists can make about human beings. They posit a group as innately limited by unalterable biology. They obligate the state to take custodial measures to protect society and the inferior group by restricting the freedoms and behaviors of those pronounced inherently incapable of controlling themselves. When groups labeled by scientists as biologically limited are also publicly feared and politically powerless—as they always seem to be before brain scientists appear on the scene—legal and social repressions can be serious and long-lasting. For these reasons, biological claims should be subjected to the strictest levels of scientific skepticism, ethics, and scrutiny. (p. 5)

Anyone who wears contact lenses, glasses, or bifocals, or who has had Lasik eye surgery is relatively quickly able to retort the idea that biology is unalterable. On the issue of using custodial measures to restrict freedoms and behaviors, consider what transpired with *Roper v. Simmons* (2005).

The decision in the landmark case *Roper v. Simmons* (2005) resulted in the categorical exemption of juveniles (persons under age 18) from capital punishment. That decision relied in part on general differences between adults and juveniles that vitiated the capital culpability of the latter. The court used three general arguments. First, the court accessed lay and academic notions that adolescence is characterized by a lack of maturity, impetuousness, and generally reckless behavior—claims that were supported with age-restrictive data pertaining to voting, serving on juries, and marrying without parental consent. It was not stated that adults were immune from these same criminogenic traits (see Arnett, 1996; Boyer, 2006; Gottfredson & Hirschi, 1990), only that psychosocial immaturity appeared to be most pronounced during adolescence.

Second, the court reasoned that "juveniles are more vulnerable or susceptible to negative influences and outside pressures, including peer pressure" (*Roper v. Simmons,* 2005, p. 15). Here the court cited research by Laurence Steinberg who served as lead scientific consultant in the amicus curiae brief filed by the American Psychological Association in the *Roper* case. Steinberg is one of the foremost authorities on the developmental neuroscience of the adolescent brain (see Steinberg, 2004, 2007, 2008, 2009) and was the primary target of the article by Males (2009). Moreover, the court held in this same

passage that "As legal minors, [juveniles] lack the freedom that adults have to extricate themselves from a criminogenic setting" (*Roper v. Simmons*, 2005, pp. 15-16). In other words, compared to adults, juveniles usually do not have as much wherewithal. Third, the court reasoned that the character of juveniles is not as well formed as the character of adults in terms of susceptibility to immature, reckless, and irresponsible behavior.

What is interesting about the court's logic is the recognition of individual-level or constitutional factors, such as psychosocial development *and* environmental effects, such as peer pressure (also see, Grisso et al., 2003). Nowhere in the decision did the court advance the idea that adolescents had congenital brain defects or that their behavior was biodetermined. Moreover, references to neurological reasoning (*Roper v. Simmons*, pp. 15-16) and research by Steinberg and colleagues was remarkably tempered and couched in the correct notion that biological vulnerabilities are just that—vulnerabilities—which can be exacerbated by environmental pathogens or buffered by environmental protective factors.

But let us return to Males' (2009) concern about custodial measures restricting the freedom of adolescents. What was the outcome of *Roper v. Simmons*—even if one wanted to conclude that it was entirely based on putative research on the adolescent brain? The outcome was a breathtakingly progressive one: the abolishment of the juvenile death penalty. Indeed, the decision to abolish the juvenile death penalty was reached in part by insights that for reasons of both nature and nurture, there exist differences between adolescents and adults. On this issue, even Males himself appears to agree: "There are, of course, genuine differences between adolescents and adults" (p. 6).

The logic and argumentation that the court used in *Roper* was comparable to the rationale used in *Atkins v. Virginia* (2002), the landmark case that categorically exempted the mentally retarded (those with IQ of 70 or lower) from capital punishment. Partially at issue was the infrequency of the execution of the mentally retarded and evolving standards of opinion against the practice. But also there was the issue of impaired judgment or reduced ability to appreciate the wrongfulness of one's conduct to the degree that one could ultimately be condemned for that conduct. At issue in both cases is neurological capacity—cognitive in the case of mentally retarded persons and socioemotional in the case of adolescents.

It is clear that Males believes strongly in the profound damaging effects of poverty or socioeconomic disadvantage and their relationship to antisocial behavior. We agree and recognize that poverty is an important environmental pathogen in the prediction of an assortment of phenotypes including antisocial behavior. What is troubling, however, is the notion that if it is poverty that

contributes to risk taking, externalizing behaviors, delinquency, and so on, then it cannot also be neurological factors. Of course, it is both (see, Dohrenwend et al., 1992; Miech, Caspi, Moffitt, Wright, & Silva, 1999; Plomin & Bergeman, 1991; Rowe & Rodgers, 1997). To illustrate, Costello, Compton, Keeler, and Angold (2003) conducted a quasiexperimental longitudinal study of the effects of poverty on psychopathology among 1,420 children some of whom received a sizeable income supplement. Consistent with the poverty thesis advocated by Males (2009), there were significant ameliorating effects on conduct and oppositional disorders. Take children out of poverty and reduce their antisocial conduct. However, these effects were not observed for anxiety and depression. Their conclusion was squarely in the tradition—now decades old—of viewing human behavior as an expression of nature and nurture:

> Selection and causation are both compatible with a genetic basis to psychopathology. Social selection implies a correlation between genes and environment such that individuals with a genetic liability have difficulty climbing out of poverty, while social causation implies an interaction: genetic liability to a disease is expressed under the stress of poverty. (p. 2029)

An easy empirical way to examine nature–nurture interplay is to conduct studies that include socioeconomic and neurological variables in the same models. For instance, Raine et al. (2005) studied 325 school boys aged between 16 and 17, in order to explore predictors of antisocial behavior. They found clear effects for neuropsychological factors in the prediction of antisocial behavior, and the most severe group (known as life-course-persistent offenders) were the most impaired neuropsychologically. These effects remained despite controls for poverty, parental psychopathology, and neglect (which were subsumed under the rubric "psychosocial adversity"). Raine et al. concluded, "Neurocognitive impairments are profound and not easily explained away by confounds and artifacts" (p. 45). Indeed, neurocognitive impairments, also known as neuropsychological deficits, are central to Moffitt's (1993) developmental taxonomy, one of the most widely tested theories of antisocial behavior.

We were struck by the condescension with which Males (2009) treated research that includes biological phenomena evidenced by statements such as "today's resurgence of biological determinism that, like it discredited predecessors, reveals more popular prejudice than scientific rigor" (p. 18). We must be reading a different science. Thousands of studies published in the most hallowed scientific journals have empirically illustrated both the profound heritability of many psychosocial constructs and the sublime ways that these

constructs activate or dissipate in the midst of various environmental conditions. Indeed, in a landmark study, Plomin, Owen, and McGuffin (1994) reported that heritabilities "range from about 40 to 50% for personality, vocational interests, scholastic achievements, and general intelligence" (p. 1734). Similarly, about 50% of variance in psychiatric and substance abuse (Kendler & Prescott, 2006) and conduct/antisocial behaviors (Beaver, 2009) is accounted for by genetic factors. In some studies, heritability estimates are very high, evidenced by a recent study of childhood antisocial and aggressive behavior provided the heritability estimate of .96 (Baker, Jacobson, Raine, Lozano, & Bezdjian, 2007)! Moreover, the scientific weight of evidence of neural developmental changes occurring during childhood, adolescence, and into adulthood is staggering (for a recent review, see Tsujimoto, 2008). As noted by Restak (2001), "The immaturity of the adolescent's behavior is perfectly mirrored by the immaturity of the adolescent's brain" (p. 76). But none of this is deterministic. Instead, contemporary research is specifying—with the aid of multiple brain imaging methodologies—how the brain contributes to behavior.

And that in the end is the central issue. The tenor of Males' skeptical appraisal of the neuroscience of the adolescent brain is to disbelieve that the human brain meaningfully influences human behavior. Earlier we reiterated Males' (2009, p. 5) belief that "biological claims should be subjected to the strictest levels of scientific skepticism, ethics, and scrutiny." We extend that. All claims—whether biological, environmental, or most sensibly, both—require such scrutiny. Science has a ruthless mission: to reveal the truth. And that truth reveals the force and dynamism of nature–nurture interaction.

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References

Arnett, J. J. (1996). Sensation seeking, aggressiveness, and adolescent reckless behavior. *Personality and Individual Differences, 20*, 693-702.

Atkins v. Virginia, 536 U.S. 304 (2002)

Baker, L. A., Jacobson, K. C., Raine, A., Lozano, D. I., & Bezdjian, S. (2007). Genetic and environmental bases of childhood antisocial behavior: A multi-informant twin study. *Journal of Abnormal Psychology, 116*, 219-235.

Beaver, K. M. (2009). *Biosocial criminology: A primer.* Dubuque, IA: Kendall/Hunt.

Boyer, T. W. (2006). The development of risk-taking: A multi-perspective review. *Developmental Review, 26*, 291-345.

Costello, E. J., Compton, S. N., Keeler, G., & Angold, A. (2003). Relationships between poverty and psychopathology: A natural experiment. *Journal of the American Medical Association, 290*, 2023-2029.

Dohrenwend, B. P., Levav, I., Shrout, P. E., Schwartz, S., Naveh, G., Link, B. G., et al. (1992). Socioeconomic status and psychiatric disorders: The causation-selection issue. *Science, 255*, 946-952.

Gottfredson, M. R., & Hirschi, T. (1990). *A general theory of crime.* Stanford, CA: Stanford University Press.

Grisso, T., Steinberg, L., Woolard, J., Cauffman, E., Scott, E., Graham, S., et al. (2003). Juveniles' competence to stand trial: A comparison of adolescents' and adults' capacities as trial defendants. *Law and Human Behavior, 27*, 333-363.

Kendler, K. S., & Prescott, C. A. (2006). *Genes, environment, and psychopathology: Understanding the causes of psychiatric and substance use disorders.* New York: Guilford.

Males, M. (2009). Does the adolescent brain make risk taking inevitable? A skeptical appraisal. *Journal of Adolescent Research, 24*, 3-20.

Miech, R. A., Caspi, A., Moffitt, T. E., Wright, B. R. E., & Silva, P. A. (1999). Low socioeconomic status and mental disorders: A longitudinal study of selection and causation during young adulthood. *American Journal of Sociology, 104*, 1096-1131.

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review, 100*, 674-701.

Plomin, R., & Bergeman, C. S. (1991). The nature of nurture: Genetic influence on "environmental" measures. *Behavioral and Brain Sciences, 14*, 373-427.

Plomin, R., Owen, M. J., & McGuffin, P. (1994). The genetic basis of complex human behaviors. *Science, 264*, 1733-1739.

Raine, A., Moffitt, T. E., Caspi, A., Loeber, R., Stouthamer-Loeber, M., & Lynam, D. (2005). Neurocognitive impairments in boys on the life-course persistent antisocial path. *Journal of Abnormal Psychology, 114*, 38-49.

Restak, R. (2001). *The secret life of the brain.* New York: Dana Press/Joseph Henry Press.

Roper v. Simmons, 543 U.S. 551 (2005).

Rowe, D. C., & Rodgers, J. L. (1997). Poverty and behavior: Are environmental measures nature and nurture? *Developmental Review, 17*, 358-375.

Steinberg, L. (2004). Risk-taking in adolescence: What changes, and why? *Annals of the New York Academy of Sciences, 1021*, 51-58.

Steinberg, L. (2007). Risk-taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science, 16*, 55-59.

Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review, 28*, 78-106.

Steinberg, L. (2009). Adolescent development and juvenile justice. *Annual Review of Clinical Psychology, 5*, 47-73.

Tsujimoto, S. (2008). The prefrontal cortex: Functional neural development during early childhood. *The Neuroscientist, 14*, 345-358.

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