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Testing Penry And Its Progeny

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Testing *Penry* and Its Progeny

Deborah W. Denno*

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I. Introduction

In *Penry v. Lynaugh*, the United States Supreme Court held that the Texas death penalty statute was applied unconstitutionally because the trial court gave no instructions allowing the jury to "consider and give effect to" the defendant's mitigating evidence of organic brain damage, moderate retardation, and disadvantaged background. The Court considered these mitigating factors relevant because of society's steadfast belief in the lesser culpability of defendants whose criminal acts are due to a disadvantaged background, or to emotional and mental disorders. The jury must have

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2. *Id.* at 327-28.
3. *Id.* at 307-10. *Penry* has two main parts. In the first part, the Court addresses the mitigating evidence issues discussed in this Article. *Id.* at 313-28. In the second part, the Court holds that the Eighth Amendment does not prohibit the execution of a mentally retarded person of Penry's capacity if the sentencers who impose the death penalty can adequately consider and give effect to the mitigating evidence of mental retardation in their decision. *Id.* at 328-40.
4. *Id.* at 319.
jury must have full consideration of such evidence in order to give its
"reasoned moral response" to the defendant's character and crime. Yet
Penry and its progeny have provided no adequate guidance on what jury
instructions and mitigating factors, apart from those presented in Penry,
would be appropriate in other cases. As a result, the Texas Court of
Criminal Appeals has applied such restrictive evidentiary standards to
Penry claims that nearly all are denied apart from those few that proffer the
"same" or "similar" evidence found in Penry.

This Article empirically challenges the legal doctrine underlying Penry
and its progeny. First, it shows that there is no empirical support for the
Texas court's constricted interpretation of the kinds of mitigating evidence
that can provide Penry relief under Article 37.071, the former Texas
death penalty statute ("former statute") at issue in Penry. Next, it
contends that Penry's whole concept of mitigation and aggravation rests
upon false assumptions concerning the correlates of crime and future
dangerousness. These conclusions are based primarily upon the results of
the "Biosocial Study," one of this country's largest studies of biological
and environmental correlates of crime. The Biosocial Study analyzed
numerous variables predicting crime within a group of nearly five hundred
males who resided in Philadelphia from the time of their birth until their
twenty-second birthday. Although there have been many longitudinal
studies of crime and behavioral disorders, no one has been able to examine
so intensively a large sample of individuals both before and after the start
of their criminal careers.

5. Id. at 328.
not provide a framework to review 'Penry claims' and determine whether the jury was able
to consider and give effect to specific mitigating evidence . . . . Unfortunately, the Supreme
Court's subsequent opinions concerning Penry shed little light on these issues.").
the mitigating evidence presented for a Penry claim "must be the same or of similar character
and quality as that found in Penry").
has been amended since Penry. TEX. CODE CRIM. PROC. ANN. art. 37.071 (West Supp.
1994).
11. The Study is described in detail in two sources: DEBORAH W. DENNO, BIOLOGY
AND VIOLENCE: FROM BIRTH TO ADULTHOOD (1990) [hereinafter DENNO, BIOLOGY
AND VIOLENCE]; Deborah W. Denno, Comment, Human Biology and Criminal Responsibility:
12. See infra notes 165-201 and accompanying text.
13. See generally KENNETH R. NISWANDER & MYRON J. GORDON, THE WOMEN AND
THEIR PREGNANCIES (1972) (describing a collaborative perinatal study, providing some raw
data, and making some general observations on the data); see also Joseph A. McFalls, Social
The Biosocial Study found no evidence that mental retardation, the disorder of most significance in *Penry*, has a significant link to crime or to future dangerousness when controlling for other influential factors, such as family characteristics and biological and environmental stressors. The Biosocial Study did find, however, associations between crime and other kinds of factors. For example, it reported strong and consistent links between lead poisoning, family instability, verbal ability, and crime—factors that the Texas court has either rejected or would be likely to reject in its review of *Penry* claims.

This Article also notes that even though the Texas legislature eventually amended the former statute ("amended statute"), the former statute still applies to the nearly four hundred inmates on death row in Texas. Moreover, it is likely that some of the constraints encountered with the former statute will continue with its amended version despite language that, on its face, would suggest otherwise.

Many articles and cases have analyzed *Penry*’s doctrine. This Article takes a different tack by questioning the doctrine’s empirical foundations. It first describes the former Texas death penalty statute and how the Texas court has applied it in light of *Penry*, *Penry*’s progeny, and the Texas court’s nexus requirement, which mandates a showing of a direct link between a mitigating factor and the defendant’s crime. Through the use of various interpretative hurdles, the courts have applied these doctrinal developments in order to exclude a vast array of mitigating evidence.

Next, this Article discusses the results of the Biosocial Study, the first ever to report an association between lead poisoning and crime. Lead poisoning is a new type of mitigating evidence that illustrates the causal complexities between internal and external factors and behavior, and how these factors could constitute mitigating evidence. In so doing, this Article describes an ongoing capital case in Texas that is using the Biosocial Study’s lead poisoning results in the context of its presentation of mitigating evidence on the defendant’s disadvantaged background.

Lastly, this Article critiques the *Penry* standard and the nexus requirement in light of the Biosocial Study’s results. It suggests that the Texas court’s doctrinal developments would reinforce inappropriately the

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*Science and the Collaborative Perinatal Project: An Opportunity for Research*, 4 REV. PUB. DATA USE 37, 37 (1976) (noting that a study of children from the time of their birth through age seven had cost over $100 million). Numerous publications have resulted from examining these data. See Sarah H. Broman et al., Preschool IQ: Prenatal and Early Developmental Correlates (1975); Janet B. Hardy et al., The First Year of Life (1979); Paul L. Nichols & Ta-Chuan Chen, Minimal Brain Dysfunction: A Prospective Study (1981).

types of underlying assumptions behind criminal law defenses. These assumptions appear to favor seemingly "internal" factors, such as organic brain damage and mental retardation, over seemingly "external" factors, such as lead poisoning and other environmental influences. Because there is no empirical support for this "internal-external" distinction and the causal assumptions behind it, the Texas court will be calling upon juries to decide capital cases by applying empirically baseless criteria.

Because the Texas court provides for some types of mitigating evidence, its criminal justice system may appear to be fair. The constraints, arbitrariness, and erroneous assumptions concerning the types of mitigating factors found to be acceptable in capital cases, however, make the reality of the Texas capital litigation process unfair. In light of this unfairness, this Article suggests that the capital litigation process be more flexible in considering both internal and external factors in its evaluation of mitigating evidence, recognizing the doctrinal fiction that fuels Penry.

II. The Texas Death Penalty Statute

In Furman v. Georgia, the Supreme Court established that all existing death penalty statutes were unconstitutional under the Eighth Amendment's Cruel and Unusual Punishment Clause because of their arbitrary and inconsistent applications. Thereafter, all death penalty states revised their capital sentencing statutes so that they would meet the perceived requirement for constitutionality.


17. Id. at 428-29 (Douglas, J., concurring). It is unclear if there is an actual Furman "holding" because each Justice wrote a separate opinion. Robert Weisberg, Deregulating Death, 1983 Sup. Ct. Rev. 305, 314-15 (1984). Five justices filed separate supporting opinions in which two positions can be identified. Justices Marshall and Brennan contended that any method of capital punishment violated the Eighth and the Fourteenth Amendments. Furman, 408 U.S. at 360, 364-66 (Marshall, J., concurring); id. at 305 (Brennan, J., concurring). Rejecting this per se position, Justices Douglas, Stewart, and White stated that existing capital punishment statutes were deficient in their form. Id. at 256-57 (Douglas, J., concurring); id. at 310 (Stewart, J., concurring); id. at 312-13 (White, J., concurring). They claimed that the statutes allowed decisionmakers to have unbridled discretion that resulted in "wanton" or "freakish" capital sentencing patterns. Id. at 309-10 (Stewart, J., concurring); id. at 313-14 (White, J., concurring). Justices Burger, Blackmun, Powell, and Rehnquist filed separate dissenting opinions. Id. at 375 (Burger, C.J., dissenting); id. at 405 (Blackmun, J., dissenting); id. at 414 (Powell, J., dissenting); id. at 465 (Rehnquist, J. dissenting).

A. The Former Texas Death Penalty Statute

In response to Furman, the Texas legislature adopted former Article 37.071, a capital sentencing procedure that was unique in this country. 19 Under former Article 37.071, the jury determined the sentence to be imposed on a defendant by answering three questions, known as “special issues:”

(1) whether the conduct of the defendant that caused the death of the deceased was committed deliberately and with the reasonable expectation that the death of the deceased or another would result;

(2) whether there is a probability that the defendant would commit criminal acts of violence that would constitute a continuing threat to society; and

(3) if raised by the evidence, whether the conduct of the defendant in killing the deceased was unreasonable in response to the provocation, if any, by the deceased. 20

These issues were submitted by the trial court during the sentencing phase of a capital murder trial after all the evidence had been presented. 21 The court had to sentence the defendant to death if the jury provided a unanimous “yes” answer to each issue submitted; without such unanimity, the defendant was sentenced to life imprisonment. 22

When the Supreme Court held in 1976 that the death penalty was not unconstitutional per se, 23 Jurek v. Texas 24 was among the five cases the Court used to set forth the standards for deciding capital cases. 25 In Jurek, the joint opinion of Justices Stewart, Powell, and Stevens determined that the former Texas death penalty statute was constitutionally sufficient under the Eighth Amendment because it allowed the jury to

21. Id. § (b).
22. Id. §§ (c)-(e).
25. Gregg, which was the lead case, upheld the constitutionality of the particular capital sentencing procedure in Georgia. Gregg, 428 U.S. at 206-07. In addition, the Court upheld the capital sentencing procedure in Florida, Profitt v. Florida, 428 U.S. 242, 259 (1976), and Texas, Jurek, 428 U.S. at 276. The Court rejected the mandatory capital sentencing procedures applied in North Carolina, Woodson v. North Carolina, 428 U.S. 280, 305 (1976), and Louisiana, Roberts v. Louisiana, 428 U.S. 325, 336 (1976).
consider “particularized circumstances” of the offense and the offender prior to imposing the death sentence.\textsuperscript{26} Jurek had presented mitigating evidence of steady employment history and aid for his family’s support.\textsuperscript{27} Even though the terms in the three special issues had not been defined precisely, the joint opinion accepted the Texas Court of Criminal Appeals’s indication that it would interpret the second special issue (concerning the probability of future dangerousness) so that a jury could consider “whatever mitigating circumstances” a defendant such as Jurek might want to bring forth.\textsuperscript{28} According to these Justices, such an interpretation would ensure that mitigating factors could be considered and that the death sentences would not be imposed with the arbitrariness and caprice invalidated in \textit{Furman}.\textsuperscript{29} Despite that conclusion in \textit{Jurek}, more than a decade later the Texas statute was again challenged primarily on the basis that it prohibited adequate consideration of mitigating evidence,\textsuperscript{30} now a constitutional requirement for imposing the death penalty under \textit{Lockett v. Ohio}\textsuperscript{31} and \textit{Eddings v. Oklahoma}.\textsuperscript{32} Although the challenge did not succeed in \textit{Franklin v. Lynaugh},\textsuperscript{33} the Court reached a different conclusion a year later in \textit{Penry}.\textsuperscript{34}

\begin{itemize}
\item \textsuperscript{26} \textit{Jurek}, 428 U.S. at 273-74 (opinion of Stewart, Powell, and Stevens, JJ.). Four Justices concurred in the judgment. \textit{Id.} at 277 (Burger, C.J., concurring); \textit{id.} at 277 (White, J., concurring) (Burger, C.J., and Rehnquist, J., joining); \textit{id.} at 279 (Blackmun, J., concurring).
\item \textsuperscript{27} \textit{Id.} at 267.
\item \textsuperscript{28} \textit{Id.} at 272. \textit{Jurek’s} conclusion only pertained to issue two. The Court noted that because the Texas court had not yet interpreted the first and third issues, it could not be determined whether the jury could properly consider mitigating circumstances for those issues as well. The Court speculated, however, that some situations could prompt such consideration. \textit{Id.} at 272 n.7.
\item \textsuperscript{29} \textit{Id.} at 276.
\item \textsuperscript{31} 438 U.S. 586, 604 (1978) (plurality opinion) (“[The Eighth and Fourteenth Amendments] require that the sentencer, in all but the rarest kind of capital case, not be precluded from considering, \textit{as a mitigating factor}, any aspect of a defendant’s character or record and any of the circumstances of the offense that the defendant proffers as a basis for a sentence less than death.”) (emphasis in original) (footnote omitted).
\item \textsuperscript{32} 455 U.S. 104, 113-14 (1982) (“Just as the State may not by statute preclude the sentencer from considering any mitigating factor, neither may the sentencer refuse to consider, \textit{as a matter of law}, any relevant mitigating evidence.”) (emphasis in original).
\item \textsuperscript{33} 487 U.S. 164, 183 (1988) (plurality opinion) (determining that the former Texas statute as applied did not unconstitutionally restrict consideration of the mitigating evidence of the defendant’s good prison disciplinary record and residual doubts concerning the offense).
\item \textsuperscript{34} \textit{Penry v. Lynaugh}, 492 U.S. 302, 328 (1989) (concluding that the former Texas
\end{itemize}
1. The Penry Standard.—Penry concerned those situations in which a defendant may present mitigating evidence that is either not relevant to the three special issues or pertains to the defendant’s culpability in a manner that exceeds the scope of the special issues. Penry required that the jury be instructed appropriately so that it could fully consider such evidence. In Penry’s case, that meant that although the jury was allowed to hear evidence of Penry’s mental retardation and child abuse, such evidence was relevant only to special issue number two (concerning Penry’s future dangerousness). The evidence, therefore, was presented as “aggravating only,” because there was no vehicle (such as another special issue) for allowing a sentencer to view it as mitigating. The Court considered such evidence a “two-edged sword.” It was mitigating because it reduced Penry’s ability “to control his impulses or to evaluate the consequences of his conduct.” But it was also aggravating because it indicated the probability of his future dangerousness. Because the special issues in the former Texas statute enabled the jury to give effect to only the aggravating side of this evidence, Penry’s sentence violated the Eighth Amendment.

From the start, the Texas court interpreted Penry claims restrictively, denying all claims apart from those that offered the “same” or “similar” evidence presented in Penry. Yet Penry itself provided no basis for

statute as applied unconstitutionally prohibited consideration of the mitigating evidence of the defendant’s mental retardation and abusive childhood).

35. Id. at 322.
36. See id. at 315 (emphasizing that the special issues must “be interpreted broadly enough to permit the sentencer to consider all of the relevant mitigating evidence a defendant might present in imposing a sentence”).
37. There was evidence that Penry, who was 22 years old at the time of the crime, suffered from organic brain damage and mild to moderate retardation based upon a tested IQ level ranging between 50 and 63 over the years. A clinical psychologist concluded that Penry had the mental age of a 6 1/2-year-old and the social maturity of a nine or 10-year-old. Id. at 307-08. There was also evidence that Penry had been subjected to childhood beatings and abuse which, in addition to birth trauma, may have contributed to his brain damage. Id. at 308-10. Although he was found competent to stand trial, and the jury rejected his insanity defense, Penry was characterized as “borderline” incompetent and “socially and emotionally deprived.” Id.
38. Id. at 324.
39. Id.
40. Id. at 322.
41. Id.
42. Id. at 328; see also Johnson v. Texas, 113 S. Ct. 2658, 2667-68 (1993) (providing a thorough summary of the Penry opinion); Tobolowsky, supra note 19 (discussing the Supreme Court decisions applicable to Texas and the death penalty).
such strict interpretations. Penry did suggest that the underlying principle of past precedent\(^\text{44}\) was "that punishment should be directly related to the personal culpability of the criminal defendant."\(^\text{45}\) This principle was based on society's belief "that defendants who commit criminal acts that are attributable to a disadvantaged background, or to emotional and mental problems, may be less culpable than defendants who have no such excuse."\(^\text{46}\) The Court's dictum, then, focused on the link between mitigation, the defendant's culpability, and the crime rather than simply the connection between mitigating evidence and the crime.\(^\text{47}\) However, the Court's general statement gave no indication that only those disorders evidenced by Penry would be acceptable for Penry relief; indeed, the words "disadvantaged background" and "emotional and mental disorders" suggest a wide spectrum. Penry further emphasized that it was constitutionally insufficient merely to allow the defendant to present evidence to the sentencer. The sentencer must also be able to "consider and give effect" to the evidence to ensure that the defendant is treated as a "uniquely individual human being[\(\text{g]\)\(^\text{48}\) and to ensure that the punishment reflects the sentencer's "reasoned moral response to the defendant's background, character, and crime."\(^\text{49}\)

With respect to the first issue concerning whether Penry acted "deliberately," the Court noted that it was not clear that the jury could fully consider whether Penry's retardation made him less able than a nonretarded adult "to control his impulses or to evaluate the consequences of his conduct."\(^\text{50}\) With regard to the second issue concerning Penry's future dangerousness, the Court noted there was no vehicle for the jury to give mitigating effect to Penry's evidence that his retardation interfered with his ability to learn from his mistakes.\(^\text{51}\) Furthermore, even if a juror believed with respect to the third issue that Penry's act of murder was not a reasonable response to provocation, answering that issue in the affirmative would preclude a juror from expressing an overall view that regardless, Penry did not have sufficient moral culpability to be sentenced to

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\(^{44}\) Penry, 492 U.S. at 317-20 (citing Lockett v. Ohio, 438 U.S. 586 (1978), and Eddings v. Oklahoma, 455 U.S. 104 (1982)).

\(^{45}\) Id. at 319 (emphasis added).

\(^{46}\) Id. at 343 (Brennan, J., concurring in part and dissenting in part) ("[W]e gauge whether a punishment is disproportionate by comparing 'the gravity of the offense,' understood to include not only the injury caused, but also the defendant's moral culpability, with 'the harshness of the penalty.'") (citations omitted).

\(^{47}\) Id. at 319 (citation omitted).

\(^{48}\) Id. (emphasis in original) (citation omitted).

\(^{49}\) Id. at 322-23.

\(^{50}\) Id. at 323.
death. For this reason, the Court determined that Penry was constitutionally eligible for additional instructions "informing the jury that it could consider and give effect to [Penry's] mitigating evidence . . . by declining to impose the death penalty." At the same time, Penry made clear that it was not announcing a "new rule" within the meaning of Teague v. Lane.

The Supreme Court put a cap on Penry's principles, however, in two 1993 cases, Graham v. Collins and Johnson v. Texas. In Graham, the Court made clear that it did not interpret Penry "as effecting a sea change" in its evaluation of the constitutionality of the former Texas death penalty statute for two reasons: (1) Penry did not invalidate the special issues and (2) Penry made clear that it was not announcing a "new rule" under Teague. Moreover, the Court considered Graham's circumstances to be different from Penry's. Unlike Penry, the Court stated that Graham's mitigating evidence (his youth of seventeen years, family transiency, religiosity, nonviolent character, and devotion to the family) was not beyond the scope of the special issues because it could have supported a negative answer to the second issue regarding his future dangerousness. The Court was also concerned that if Penry was applied to include the kinds of evidence that Graham proffered, it would conflict with Jurek's determination that youth is provided constitutionally sufficient consideration under the special issues. Moreover, the Court determined that Graham's evidence of transiency and prior nonviolence "more closely resembled" Jurek's evidence of youth, steady employment, and family relationships than Penry's evidence of mental retardation and physical abuse.

Lastly, the Court concluded that Graham's proposed application of Penry would be so broad and go so far beyond the bounds of prior precedent that it would essentially require a fourth special issue to be submitted to the jury: "Does any mitigating evidence before you, whether

52. Id. at 324-25.
53. Id. at 328.
54. Id. at 314-15.
55. 489 U.S. 288 (1989). Under Teague, a case proposes a "new rule when it breaks new ground or imposes a new obligation on the State or Federal Government." Id. at 301. In Penry, the Court concluded that it was not proposing a new rule because its proposed jury instructions were established by precedent and it was not attempting to place a "new obligation" on the State of Texas. Penry, 492 U.S. at 319.
57. 113 S. Ct. 2658 (1993).
58. Graham, 113 S. Ct. at 901.
59. Id. at 902.
60. Id.
61. Id. at 903.
or not relevant to the above [three] questions, lead you to believe that the death penalty should not be imposed?" 62 The Court rejected Graham's implied proposal of a fourth special issue because it would result in a new rule under Teague. 63 Therefore, Teague became the determinative case, not Penry. 64

In Johnson the Court supported its reasoning in Graham and again put limits on Penry by denying the defendant's claim that the former Texas statute did not provide sufficient mitigating effect to his youth. 65 Furthermore, the Court relied on post-Penry standards that it had proposed in Boyde v. California 66 for structuring the rule of Lockett and Eddings. 67 Although the Court acknowledged that under Lockett and Eddings, a sentencer cannot be prohibited from considering "any aspect" of the defendant's mitigating evidence, 68 it emphasized its later qualification in Boyde: "States are free to structure and shape consideration of mitigating evidence 'in an effort to achieve a more rational and equitable administration of the death penalty.'" 69 Johnson also relied on Boyde's proposed

62. Id. at 902.
63. Id. at 903. The Court's analysis in Graham, however, failed to provide a fair reading of Penry and its progeny. First, the Court declined to view Penry as a broadening of Jurek or view it as the Court's most recent application of Lockett v. Ohio, 438 U.S. 586 (1978), and Eddings v. Oklahoma, 455 U.S. 104 (1982), two similarly expansive perspectives of the mitigating evidence requirement that followed Jurek. Rather, the Court depended most heavily on Jurek, thereby circumventing its decade-long development of a mitigating evidence standard. Second, Graham asked the wrong question. The issue was not whether Graham's mitigating evidence more closely resembled Jurek's than Penry's; Penry never held that the evidence of mental retardation and physical abuse per se was the evidentiary standard for courts to follow. Rather, the questions in Penry concerned whether a defendant's mitigating evidence could: (1) become a "two-edged sword;" (2) reduce a defendant's ability to control his impulses; and (3) impair a defendant's efforts to evaluate the consequences of his conduct. Penry v. Lynaugh, 492 U.S. 302, 322-24 (1989). If these questions had been considered in Graham, the Court could not have concluded that the defendant was attempting to introduce a new rule, only that he was following the Court's most recent standard.
64. Graham, 113 S. Ct. at 902-03 ("Even if Penry reasonably could be read to suggest that Graham's mitigating evidence was not adequately considered under the former Texas procedures, that is not the relevant inquiry under Teague."). The Court also concluded that Graham's new rule did not fall within Teague's two "new rule" exceptions. Id. at 903.
65. Johnson, 113 S. Ct. at 2670. Because Johnson came before the Court on direct review, Teague presented no bar to the rule he requested. Id. at 2668.
67. Johnson, 113 S. Ct. at 2669.
68. Id. at 2665.
69. Id. at 2666 (quoting Boyde v. California, 494 U.S 360, 377 (1990)). In Boyde the Court set forth a standard for determining whether jury instructions were constitutionally adequate according to the dictates of Lockett and Eddings. A reviewing court must assess "whether there is a reasonable likelihood that the jury has applied the challenged instruction in a way that prevents the consideration of constitutionally relevant evidence." Boyde, 494
standard for determining whether jury instructions meet the *Lockett-Eddings* rule. According to *Boyle*, a reviewing court must assess "whether there is a reasonable likelihood that the jury has applied the challenged instruction in a way that prevents the consideration of constitutionally relevant evidence." 70

Based on this standard, the Court explained, without precedent or support, there was "no reasonable likelihood" that jurors would have viewed themselves as precluded from considering the potential mitigating effect of the defendant's age when evaluating his future dangerousness in special issue two. 71 *Johnson* therefore distinguished itself from *Penry* by concluding that there was "ample room" for jurors to take account of the mitigating effects of youth. 72 In contrast to Penry's mental retardation, which impeded his ability to learn from mistakes, the Court considered that the negative effects of youth were open to change over time; consequently, it presumed that they "are readily comprehended" as mitigating evidence in the second future dangerousness issue. 73 Applying its reasoning in *Graham*, the Court emphasized that the defendant's request would require instructions allowing a jury to "depart from the special issues in every case," thereby prohibiting the states from structuring the jury's consideration of mitigating evidence. 74 This was a result the Court had consistently rejected. 75

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U.S. at 380.
70. *Johnson*, 113 S. Ct. at 2669 (quoting *Boyle*, 494 U.S. at 380).
71. *Id.* at 2670.
72. *Id.* at 2669.
73. *Id.* at 2670.

It strains credulity to suppose that the jury would have viewed the evidence of petitioner's youth as outside its effective reach in answering the second special issue. The relevance of youth as a mitigating factor derives from the fact that the signature qualities of youth are transient; as individuals mature, the impetuousness and recklessness that may dominate in younger years can subside.

*Id.* at 2669.
74. *Id.* at 2671-72.
75. *Id.* at 2672. The Court's analysis in *Johnson*, however, distorted the defendant's request as well as *Penry*'s earlier dictates. The defendant was requesting special instructions for his youth, one type of mitigating evidence that the Court acknowledged had relevance to the defendant's culpability. Indeed, as the dissent contended, the Court had made clear in *Eddings* "that the vicissitudes of youth bear directly on the young offender's culpability and responsibility for the crime." *Id.* at 2673 (O'Connor, J., dissenting).

"Youth is more than a chronological fact. It is a time and condition of life when a person may be most susceptible to influence and to psychological damage. Our history is replete with laws and judicial recognition that minors, especially in their earlier years, generally are less mature and responsible than adults. Particularly during the formative years of childhood and adolescence, minors often lack the experience, perspective, and judgment expected of adults."
Since Johnson, the Court has vacated several death sentences and remanded the cases to the Texas court so that they can be reevaluated in light of Penry or Johnson. Although in each case the defendant introduced mitigating evidence of a mental impairment, in no case was the evidence identical to that in Penry. None of the defendants was mentally retarded and some did not indicate a history of child abuse. Therefore, these cases suggest that, irrespective of its holdings in Graham and Johnson, the Court considers mental impairment apart from retardation to be eligible relief under Penry.

2. The Nexus Requirement.—In addition to the Penry standard, the Texas court also created a requirement whereby defendants must demonstrate a "nexus" between the mitigating evidence and those aspects of the offense that suggest the defendant is less morally culpable and therefore, less deserving of death. The Texas court first implied such a connecting
link one year after Penry, although the nexus requirement was not made explicit until another year later in a footnote in Lackey v. State. It would be another year before a majority of the Texas court in Nobles v. State would apply the nexus requirement to reject a Penry claim.

Evidence of the appellant's unfortunate childhood was not, without some testimony indicating a nexus between his childhood circumstances and the commission of the crime, helpful to the jury's consideration of the special issues or indicative of a lessened moral blameworthiness.

Today, the nexus requirement is considered "settled law" and established precedent for those defendants sentenced under the former Texas statute. Thus, even if a defendant could satisfy the Penry standard, the nexus requirement provides an additional hurdle. Yet members of the Texas court have consistently questioned the requirement's constitutionality in the numerous cases in which it has been applied.

problems of childhood and the commission of the crime."). For a thorough description of the development of the nexus requirement, see Mines, 852 S.W.2d at 956-59 (Baird, J., dissenting).

80. See Gribble v. State, 808 S.W.2d 65, 76 (Tex. Crim. App. 1990) (commenting that the defendant's childhood experiences and mental illness "are widely regarded, according to some contemporary social standards, as redeeming personality traits or factors which tend to ameliorate fault").


Justice O'Connor seems to further require some nexus between the mitigating evidence and culpability for the crime. If moral or personal culpability is reduced only when the criminal act (murder) is "attributable to a disadvantaged background, or to emotional and mental problems," then mitigating evidence relevant to the defendant's character, background, mental condition or circumstances of the offense must also be connected with or somehow help to explain or excuse the commission of the offense by the defendant.

Id. (citing California v. Brown, 479 U.S. 538, 545 (1987) (O'Connor, J., concurring)).


83. A plurality of the Texas court has used the requirement in two previous cases. See Richardson (Miguel) v. State, 886 S.W.2d 769, 775 (Tex. Crim. App. 1991) (noting that the defendant had not demonstrated "any connection between alleged childhood abuse and its subsequent effect" on him and concluding that "[i]there is simply no Penry evidence presented by [his] nexus argument"), vacated, Richardson v. Texas, 113 S. Ct. 3026 (1993), aff'd, No. 68,934, 1994 WL 232383 at *1 (Tex. Crim. App. June 1, 1994); Goss v. State, 826 S.W.2d 162, 166 (Tex. Crim. App. 1992) (concluding that the defendant's mitigating evidence did not meet the Penry standard because the defendant had not presented testimony concerning "any mental disorder or physiological damage" that would account for why he was less morally culpable and there was no evidence to explain the connection between the defendant's childhood problems and his crime).


86. See Mines, 852 S.W.2d at 952 (Baird, J., dissenting) (citations omitted) ("I find no
The requirement’s potential impermissibility was also recognized in Lackey when it was first mentioned. There the Texas court noted that the requirement would conflict with the set doctrine of Lockett and Eddings, which mandates that the sentencer be allowed to consider as mitigation, “in all but the rarest kind of capital case,” any part of the defendant’s character, record, or offense that is introduced at trial.69

B. Restrictions on Penry Relief

The Texas court and the Fifth Circuit have so restricted the Penry (and progeny) standard and the nexus requirement that Penry relief pertaining to special issues one and two has been granted in only a half dozen cases.90 Such restrictions rest on five primary hurdles:

1. Penry claims can be granted only if they satisfy the Texas court’s Penry standard, namely, the “same” or “similar” evidence as in Penry.

2. Penry claims can be granted only if they pass the Texas court’s nexus requirement, which:
   (a) proposes an ill-defined standard of connection or causation that cannot be satisfied by evidence that does not meet the Penry standard;91
   (b) focuses on the link between the mitigating evidence and the crime, in contrast to Penry’s requirement that the evidence be linked to the defendant’s culpability and the crime.92

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basis in Penry, or in its predecessors, for requiring a nexus between a defendant’s mitigating evidence and the charged offense”); Richardson (Miguel), 1994 WL 232383 at *2 (Clinton, J., dissenting) (noting that the majority’s “rote invocation of its own homemade nexus requirement” has no support in either Johnson or Penry).
90. These restrictions are discussed infra notes 97-139 and accompanying text.
91. The Texas court “[d]oes] not require proof of a nexus when the defendant presents evidence of mental retardation.” Earhart v. State, 877 S.W.2d 759, 765 n.9 (Tex. Crim. App. 1994); see also Richard v. State, 842 S.W.2d 279, 283 (Tex. Crim. App. 1992) (noting that “since Nobles was decided, the Court has still not required an express showing of ‘nexus’ between evidence of mental defectiveness and the offense on trial”).
92. See Mines v. State, 852 S.W.2d 941, 960 (Tex. Crim. App. 1992) (Baird, J., dissenting) (arguing that the nexus requirement distorts Penry’s intent because it prevents the jury from considering those factors pertaining to the defendant’s character and background that may be relevant and yet not-connected to the offense charged).
(4) The Gribble95 "mental illness" exception, which is the only time that the Texas court has deviated from its "same" or "similar" Penry evidence standard, has not since been followed and may well never be.96

(5) When the Supreme Court remands a Texas court case so that it may be considered further in light of Johnson, the Texas court has interpreted this mandate as pertaining only to the issue of the defendant's age, without reference to other mitigating factors. Yet the cases that the Supreme Court remands include a vast array of mitigating evidence apart from age.

1. "Same" or "Similar" Evidence.—Penry claims are granted only if the accused introduces evidence of retardation,97 generally considered to be an IQ of less than seventy,98 irrespective of any other severe mental impairment. For example, the Texas court has rejected claims by defendants presenting evidence of a broad range of disorders: mental dysfunction requiring commitment to a mental institution,99 limited mental capability and physical abuse by a father,100 irreversible organic brain damage resulting in uncontrollable violence, personality change, and blackouts,101 psychiatric testimony of psychological and psychiatric problems and "not dealing with a full deck,"102 and manic depressive

96. See infra notes 128-30 and accompanying text.
98. See AMERICAN PSYCHIATRIC ASSOCIATION, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS 39 (4th ed., 1994) ("The essential feature of mental retardation is significantly subaverage general intellectual functioning . . . that is accompanied by significant limitations in adaptive functioning in at least two of the following skill areas: communication, self-care, home living, social/interpersonal skills, use of community resources, self-direction, functional academic skills, work, leisure, health, and safety."). There are four degrees of severity of retardation:
1. Mild IQ level 50-55 to approximately 70
2. Moderate IQ level 35-40 to 50-55
3. Severe IQ level 20-25 to 35-40
4. Profound IQ level below 20 or 25

Id. at 40. There are a variety of ways to measure retardation and a wide range of factors that can influence performance. See id. at 39-46.
damage resulting in uncontrollable violence, personality change, and blackouts;\footnote{Ex Parte Crane, No. 71,250, slip op. at 5 (Tex. Crim. App. Mar. 11, 1992).} psychiatric testimony of psychological and psychiatric problems and “not dealing with a full deck;”\footnote{Earhart v. State, 877-S.W.2d 759, 762 (Tex. Crim. App. 1994).} and manic depressive illness.\footnote{Mines v. State, 852 S.W.2d 941, 947-50 (Tex. Crim. App. 1992).} In each case, the Texas court rejected the claim for relief because the evidence was not similar to that presented in \textit{Penry}. Recently, the Fifth Circuit applied a comparably constrained approach.\footnote{Andrews v. Collins, 21 F.3d 612 (5th Cir. 1994).} It concluded that the defendant’s low IQ did not indicate that he was mentally retarded and, therefore, could not be considered mitigating evidence outside the realm of the special issues.\footnote{Id. at 630.} The Texas court has not softened its stance over time. Moreover, it has used \textit{Johnson} to focus on the issue of the defendant’s age, irrespective of other kinds of mitigating evidence. In \textit{Lucas v. Texas},\footnote{Id. at 317.} for example, the defense presented evidence that the defendant: (1) suffered from chronic schizophrenia; (2) evidenced two personality disorders, “a schizotypical personality and elements of sociopathic personality;” (3) experienced seizures at school that made him an “outcast;” (4) was victimized by his mother’s physical and mental abuse that led him later to feel resentment toward females; (5) was of low-average intelligence (an IQ of eighty-four); and (6) had past episodes of attempted suicide and commitments to mental health institutions.\footnote{Id.} Yet upon remand from the Supreme Court with instructions to follow \textit{Johnson}, the Texas court focused on Lucas’s age and not his disabilities. By noting that Lucas was forty-three when he committed the offense, in contrast to Johnson who was only nineteen, the Texas court merely concluded that “youth is not a factor in the instant case.”\footnote{Id.} The Texas court denied \textit{Penry} relief without squarely addressing Lucas’s other disorders.

By using the nexus requirement, the Texas court has ensured that only mitigating evidence directly comparable to that introduced in \textit{Penry} is sufficient for \textit{Penry} relief.\footnote{Mines v. State, 852 S.W.2d 941, 959 (Tex. Crim. App. 1992) (Baird, J., dissenting).} As a result, defendants’ claims of mitigating evidence are consistently rejected either because they do not demon-

\begin{itemize}
\item \textit{Andrews} v. Collins, 21 F.3d 612 (5th Cir. 1994).
\item \textit{Id.} at 630.
\item 877 S.W.2d 315 (Tex. Crim. App. 1994).
\item \textit{Id.} at 317.
\item \textit{Id.} According to the three justices who dissented, “[T]he majority pretends the Supreme Court remanded this case to reconsider the matter of age, all the while ignoring that it pointedly cautioned, ‘\textit{Penry} remains the law and must be given a fair reading.’” \textit{Id.} (Clinton, Baird, & Overstreet JJ., dissenting) (quoting \textit{Johnson} v. Texas, 113 S. Ct. 2658, 2670 (1993)).
\end{itemize}
strate a sufficient nexus in the minds of the Texas court or because they are irrelevant.\textsuperscript{110} In Richardson \textit{v. State},\textsuperscript{111} for example, the Texas court affirmed a death sentence by concluding that Article 37.071 did not unconstitutionally preclude the jury from considering evidence of the defendant’s disadvantaged upbringing, which included poverty, parental neglect, illiteracy, learning disabilities, and stuttering.\textsuperscript{112} The court stated that the evidence was not mitigating because there was no nexus between the defendant’s disadvantaged life and the circumstances of his crime that would “excuse or explain” his acts and demonstrate that the death sentence was improper.\textsuperscript{113} The court noted that its determination may have differed if Richardson had shown that his mother had taught him to commit murder or other violent crimes or if the murder he committed had begun as a robbery.\textsuperscript{114} The court reasoned that this evidence “might indicate that his personality had been damaged through no fault of his own and that his capital crime was caused in part by that personality.”\textsuperscript{115}

By focusing on the link between the defendant’s mitigating evidence and his crime, however, irrespective of the considerably stronger potential link between the evidence and his culpability, the Texas court applies a requirement that is nearly impossible to meet. Unless there is evidence that Richardson’s parent specifically trained him to commit a homicide, no nexus can ever be shown.

\begin{footnotes}
\item 110. For example, in Muniz \textit{v. State}, 851 S.W.2d 238, 256 (Tex. Crim. App. 1993), the Texas court held that the defendant’s evidence of positive behavior (he was religious and loving to his family) fell within the scope of the second special issue. The evidence describing the defendant’s development of his artistic abilities, however, was considered irrelevant to an individualized determination of the defendant’s eligibility for a death sentence. \textit{Id.}

\item 111. 879 S.W.2d 874 (Tex. Crim. App. 1993).

\item 112. \textit{Id.} at 883. The defendant offered the following evidence at trial:
[\textit{H}is mother was “in and out” of penal institutions and had little to do with his upbringing; that he never knew his father; that when he was very young, he and his six siblings were raised by his maternal grandmother in substantial poverty and with little supervision; that sometimes he and his siblings went hungry; that sometimes “they would go out and steal, go in other people’s houses [looking for] food . . . to survive;” that the defendant got “in trouble with the law . . . twelve times . . . for stealing something to eat;” that sometimes, when his mother was around, she “would go in the stores and entertain the clerks while the children [were] taking food—taking clothes and what they wanted out of the stores;” that when the defendant was nine or ten, he was sent by state authorities to the Texas Boys Ranch and later, to the Giddings State School; that when he arrived at the Texas Boys Ranch, he was illiterate, stuttered badly, and was a “slow learner;” and that he was released from state care when he was 15 or 16. \textit{Id.}

\item 113. \textit{Id.} at 884.

\item 114. \textit{Id.} at 885.

\item 115. \textit{Id.}
\end{footnotes}
In *Ex Parte Crane*\(^{116}\) the Texas court further relied on the nexus requirement and the *Penry* standard in rejecting the petitioner's claim that a motorcycle accident resulting in irreversible brain damage, uncontrollable behavior, and personality changes, contributed to Crane's homicidal conduct six years later.\(^{117}\) Most recently in *Earhart v. State*,\(^ {118}\) the Texas court reaffirmed the nexus requirement and *Penry* standard by distinguishing evidence of mental retardation from evidence of substance abuse, which it found did not make the defendant less morally culpable for the crime.\(^ {119}\) Moreover, the defendant's evidence of psychological problems ("low ego strength" and "psychotic decompensation") was not considered relevant for mitigation because there was no indication that his problems were somehow linked to the commission of the offense.\(^ {120}\) The Fifth Circuit has shown a comparable reliance on the nexus requirement.\(^ {121}\)

2. **Additional Standards and Requirements.**—It is unlikely that the Texas court's nexus requirement will be challenged effectively. Even though cases are consistently remanded by the Supreme Court with a memorandum order to vacate the judgment and reconsider according to *Penry*, and more recently, *Johnson*, the Texas court merely reaffirms its prior finding.\(^ {122}\) Moreover, *Richardson* demonstrates that the Texas

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117. See *id.*, slip op. at 5 ("While Penry's evidence could reasonably be thought to excuse or explain, at least in part, his criminal conduct, the jury in [Mr. Crane's] case could not reasonably infer from his written medical records that his 1987 criminal conduct was attributable in any way to his 1981 motorcycle accident.").
119. *Id.* at 767.
120. *Id.*
121. See *Madden v. Collins*, 18 F.3d 304, 307 (5th Cir. 1994) (noting that although there was a "clear nexus between Penry's handicap and his criminal act," there was insufficient evidence that the defendant's criminal conduct in this case was attributable to the evidence of his antisocial personality); *Motley v. Collins*, 3 F.3d 781, 791 (5th Cir. 1993) (rejecting a *Penry* claim when the petitioner "failed to explore the nexus between the allegedly mitigating evidence and the crime itself"); *Russell v. Collins*, 998 F.2d 1287, 1292 (5th Cir. 1993) ("Under precedent in this circuit, evidence of a defendant's background is constitutionally relevant mitigating evidence only if the crime committed . . . is in some sense 'attributable' to that background. While 'attribution' does not require a precise nexus between such background evidence and the crime, at a minimum the evidence must permit a rational jury to 'infer that the crime is attributable, at least in part, to the defendant's background.'") (citation omitted); *Graham v. Collins*, 950 F.2d 1009, 1033 (5th Cir. 1992) (rejecting a *Penry* claim because there was insufficient evidence establishing that the defendant's "criminal conduct was 'attributable to a disadvantaged background, or to emotional and mental problems'").
122. See *Richardson (Miguel) v. Texas*, No. 68,934, 1994 WL 232238 at *1 (Tex. Crim.
court appears to apply an increasingly rigorous interpretation of what it means by "nexus."

In Earhart, the Texas court noted that it has provided Penry relief in only three circumstances: \(^{123}\) (1) when there is evidence of mental retardation, which falls beyond the scope of the special issues; \(^{124}\) (2) when there is evidence of mental illness, which may fall beyond the scope of the special issues; \(^{125}\) and (3) when the special issues failed to allow the jury a proper vehicle for considering evidence of provocation by a second victim in a prosecution for capital murder. \(^{126}\)

The Texas court has granted Penry relief in only five cases relating to the first circumstance and only one case relating to the second. Penry relief cases for the first circumstance concerning mental retardation merely reaffirm the previously stated proposition that the Texas court allows claims for evidence that are the "same" or "similar" to Penry's. \(^{127}\) The single Penry relief case for the second circumstance concerning mental illness, Gribble v. State, \(^{128}\) is a clear exception; \(^{129}\) it is unlikely that

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\(^{125}\) See Gribble v. State, 808 S.W.2d 65 (Tex. Crim. App. 1990), cert. denied, 111 S. Ct. 2856 (1991) (involving traumatic childhood, including sexual abuse by his mother). In Gribble, the Texas court reversed the trial court's denial of requested jury instructions, holding that the defendant was not provided a means by which the jury could sufficiently consider his mitigating evidence. Id. at 76. Note, however, that Gribble was decided before the Texas court's development of the nexus requirement.


\(^{127}\) See supra note 124 and accompanying text.


\(^{129}\) In Gribble, the Texas court reversed a trial court's conviction and sentence of death based on its finding that the jury was unable to "consider and give effect to" the defendant's mitigating evidence. Id. at 76. The defendant offered testimony describing his "troubled and insecure childhood," which he attributed to the institutionalization of both parents while he was still an infant—his mother for mental illness and his father for burglary. Id. at 75.
Gribble would be applied again.\textsuperscript{130}

Even within the constricted application of the current nexus requirement, the Texas court has applied a variety of inconsistent standards. In \textit{Goss v. State},\textsuperscript{131} for example, the Texas court was consistent with Gribble in concluding that the defendant’s mitigating evidence did not meet the \textit{Penry} standard because it did not show “any mental disorder or physiological damage . . . that would help explain why he ‘was less morally culpable than defendants who have no such excuse.’”\textsuperscript{132} In \textit{Nobles}, however, the Texas court made clear that “unless a direct correlation can be drawn between the use of drugs and a defendant’s aberrational behavior, we have determined that such usage is fully encompassed within the scope” of the Texas statute.\textsuperscript{133}

a young child, he and his siblings were continually placed among different relatives, causing him to experience considerable residential instability. \textit{Id}. When his mother was finally released from confinement and divorced from his father, he lived with her, her new husband, and his siblings in a rural shack without running water. Thereafter, his stepfather disappeared, leaving his pregnant mother without food for the family. His mother subsequently spent her time in bars, often bringing strange men home at night, leaving the children with “no responsible adult figure.” \textit{Id}.

According to the Texas court, the defendant’s mental and emotional condition was “abnormal” due to these circumstances. Moreover, a psychoanalyst testified that the defendant eventually disclosed to him that his mother sexually abused him on two occasions when he was a small child. \textit{Id}. Lastly, the psychoanalyst testified that “even if [the defendant’s sexual experiences] were untrue fantasies, [they] provided a substantial explanation for the appellant’s subsequent history of violence, and how the contrast of his violent behavior with his positive personality traits were indicative of severe mental illness, depression, and psychotic illusions of the kind experienced by his mother.” \textit{Id}. The Texas court viewed these circumstances “as redeeming personality traits or factors which tend to ameliorate fault.” \textit{Id}. at 76. For this reason, a sentencer “must be authorized to mitigate punishment if it finds that a defendant’s personal moral culpability was thereby reduced.” \textit{Id}.

130. There are several aspects of Gribble that may explain why it was an exception to the “same” or “similar” \textit{Penry} evidence standard that the Texas court has followed. First, it was decided in 1990, prior to the Texas court’s development of the nexus requirement. It is questionable whether that requirement, put in the context of the \textit{Penry} and progeny standard, would allow for the jury’s consideration of mental illness today. The Texas court’s current approach suggests that such an allowance would be unlikely. Second, Gribble focused on the relationship between the defendant’s circumstances and his moral culpability, only addressing how the circumstances could relate to his crime (a possible rape, kidnapping, and homicide). Again, it is doubtful that Gribble would be able to demonstrate a direct link between his circumstances and his offense under the Texas court’s current requirements. Moreover, Gribble never introduced evidence of mental retardation or even low intelligence. As this Article has noted, defendants with illnesses and family background experiences that are far more serious than those presented in Gribble have not been successful in winning \textit{Penry} claims. It appears, then, that Gribble may have been a fluke.


132. \textit{Id}. at 166.

Yet even if a defendant can get beyond the Penry standard and nexus requirement, there are additional hurdles that the Fifth Circuit has put forth. For example, as this Article mentioned in its discussion of age, 134 Graham implied that permanency may be a requirement for a mitigating circumstance; if a condition is not permanent, the evidence is sufficiently addressed by the second issue. The Court considered age to be a “transitory” condition. 135 Likewise, in Black v. Collins, 136 the Fifth Circuit held that evidence of the defendant’s good character prior to Vietnam did not require a special instruction because there was “no evidence to show that he suffered from a permanent emotional or mental impairment arising from his military service in Vietnam.” 137

Moreover, the Fifth Circuit has held that evidence is mitigating only if it is not due to the fault of the defendant; otherwise, it cannot be considered to reduce the defendant’s culpability. 138 Thus, substance abuse and voluntary intoxication are not mitigating because they are not “uniquely severe permanent handicaps with which the defendant was burdened through no fault of his own.” 139 However, the Texas court has primarily denied Penry claims with the blanket explanation that the defendant’s mitigating evidence could be sufficiently considered and “given effect to” within the Texas statute.

C. The Amended Texas Death Penalty Statute

Despite the Texas court’s narrowness, the Texas Legislature applied an expansive approach to its interpretation of Penry, which resulted in the amendment of the Texas statute in 1991. 140 During the regular session

the standard in Penry, however, have improperly focused on Penry’s disabilities, rather than the basis for his culpability. The issue in Penry was not that he suffered from mental retardation or from an abusive childhood, but that these were among a number of conditions contributing to his inability to control his behavior and learn from past mistakes. Evaluating the potency of conditions contributing to these disorders, and not retardation and child abuse per se, was the point to be learned from Penry.

134. See supra notes 71-75 and accompanying text.
137. Id. at 405.
139. Id. at 639.
following *Penry*, the legislature concluded that statutory changes were needed so that mitigating factors could be more fully considered.\(^{141}\) In contrast to the conflict created when the former Texas statute was enacted, this time the Texas Senate and House generally agreed that statutory changes were needed.\(^{142}\) Although the Texas Legislature's and court's different responses to *Penry* in 1991 were less than two weeks apart, the legislature acted first.\(^{143}\)

Generally, the house and senate agreed to delete the first and third special issues concerning, respectively, deliberate conduct and provocation, although both chambers concluded that the "continuing threat" issue should be retained. Moreover, both agreed to changes that would prohibit the improper exclusion of mitigating evidence at sentencing.\(^{144}\) This was accomplished through an express statement to "includ[e] evidence of the defendant's background or character or the circumstances of the offense that mitigates against the imposition of the death penalty."\(^{145}\) Moreover, the legislature also included an expansive jury instruction for determining the "continuing threat" and new causation/intent issues (if they applied) so that the jury would consider all evidence presented at the guilt and punishment stages.\(^{146}\) Most importantly, the legislature added a new mitigating circumstances issue that the jury would have to answer if it answered the "continuing threat" and causation/intent issues affirmatively.\(^{147}\) The legislature's changes apply to all offenses committed on or after September 1, 1991.\(^{148}\)

The following provisions of the amended statute are most applicable to the discussion in this Article. The amended statute first presents two special issues that the jury must consider:

1. whether there is a probability that the defendant would commit criminal acts of violence that would constitute a continuing threat

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142. Tobolowsky, supra note 19, at 380.
144. For a thorough discussion of the history and background of the amended Texas statute, see Tobolowsky, supra note 19, at 380-84.
145. TEX. CODE CRIM. PROC. ANN. art. 37.071, § 2(a) (West Supp. 1994).
146. Id. § 2(d)(1).
147. Id. § 2(e).
148. Id. § 2(f).
to society; and

(2) in cases in which the jury charge at the guilt or innocence stage permitted the jury to find the defendant guilty as a party under Sections 7.01 and 7.02, Penal Code, whether the defendant actually caused the death of the deceased or did not actually cause the death of the deceased but intended to kill the deceased or another or anticipated that a human life would be taken.\textsuperscript{149}

The statute then requires a specific jury charge:

\textit{[I]n deliberating on the issues submitted under Subsection (b) of this Article, it shall consider all evidence admitted at the guilt or innocence stage or the punishment stage, including evidence of the defendant's background or character or circumstances of the offense that militates for or mitigates against the imposition of the death penalty.\textsuperscript{150}}

Lastly, the statute requires a third special issue if issues (1) and (2) above are answered in the affirmative:

(3) Whether, taking into consideration all of the evidence, including the circumstances of the offense, the defendant's character and background, and the personal moral culpability of the defendant, there is a sufficient mitigating circumstance or circumstances to warrant that a sentence of life imprisonment rather than the death sentence be imposed.\textsuperscript{151}

If the jury under the amended statute returns unanimous affirmative findings for the "continuing threat" and causation/intent (if applicable) issues, plus a unanimous negative finding for the mitigating circumstances issue, the court must apply the death penalty.\textsuperscript{152} The court must sentence the defendant to confinement for life, however, if any one of the three following circumstances occur: (1) the jury returns a negative finding for the "continuing threat" or causation/intent issues; (2) the jury returns an affirmative finding for the mitigating circumstances issue; or (3) the jury is not able to answer any of the submitted sentencing issues.\textsuperscript{153}

On its face, the amended statute appears to more fully accommodate the constitutional requirements for adequate consideration of mitigation evidence under \textit{Penry} and its more restrictive progeny.\textsuperscript{154} For example, although Justice Thomas has stated that he believes \textit{Penry} was "wrongly

\begin{itemize}
\item \textsuperscript{149} \textit{Id.} \textsection 2(b)(1), (2).
\item \textsuperscript{150} \textit{Id.} \textsection 2(d)(1).
\item \textsuperscript{151} \textit{Id.} \textsection 2(e).
\item \textsuperscript{152} \textit{Id.} \textsection 2(g).
\item \textsuperscript{153} \textit{Id.}\textsuperscript{154}
\item \textsuperscript{154} Tobolowski, \textit{supra} note 19, at 384-94.
\end{itemize}
decided," 155 and that it represents the Court's most "extreme statement" in its "mitigating line," 156 he also believes that the Texas legislature's amendment was a "predictable" consequence of Penry. 157

The amended statute also appears to have rendered obsolete the Texas court's nexus requirement given its addition of a specific jury charge and a third special issue for mitigating evidence. But, while nexus is no longer expressly an appellate issue under the amended statute, it is foreseeable that a prosecutor will argue in summation what is essentially a nexus issue when discussing the mitigating circumstances that the defense has presented. Thus, the amended statute will have moved the nexus issue from the appellate court (which substituted its opinion for that of the jury) to the trial court. 158 Even though Texas jurors will be making decisions about the impact of certain mitigating evidence, it can be expected that some kind of nexus between the mitigating evidence and the defendant's culpability and crime will be required to turn them away from the death penalty. It bears reminding, for example, that Penry received a death sentence upon retrial under the former Texas statute despite the court's grant of special instructions for his mitigating evidence. 159

From an empirical standpoint, the Texas court's emphasis on Penry-only evidence in deciding Penry claims is also extremely limited. Although there is some evidence of a link between mental retardation and crime, 160 numerous other factors, which the Texas court has shunned in its application of Penry, have also been found to be associated with crime. These include: low socioeconomic status, family instability, poor verbal ability, low school achievement, learning disabilities, 161 and mental disorder. 162

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156. Id. at 904.
157. Id. at 913 n.9.
158. See Tobolowsky, supra note 19, at 393-94 ("Rather than merely engraving consideration of mitigating circumstances into the responses to the 'aggravating' circumstances issue(s), the legislature has also given Texas capital jurors the ability to 'consider and give effect to' a defendant's mitigating evidence by 'declining to impose the death penalty.'") (quoting Penry v. Lyaugh, 492 U.S. 302, 328 (1989)).
159. Id. at 394 n.225.
161. See generally JAMES Q. WILSON & RICHARD J. HERRENSTEIN, CRIME AND HUMAN NATURE (1985) (discussing how factors such as low intelligence, broken and abusive families, low socioeconomic status, and difficulty in school are associated with crime); KEVIN N. WRIGHT & KAREN E. WRIGHT, FAMILY LIFE, DELINQUENCY, AND CRIME: A POLICYMAKER'S GUIDE (1994) (discussing how children who grow up in homes with considerable conflict and lack of supervision are at great risk for becoming delinquent).
162. See WILSON & HERRENSTEIN, supra note 161, at 173-209 (1983) (suggesting a link between mental disorder and crime); NATHANIEL J. PALLONE, MENTAL DISORDER AMONG PRISONERS: TOWARD AN EPIDEMIOLOGIC INVENTORY 34, 147 (1991) (reporting that 74% of
Moreover, there is some evidence to suggest that no link exists between mental retardation and crime when other factors are taken into account.\textsuperscript{163}

the prison population in a study using the Minnesota Multiphasic Personality Inventory (MMPI) could be classified as psychologically disordered. Pallone notes that the 74\% figure is nearly four times greater than that reported for the general population. \textit{Id.} at 24-25. Relative to Whites, non-Whites have a higher incidence of organic brain disorders, mental deficiency, and psychosocial dysfunction. \textit{Id.} at 27. Furthermore, psychosocial dysfunction increases as socioeconomic status (SES) decreases. \textit{Id.} at 28. Thus, for example, the high incidence of neuropsychiatric or neurogenic mental disorders among prisoners is consistent with the disproportionate incidence of head trauma found among Blacks and low SES individuals. \textit{Id.} at 93-95. Pallone concludes, then, that “[g]iven the demographic differences between the general population and imprisoned offenders (who are disproportionately male, non-White, and from the lower socioeconomic strata), the inflicted prevalence of mental disorder among offenders seems to resemble that among the relevant reference groups in the general population.” \textit{Id.} at 147.

Other reviews of research studies conclude that an association between violence and mental disorder exists even when controls are provided for key demographic factors. See John Monahan, \textit{Mental Disorder and Violent Behavior: Perceptions and Evidence}, 47 AM. PSYCHOLOGIST 511 (1992). As Monahan states:

Whether the measure is the prevalence of violence among the disordered or the prevalence of disorder among the violent, whether the sample is people who are selected for treatment as inmates or patients in institutions or people randomly chosen from the open community, and no matter how many social and demographic factors are statistically taken into account, there appears to be a relationship between mental disorder and violent behavior. \textit{Id.} at 519. Yet Monahan’s conclusion is based on a major qualification that may distinguish it from Pallone’s. As Monahan emphasizes, “It is only people currently experiencing psychotic symptoms who may be at increased risk of violence. Being a former patient in a mental hospital—that is, having experienced psychotic symptoms \textit{in the past}—bears no direct relationship to violence, and bears an indirect relationship to violence only in the attenuated sense that previous disorder may raise the risk of current disorder.” \textit{Id.}

Other research has examined the link between crime and mental disorder using measures other than the MMPI, which some have criticized because it was designed in part to distinguish between offenders and nonoffenders. See Robert F. Krueger et al., \textit{Personality Traits Are Linked to Crime Among Men and Women: Evidence From a Birth Cohort}, 103 J. ABNORMAL PSYCHOL. 328, 329 (1994). The Krueger study examined the link between personality and criminal or delinquent behavior in both males and females using the Multidimensional Personality Questionnaire (MPQ), which was not designed to differentiate between offenders and nonoffenders, but to allow identification of numerous personality traits that could be linked to crime. \textit{Id.} This study determined that, for both genders, greater delinquent participation was associated with more aggression, alienation, greater stress reactivity, less traditionalism, and less self-control. \textit{Id.} at 335.

163. \textit{DENNO, BIOLOGY AND VIOLENCE}, supra note 11, at 70-95. Although a considerable amount of research has examined the relationship between intelligence and crime, \textit{Id.} at 10-12, there has been scant attention paid to mental retardation as a separate category. According to Pallone, prisoners evidence a higher incidence of mental retardation relative to the general population, although the disparity is not as great as that found with mental illness.
Indeed, researchers emphasize their failure to detect strong or consistent predictors of crime in general.164

In light of these circumstances, the following sections examine the results of the Biosocial Study to determine the strength of the relationship between certain factors which could be considered mitigating, and crime. The Study analyzed the following issues: (1) whether there is a relationship between mental retardation and crime, as Penry suggests; (2) whether factors other than retardation show a stronger relationship to crime; and (3) whether any one or combination of factors apart from retardation can meet the standard currently used in the Texas court’s nexus requirement and the standard which may be suggested or implied under the amended Texas statute. Contrary to much prior empirical research, the Biosocial Study examined numerous variables collected on individuals who are, demographically, at a high risk for the death penalty.

III. An Empirical Analysis of Penry Evidence

The 987 subjects who participated in the Biosocial Study were born at Philadelphia’s Pennsylvania Hospital between 1959 and 1962.165 All

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See Pallone, supra note 162, at 147. For example, a 1985 survey of prison administrators found that mentally retarded inmates constituted approximately two percent of the prison population, id. at 39, relative to approximately 1.5% of the general population. Id. at 40. The incidence among non-Whites was greater than among Whites at a ratio of 161%. Id. This demographic disparity may account in part for Pallone’s general conclusion that “mental retardation among imprisoned offenders exceeds that in the general population by 50%.” Id. at 147. Relative to his discussion of mental illness, however, Pallone engaged in limited discussion of the other factors associated with mental retardation that could also be linked to crime. Others suggest that the relationship between intelligence and crime is curvilinear. Whereas most offenders occupy the normal or borderline subnormal IQ levels that range from 60 to 100, “their relative frequencies decline on either side of this range.” Wilson & Herrnstein, supra note 161, at 155. Thus, offenders may have generally lower intelligence test scores, but they are not disproportionately mentally retarded.


165. The subjects and their families were originally part of the Collaborative Perinatal Project, one of the largest medical projects ever conducted in this country. In 1957, the National Institute of Neurological Diseases and Stroke launched the Collaborative Perinatal Project, a nationwide study of biological and environmental influences on pregnancy, and infant and childhood mortality, as well as on physical, neurological, and psychological development in children. Nearly 60,000 pregnant women participated in the study between 1959 and 1966 in 15 different medical centers. One of these medical centers was located in Philadelphia. Examination of the children from the time of their birth through age seven continued until 1974. Niswander & Gordon, supra note 13, at 3-7 (1972).
subjects were Black because there were too few White subjects to study and because, at the time, commentators had complained that a dearth of research had been devoted to studying crime among Black youths.\textsuperscript{166} For

The Philadelphia Perinatal Project comprised nearly 10,000 pregnant patients who delivered their children at Pennsylvania Hospital between 1959 and 1965; the children were later tested at Children's Hospital of the University of Pennsylvania. \textit{Id.} at 11. All pregnant women who attended Pennsylvania Hospital during this time were included in the Philadelphia Perinatal Project if they wanted to be, except for those women who had unregistered emergency deliveries or who were planning to deliver elsewhere. \textit{Id.} at 498. The total sample in the Philadelphia Perinatal Project reflects, in part, the characteristics of families who would be interested in receiving inexpensive maternity care provided by a public clinic. The sample was comprised predominantly (87\%) of Black families, \textit{id.} at 10, whose socioeconomic levels were slightly lower than those of the United States population at the time. \textsc{Denno}, \textit{Biology and Violence}, \textit{supra} note 11, at 30. In 1978, the Sellin Center for Studies in Criminology and Criminal Law at the University of Pennsylvania received a grant from the National Institute of Justice to examine the Philadelphia Perinatal Project children. As part of the grant, public school and police record data were collected on all 10,000 youths. For ten years thereafter, detailed data were organized and analyzed on a subsample consisting of 987 individuals who constituted the subjects for the Biosocial Study. \textit{Id.} at 29. Those subjects were selected from the first four years (1959-62) or from "cohorts" of 2,958 Black mothers who participated in the Philadelphia Perinatal Project. A "cohort" is "[a]ny group that passes through a set of experiences or institutions at the same time." \textsc{John M. Neale} \& \textsc{Robert M. Liebert}, \textit{Science and Behavior: An Introduction to Methods of Research} 309 (3d ed. 1986).

Subjects were selected according to the following criteria: (1) attended a Philadelphia public school, (2) stayed in Philadelphia from ages 10 through 17, (3) received selected intelligence tests within six months of age seven and achievement tests at ages 13 and 14, and (4) did not have a sibling in the sample to prevent the possible biases that could result in examining family members. Comparisons between the final sample of 987 subjects and the excluded sample of 1971 Black subjects showed no significant differences in key variables: total family income, per capita family income, the number of prenatal examinations the mother had, the mother's age, and the distribution of males and females. In general, the final sample appeared to be representative of the sample from which it was drawn. \textsc{Denno}, \textit{Biology and Violence}, \textit{supra} note 11, at 30.

\textsuperscript{166} The Biosocial Study's research on Black youths was initiated in 1980 at a time when Black commentators were criticizing the Office of Juvenile Justice and Delinquency Prevention ("Office") for spending most (80\%) of its monies researching White youths. \textit{See} William Raspberry, \textit{Youth Crime Funds Go to the Whites}, \textsc{Phila. Inquirer}, Apr. 1, 1980, at A9. Essentially, commentators accused the Office of using crime statistics on Black youths in order to acquire money, which the Office would then spend on research or rehabilitation programs for White youths. One result was that a growing number of White youths were being removed from the criminal justice system through deinstitutionalization and diversion programs, while a growing number of Black youths were populating the prisons. One commentator claimed that the premise underlying such differential treatment was that serious Black offenders could not be similarly treated through counselling or diversion. \textit{Id.} Because of these claims, many federal programs providing research funding on crime today urge grant applicants "to assess carefully the feasibility of including the broadest possible representation of minority groups" in their samples. \textsc{Department of Health and Human Services et al., Program Announcement: Research on Relationships Between Alcohol and
the purposes of this Article, only the results for the sample of 487 males are reported because their crimes were more serious than the crimes found among females\textsuperscript{167} and because relatively few females are sentenced to death.\textsuperscript{168}

A. The Testing of Different Theories of Crime

In order to test different theories of crime with this sample, the Biosocial Study used, in addition to urban environment,\textsuperscript{169} three primary

\textit{Violence} 15 (June 1993). The racial and socioeconomic characteristics of this sample (Black and lower-class) limits the extent to which the results of the Biosocial Study can be generalized to other groups comprised of individuals of different races and socioeconomic status, such as middle-class Whites. However, the demographic homogeneity of the Study's sample provides built-in "controls" for those racial and socioeconomic factors that have been strongly linked to crime and its determinants. See generally Marvin E. Wolfgang et al., \textit{Delinquency in a Birth Cohort} (1972) (describing an earlier Philadelphia study that concluded that race and socioeconomic status were major predictors of delinquency). Therefore, it can be assumed that the results of the Biosocial Study are not attributed to racial and socioeconomic variations among individuals.

167. The Biosocial Study also conducted in depth analyses on females that are not reported here because of this Article's focus on more serious criminal behavior. For example, although 22% of the 987 youths experienced at least one offense prior to age 18, strong gender differences appeared. Over twice as many males (31%) as females (14%) had any offenses. Among those males and females who did have an offense, twice as many males (25%) as females (12%) had at least one offense that involved violence or injury to at least one other person. Denno, \textit{Biology and Violence}, supra note 11, at 40-41. Moreover, 22% of the sample of male offenders was arrested as adults compared to only five percent of the female offenders. Id. at 46.


169. During the 1960s, at the time of the Perinatal Project, the majority of large metropolitan areas, including Philadelphia, experienced significant social upheaval and shifts in the distribution of non-White residential patterns. Roger Lane, William Dorsey's \textit{Philadelphia & Ours: On the Past and Future of the Black City in America} 366 (1991); Frederick B. Glantz and Nancy J. Delaney, \textit{Changes in Nonwhite Residential Patterns in Large Metropolitan Areas, 1960 and 1970}, New Eng. Econ. Rev. Mar.-Apr. 1973, at 2-13. In general throughout the decade, there was an increase in the concentration of Blacks and all non-Whites in urban areas. Id. at 13. In Philadelphia, for example, the proportion of Blacks rose from 23% in 1960 to 33% in 1970. Peter O. Muller et al., \textit{Metropolitan Philadelphia: A Study of Conflicts and Social Cleavages} 14 (1976). With the exception of New York City, Philadelphia was probably the most socially heterogeneous city in the United States. Id. at 1. Despite such diversity, however, ethnic and racial groups had a long tradition of residential segregation. Id. at 18-23. Even neighborhoods that appeared ethnically mixed in tabulated statistics remained firmly segregated at the block level. Id. at 22-23.
During the time when the Biosocial Study's subjects were young children, most Blacks with low incomes were concentrated in Philadelphia's inner city areas, which were isolated socially and culturally. Conrad Weiler, Philadelphia: Neighborhood, Authority, and the Urban Crisis 181-82 (1974); see John F. Bauman et al., Public Housing, Isolation, and the Urban Underclass, 17 J. Urb. Hist. 264, 265, 273-86 (1991) (studying low income Black families living in a large Philadelphia public housing project). Plagued by overcrowded and substandard housing, the social-cultural constraints and conditions of these neighborhoods were recognized as "festers of crime." See Gaeton Fonzi, Hard-Core Families A Festering Empire, 51 Greater Phila. Mag. 17, 18, 50-55 (1960); see also John F. Bauman, Public Housing, Race, and Renewal: Urban Planning in Philadelphia, 1920-1974, at 183-201 (1987) (detailing how failed federal policies made public housing warehouses for the urban poor).

Although the Biosocial Study "controlled" or accounted for the effects of the urban environment because all subjects were raised in it, the Biosocial Study examined many other kinds of socioeconomic and environmental data. These data included, among other factors: parents' occupation, education, and employment history; family income and size; religion; marital stability; welfare status; whether or not the child resided in a foster home; and number of persons supported in the household. As would be expected, many of these factors were interrelated. See Denno, Biology and Violence, supra note 11, at 19-24 (describing how these variables were measured and interrelated and describing their association with crime).

170. The amount of data available for early biological and environmental factors was extraordinarily comprehensive. Upon registration for the Perinatal Project, each mother underwent a battery of interviews and physical examinations that provided data for each pregnancy, including the mother's reproductive history, recent and past medical history, and labor and delivery events. Data recorded for each child included information on neurological examinations conducted at birth, throughout the hospital stay, at four months, and at ages one and seven. Additionally, the children took speech, language, and hearing examinations at ages three and eight. Researchers collected socioeconomic and family data during the mother's registration and the child's seven-year examination. Data were collected immediately after an event occurred. Highly structured forms and manuals were used to ensure comprehensiveness and comparability among the coders who recorded the data. All coders were either medical doctors or psychologists trained to record data systematically. For descriptions of the numerous procedures used to ensure reliability in the Project's coding, see Niswander & Gordon, supra note 13, at 17-19, 500-24.

171. Philadelphia public school records also contained a variety of additional data about each subject, although the Biosocial Study relied predominately on two types: (1) academic achievement during ages 13 and 14 and (2) evidence of learning or disciplinary problems in school.

The California Achievement Test measured academic achievement in grades seven and eight, corresponding to ages 13 and 14. Social scientists have described the California Achievement Test as an excellent data source for measuring both verbal and mathematical achievement. Denno, Biology and Violence, supra note 11, at 171-73. Researchers have found a high correlation between that test and the other tests measuring achievement that were administered in the Perinatal Project at age seven. Id. at 169. Moreover, the standardization sample for the California Achievement Test allowed for "proportionate representation in the national norms of minority group students in the total school population." Id. at 171 (citation omitted). However, social scientists have found evidence of test bias in a number of other
for juveniles and adults. The Biosocial Study used three different measures of juvenile and adult crime: (1) number of offenses; (2) categorization of juvenile offenders according to levels of the most serious offense recorded (violence, property, and nonindex); and (3) seriousness of offenses.

The first stage of the Biosocial Project examined nearly 150 factors that were selected according to developmental and biopsychological theories of crime which were grouped very generally into six types: (1) early psychological tests administered in the Perinatal Project based upon a wide range of possible racial, socioeconomic, and cultural influences. Id. at 173. Because the individuals in the Biosocial Study were racially and socioeconomically homogenous, many of the factors most influential in creating testing bias could not exist in the Biosocial Study’s analyses. The Appendix contains further discussion of the California Achievement Test and test bias.

Learning and disciplinary problems during school were measured, respectively, by the presence of any record of the child’s involvement in special school programs for those classified as being mentally retarded or having disciplinary problems. Children with disciplinary problems were diagnosed as having normal intelligence, but having some record of asocial behavior in school, including a history of starting fires, physical aggression toward teachers, maladjustment to school, and conduct disturbance. The Philadelphia School Board stated that any school’s recommendation of a child to a special school program was made independently of any knowledge of that child’s official delinquency status. DENNO, BIOLOGY AND VIOLENCE, supra note 11, at 32.

172. The Biosocial Study collected official police records for all subjects from ages seven to 22. Id. at 32.

173. Violent offenders were those individuals who had a record of at least one violent offense at any time during their juvenile criminal career. Violent offenses consisted of murder, assault with intent to kill, aggravated assault, simple assault, rape, robbery with injury, and any other offense that involved injury to the victim. Property offenders had a record of at least one property-related offense, but no history of violent offenses. Property-related offenses included vandalism, burglary, robbery without injury, and auto theft. Nonindex offenders had a record of at least one nonindex offense, but no history of violent or property-related offenses. Nonindex offenses included truancy, disorderly conduct, running away, fraud, and possession of alcohol, marijuana, or hard drugs. Id. at 39.

The method of ranking and scoring offense seriousness was based on a widely accepted and validated system of assigning numerical weights to different components of an offense that was derived from a national survey of crime severity. See generally MARVIN E. WOLFGANG ET AL., THE NATIONAL SURVEY OF CRIME SEVERITY (1985) (describing the National Survey of Crime Severity, overall findings, analytical results and suggestions for use). The different components of an offense included the seriousness of personal injury to the victim, the amount of property theft or damage, the extent to which the victim was intimidated (for example, through a threat of gross bodily harm), the number of premises that the offender entered, and the number of vehicles stolen. Id. at 129-36.

174. DENNO, BIOLOGY AND VIOLENCE, supra note 11, at 34-36. Developmental and biopsychological theories of crime emphasize the physiological and psychological capacities for individuals to adjust to their environments and to learn appropriate behavior. Individuals who show central nervous system disorders, delayed maturation, or low intelligence test scores, for example, may be more vulnerable to negative or stressful environments. Id. at 37. These relationships exist regardless of the racial or socioeconomic characteristics of those
central nervous system development (for example, prenatal and pregnancy complications and Apgar score, an accepted and validated scale of health and development immediately following birth); (2) intelligence and cerebral dominance (for example, measures of verbal and spatial ability, as well as indicators of laterality, such as the child’s hand, eye, and foot preference, which are indicative of learning disabilities); (3) physical growth and development (for example, measures of height and weight); (4) neurological status (for example, “soft neurological signs” or lack of coordination); (5) attention deficit disorder and hyperactivity (for example, evidence of disciplinary problems in childhood and adolescence, as well as mixed indicators of laterality and difficulty with left-right identification); and (6) general physical health (for example, high blood pressure, pica, lead poisoning, and anemia).

Although the Biosocial Study “controlled” or accounted for the effects of the urban environment because all subjects were raised in it, the Biosocial Study examined many other kinds of socioeconomic and environmental data. These data included, among other factors: parents’ occupation, education, and employment history; family income and size; religion; marital stability; welfare status; whether or not the child resided in a foster home; and number of persons supported in the household. As would be expected, many of these factors were interrelated.

The integration of both biological and environmental factors is a crucial step toward understanding why crime occurs and how it relates to criminal responsibility. Based upon extensive research in this area, a juvenile or adult criminal status may depend, in part, on early developmental, biological, and environmental factors whose cumulative influences vary over time. Associations among the biological and environmental factors selected for the Biosocial Study were examined from the time of the subjects’ birth to young adulthood (age twenty-two) to determine which factors predicted crime and how these factors were interrelated. A major focus concerned offender group differences in measures of mental retardation and intelligence.

individuals, although individuals who are minorities and are from lower socioeconomic backgrounds are more likely to be raised in stressful environments. *Id.* at 19.

175. *Id.* at 37-39.

176. For a description of how these variables were measured and interrelated, as well as extensive literature describing their association with crime, see *id.* at 19-24.
B. Mental Retardation, Intelligence, and Crime

1. Intelligence Test Scores.—Despite the magnitude of the research conducted on the association between intelligence and crime, the nature and extent of the link is not entirely clear. Most studies have not incorporated sufficient numbers of intelligence measures at varying points in time to draw definite conclusions. Nor have most studies examined intelligence with other predictors of crime, such as early central nervous system development, socioeconomic status, or family factors.

This section examines the relationship between crime and the intelligence and achievement test scores of the Biosocial Study children at ages four, seven, and thirteen-fourteen. These ages are important both for intellectual and moral development and because of their relationship to the onset of delinquency. The Appendix provides a description of the different intelligence and achievement tests that were applied.

Offender group differences in test scores were examined using the analysis of variance (ANOVA) and the Duncan's Multiple Range test. ANOVA tests whether significant differences exist in general among offender groups. The Duncan's Multiple Range test contrasts all possible pairs of group means to determine if there are significant differences between each of the offender groups. For example, the Duncan test can show whether the mean scores for nonoffenders are significantly different from the mean scores of one-time offenders or multiple offenders.

In Table 1, the results of between-group differences examined with the Duncan test are indicated by changes in the letters A and B (shown in the column labelled [DN]), with order group means respectively from largest to smallest. Means with the same letter are not significantly different at the $p < .05$ level. If two groups have identical letters (for example, [A]

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177. Much of the discussion in this section derives from id. at 48-69.
178. The dearth of reliable research on this link is attributable in part to the argument that intelligence is not a significant predictor of delinquency when controlling for important intervening factors, such as socioeconomic status. However, there have been a number of studies showing that the link between intelligence and crime remains strong even when socioeconomic status is controlled. Id. at 7-28. Conflicting conclusions about the intelligence-crime relationship are further clouded by claims that intelligence test scores, which have been largely standardized with White, middle-class children, do not adequately reflect the abilities of minorities or those from lower socioeconomic levels. Such claims are not entirely relevant, however, in studies of children who are of the same race and socioeconomic background. Id. at 48.
179. Id. at 49.
180. Id. at 50.
181. Statistical significance refers to the probability that a particular result occurred by chance. All factors were at least significant at the .05 level, the standard significance level for social science research. Therefore, five times out of 100, a factor that appeared to be
and [A]) or share the same letter (for example, [A] and [AB]), they are not significantly different; if two groups have discrepant letters (for example, [A] and [B]), they are significantly different.

a. Violent Offenders.—Table 1 shows that some test scores for types of male offenders differed according to degrees of offense severity—particularly violence. At ages four and seven, violent offenders scored significantly lower than some other offender groups or nonoffenders on the following tests: Stanford-Binet, WISC Full Scale IQ, Verbal IQ and Performance IQ, WISC Digit Span, WISC Block Design, and WRAT Spelling and Reading. However, comparisons between nonoffenders and violent offenders show that the differences are not great (not more than three IQ points).

Similarly, when “high, medium, and low” levels of the WISC Verbal and Performance IQ’s are compared, violent offenders are disproportionately ranked in the lower third of the test scores (which range from fifty-seven to eighty-six), but not significantly so. Relative to nonoffenders, violent offenders were also not significantly represented among those youths with borderline-or-below (IQ < eighty) or mentally defective (IQ < sixty-nine) intelligence scores for either the WISC Verbal or the Performance IQ.

More striking differences existed at adolescence, however, and most strongly for violent offenders. Compared to nonoffenders, violent offenders scored seventeen percentiles lower on Vocabulary, sixteen percentiles lower on Total Reading, and between ten and fourteen percentiles lower on Total Language, the Total Battery, Comprehension, Mechanics, and Usage and Structure. No differences existed for the Total Math and its subtests, indicating that violent offenders performed more poorly in verbal and language abilities.

The extent of these differences among offender groups becomes magnified, particularly in adolescence, when sample test scores are grouped into categories of high, medium, and low. Highly significant differences existed in comparisons of select reading and language achievement tests. For example, twice as many violent offenders than nonoffenders scored in the bottom third (ranging from one to fifteen percentiles) of the Biosocial Study sample for Total Reading achievement; in turn, four times more nonoffenders than violent offenders scored in the top third (ranging from thirty-eight to ninety-nine percentiles) of the sample ($X^2[2] = 16.5; p < .001$). Comparable and highly significant disparities

significant would really not be; the apparent significance would only be by chance. JOHN MONAHAN & LAURENS WALKER, SOCIAL SCIENCE IN LAW 79 (3d ed. 1994); NEALE & LIEBERT, supra note 165, at 62-63.
<table>
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<th>Age</th>
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<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
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<td>(24.09)</td>
<td>30.00</td>
<td>(23.50)</td>
<td>27.00</td>
</tr>
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<td></td>
<td>Total Math (0-24)</td>
<td>24.51</td>
<td>(22.50)</td>
<td>23.00</td>
<td>(23.00)</td>
<td>19.00</td>
</tr>
<tr>
<td></td>
<td>Computation (1-20)</td>
<td>24.64</td>
<td>(22.59)</td>
<td>22.00</td>
<td>(12.50)</td>
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<td>25.70</td>
<td>(22.53)</td>
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<td>(30.00)</td>
<td>22.00</td>
</tr>
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<td></td>
<td>Total Language (1-20)</td>
<td>25.30</td>
<td>(24.24)</td>
<td>24.00</td>
<td>(23.57)</td>
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<td>Mechanics (1-20)</td>
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<td>27.47</td>
<td>(32.50)</td>
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<td>Usage and structure (1-20)</td>
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<td>(18.50)</td>
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<td>Spelling (0-20)</td>
<td>26.60</td>
<td>(24.50)</td>
<td>25.00</td>
<td>(21.40)</td>
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<tr>
<td></td>
<td>Total Battery (1-20)</td>
<td>25.31</td>
<td>(22.11)</td>
<td>25.75</td>
<td>(21.00)</td>
<td>21.00</td>
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<td>15-14</td>
<td>Placement in discipline programs (0-5)</td>
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<td>0.14</td>
<td>(0.71)</td>
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<td>Placement in programs for the retarded (0-16)</td>
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<td>(1.23)</td>
<td>0.14</td>
<td>(0.70)</td>
<td>0.18</td>
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</table>

Sample size: 33, 34, 31, 30, Total: 497

Notes: *p < .05; **p < .01; ***p < .001
Duncan [BD] significant at p < .05
existed between nonoffenders and violent offenders for Total Language achievement ($\chi^2[2] = 11.0; p < .01$).

b. Repeat Offenders.—Table 2 shows comparisons among types of male, repeat offenders. Chronic offenders (those who commit five or more offenses) differed significantly from nonoffenders on the following tests: Stanford-Binet, WISC Full Scale IQ and Verbal IQ, WISC Vocabulary, WISC Digit Span, and WRAT Reading and Arithmetic.

Relative to nonoffenders, chronic offenders were also significantly more likely to be in the bottom third of the WISC Verbal IQ ($\chi^2[2] = 6.0; p = .05$). Although not significantly different from nonoffenders on the WISC Performance IQ when separated into high, medium, and low categories, chronic offenders were significantly represented among youths with borderline-or-below and mentally defective scores on the WISC Performance IQ. For example, more than twice as many chronic offenders than nonoffenders had borderline-or-below Performance IQ ($\chi^2[1] = 4.4; p < .05$), and over five times as many were scored as mentally defective ($\chi^2[1] = 7.3; p < .01$).

Again, discrepancies were strongest in adolescence. Chronic offenders scored seventeen percentiles lower on the Mechanics subtest; fifteen to sixteen percentiles lower on Total Reading, Total Language, and Comprehension; and ten to fourteen percentiles lower on Spelling and Total Battery achievement and the Vocabulary and Concepts and Problems. In general, for most tests, nonoffenders and one-time offenders scored higher than nonchronic repeat offenders, who in turn scored higher than chronic offenders.

Altogether, chronic offenders were significantly more likely to be in the bottom third of the group in Total Reading ($\chi^2[2] = 10.4; p < .01$) and Total Language ($\chi^2[2] = 11.0; p < .01$). Only one of the twenty-five chronic offenders scored in the top third of the Total Language and Total Reading. Nonoffenders were much more likely to score in the top third.

2. Mental Retardation and Behavioral Disorders.—In light of the considerably lower test scores found for repeat offenders, it would be expected that delinquents would be disproportionately enrolled in school programs for those children diagnosed as mentally retarded. Likewise, it would be expected that children with some record of troublesome behavior would be more likely than nondelinquent children to demonstrate disciplinary problems in school.
<table>
<thead>
<tr>
<th>Age</th>
<th>Test</th>
<th>Nonoffender</th>
<th>One-time offender</th>
<th>Two-time offender</th>
<th>Two-three-time offender</th>
<th>More than three-time offender</th>
<th>Examine (N=403)</th>
</tr>
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<tr>
<td></td>
<td></td>
<td>Mean (SD)</td>
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<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>4</td>
<td>Stanford-Binet Intelligence</td>
<td>92.75 (13.19)</td>
<td>92.49 (10.90)</td>
<td>91.05 (15.13)</td>
<td>89.62 (13.45)</td>
<td>87.11 (17.02)</td>
<td>2.24 (50)</td>
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<tr>
<td></td>
<td>Scale (25-175)</td>
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<tr>
<td>7</td>
<td>WISC Full Scale IQ (25-154)</td>
<td>82.07 (11.22)</td>
<td>84.04 (7.54)</td>
<td>83.05 (11.11)</td>
<td>85.10 (8.05)</td>
<td>87.13 (7.52)</td>
<td>2.54 (50)</td>
</tr>
<tr>
<td>7</td>
<td>WISC Verbal IQ (4-155)</td>
<td>82.43 (11.53)</td>
<td>82.10 (10.85)</td>
<td>82.28 (10.63)</td>
<td>83.32 (10.65)</td>
<td>87.13 (7.52)</td>
<td>2.54* (50)</td>
</tr>
<tr>
<td>7</td>
<td>WISC Verbal Subscales</td>
<td>9.14 (3.44)</td>
<td>9.75 (2.31)</td>
<td>9.31 (2.18)</td>
<td>9.64 (2.13)</td>
<td>9.84 (1.63)</td>
<td>1.04 (50)</td>
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<td>Information (9-20)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Comprehension (9-20)</td>
<td>8.07 (2.41)</td>
<td>8.01 (2.40)</td>
<td>8.47 (2.74)</td>
<td>8.95 (2.53)</td>
<td>8.95 (2.53)</td>
<td>0.25 (50)</td>
</tr>
<tr>
<td></td>
<td>Vocabulary (9-20)</td>
<td>6.31 (2.40)</td>
<td>6.55 (2.25)</td>
<td>6.95 (2.50)</td>
<td>7.48 (2.47)</td>
<td>7.88 (2.45)</td>
<td>2.54 (50)</td>
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<td>Digit span (9-20)</td>
<td>8.10 (2.55)</td>
<td>8.74 (2.60)</td>
<td>8.95 (2.67)</td>
<td>9.35 (2.89)</td>
<td>8.94 (2.69)</td>
<td>2.50* (50)</td>
</tr>
<tr>
<td>7</td>
<td>WISC Performance IQ (44-150)</td>
<td>84.27 (12.96)</td>
<td>86.24 (11.07)</td>
<td>94.08 (13.75)</td>
<td>91.05 (13.45)</td>
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<td>0.65 (50)</td>
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<tr>
<td>7</td>
<td>WISC Performance Subscales</td>
<td>9.12 (3.22)</td>
<td>8.90 (2.41)</td>
<td>9.90 (2.41)</td>
<td>8.96 (2.41)</td>
<td>8.96 (2.41)</td>
<td>1.02 (50)</td>
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<td>Block design (9-20)</td>
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</tr>
<tr>
<td></td>
<td>Coding (9-20)</td>
<td>6.10 (2.71)</td>
<td>6.00 (2.50)</td>
<td>6.00 (2.50)</td>
<td>6.00 (2.50)</td>
<td>6.00 (2.50)</td>
<td>0.01 (50)</td>
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<td>Picture arrangement (9-20)</td>
<td>8.94 (2.51)</td>
<td>9.17 (2.55)</td>
<td>9.17 (2.55)</td>
<td>8.97 (2.47)</td>
<td>7.90 (2.37)</td>
<td>1.47 (50)</td>
</tr>
<tr>
<td></td>
<td>Picture completion (9-20)</td>
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<td>0.89 (1.03)</td>
<td>0.89 (1.03)</td>
<td>0.89 (1.03)</td>
<td>0.89 (1.03)</td>
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<tr>
<td></td>
<td>Total (9-20)</td>
<td>20.10 (3.54)</td>
<td>20.24 (3.55)</td>
<td>20.32 (3.56)</td>
<td>20.35 (3.55)</td>
<td>20.55 (3.55)</td>
<td>2.00 (50)</td>
</tr>
<tr>
<td>7</td>
<td>Bender-Gestalt Replication</td>
<td>7.22 (3.44)</td>
<td>7.07 (3.25)</td>
<td>7.07 (3.25)</td>
<td>7.07 (3.25)</td>
<td>7.07 (3.25)</td>
<td>1.24 (50)</td>
</tr>
<tr>
<td></td>
<td>Score (9-20)</td>
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<td>7</td>
<td>Bender-Gestalt time (in secs)</td>
<td>412.55 (150.40)</td>
<td>329.07 (122.33)</td>
<td>432.49 (227.22)</td>
<td>459.50 (157.37)</td>
<td></td>
<td>1.49 (50)</td>
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<td>7</td>
<td>Goodenough-Harris drawing test (40-151)</td>
<td>0.67 (0.19)</td>
<td>0.70 (0.18)</td>
<td>0.70 (0.18)</td>
<td>0.70 (0.18)</td>
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<td>0.55 (50)</td>
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<td>10-14</td>
<td>California Achievement Test</td>
<td>Total Reading (1-09)</td>
<td>51.25 (7.05)</td>
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<td>35.21 (23.25)</td>
<td>39.20 (24.32)</td>
<td>5.50** (10)</td>
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<td>50.09 (7.34)</td>
<td>34.09 (24.76)</td>
<td>37.00 (23.64)</td>
<td>40.00 (24.30)</td>
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<td></td>
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<td>Comprehension (1-09)</td>
<td>21.09 (24.09)</td>
<td>25.05 (23.62)</td>
<td>27.77 (23.09)</td>
<td>30.75 (23.62)</td>
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<td>Total Math (1-09)</td>
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<td>24.01 (21.73)</td>
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<td></td>
<td>Concepts and problems (1-09)</td>
<td>23.99 (22.93)</td>
<td>27.01 (22.93)</td>
<td>28.14 (23.95)</td>
<td>29.14 (23.95)</td>
<td>5.50** (10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Language (1-09)</td>
<td>25.05 (24.04)</td>
<td>20.25 (21.94)</td>
<td>21.52 (21.94)</td>
<td>22.52 (21.94)</td>
<td>5.50** (10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mechanics (1-09)</td>
<td>20.05 (24.03)</td>
<td>20.40 (23.64)</td>
<td>21.74 (23.43)</td>
<td>22.92 (23.43)</td>
<td>5.50** (10)</td>
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<tr>
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<td></td>
<td>Usage and structure (1-09)</td>
<td>20.08 (25.45)</td>
<td>22.66 (10.59)</td>
<td>23.25 (21.75)</td>
<td>24.24 (21.75)</td>
<td>5.50** (10)</td>
</tr>
<tr>
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<td>Spelling (1-09)</td>
<td>20.09 (32.53)</td>
<td>20.94 (24.43)</td>
<td>22.31 (24.43)</td>
<td>23.31 (24.43)</td>
<td>5.50** (10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total (1-09)</td>
<td>25.05 (23.57)</td>
<td>20.71 (21.34)</td>
<td>21.79 (21.34)</td>
<td>22.87 (21.34)</td>
<td>5.50** (10)</td>
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<td>10-14</td>
<td>Placements in disciplinary programs (0-9)</td>
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<td>0.07 (0.45)</td>
<td>0.07 (0.45)</td>
<td>0.07 (0.45)</td>
<td>1.00 (25)</td>
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<td>10-14</td>
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<td>0.22 (0.93)</td>
<td>0.22 (0.93)</td>
<td>0.55 (25)</td>
</tr>
</tbody>
</table>

Notes: *p < .05; **p < .01; ***p < .001

Duncan (D) significant at p < .05
At the time achievement test scores were administered to the subjects in the Biosocial Study (1972-1975), the School District of Philadelphia had available Individual Education Programs that were recommended by a Child Study Evaluation Team for all "exceptional students," particularly those with learning and behavioral difficulties. Exceptional students were broadly defined as "those who differ from the average to such a degree that they cannot benefit from their educational experience without special education program assistance."182 A Child Study Evaluation Team consisted of a varied group of school district personnel including the principal, school nurse, school psychologist, counselor, other therapists and professionals, and the student's parents. Together, the team identified and evaluated exceptional students according to specific criteria established by state guidelines. Evaluations included a student's history, observations, review of school achievement and adjustment, as well as psychological and medical examinations.183

The Biosocial Study focused on programs for subjects diagnosed as mentally retarded or in need of behavioral discipline. The determination of mental retardation was based on a range of criteria, including results of a full battery of psychological tests that included the Stanford-Binet, the WISC-R, the Bender-Gestalt, the Goodenough-Harris drawing test, and the Rorschach. Children were referred to disciplinary programs based upon continuous psychological and behavioral assessments. These children were diagnosed as having normal intellectual ability but a long record of asocial behavior in school that included physical aggression toward teachers, firestarting, inability to adjust in school, persistent alienation resulting in conduct disturbance, and indifference toward misconduct.184

Altogether, five percent of the subjects were placed in programs for the mentally retarded and five percent also were placed in programs for youths with disciplinary problems.185 As Tables 1 and 2 show, there were no significant differences in the number of program placements for the mentally retarded for either violent or repeat offenders. Highly significant differences appeared, however, in the number of placements for disciplinary programs. Violent offenders had over eight times more placements than nonoffenders, and property offenders had over ten times more placements than nonoffenders. Repeat offenders had over fifteen times the placements of nonoffenders.

In light of test score differences in intellectual ability and program placements among offender groups, results have shown overall that both

182. DENNO, BIOLOGY AND VIOLENCE, supra note 11, at 62 (citation omitted).
183. Id.
184. Id. at 62-63.
185. Id. at 63.
violent, nonchronic, repeat, and chronic offenders have a significantly higher incidence of intellectual and learning difficulties, particularly in verbal ability, and a higher incidence of disciplinary problems, in comparison to nonviolent offenders and nonoffenders. These differences in abilities among the different types of offenders were strongest at adolescence.\textsuperscript{186} The greatest differences were in program placements for youths with disciplinary problems. Yet, the lack of statistically significant differences for program placements for the mentally retarded does not support the Texas court's "same" or "similar" evidence restriction on Penry claims because there appears to be no link between either violent or nonviolent crime and mental retardation.

In their review of delinquency studies, Loeber and Dishion\textsuperscript{187} cited a child's conduct problems and poor academic performance as two of the four principal predictors of delinquency among males. However, the great majority of the research they examined did not study these two factors in comparison with many other potential predictors. As yet, the relative impact of conduct problems and achievement on delinquency is not known. The next section analyzes key early developmental factors to determine whether differences exist among offenders grouped according to the total number of their police contacts as juveniles and as adults.

C. A Test of Multidisciplinary Effects on Crime

In this section, offender group differences in biological and environmental factors are examined in three different ways following a statistical screening of 150 variables in order to obtain statistically significant\textsuperscript{188} predictors of violent and chronic delinquent behavior.\textsuperscript{189} First, Table 3

\textsuperscript{186} For nearly all offender groups, fewer differences in test scores existed at ages four or seven. This contrast between smaller test score differences at early ages and the considerable differences found at adolescence may be attributable to one or more of the following factors: (1) Tests at early ages may be cruder measures of intellectual or achievement abilities than tests given during adolescence. It is likely that developmental or situational events that occur after age seven influence achievement test scores at adolescence; (2) schooling and school experiences can have a strong impact on intellectual development during adolescence, a time when psychological, sociological, and biological changes enhance individual variation and malleability; (3) low achievement test scores may be associated with behavioral problems that occur during adolescence and impede learning ability. For example, in the Biosocial Study, different categories of offenders were not disproportionately enrolled in programs for the mentally retarded. It appears, then, that the problems faced by offenders in school may be behavioral as well as intellectual. \textit{Id.} at 64.


\textsuperscript{188} For a definition of statistical significance, see supra note 181.

\textsuperscript{189} Variable screening was conducted with three types of regression equations, using two
analyzes mean group differences in a total of twenty-nine selected variables: eight "dependent" variables, designated by the letter "Y," which were predicted or explained, and twenty-two "independent" variables, designated by the letter "X," that predicted or explained the dependent variables. Second, Table 4 reports the results of structural equation path models which measure the direct and indirect effects of the twenty-two independent variables on the eight dependent variables. Third, Table 5 examines the structural equation models in their "reduced form," which combines the total impact of indirect and direct effects. Tables 3-5 focus on three variables indicating behavioral problems at different ages: (1) disciplinary problems in school, (2) juvenile crime, and (3) adult crime.

1. Mean Differences Among Adult Offender Groups.—Table 3 shows offender group differences in test scores for males for the twenty-nine dependent variables: number of offenses and seriousness of offenses. Those variables found to be significant predictors at the p < .05 level with either of the two dependent variables are listed. Included are six variables that were not significant predictors in the regression screening but were included in analyses for theoretical reasons and because they were significant predictors in past delinquency research. These variables were: Stanford-Binet, WISC Verbal and Performance IQ, pregnancy and delivery complications, and family income at birth and at age seven. One variable, "otoscopic exam" (hearing), was eventually not included in the analyses. Although it demonstrated a highly significant effect on delinquency, the statistical association was unreliably inflated because only two serious delinquents had an abnormal hearing exam. Denno, Biology and Violence, supra note 11, at 70.

190. Id. at 71. A dependent variable "is that quantity or aspect of nature whose change or different states the researcher wants to understand or explain or predict. In cause-and-effect investigations, the effect variable is the dependent variable." Monahan & Walker, supra note 181, at 38 (emphasis added). The Biosocial Study was unusual because it had more than one dependent variable. An independent variable "is a variable whose effect upon the dependent variable you are trying to understand." Id. (emphasis added).

191. Structural equation path models, which combine features of factor analysis and regression analysis, have been found to be useful in many areas of the social and behavioral sciences. See Karl G. Jöreskog, A General Method for Estimating A Linear Structural Equation System, in Structural Equation Models in the Social Sciences 85 (Arthur S. Goldberger & Otis D. Duncan eds., 1973); Advances in Factor Analysis and Structural Equation Models (Karl G. Jöreskog & Dag Sörbom eds., 1979). The models are appropriate for analyzing longitudinal panel data because each equation represents a "causal link," in contrast to other techniques such as ordinary least squares regression in which each equation represents an empirical association. Arthur S. Goldberger, Structural Equation Models in the Social Sciences, 40 Econometrica 979, 979-1001 (1972); Arthur S. Goldberger, Structural Equation Models: An Overview, in Structural Equation Models in the Social Sciences 2 (Arthur S. Goldberger & Otis D. Duncan eds., 1973). Karl Jöreskog's development of a general linear model for the analysis of covariance structures, which was applied in analyzing the Biosocial Study data, provides for a system of equations relating observable and unobservable independent and dependent variables with an underlying causal structure. Thus, a strong relationship between any particular variable and crime accounted for, or "controlled," any other effects that may be influencing that one variable.
variables across three different ages (four, seven, and thirteen-fourteen). According to Table 3, there are striking differences between adult male repeat offenders (those with two or more offenses) and the seriousness of offenses and number of offenses these same subjects incurred as juveniles. Repeat adults had four times the mean level of seriousness as one-time adult offenders and more than eight times the mean level of seriousness as those who never became adult offenders. In turn, repeat offenders had over 3.5 times more offenses as juveniles than one-time adult offenders and nearly 6.5 times more offenses than those who never became adult offenders. These differences are highly statistically significant, and strongly support prior research demonstrating the firm links between juvenile and adult crime. Furthermore, repeat offenders evidence four times the proportion of disciplinary problems accumulated over childhood school years (up to ages thirteen-fourteen) than either one-time offenders or nonoffenders.

An examination of tests of intellectual ability and achievement demonstrate less consistency with past research. For example, there were no significant differences among offender groups in test scores on the Stanford-Binet at age four or on the WISC Verbal or Performance IQ tests at age seven. Moreover, no offender group differences existed in a physician's test of intellectual status or speech at age seven. However, both repeat and one-time offenders scored significantly lower than nonoffenders on language achievement at ages thirteen-fourteen, and significantly more repeat offenders than one-time offenders were enrolled in a program for school children assessed as mentally retarded or learning disabled. These results suggest that offender groups show no differences on tests, or in a physician’s assessment, of intelligence at a preschool or near-school age, but that they do have difficulties in learning once they are enrolled in school.

Explanations for these differences appear to be attributable to selected early family effects, particularly for repeat offenders. The mothers of repeat and one-time offenders have a significantly lower educational level, although the difference is only by one year. However, the fathers of repeat offenders have significantly longer periods of unemployment, and the family experiences a higher number of household moves between birth and age seven. In turn, repeat offenders show significantly higher levels of lead poisoning at age seven relative to either one-time offenders or nonoffenders. Likewise, one-time offenders have a lower incidence of left-hand preference at age four, thereby supporting the proposition that certain types of offenders have a lower, rather than a higher, incident of left-handedness. No other significant differences were found among the groups on the other variables.
### Table 3: Test Scores at Ages 4, 7, and 13-14 Years by Number of Adult Offenses (Y)

<table>
<thead>
<tr>
<th>Ages</th>
<th>Variables</th>
<th>Nonoffender Mean (SD) [DN]</th>
<th>One-time offender Mean (SD) [DN]</th>
<th>2+ Two-time offender Mean (SD) [DN]</th>
<th>F-value (3,463)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Y&lt;sub&gt;1&lt;/sub&gt; WISC Verbal IQ (45-165)</td>
<td>92.52 (13.23) [A]</td>
<td>93.35 (10.19) [A]</td>
<td>91.95 (6.65) [A]</td>
<td>.23</td>
</tr>
<tr>
<td>7</td>
<td>Y&lt;sub&gt;2&lt;/sub&gt; WISC Performance IQ (44-166)</td>
<td>95.60 (12.04) [A]</td>
<td>95.36 (15.57) [A]</td>
<td>91.64 (11.16) [A]</td>
<td>2.54</td>
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<td>13-14</td>
<td>Y&lt;sub&gt;3&lt;/sub&gt; Disciplinary problem (0 = absent; 1 = present)</td>
<td>.04 (2.20) [AB]</td>
<td>.04 (1.10) [B]</td>
<td>.11 (.87) [B]</td>
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<td>13-14</td>
<td>Y&lt;sub&gt;4&lt;/sub&gt; Language achievement (1-99)</td>
<td>23.06 (2.10) [A]</td>
<td>20.64 (16.95) [B]</td>
<td>19.07 (16.49) [B]</td>
<td>6.69***</td>
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<td>7-17</td>
<td>Y&lt;sub&gt;5&lt;/sub&gt; Number of juvenile offenses</td>
<td>.54 (1.54) [B]</td>
<td>2.95 (2.53) [B]</td>
<td>3.46 (5.93) [B]</td>
<td>4.07***</td>
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<td>7-17</td>
<td>Y&lt;sub&gt;6&lt;/sub&gt; Seriocity of juvenile offenses</td>
<td>2.52 (9.23) [B]</td>
<td>5.93 (15.84) [B]</td>
<td>24.06 (99.39) [B]</td>
<td>4.06***</td>
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<td>Birth</td>
<td>Y&lt;sub&gt;7&lt;/sub&gt; Pregnancy and delivery conditions (1-17 items)</td>
<td>1.23 (1.96) [A]</td>
<td>1.11 (1.16) [A]</td>
<td>1.26 (1.30) [A]</td>
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<td>Birth</td>
<td>Y&lt;sub&gt;8&lt;/sub&gt; Mother's education (number of years)</td>
<td>10.49 (1.83) [A]</td>
<td>9.72 (2.25) [A]</td>
<td>9.65 (2.10) [B]</td>
<td>7.54***</td>
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<tr>
<td>Birth</td>
<td>Y&lt;sub&gt;9&lt;/sub&gt; Father's education (number of years)</td>
<td>10.35 (1.63) [A]</td>
<td>10.46 (1.67) [A]</td>
<td>10.67 (1.23) [A]</td>
<td>2.24</td>
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<td>Birth</td>
<td>Y&lt;sub&gt;10&lt;/sub&gt; Family income (1970 dollars)</td>
<td>4229.60 (2008.46) [A]</td>
<td>3741.60 (1586.24) [A]</td>
<td>3333.60 (1735.77) [A]</td>
<td>3.02*</td>
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<tr>
<td>Birth</td>
<td>Y&lt;sub&gt;11&lt;/sub&gt; Time father unemployed (number of months)</td>
<td>0.23 (0.02) [AB]</td>
<td>1.56 (1.97) [A]</td>
<td>5.70 (15.14) [A]</td>
<td>1.43</td>
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<td>Y&lt;sub&gt;12&lt;/sub&gt; Hand preference (0 = right; 1 = left variable)</td>
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<td>.04 (1.02) [A]</td>
<td>.04 (2.39) [A]</td>
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<td>Y&lt;sub&gt;13&lt;/sub&gt; Sanford-Binet (25-175)</td>
<td>90.37 (13.03) [A]</td>
<td>89.04 (12.02) [A]</td>
<td>92.20 (16.53) [A]</td>
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<td>Y&lt;sub&gt;14&lt;/sub&gt; Hand preference (0 = right; 1 = left)</td>
<td>3.22 (5.33) [A]</td>
<td>.02 (1.33) [B]</td>
<td>.09 (2.92) [AB]</td>
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<td>Y&lt;sub&gt;15&lt;/sub&gt; Eye preference (0 = right; 1 = left)</td>
<td>.32 (4.37) [A]</td>
<td>.46 (4.49) [B]</td>
<td>.61 (6.47) [B]</td>
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<td>3.38 (5.39) [A]</td>
<td>.09 (1.39) [B]</td>
<td>.20 (1.16) [B]</td>
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<td>Y&lt;sub&gt;17&lt;/sub&gt; Neurological abnormalities (total number)</td>
<td>.11 (2.31) [A]</td>
<td>.11 (3.11) [A]</td>
<td>.07 (2.86) [A]</td>
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<td>X&lt;sub&gt;18&lt;/sub&gt; Abnormal movements (0 = absent; 1 = present)</td>
<td>.11 (1.11) [A]</td>
<td>.11 (2.33) [A]</td>
<td>.07 (2.28) [A]</td>
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<td>.11 (3.37) [A]</td>
<td>.13 (3.33) [A]</td>
<td>.07 (2.20) [A]</td>
<td>1.82</td>
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<td>X&lt;sub&gt;20&lt;/sub&gt; Lead intoxication (0 = absent; 1 = present)</td>
<td>.01 (1.21) [B]</td>
<td>.00 (2.00) [B]</td>
<td>.06 (2.23) [B]</td>
<td>3.16*</td>
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<td>X&lt;sub&gt;21&lt;/sub&gt; Anemia (0 = absent; 1 = present)</td>
<td>.01 (1.10) [A]</td>
<td>.00 (2.00) [A]</td>
<td>.06 (2.16) [A]</td>
<td>.47</td>
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<td>4</td>
<td>X&lt;sub&gt;22&lt;/sub&gt; Intellectual status (0 = normal; 1 = abnormal)</td>
<td>.04 (1.19) [A]</td>
<td>.02 (1.13) [A]</td>
<td>.00 (2.00) [A]</td>
<td>1.55</td>
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<tr>
<td>4</td>
<td>X&lt;sub&gt;23&lt;/sub&gt; Speech (0 = normal; 1 = abnormal)</td>
<td>.04 (3.31) [A]</td>
<td>.02 (1.23) [A]</td>
<td>.07 (2.28) [A]</td>
<td>.29</td>
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<tr>
<td>Birth-7</td>
<td>X&lt;sub&gt;24&lt;/sub&gt; Foster parents (0 = absent; 1 = present)</td>
<td>3.97 (17.42) [A]</td>
<td>3.93 (17.42) [A]</td>
<td>3.93 (17.42) [A]</td>
<td>3.93</td>
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<tr>
<td>Birth-7</td>
<td>X&lt;sub&gt;25&lt;/sub&gt; Father in household (0 = present; 1 = absent)</td>
<td>2.00 (5.29) [A]</td>
<td>2.00 (4.11) [A]</td>
<td>2.00 (4.11) [A]</td>
<td>.01</td>
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<tr>
<td>Birth-7</td>
<td>X&lt;sub&gt;26&lt;/sub&gt; Household moves (total number)</td>
<td>1.03 (1.53) [B]</td>
<td>1.05 (1.34) [B]</td>
<td>2.28 (1.68) [B]</td>
<td>3.52*</td>
</tr>
<tr>
<td>7</td>
<td>X&lt;sub&gt;27&lt;/sub&gt; Persons supported (total number)</td>
<td>2.00 (2.14) [A]</td>
<td>2.00 (2.24) [B]</td>
<td>2.00 (2.14) [B]</td>
<td>1.76</td>
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<tr>
<td>7</td>
<td>X&lt;sub&gt;28&lt;/sub&gt; Family income (1970 dollars)</td>
<td>6812.00 (3465.77) [A]</td>
<td>6804.40 (3424.91) [A]</td>
<td>6240.90 (3470.42) [A]</td>
<td>.51</td>
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</table>

**Sample sizes:**
- 378
- 55
- 54
- Total = 487

**Notes:**
- *p < .05
- **p < .01
- ***p < .001

Duncan significant at p < .05
These results are important for what they do not show, in addition to the significant differences that they do show. No significant mean differences existed among offender groups relative to “traditionally” important influences, such as family income and family size (number of persons supported); nor do other variables, such as hand preference, appear to be a distinguishing factor. On the other hand, repeat offenders do demonstrate a significantly higher incidence of mental retardation, thereby appearing to affirm Penry’s assumption of a link between mental retardation and crime.

It must be emphasized, however, that any impact these factors may have on adult crime is contingent on both their simultaneous influences and their direct and indirect effects on juvenile and adult crime. If, for example, mean differences in achievement test scores are primarily attributable to the influences of disciplinary problems, then in a regression model where all variables “control” or account for one another, the significance of test score differences may disappear. These simultaneous effects are examined in the next section.

2. Effects on Number of Adult Offenses.— Simultaneous direct and indirect effects were measured two ways: (1) by structural equation models in Table 4; and (2) by structural equation models in their “reduced form” in Table 5.

In Tables 4 and 5, coefficients can be interpreted in the same way as ordinary least squares regression. The effects of independent variables upon dependent variables are represented by “X;” the effects of dependent variables upon other dependent variables are represented by “Y.”

In Table 4, five factors showed significant effects on the number of adult offenses for males. The strongest factors were the number of juvenile offenses, mother’s educational level, and the seriousness of juvenile offenses. These were followed by the father’s educational level and the subjects’ language achievement. Yet the predictors for number of adult offenses changed somewhat for the reduced form equations in Table 5, which showed four influential factors: mother’s and father’s educational levels, lead poisoning, the amount of time the father was unemployed, and the number of household moves.

Indeed, the results of Tables 4 and 5 are striking with respect to the effect of lead poisoning. When considering both tables, lead poisoning is the only factor that is a major predictor of all three behavioral problem variables. As would be expected, the number and seriousness of juvenile offenses are among the strongest predictors of the subjects’ crimes as adults. However, lead poisoning followed only the subjects’ parents’ educational levels as the next strongest predictor.
### Table 4: Structural Equation Model of Biological and Environmental Effects on Juvenile and Adult Crime

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>WISC Verbal IQ, age 7 (Y)</th>
<th>WISC Performance IQ, age 7 (Y)</th>
<th>Disciplinary problem, ages 13-14 (Y)</th>
<th>Language achievement, ages 13-14 (Y)</th>
<th>Mental retardation, ages 13-14 (Y)</th>
<th>Number of Juvenile offences, ages 7-17 (Y)</th>
<th>Seriousness of juvenile offences, ages 7-17 (Y)</th>
<th>Number of adult offences, ages 16-22 (Y)</th>
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</thead>
<tbody>
<tr>
<td>Y₁ WISC Verbal IQ</td>
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<tr>
<td>Y₂ WISC Performance IQ</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>Y₃ Disciplinary problem</td>
<td>13-14</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
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<tr>
<td>Y₄ Language achievement</td>
<td>13-14</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Y₅ Mental retardation</td>
<td>13-14</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>Y₆ Number of juvenile offences</td>
<td>7-17</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>.244** (2.90)</td>
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<td>-</td>
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<tr>
<td>Y₇ Seriousness of juvenile offences</td>
<td>7-17</td>
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<td>-</td>
<td>-</td>
<td>.320** (2.73)</td>
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<td>X₁ Pregnancy and delivery conditions</td>
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<td>X₂ Mother's education</td>
<td>Birth</td>
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<tr>
<td>X₃ Father's education</td>
<td>Birth</td>
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<td>-</td>
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<tr>
<td>X₄ Family Income</td>
<td>Birth</td>
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<tr>
<td>X₅ Time father unemployed</td>
<td>Birth</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.179*** (4.15)</td>
<td>.115** (2.62)</td>
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<td>X₆ Hand preference</td>
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<tr>
<td>$X_i$</td>
<td>Stanford-Binet</td>
<td>4</td>
<td>$-0.543^{***}$ (14.16)</td>
<td>0.323*** (7.50)</td>
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<td>-</td>
<td>1.183*** (-3.43)</td>
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<td>$X_2$ Eye preference</td>
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Sample size = 497

Notes: The $t$-statistic is reported in parentheses (2-tailed test)

*p < .05; **p < .01; ***p < .001

Male model $\chi^2(160) = 189.28; p = .804$
<table>
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<th>Independent Variables</th>
<th>Ages</th>
<th>Language achievement, ages 13-14 ($Y_1$)</th>
<th>Number of juvenile offenses, ages 7-17 ($Y_2$)</th>
<th>Seriousness of juvenile offenses, ages 7-17 ($Y_3$)</th>
<th>Number of adult offenses, ages 18-22 ($Y_4$)</th>
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<td>$X_1$ Pregnancy and delivery conditions</td>
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<td>-</td>
<td>.011</td>
</tr>
<tr>
<td>$X_{18}$ Foster parents</td>
<td>7</td>
<td>.022</td>
<td>-.021</td>
<td>-.017</td>
<td>-.011</td>
</tr>
<tr>
<td>$X_{19}$ Father absence</td>
<td>Birth-7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$X_{20}$ Household moves</td>
<td>Birth-7</td>
<td>-</td>
<td>.116</td>
<td>.131</td>
<td>.058</td>
</tr>
<tr>
<td>$X_{21}$ Persons supported</td>
<td>7</td>
<td>-</td>
<td>.078</td>
<td>.091</td>
<td>.039</td>
</tr>
<tr>
<td>$X_{22}$ Family income</td>
<td>7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Sample size = 437
Although in Table 4, juvenile crime was most strongly predicted by the number of the subjects’ disciplinary problems in school and amount of time the father was unemployed, evidence of lead poisoning was the third strongest predictor. It was followed by low language achievement, number of household moves, and evidence of abnormal speech. In turn, in the reduced form equations in Table 5, juvenile crime was predicted by the amount of time the father was unemployed, lead poisoning, and number of household moves.

Notably, lead poisoning was the strongest predictor of the subjects’ disciplinary problems in school, followed next by evidence of anemia, a frequent symptom of lead poisoning. Also significantly related to disciplinary problems were number of household moves, left hand preference, and lack of foster parents. Moreover, as would be expected, both WISC Verbal IQ and WISC Performance IQ had the only significant direct effects on language achievement.

Although these results were consistent with past findings emphasizing the significance of behavior and ability in predicting crime, the Biosocial Study also revealed the importance of a number of factors that had never before been examined in crime research, particularly those related to the urban environment. Indeed, the Biosocial Study is the first empirical work demonstrating a relationship between crime and lead poisoning, the only factor that showed an independent effect on each of the three “problem behavior” variables. As the next section of this Article discusses, although lead poisoning is often “biological-looking” because it can lead to permanent physical disorders such as neurodevelopmental delay and intellectual deficit, its origins are environmental.

In the Biosocial Study, crime also appeared to be related to a lack of behavioral control typically associated with poor environment as well as neurological and central nervous system disorders. Studies have shown links among behavioral disorders, low school achievement, and subsequent crime in intellectually normal children with attention deficit disorder and hyperactivity. Comparable links have also been found with lead

192. See infra note 214 and accompanying text.
194. The Biosocial Study’s finding of a relationship between lead poisoning and crime was first reported in 1988. See Denno, supra note 11. A subsequent article reported a significant relationship between lead and violence although the article failed to: (1) include nonoffender control groups; (2) control for race; or (3) control for numerous other factors that also could be related to both lead and crime. See R.O. Pohl & F. Ervin, Lead and Cadmium Levels in Violent Criminals, 65 Psych. Reports 839, 839-44 (1990).
195. See infra notes 208-38 and accompanying text.
196. DENNO, BIOLOGY AND VIOLENCE, supra note 11, at 27.
poisoning.\textsuperscript{197}

The Biosocial Study reveals that attention deficit disorder and hyperactivity may be linked to learning and behavioral disorders that could lead to academic problems among school children. Academic failure in turn can perpetuate criminal behavior and hinder a child’s attempts at future, socially acceptable behavior even through adulthood.\textsuperscript{198}

However, results of the Biosocial Study were not consistent with some past findings showing associations among crime and low early intelligence, mental retardation, or early central nervous system dysfunction (indicated by the number of a mother’s pregnancy complications).\textsuperscript{199} The lack of any strong association among these variables and crime may be due to a number of factors, most likely the strong cultural and demographic homogeneity of the sample and the simultaneous examination of both biological and environmental variables. Traditional studies of crime have typically examined either biological or environmental variables, but not both together. The Biosocial Study shows, then, that even in a racially and environmentally homogenous sample of individuals, environmental factors predominate in predicting who will be a criminal and who will not.

These results suggest, then, that the Texas court’s insistence on “same” or “similar” Penry evidence in its evaluation of Penry claims has no empirical support when mental retardation is examined in the context of other kinds of interdisciplinary factors. The Biosocial Study’s findings are particularly compelling because the demographic characteristics of its sample are consistent with those of death row inmates.\textsuperscript{200} Furthermore, other types of mitigating evidence that the Texas court has rejected, such as mental illness or brain damage, were not included in the Biosocial Study’s analyses, suggesting that the findings discussed in this Article may not account for other explanations of crime for which no measures were available.

The next section discusses more fully the significance of the Biosocial Study’s finding of an association between lead poisoning and crime as a background for describing how lead poisoning is currently being used as mitigating evidence in \textit{Lewis v. Collins},\textsuperscript{201} an ongoing capital case in Texas. Given that the Biosocial Study found mental retardation to be an insignificant predictor of crime, this Article considers how other kinds of factors, such as lead poisoning, may be applied in the context of a Penry

\textsuperscript{197} \textit{See infra} notes 215-21 and accompanying text.

\textsuperscript{198} \textit{DENNO, BIOLOGY AND VIOLENCE, supra} note 11, at 63-64.

\textsuperscript{199} \textit{Id.} at 7-15.

\textsuperscript{200} \textit{See infra} note 238 and accompanying text.

\textsuperscript{201} No. 3: 93-CV-0329-G (N.D. Tex. filed Feb. 17, 1993); \textit{see infra} notes 259-80 and accompanying text.
claim, the former Texas death penalty statute at issue in *Lewis*, as well as the amended Texas statute.

IV. Links Between Lead Poisoning and Typical Crime Correlates

A few criminal law cases have relied on lead poisoning as a defense or mitigating circumstance. Such use reflects attorneys' growing awareness of the link between lead poisoning and a host of medical and behavioral problems. In contrast, tort law has a well-established body of precedent recognizing lead poisoning as the crucial factor in winning generous damages awards. A typical tort case involves a child or

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203. See, e.g., People v. Belcher, 74 Cal. Rptr. 602, 603 (Cal. Ct. App. 1969) (affirming a conviction despite the defendant's claim that he was mentally ill during a burglary because he suffered brain damage due to lead poisoning); *Lewis v. Collins*, No. 3: 93-CV-0329-G (N.D. Tex. filed Feb. 17, 1993) (petitioning for federal habeas relief in an attempt to obtain an evidentiary hearing on the defendant's mitigating factors, including evidence of lead poisoning, which were never addressed by the trial court or in the state habeas proceeding); Robert Enstad, *Girlfriend's Killer Get 50-Year Term*, CHI. TRIB., June 21, 1991, § 2 at 3 (reporting that defense attorney contended that defendant's violent behavior was due to early physical and sexual abuse, lead poisoning, and ingestion of drugs and alcohol).

204. See generally NATIONAL RESEARCH COUNCIL, MEASURING LEAD EXPOSURE IN INFANTS, CHILDREN, AND OTHER SENSITIVE POPULATIONS (1993) (studying the effect of lead exposure on sensitive populations, such as infants, children, and pregnant women); RICHARD M. STAPLETON, LEAD IS A SILENT HAZARD (1994) (discussing the sources, consequences, and treatment of lead poisoning); see also infra notes 215-21 and accompanying text.

205. See Mealey's Litigation Reports: Lead (1994-95). There are three main types of tort law lead cases. *Id.* at 4. The first type involves a suit brought against a lead smelter or lead facility, often by nearby residents. See, e.g., David Ruben, *What Went Wrong in Throop, Pa.?*, PARENTING 70 (Oct. 1990) (describing the effects on neighborhood residents of the dangerous levels of lead emitted from the former Marjol Battery and Equipment Company, an automobile battery-processing and lead-reclamation plant). The second type involves a suit brought against a manufacturer of lead paint, typically by individuals living in an apartment or housing complex. The third type involves a suit brought against the landlord or owner of a dwelling, usually by a tenant or tenants. See, e.g., Hurt v. Philadelphia Housing Authority, 151 F.R.D. 555 (E.D. Pa. 1993) (certifying a class of plaintiffs who were alleging that the Philadelphia Housing Authority failed to remove lead-based paint in housing that it owned or operated). The third type often occurs when individuals are unable to sue the manufacturer or industry. See, e.g., Philadelphia v. Lead Indus. Ass'n, 994 F.2d 112 (3d Cir. 1993) (affirming the trial court's dismissal of a suit filed against lead paint manufacturers); Hurt v. Philadelphia Housing Authority, 806 F. Supp. 515, 530 (E.D. Pa. 1992) (holding that manufacturers and sellers of lead-based paint cannot be held liable for breach of warranties on the final use of their product because lead pigments "are merely component parts of lead-based paint" and plaintiffs could not show the "requisite causal link between the harmful product and its seller").
teenager who was exposed to lead paint during infancy or at a very young age, and who has since suffered various impairments, such as neurological damage, attention deficit disorder, hyperactivity, mental retardation, learning disabilities, or emotional disturbances. All such impairments have been found to be associated with criminal behavior.

A. The Sources and Consequences of Lead Poisoning

Children acquire lead toxicity in various ways. The key source is lead-based paint, which has been outlawed in new buildings, but remains in older homes. Children ingest the paint by eating paint chips or, perhaps more seriously, by swallowing the dust derived from the lead paint that settles on walls, windows, and floors. Other sources of lead

206. Richard Lewis and Barbara Pratt (attorneys at Cohen, Milstein, Hausfield & Toll) compiled an extensive chart detailing various lead paint settlements and verdicts, with a focus on the extent of damages rendered (based on expert opinion) and the result. See Richard Lewis & Barbara Pratt, Lead Paint Settlement and Verdicts (on file at Cohen, Milstein, Hausfield & Toll, Washington, D.C.). The Lewis-Pratt chart indicates that in some cases damages run into the millions of dollars for the various impairments suffered. See, e.g., Lugo v. City of New York, No. 16511/88 (N.Y. Sup. Ct. 1993) (detailing how the city has asked the court to set aside a jury verdict of ten million dollars to a boy (then age 12) who was diagnosed as lead poisoned in 1984 and who now evidences mental retardation and takes special education classes); Walker v. Thompson, No. 86-233045/CL-54616 (Baltimore City Ct. Md. 1992) (awarding default judgment of eight million dollars to one child exposed to lead at age one and a half who now evidences emotional disturbance, attention deficit disorder, hyperactivity, and loss in IQ); Miller v. Beaugrand, 564 N.Y.S.2d 390 (N.Y. Sup. Ct. 1991) (affirming 1.7 million dollar award to one child (then age eight) exposed to lead in infancy and who now evidences neurological impairment, attention deficit disorder, hyperactivity, and impaired employability).

207. See infra notes 177-98 and accompanying text.

208. For a general overview, see Stapleton, supra note 204, at 34-183.

209. Yona Amitai et al., Hazards of ‘Deleading’ Homes of Children with Lead Poisoning, 141 AM. J. DISEASES OF CHILDREN 758, 758 (1987); Death From Lead Exposure Prompts Calls for Yearly Tests, N.Y. TIMES, Mar. 29, 1991, at B6. Although over two decades have passed since Congress announced that lead-based paint was a health hazard that should be removed from federally subsidized housing, researchers estimate that 900,000 units of public housing still contain the paint. Moreover, approximately 57 million homes still have the paint, although Congress banned its use over a decade ago. Philip J. Hilt, U.S. Opens a Drive to Wipe Out Lead Poisoning Among Children, N.Y. TIMES, Dec. 20, 1990, at A1.

210. See Committee on Environmental Hazards, Committee on Accident and Poison Prevention, Statement on Childhood Lead Poisoning, 79 PEDIATRICS 457, 459 (1987) (reporting that according to most pediatricians, “virtually all” cases of serious lead poisoning are due to the consumption of lead paint chips); but see Joel Schwartz & Ronnie Levin, Lead: Example of the Job Ahead, 18 EPA J. 42, 43 (1992) (stating that “most cases of lead paint poisoning seem to occur from the ingestion of common household dust that has been contaminated with lead,” and that it is uncommon for children to be poisoned by eating paint chips).

211. See Committee on Environmental Hazards, supra note 230, at 457; Schwartz &
toxicity are drinking water, soil, food, gasoline, and industry.212

Those factors enhancing an individual's susceptibility to lead toxicity include young age and hand-to-mouth behavior, or nutritional deficiencies of iron, calcium, or zinc.213 Iron deficiency, whether or not it is accompanied by anemia, "appears to be the single most important predisposing factor for increased absorption of lead."214

Lead-exposure can produce devastating physiological and neurobehavioral disorders among young children, who are far more sensitive to its effects than adults.215 For example, numerous medical studies have reported that both high and low lead levels have been linked to learning disabilities, delayed nervous system development, deficits in visual motor function, hyperactivity, hypoactivity, and abnormal social and aggressive behavior.216 Associations between lead and intellectual deficits in


213. Committee on Environmental Hazards, supra note 210, at 460.

214. Id.

215. See UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL EQUITY: REDUCING RISK FOR ALL COMMUNITIES, 230-R-92-008, at 19 (June 1992) [hereinafter USEPA].

216. See, e.g., Peter A. Baghurst et al., Environmental Exposure to Lead and Children's Intelligence at the Age of Seven Years, 327 NEW ENG. J. MED. 1279, 1279-84 (1992) (noting that there is an inverse relationship between I.Q. at the age of seven years and blood-lead concentrations); Harris Chaiklin et. al., Recurrence of Lead Poisoning in Children, 19 SOC. WORK 196, 196-209 (1974) (stating that the incidence of permanent brain damage is almost 100% in survivors of acute lead encephalopathy who are reexposed to lead-containing environments); Committee on Environmental Hazards, supra note 210, at 457 (stating that a reduction in intelligence and an alteration in behavior occur in children with elevated blood-lead levels); Philip J. Landrigan & John W. Graef, Pediatric Lead Poisoning in 1987: The Silent Epidemic Continues, 79 PEDIATRICS 582, 583-84 (1987) (discussing studies that conclude that elevated lead levels in children are associated with lower I.Q. and increased reading abilities); Anthony J. McMichael et al., Port Pirie Cohort Study: Environmental Exposure to Lead and Children's Abilities at the Age of Four Years, 319 NEW ENG. J. MED. 468, 474 (1988) (stating that blood-lead level concentration is inversely related to cognitive development in children); Herbert L. Needleman et al., Deficits in Psychologic and Classroom Performance of Children With Elevated Dentine Lead Levels, 300 NEW ENG. J. MED. 689, 692-94 (1979) (stating that children with high blood-lead levels performed worse on the Wechsler Intelligence Scale, on attention-performance measurements, and on teacher behavioral ratings); Herbert L. Needleman et al., Low-level Lead Exposure and the IQ of Children, 263 J.A.M.A. 673, 677-78 (1990) (stating that there is "a strong link between low-dose lead exposure and intellectual deficits in children"); R.O. Pihl & M. Parkes, Hair Element Content in Learning Disabled Children, 198 SCIENCE 204, 204-06 (1977) (stating that lead toxicity has deleterious effects on behavior, including hyperactivity); Robert Pear, U.S. Orders Testing of Poor Children for Lead Poisoning, N.Y. TIMES, Sept. 13, 1992, at A1 (stating that federal officials concluded that
particular have also been found among samples of low-socioeconomic status Black children.\textsuperscript{217}

Recent research indicates that even relatively low lead levels can have serious effects on the psychological and physiological development of children, which may in turn demonstrate life-long consequences.\textsuperscript{218} Thus, in one study, teenagers exposed to lead in elementary school were seven times more likely than those with very low lead levels to drop out of high school, to have lower class standing, and more absenteeism. They were also significantly more likely to evidence deficits in reading ability, vocabulary, fine motor skills, reaction time, and hand-eye coordination.\textsuperscript{219} According to the authors of the study, lead exposure in children “may have an important and enduring effect on the success in life of such children and that early indicators of lead burden and behavioral deficit are strong predictors of poor school outcome.”\textsuperscript{220} A newly released study in Australia concluded that both middle-class and poor children suffer losses in intellectual ability after exposure to even low levels of lead and that such intellectual deficits continued throughout elementary school.\textsuperscript{221}

B. The Effects of Race and Poverty

Although children of all socioeconomic classes are susceptible to the effects of lead,\textsuperscript{222} urban-dwelling Black children appear to be most at risk.\textsuperscript{223} Moreover, race appears to be a stronger risk factor than poverty. For example, the Environmental Protection Agency noted in a recent report that although researchers were unable to link racial differences in death and disease to environmental factors, the “notable exception” was childhood lead poisoning.\textsuperscript{224} Across all socioeconomic groups, “a significantly higher percentage of Black children compared to White children have

\textsuperscript{217} Stephen R. Schroeder et al., \textit{Separating the Effects of Lead and Social Factors on IQ}, 38 ENVTL. RES. 144, 149-52 (1985).

\textsuperscript{218} Herbert L. Needleman et al., \textit{The Long-term Effects of Exposure to Low Doses of Lead in Childhood}, 322 NEW ENG. J. MED. 83, 86 (1990); Mark Jaffe, \textit{Study: Lead Poisoning Scars for Life}, N.Y. TIMES, Jan. 11, 1990, at A1, A4.

\textsuperscript{219} Needleman et al., supra note 218, at 86.

\textsuperscript{220} Id. at 88.

\textsuperscript{221} Id. at 1281-83.

\textsuperscript{222} Id. at 1282-83; Jane E. Brody, \textit{Study Documents Lead-Exposure Damage in Middle-Class Children}, N.Y. TIMES, Oct. 29, 1992, at A20.

\textsuperscript{223} David Bellinger et al., \textit{Longitudinal Analyses of Prenatal and Postnatal Lead Exposure and Early Cognitive Development}, 316 NEW ENG. J. MED. 1037, 1037 (1987).

\textsuperscript{224} USEPA, supra note 215, at 11.
unacceptably high blood levels."225

Poverty is an aggravating circumstance in the lead poisoning and race link, however. According to the Environmental Defense Fund, over sixty-seven percent of Black inner-city children have been contaminated by excessively high levels of lead.226 Using a stricter measure of high level toxicity based upon dentine lead (measured from teeth), one large study of Philadelphia school children in 1971 showed that Black children from public schools who resided in areas with poor housing had “marked elevations” of dentine lead; in addition, twenty percent of the children had lead levels in ranges associated with toxicity.227

Lead in Philadelphia is still a problem, as one large scale study228 and one recent case demonstrated in its detailed account of an urban Black child who suffered brain damage as a result of a year of continuously eating the sweet-tasting paint in his home.229 Moreover, it has been estimated that eighty percent of New York City’s public schools still contain lead paint.230 As the Committee on Environmental Hazards emphasized, the incidence of lead poisoning among children is “particularly prevalent in areas of urban poverty.”231 Thus, “[l]ead exposure is at once a by-product of poverty and a contributor to the cycle that perpetuates and deepens the state of being poor.”232

There is, then, ample support for emphasizing the serious consequences of lead poisoning, recently deemed the nation’s leading environmental threat to children.233 In light of statistics indicating that one out of nine children is adversely affected by lead, Dr. Louis Sullivan, former Secretary of Health and Human Services, reached the following conclusion: “Lead poisoning

225. Id.
226. Perkins, supra note 212, at 394.
227. Herbert L. Needleman et al., Subclinical Lead Exposure in Philadelphia Schoolchildren, 290 NEW ENG. J. MED. 245, 245 (1974); see also Landrigan & Graef, supra note 216, at 582 (noting that between 1976 and 1980, the prevalence of increased lead absorption among Black preschool children was 24.5%).
228. See Needleman et al., supra note 227, at 246 (reporting that children residing in the “lead belt” of urban Philadelphia evidenced nearly five times greater concentration of lead than their suburban counterparts).
231. Committee on Environmental Hazards, supra note 210, at 457.
232. Perkins, supra note 212, at 394 (citing CENTERS FOR DISEASE CONTROL, PREVENTING LEAD POISONING IN YOUNG CHILDREN 12 (1991)); Pear, supra note 216, at A1 (reporting that low income children are at the highest risk for lead poisoning).
233. Steven Waldman, Lead and Your Kids, NEWSWEEK, July 15, 1991, at 42, 43; see also Hilts, supra note 209, at A1 (reporting on the federal government’s broad effort to eliminate lead poisoning in children).
is entirely preventable, yet it is the most common and socially devastating environmental disease of young children. 234 Given the relatively stronger effects of lead poisoning on blacks, its prevalence and consequences have become a focal point in litigation concerning "environmental racism." 235 Environmental racism characterizes the frequent and predictable environmental circumstances of many urban minority poor who reside in run-down housing that contains lead- or mercury-based paint, or who live near hazardous waste sites. 236

Whether or not "racism" accounts for the disproportionate exposure of minority groups to lead poisoning and hazardous wastes is an issue open to debate. 237 Yet, minority groups provide an important focus for study in

234. Waldman, supra note 233, at 44.
235. The term "environmental racism" was first used in 1987 by Dr. Benjamin F. Chavis, Jr., then Executive Director of the United Church of Christ's Commission for Racial Justice, in order to characterize the results of the Commission's nationwide study on race and waste distribution. See UNITED CHURCH OF CHRIST, COMMISSION FOR RACIAL JUSTICE, TOXIC WASTES AND RACE IN THE UNITED STATES: A NATIONAL REPORT ON THE RACIAL AND SOCIO-ECONOMIC CHARACTERISTICS OF COMMUNITIES WITH HAZARDOUS WASTE SITES ix (1987) [hereinafter TOXIC WASTES AND RACE]; see also Paul Mohai & Bunyan Bryant, Race, Poverty, and the Environment, 18 EPA J. 6, 7 (1992) (focusing on how environmental hazards are disproportionately placed in minority communities); Dorcetta Taylor, The Environmental Justice Movement, 18 EPA J. 23, 23-25 (1992) (reporting on minority activism for environmental justice); UNITED CHURCH OF CHRIST, COMMISSION FOR RACIAL JUSTICE, PROCEEDINGS: THE FIRST NATIONAL PEOPLE OF COLOR ENVIRONMENTAL LEADERSHIP SUMMIT (Charles Lee ed., 1991) (documenting the summit held October 24-27, 1991, in Washington D.C.). The Commission's study reported a "consistent national pattern" showing race "to be the most significant among variables tested in association with the location of commercial hazardous waste facilities." TOXIC WASTES AND RACE, supra, at xiii; see also Alice M. Brown, "Environmental Racism": Fact or Fiction?, 12 ENVTL. L. 1, 1 (Fall/Winter 1992-93) (discussing the United Church of Christ study). Race was more significant than even socioeconomic status in determining the location of these facilities. See TOXIC WASTES AND RACE, supra, at xiii; see also Mohai & Bryant, supra, at 7 (positing that housing discrimination and lack of minority political resources suggest that race had an impact on the distribution of environmental hazards independent of income). In determining that it was "virtually impossible" that such a result would occur by chance, the Commission concluded that racial biases influenced the location of waste facilities. TOXIC WASTES AND RACE, supra, at 23.
the context of examining a nexus between crime and its correlates because they represent a grossly disproportionate percentage of those defendants who are considered eligible for the death penalty, and who are ultimately sentenced to death.\footnote{238}

\section*{C. Lead Poisoning and the Nexus Requirement}

The association between lead poisoning and the three “problem behavior” variables in the Biosocial Study prompts consideration of the significance of this result in light of other features of the urban environment. Although the Biosocial Study’s subjects were born between 1959-1962, they were examined during the course of twenty-four years: until, respectively, 1983-1986. It cannot be assumed that environmental conditions for minorities improved during that quarter century.\footnote{239}

Moreover, in Philadelphia and other large cities, different kinds of problems have developed. For example, homelessness,\footnote{240} drug abuse,\footnote{241} and homelessness have increased in the suburbs (concluding INDUSTRIAL population in Inner City, \textit{The Black Scholar} at 10-11 (May/June 1988) (reporting that although population in the nation’s five largest cities decreased nine percent between 1970 and 1980, the poverty population increased by 21%); see generally \textit{William J. Still} \& \textit{Janice F. Madden}, \textit{Post-Industrial Philadelphia: Structural Changes in the Metropolitan Economy} (1990) (concluding that the unemployment rate differential between the city of Philadelphia and its suburbs was worse at the end of the 1980s than at the beginning of the decade).


\footnote{241} See, e.g., Michael deCourcy Hinds, \textit{Pennsylvania City Hopes It's Bouncing Back From the Bottom}, \textit{N.Y. Times}, Jan. 5, 1992, at A14 (quoting a Chester, Pa., resident who stated that the example of success for children in that city is standing on the corner pushing...
and the social isolation of the ghetto\textsuperscript{242} have increased substantially since the 1960s. There is also evidence to suggest that environmental hazards such as lead toxicity may not have declined appreciably, if at all, given accounts of its ongoing presence among urban minorities in Philadelphia and elsewhere.\textsuperscript{243}

A brief survey of the causes and consequences of lead poisoning, as well as the results of the Biosocial Study, suggest that lead poisoning is pervasive, particularly among Blacks in urban communities; that its effects can be debilitating; and that it has been linked to disciplinary problems, aggression, and as the Biosocial Study showed, repetitive and often violent crime. A question that may be asked, then, is whether lead poisoning could be viable for mitigating responsibility even under the Texas statute’s nexus requirement.

The answer may depend on how such evidence is presented. In People v. Belcher,\textsuperscript{244} for example, the California appellate court affirmed the trial court’s conviction of Belcher for burglary and possession of narcotics\textsuperscript{245} based on evidence that Belcher had burglarized a small medical center and was later found with two small bottles of narcotics.\textsuperscript{246} Belcher contended on appeal that he was not guilty by reason of insanity based on his psychiatrist’s opinion that Belcher suffered brain damage due to lead encephalopathy, a disease caused by severe lead poisoning. The psychiatrist concluded that Belcher was mentally ill when he committed the acts.\textsuperscript{247} Belcher’s personal physician also testified that tests he conducted on Belcher five weeks after the incident demonstrated that Belcher was suffering from lead poisoning.\textsuperscript{248} Belcher further testified that while working as a chemist, he was exposed to a variety of chemicals and that he could not remember any of the events associated with the crime.\textsuperscript{249} Indeed, the police officer who had encountered Belcher after the burglary stated that Belcher appeared to be “under the influence of something.”\textsuperscript{250} His “eyes were pinpointed, his eyelids droopy,” and his speech was unusually slow.\textsuperscript{251} The trial court, however, accepted the opinions offered

\textsuperscript{242} See Wilson, supra note 239, at 14-16.
\textsuperscript{243} See supra notes 228-232 and accompanying text.
\textsuperscript{244} 74 Cal. Rptr. 602 (Cal. Ct. App. 1969).
\textsuperscript{245} Id. at 605.
\textsuperscript{246} Id. at 603.
\textsuperscript{247} Id.
\textsuperscript{248} Id.
\textsuperscript{249} Id. at 604.
\textsuperscript{250} Id.
\textsuperscript{251} Id.

Tom Morgenbauer, \textit{Children of the Underclass}, \textsc{Newsweek}, Sept. 11, 1989, at 16 (documenting the effect of crack cocaine in the inner city).
by prosecution experts who stated that Belcher’s exculpatory statements at the time of the crime (namely, that he had seen juveniles running from the area) negated his contention that he had a mental lapse. 252 The court concluded that simply because Belcher appeared to be “abnormal” following the acts in question, he was not necessarily insane in the eyes of the law. 253

Although Belcher’s arguments were weak, comparable kinds of mitigating evidence have been successful in some cases that, contrary to Belcher, are pertinent to capital litigation. For example, in 1989, a Navajo tribesman, Terrance Frank, won a temporary insanity defense in a federal murder case in which Frank admitted that he shot to death two individuals and seriously wounded two others in a dispute on an Arizona reservation. 254 Frank contended that he had been brain damaged because of uranium-related radiation near his home. His brain damage, together with the effects of the alcohol that he had ingested the day of the murder, caused his temporary insanity at the time of the shootings. This evidence lead the jury to agree on a second-degree murder conviction, concluding that Frank’s brain damage and alcohol use precluded premeditation and a first-degree murder conviction. 255 As one expert in the Frank case commented, if such toxins lead to brain damage, the victims could become human time bombs who are considerably more sensitive to the effects of drugs and alcohol. 256

Lewis v. Collins, 257 a federal habeas petition on behalf of a death row inmate, provides the most recent and sophisticated use of lead poisoning in the context of other factors contributing to the inmate’s disadvantaged background. Lewis was initially litigated by attorneys at the Texas Resource Center, 258 who gathered extensive evidence on lead poisoning and other background factors. Now the case is being handled by A. Richard Ellis of California, who was able to extend the time for Lewis’s petition ten hours before he was to be executed.

252. Id.
253. Id. at 605.
256. Id.
257. No. 3: 93-CV-0329-G (N.D. Tex. petition filed Feb. 17, 1993). Lewis is still pending; it is anticipated that an evidentiary hearing will be held on Lewis’s claims.
258. The Texas Resource Center has offices located in both Houston and Austin, Texas. Lewis’s attorneys, Sandra Babcock and Elizabeth Cohen, discovered a substantial amount of mitigating evidence, including evidence of lead poisoning.
D. Lewis v. Collins: A Case Study in the Nexus Requirement

In 1985, Andre Lewis shot to death a seventeen-year-old boy in a Texas convenience store that he was robbing because the victim did not respond fast enough to Lewis's command to lie on the floor. Lewis, who was nineteen, already had a criminal record that included the use of hard drugs and alcohol. Even though there is evidence that the robbery was orchestrated by Lewis's uncle, the uncle was cleared of all charges because he turned in Lewis.

Generally, Ellis is attempting to show that, in addition to other factors, Lewis's exposure to high lead levels while he resided at the George Loving Housing Project (GLHP) in West Dallas contributed to his neurological and developmental deficits. This lead poisoning evidence constitutes a major part of a substantial amount of other mitigating evidence that was never presented to the jury at Lewis's trial nor at his state habeas proceeding. Ellis is attempting to obtain an evidentiary hearing on this mitigating evidence in federal district court for the Northern District of Texas.

Ellis and the Texas Resource Center have presented Lewis's lead poisoning evidence on a variety of different levels that parallel those used in tort law cases. First, these attorneys reported the results of the Biosocial Study described in this Article, thereby introducing statistical evidence of a significant link between lead poisoning and criminal behavior. Next, they presented evidence of the effects of lead in Lewis's environment at the GLHP during key developmental ages:

Mr. Lewis lived in the George Loving Housing Project (GLHP) in West Dallas from at least August, 1972 until at least May, 1974. The section of GLHP Mr. Lewis lived in was located less than one-half of a mile from the RSR Lead Smelter. This lead smelter expelled lead into the air, on average, over twenty times the limit suggested by the EPA. The area within a two mile radius of the smelter was discovered to have high lead contamination. The areas most affected by the pollution were those areas downwind (to the north/northwest) of the RSR smelter. The section of GLHP occupied by Mr. Lewis and his family when Mr. Lewis was

260. Id. at 20.
263. See supra notes 205-06 and accompanying text.
between the ages of five and seven years of age was identified as the most contaminated area.\textsuperscript{265}

Based on the results of analyses of soil samples from the section of GLHP where Lewis played, Lewis was exposed to twenty times the unacceptable level of lead on a daily basis for at least two years.\textsuperscript{266} Moreover, school records indicated that Lewis was exposed to unacceptable lead levels for at least five more years thereafter. Even though his family moved in 1974, they continued to reside in homes less than two miles downwind from a smelter. Therefore, between the ages of five and twelve, Lewis was exposed to very high lead levels.\textsuperscript{267} Moreover, Lewis showed evidence of the effects of severe lead poisoning.

Mr. Lewis exhibited many of the classic symptoms of chronic lead poisoning as a child and young adult. Mr. Lewis's school records indicate that he consistently flunked various elementary and junior high school classes. Mr. Lewis's grandmother, Ms. Berry, reports that Mr. Lewis "was slow in his studies and had trouble learning." Ms. Sims, Mr. Lewis's aunt, states that she took care of Mr. Lewis a great deal in his formative years. Ms. Sims recalls that Mr. Lewis went to special schools and had trouble with other children "making fun of him." Mr. Lewis's teachers and coaches describe Mr. Lewis as being easily led, simple, and quiet. One coach, Mr. King, states that Mr. Lewis is incapable of understanding complex strategic moves or plans and would become confused when given a simple set of instructions to follow. Mr. Lewis's crime is one where it appears that Mr. Lewis shot a convenience store customer as an impulsive reaction to that person's failure to "get down" when ordered to do so. My research indicates that heightened impulsivity is related to early exposure to high levels of lead.\textsuperscript{268}

The results of Lewis's evaluation by Richard L. Peck, Ph.D., a psychologist, also highlight the impact of lead exposure in the context of other-mitigating factors in Lewis's family and environment.\textsuperscript{269} Attorneys from the Texas Resource Center asked Peck to evaluate Lewis's current mental state, as well as his mental state at the time he committed his offense. Peck performed this evaluation based on information he gathered from a variety of sources: a three-hour clinical interview and mental status examination of Lewis; Lewis's school records as well as those of his sister; medical records noting wounds sustained by Lewis and his parents; a social

\begin{itemize}
\item \textsuperscript{265} Id. \S 3.
\item \textsuperscript{266} Id. \S 4.
\item \textsuperscript{267} Id. \S 5.
\item \textsuperscript{268} Id. \S\S 9-10.
\end{itemize}
history of Lewis obtained from interviews with his family members; and the results of recent studies examining the link between lead poisoning and neurological and behavioral disorders.\textsuperscript{270}

Among other things, Peck concluded that the symptoms of Lewis’s “cognitive and personality impairments are consistent with both the effects of lead poisoning and neurological deficits due to trauma, both physical and psychological.”\textsuperscript{271} Furthermore, his condition was indicative of “severe childhood abuse,” which had been reported both by Lewis and his interviewed relatives.\textsuperscript{272} Lewis had “significant cognitive deficits, which are indicated by his expressive language disorder and developmental writing disorder.”\textsuperscript{273} Furthermore, Lewis was found to be “unable to adequately process disparate pieces of information such that his ability to respond to new situations is significantly impaired.”\textsuperscript{274} Peck particularly emphasized a number of parallels between lead contamination and risk factors for criminal behavior. The disordered thinking, impaired impulse control, reduced verbal skills, and demonstrated increase in school failure, all known products of lead exposure, arguably increase the probability that some individuals will be less equipped to respond appropriately to the challenges of society.\textsuperscript{275} Peck noted, however:

It is impossible to determine with absolute certainty, even with additional medical evaluation, whether lead toxicity was the primary factor in [Lewis’s] learning disabilities and subsequent criminal behavior. Nevertheless, based on the high levels of lead contamination in the area in which he lived, and my observations of his cognitive impairments, there is at least a strong possibility that the exposure to lead in his environment had serious consequences in his early development and significant ramifications in late adolescence.\textsuperscript{276}

For these reasons, Peck concluded that Lewis’s “cognitive deficits, his intoxication on the night of the crime, and the facts of this particular crime, create a substantial doubt that [Lewis’s] reaction to the victim’s failure to cooperate during the crime or to ‘get down’ as commanded was a reasoned, intentional attempt to kill.”\textsuperscript{277}

Given the manner of presentation of mitigating evidence in Lewis’s case, it appears that Ellis has succeeded in establishing a nexus between Lewis’s disadvantaged background and his lack of culpability at the time.

\textsuperscript{270} Id.
\textsuperscript{271} Id.
\textsuperscript{272} Id.
\textsuperscript{273} Id.
\textsuperscript{274} Id.
\textsuperscript{275} Id.
\textsuperscript{276} Id.
\textsuperscript{277} Id.
he committed the crime. Lewis’s background and cognitive deficits, in addition to his intoxicated condition at the time of the crime, contributed to the kind of “damaged personality” required by the Texas court in *Richardson v. State*,278 so that the defendant in that case could excuse his criminal behavior.

Perhaps Richardson could have achieved a more favorable result had he presented his mitigating evidence in a more causal framework. As the Texas court stated, Richardson “made no showing that, from the viewpoint of society as a whole, his alleged childhood experience of poverty, parental neglect, illiteracy, and a speech disorder tends to excuse his capital crime.”279 Yet, abnormal speech (which included evidence of stuttering) and low language achievement (which included evidence of illiteracy) were significant predictors of juvenile delinquency in the Biosocial Study. Indeed, speech problems were characteristic of many of the most serious offenders.280 In turn, other types of indicators of parental neglect, as measured by problems with the father’s employment history, were significant predictors of both juvenile and adult crime.

Presumably, this type of evidence could establish the Texas court’s nexus requirement under the former Texas statute, as well as the causation standard that may be applied under the amended Texas statute. The question is whether it should. The next section examines whether such a requirement has any empirical or logical basis to it, given the criminal law’s propensity to favor factors that appear to be more “internally” based, and our gaps in knowledge regarding the underlying causes of crime.

E. Interpreting Unexplained Behavior

The question of whether there is any basis for a nexus requirement in general, or a lead poisoning defense in particular, is perhaps most appropriately placed in the context of debates regarding free will, determinism, and the ability of social scientists to predict the course of any one individual’s behavior. If social scientists wanted to establish “true” cause and effect relationships between certain factors, such as lead poisoning and crime, they would want to predict all—or one hundred percent—of an individual’s future behavior. Such a total degree of prediction is not possible, however, particularly when dealing with human behavior.281 In

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279. Id. at 884.
280. See Table 4 (noting that low language achievement was the fifth strongest predictor of juvenile delinquency).
281. Establishing reliable levels of prediction is a problem in most scientific research. See Monahan & Laurens, supra note 181, at 79.
the Biosocial Study, comprehensive models of biological and environmental variables predicted twenty-five percent of future adult criminality, an acceptable and statistically significant level of prediction. Three-quarters of such behavior, however, was left unexplained.282

There are two possible ways of interpreting such unexplained behavior. First, those who believe in a philosophy of “full determinism” state that theoretically it is possible to predict all of an individual’s behavior, but social scientists are currently aware of only a small number of behavioral-causing factors.283 “Full determinists” would contend that a lead poisoning defense would be untenable because there may be comparably severe deficiencies that individuals possess that are simply not yet known to social scientists or others investigating the causes of crime. Moreover, it could be argued that all criminal behavior could be excused or defended if we could simply find the causal factors for it. As Moore notes, such an argument results in the “absurd conclusion that no one is responsible for anything,”284 and therefore no one can be punished.

A second view, perhaps represented by a philosophy of “degree determinism,” suggests that varying degrees of free will and determinism exist in all actions depending on the impact of various biological and environmental forces. Therefore, degree determinism may be defined as the “degree of freedom of choice on a continuum from the hypothetically entirely rational to the hypothetically pathologically determined—in states of consciousness neither polar condition exists.”285 With regard to the issue of criminal defenses, “degree determinists” must consider when an individual’s behavior is so beyond that individual’s control that he or she is no longer blameworthy. In other words, at what point along this continuum does responsibility end and excuse begin?

According to Norval Morris, external pressures, such as social adversity, have a much more powerful impact on crime than internal pressures, such as psychosis,286 although the criminal law favors internally-based excuses.287 For example, there is no recognized criminal defense based upon socioeconomic deprivation.288 For this reason, Morris

282. See Denno, Biology and Violence, supra note 11, at 89-92.
283. This viewpoint is a modification of that discussed by Michael Moore. See Michael S. Moore, Causation and the Excuses, 73 CAL. L. REV. 1091, 1118-19 (1985).
284. Id. at 1092.
286. Id. at 61-64. For example, some courts have considered postpartum psychosis as a viable insanity defense. See Amy L. Nelson, Comment, Postpartum Psychosis: A New Defense?, 95 DICK. L. REV. 625 (1991) (discussing the use of postpartum psychosis as a defense to infanticide).
287. See Morris, supra note 285, at 64.
288. Richard Delgado, “Rotten Social Background:” Should the Criminal Law Recognize
contends that the insanity defense should be abolished because such excuses unjustifiably give "excessive weight to the psychological over the social." 289

Alternatively, Richard Delgado suggests that a defendant's acts should be partially excused if it can be shown that the conditions that caused them are attributable to society's neglect. 290 Under this "societal fault model," society should be responsible for failing to eliminate particular crime-causing factors that could have been prevented. 291 Similar to negligence cases in some jurisdictions, the jury would be instructed to apportion the degree of fault between society and the individual. 292 The defense would be limited to cases in which the defendant can prove that specific social institutions, such as schools, failed to discharge a duty to the defendant resulting in his or her commission of a criminal offense. 293

In light of the Biosocial Study's link between lead poisoning and crime, Delgado's argument seems compelling. Lead poisoning, largely an environmental and societally-created problem, was a leading predictor of both juvenile and adult crime, as well as disciplinary problems in school. 294 Furthermore, although lead toxicity is preventable, efforts to eliminate lead have had limited success. 295

Regardless, Delgado's reasoning is not flawless. Given scientists' limited abilities to predict behavior, it is as yet unknown what other factors may be significant in causing crime. In line with the full determinists, scientists simply may not know the "true" causes of crime because so much of an individual's behavior is left unexplained. 296 The danger is that the criminal law may be providing a defense for those who are truly culpable and who actually do have sufficient self-control over their behavior.

F. The Myth of the Internal-External Distinction

Given this position, why should the criminal law retain defenses for those behaviors that appear to have an internal, rather than an external, cause? Morris may be correct in stating that internal factors are preferred as criminal law defenses, yet there is no evidence that they are any stronger

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289. MORRIS, supra note 285, at 64.
290. See generally Delgado, supra note 288 (addressing the issue of whether a disadvantageous background should mitigate criminal responsibility).
291. Id. at 89.
292. Id.
293. Id.
294. See supra Tables 4 and 5 and accompanying text.
295. See supra notes 228-34.
296. See supra notes 281-82 and accompanying text.
determinants of an individual’s behavior. Alternatively, internal factors may be more appealing because they appear to be more tangible, hence more “causal.” During the 1980s, for example, a number of courts considered the results of Positron Emission Tomography (PET) scans in their sentencing decisions, relying in part on the presumption that a biological predisposition to brain damage could preclude free will.\(^{297}\) It was not until 1992, however, that any court rendered admissible into trial testimony concerning the results of PET scans to determine a defendant’s sanity.\(^{298}\) In *People v. Weinstein*,\(^{299}\) a New York court concluded that an expert’s in-court consideration of the results of a PET scan and skin conductance response tests—indicating the existence of both an arachnoid cyst and metabolic imbalances in the defendant’s brain—was not unreasonable in making a diagnosis of insanity. However, the court emphasized that attorneys could not mention at trial “certain theories relating to human behavior” because they were not generally accepted as valid. These included statements that either arachnoid cysts or reduced levels of glucose metabolism in the frontal lobes of the brain, directly cause violence.\(^{300}\)

Regardless, the State agreed to negotiate a plea rather than go to trial, thereby reducing the initial charge from murder to manslaughter.\(^{301}\) Irrespective of the court’s constraints on the mentioning of causal theories, the State’s concern was that such tangible evidence could lead a jury could to presume causation anyway.

Furthermore, it remains to be considered the extent to which some environmental forces, such as lead poisoning, produce internal disorders, such as neurodevelopmental delay or hyperactivity. A knowledgeable defense attorney could legitimately transform what appears to be an externally produced disorder, such as lead poisoning, into an internally produced one, claiming that the defendant’s behavior was due to the brain damage or neurological dysfunction that the lead induced. This was the strategy used in the Terrance Frank case,\(^{302}\) and perhaps for this reason that strategy was influential. This is also the approach taken in *Lewis v. Collins*.\(^{303}\) Consider, however, the disadvantages faced by those attorneys who are not so knowledgeable about the consequences of externally produced events.


\(^{300}\) Id. at 722-25.

\(^{301}\) Anderson, *supra* note 298, at 1.

\(^{302}\) See *supra* notes 254-56 and accompanying text.

\(^{303}\) See *supra* notes 257-77 and accompanying text.
Perhaps, however, the issue is not "causal appeal" but the fact that what appear to be internally produced stresses, such as brain cysts, occur less frequently than those that are externally produced, such as lead poisoning and other environmental toxins. Indeed, if the criminal justice system were to allow a defense based upon "rotten social background," nearly every poor minority who has committed a crime would be found less culpable because a wealth of social science research suggests that most criminals are socioeconomically deprived.  

This prompts another question: Is infrequency of occurrence or "exoticism" a proper rationale for allowing a criminal defense to be acceptable? Perhaps exoticism is the basis for some of the successful defense strategies based on postpartum psychosis. But if this is a factor, then the lead poisoning defense may be appealing to juries because it has a limited history in criminal trials.

Perhaps, however, the apparent focus on exoticism is simply the criminal law's way of allowing some recognition, and therefore allowance, for human frailty without setting the majority of wrongdoers free. It may be argued, however, that if mitigation or allowances are based on such calculations and causal fictions, this practice could undermine the philosophy and purpose of the criminal law. Perhaps it would simply be more "just" to discard defenses based upon both internal and external factors, recognizing that although both may cause crime, it is unfair to allow only for those factors (internal) that occur less frequently albeit no more forcefully than those factors (external) that may be responsible for determining a large proportion of lawbreaking. In this sense, then, courts applying the nexus requirement would need to broaden their view of the types of evidence that they would consider to be significant with respect to the defendant's culpability.

V. Conclusion

Based upon an examination of the Penry standard as well as the Texas court's current and "future" nexus requirement in the context of the Biosocial Study's results, this Article reaches several conclusions. First,
there is no logical or empirical basis for the nexus requirement, given social scientists' current inability to predict human behavior. Although social scientists are able to show that some factors are stronger predictors of crime than others, most criminal behavior cannot be predicted from their models. Of the factors that do prove to be significant predictors of crime, there is no evidence to suggest that those considered to be "internal" (namely, biological or psychological) are more important than those considered to be "external" (namely, environmental). Furthermore, there can be considerable interlinkage between the two, as the research on lead poisoning has demonstrated. Yet, the criminal law presumes that what appear to be "internal" factors are more causally linked to crime. Thus, these factors are more likely to be considered acceptable under the Texas court's mitigating evidence standard, as the Texas court has demonstrated in its focus on "same" or "similar" Penry evidence, most particularly mental retardation.

In light of this incongruity, this Article suggests that the criminal law in general, and the Texas court in particular, be more flexible in considering both internal and external factors in assessing the standard for presenting mitigating evidence. However, this Article suggests that a number of accepted mitigating factors or defenses that are popular simply because they are exotic or have the appearance of causality should be discarded if there is no evidence that they have any distinguishable relation to culpability and criminal behavior. Not only would this approach to considering mitigating evidence have the appearance of fairness, it would also in fact be more fair, given its closer link to the reality of criminal behavior—what little we know of it.
APPENDIX

MEASURES OF INTELLIGENCE AND ACHIEVEMENT

Because the Collaborative Perinatal Project sample discussed in this Article was tested between 1959-62, the measures used reflect the times, though all remain valid and reliable indicators of intelligence and achievement today. The references and empirical research cited in this Appendix are dated, however, in order to reflect how the measures were constructed and viewed at the time they were administered.

A. Four-year Intelligence Test

1. Stanford-Binet Intelligence Scale.—The Stanford-Binet Intelligence Scale assesses the intellectual development of children between the ages of thirty months, the upper age limit on the Bayley Scales of Mental and Motor Development, and forty-eight months, the lower age limit on the WISC, which was administered at seven years. According to Sattler, the Stanford-Binet measures primarily visual-motor capabilities, nonverbal reasoning, social intelligence, and language functions between the ages of two and five years, and abstract reasoning and memory skills at older ages. The third revision of the Stanford-Binet, which was used in the Collaborative Perinatal Project, is based on a standardized sample with rescaled intelligence scores normally distributed at a mean of 100 and a standard deviation of sixteen.

The Collaborative Perinatal Project applied a short form of the Stanford-Binet. Silverstein demonstrates that the short and long forms have comparable reliability. The high internal reliability of the short form has been shown on the national Collaborative Perinatal sample. The accepted validity of the Stanford-Binet as a measure of global intelligence has been discussed in depth, although in general it appears to reflect more strongly verbal relative to performance or spatial skills.

B. Seven-year Intelligence Tests

1. Wechsler Intelligence Scale for Children (WISC).—According to Friedes,\textsuperscript{311} the WISC is the best available test purported to measure intelligence in children. In contrast to the Stanford-Binet, the WISC examines both intellective and nonintellective factors rather than a unidimensional construct. The WISC is comprised of twelve subtests divided into two summary scales of verbal (Verbal IQ) and nonverbal (Performance IQ) intelligence, and includes a total summary intelligence scale (Full Scale IQ). The raw scores for each subtest are converted into scaled scores with a mean of ten and a standard deviation of three. Verbal IQ’s, Performance IQ’s, and Full Scale IQ’s are summaries of the scaled scores of the appropriate subtests and have distributions with a mean of 100 and a standard deviation of fifteen.

In the Collaborative Perinatal Project, a short form of the WISC was administered comprised of four of the verbal subtests and three of the performance subtests. Silverstein\textsuperscript{312} has shown that the long and short forms are functionally equivalent. Briefly, the three summary scales and twelve subtests measure the following:\textsuperscript{313}

(1) Full Scale IQ—a general measure of intelligence based upon a composite of all twelve subtests.

(2) Verbal IQ—a summary measure of verbal ability based upon a composite of four subtests.

(a) Information—assesses how much general information a child has obtained from the surrounding environment, requiring such skills as remote memory, ability to comprehend, and associative thinking, in addition to interests and reading background.

(b) Comprehension—determines the level of a child’s use of practical judgment in daily events in addition to the development of social acculturation and a maturing conscience or moral sense. Posses-

\textsuperscript{312} See A.B. Silverstein, Validity of WISC Short Forms at Three Age Levels, 31 J. CONSULTING PSYCHOL. 635, 635-36 (1967).
\textsuperscript{313} See generally ALAN J. GLASSER & IRLA L. ZIMMERMAN, CLINICAL INTERPRETATION OF THE WECHSLER INTELUENCE SCALE FOR CHILDREN 36-104 (1967) (describing in detail each of the various subtests).
sion of practical information and the ability to use past experience in socially acceptable ways are important.

(c) **Vocabulary**—most likely represents the best single measure of intellectual ability by indicating a child’s learning ability, extent of information and ideas, quality of language, degree of abstract thinking, and development of thought processes. This test is influenced by a child’s education and environment.

(d) **Digit Span**—determines the child’s ability to attend in a simple situation, measuring both immediate auditory recall or immediate auditory memory (attention) span.

(3) **Performance IQ**—a summary measure of performance (nonverbal or spatial) ability based upon a composite of three subtests.

(a) **Picture arrangement**—assesses such abilities as perception, visual comprehension, planning with sequential and causal events, and synthesis into intelligible wholes.

(b) **Block design**—measures perception, analysis, synthesis, visual-motor coordination, and reproduction of abstract designs, in addition to logic and reasoning applied to space relationships. Nonverbal concept formation along with implicit verbal manipulation is also required.

(c) **Coding**—evaluates in particular visual-motor dexterity with pencil manipulation, in addition to the ability, speed, and accuracy of absorbing new material presented in an associative context.

The WISC was standardized on a sample of over two thousand White males and females at different age levels who were representative of geographic location, type of location (urban or rural), and parental occupation in the 1940 census statistics. The validity of the WISC as a measure of mental ability is described by Matarazzo using multiple kinds of evidence; it has received substantial corroboration by others.

In neuropsychological research, the WISC verbal and performance summary scales and subtests, respectively, are used as one of a number of possible indicators of left and right hemisphere functioning. Thus, a large

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315. See Freides, supra note 311, at 801-03.
discrepancy between verbal and performance IQ scores (computed by subtracting scores or taking an absolute value) is used as one of several indicators or organic brain damage. In the Biosocial Study, this discrepancy is defined as the Difference between Performance and Verbal WISC scores (PIQ - VIQ difference).

2. Wide Range Achievement Test.—The Wide Range Achievement Test (WRAT) attempts to measure “achievement” rather than “intelligence,” although the two concepts are not entirely clear. The WRAT is particularly appropriate for the Biosocial Study because it assesses very elementary reading, arithmetic, and spelling skills that can be more easily tested with disadvantaged populations who may lack a more formal education.

The WRAT comprises three parts:

(1) Spelling—which consists of copying marks that resemble letters, writing one’s name, and dictated words;

(2) Reading—which involves recognizing and naming letters and pronouncing words; and

(3) Arithmetic—which includes counting, reading number symbols, solving oral problems, and figuring written computations.

According to Lezak, the WRAT, which was developed by Jastak, is “carefully standardized with a full set of norms for each subtest.” Reading and spelling constitute a large verbal component; arithmetic measures mostly motivation and arithmetic ability. Although some have criticized the validity of the WRAT, the test is widely used and correlates at fairly high levels with the WISC and Stanford-Binet Mental Age; it correlates at a high level with the California Achievement

Test (CAT).  

3. Bender Gestalt Test, Kopitz Scoring; Bender Gestalt, Time in Seconds.—The Bender Gestalt is a nonverbal measure of perceptual activity and motor response, along with a spatial component. Of all visuographic tests, it is the most widely applied, in part because of the diversity of its uses. The test can be used to evaluate intellectual capacity and functioning as well as emotional stability. The Kopitz method of scoring was developed to assess abilities among children.

The Bender test is a set of nine geometrical designs comprising dots, lines, angles, and curves, which children must reproduce. In the Kopitz method of scoring, thirty errors are possible in reproduction; thus, the higher the score (a maximum of thirty points), the poorer a child’s performance.

Norms for Kopitz scoring were established on a sample of 1,055 children from diverse backgrounds with ages ranging from five to ten years. The Bender test discriminates among children with many different levels of visual-motor functioning up to age eight years, beyond which time it distinguishes only inferior from average performance. According to Kopitz, very fast test performance is more often a sign of immaturity and impulsiveness rather than ability; very slow performance is either a sign of compulsiveness or visual-motor impairment.

The Bender’s ability to discriminate between neurological and psychiatric patients as well as organically impaired and normal patients has been demonstrated. The test’s effectiveness may be due in part to its requirement of a “high level of integrative behavior that is not necessarily specific to visuopractic functions but tends to break down with cortical damage.” The Bender test has also been found to be an effective measure of developmental changes among a sample of European children, although it was not an accurate test of neurological impairment.


322. Lezak, supra note 318, at 310-11.


325. Id.

326. See Billingslea, supra note 323, at 233-51; Lezak, supra note 318, at 319-20.

327. Lezak, supra note 318, at 320.

among inner-city children.  

4. Goodenough-Harris Drawing Test.—The Draw-A-Man Test, originally published in 1926 by Goodenough, was extensively revised by Harris in 1963. The Collaborative Perinatal Project used the revised form, which is described in detail in Children's Drawings As Measure of Intellectual Maturity.

Since its original publication, the Draw-A-Man Test has “enjoyed widespread popularity;” in 1961 it was among the ten most frequently used tests in clinical psychology, even though it can be applied only to children. The test requires only that a child “make a picture of a man,” a task that is easy to administer and quick to complete. Harris's revision of the test redeveloped the Goodenough scoring criteria on a more “highly objective, empirical basis”; implemented a new standardization of the test; converted the IQ computation to the deviation IQ concept from the old mental age/chronological age ratio; and introduced a companion Draw-A-Woman Test.

Similar to the original test, the revision is intended to assess intellectual capacity (maturity) through the accuracy of a child’s observation and level of conceptual thinking, rather than artistic ability. Other research also suggests that performance on the Draw-A-Man may be related to a compulsivity-cautiousness cognitive style, possibly reflective of personality differences. The notion that personality may influence Goodenough-Harris scores was discouraged by Harris and others. However, in a review of studies focusing on delinquent children, Harris does suggest that “a Goodenough IQ markedly lower than that earned on the Binet may afford some indication of emotional or nervous instability.” Whether or not the Draw-A-Man Test can be used as a projective technique remains an open issue, however.

SPECIAL EDUC. 16, 16-22 (1969).

329. Doris W. Welcher et al., The Bender-Gestalt Test as an Indicator of Neurological Impairment in Young Inner-City Children, 38 PERCEPTUAL AND MOTOR SKILLS 899, 899-910 (1974).


335. HARRIS, supra note 330, at 28.
new standardization sample in 1950 of nearly 3,000 children between the ages of six and fifteen whose parents were representative of U.S. occupations as well as of four major geographic areas. In the new test, as in the earlier version, scoring reliabilities are over .90; split-half reliabilities are in the .70's and .80's, and retest reliabilities fall in the .60's and .70's. In general, correlations between the Goodenough-Harris and the Stanford-Binet, WISC, WAIS, and other tests are significant. Harris suggests that the drawings reflect conceptual maturity only up to the stage when a child ceases to use concrete concepts and relies more on higher order abstractions and verbal means of expression.335

5. California Achievement Test.—The California Achievement Test (CAT) is designed for the measurement, evaluation, and analysis of school achievement. The emphasis is upon content and objectives in the basic curricular areas of reading, mathematics, and language.337

The 1970 edition, which is used in the present study, was the latest of a number of revisions that had been available to schools for over fifty years. Nearly 300 state-approved reading, language, and mathematics texts, as well as other recommended subjects of study, were referenced in revising the 1970 edition. Selection of the standardization sample involved a two-stage stratified random sampling from public schools with more than 300 students and from Catholic schools.338

The public school population was stratified according to geographic region, average enrollment per grade, and community type; and the Catholic schools, according to enrollment, geographic region, and type of school (diocesan or private). The sampling technique provided for proportionate representation in the national norms of minority group students in the total school population. The final standardization sample contained 203,684 students from schools in 36 states.339

The CAT covers grades 1 through 12 with five overlapping levels of tests at the second, fourth, sixth, and ninth grades. This overlap allows the test to be administered according to a student’s attainment level rather than chronological age, if necessary. Overall, eleven test scores are available: a total battery score; three tests (reading, math, and language); their six respective subtests; and a total spelling score. Tests and corresponding

339. Id.
subtests are as follows:  

(1) *Total Reading*—intended to measure reading progress, comprehension, the interpretation of written material, and the criticism of its content.

(a) *Vocabulary*—in lower levels, assesses skills of auditory and visual discrimination, structural analysis, and pre-reading abilities; in upper levels, evaluates functional vocabulary and the ability to adapt meaning to context.

(2) *Total Math*—intended to measure a student’s level of achievement in a general mathematics program.

(a) *Computation*—assesses a student’s skill in the fundamental operations necessary in addition, subtraction, multiplication, and division of positive integers, fractions, and measurement quantities.

(b) *Concepts and problems*—tests a student’s ability to perform written single-step and multiple-step problems involving fundamental operations and the understanding of basic concepts.

(3) *Total Language*—intended to assess basic communication skills.

(a) *Mechanics*—determines a student’s ability to recognize those words that need capitalization and to use punctuation marks.

(b) *Usage and structure*—tests a student’s ability to distinguish between standard and nonstandard English usage, to recognize possible sentence transformations, and to identify sentence elements, their functions, and total sentence structure and type.

(4) *Spelling*—determines a student’s ability to distinguish between correctly spelled and misspelled words.

(5) *Total Battery*—reflects a student’s standing in terms of total achievement level.

For the purposes of the Biosocial Study, Level Four CAT tests for grades seven and eight were used for analyses. A student’s percentile rank

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is defined as the percentage of the students in the national norm group who had a lower score. Percentile ranks are recommended over other types of scores available for the CAT for determining the current status of a student’s achievement. Their limitations in terms of unequal scale units should be recognized, however.\textsuperscript{341}

Generally, alternate form reliabilities for the total battery and the three tests are high, ranging from .80 and .96; reliabilities for subtests are lower but still adequate. Evidence of content validity is derived mostly from data showing the appropriate placement of items in various levels and from subtest intercorrelations. More important is the content validity achieved from examining nationwide texts and course curricula.\textsuperscript{342}

The language tests are open to more criticism than other items in the CAT battery primarily because they appear to be overly difficult at each grade level\textsuperscript{343} and omit certain tests of important skills, such as paragraph organization.\textsuperscript{344} Overall, however, the language tests are considered to be “good state-of-the-art instruments.”\textsuperscript{345} Indeed, the CAT in general is highly praised in terms of its validity, comprehensive test and interpretive materials, reliability, and standardization procedures.

\textsuperscript{341} Id. at 47-50.
\textsuperscript{343} Bryan, \textit{supra} note 338, at 36.