University of Michigan Journal of Law Reform

Volume 36

2002

Behavioral Genetics and the Best Interests of the Child Decision Rule

David J. Herring
University of Pittsburgh School of Law

BEHAVIORAL GENETICS AND THE BEST INTERESTS OF THE CHILD DECISION RULE

David J. Herring*

This Article proposes that modern child custody law should be reassessed in light of recent scientific findings. Judicial determinations of custody use the "best interests of the child" rule. The rule is justified to a large extent by the goal of maximizing child developmental outcomes. The assumption is that a child whose "best interests" are protected stands a better chance of becoming a socially well-adjusted, productive and prosperous citizen.

Recent child development studies have shown that so-called "shared environment," or home environment factors have little effect on child development so long as the shared environment is minimally adequate. Genetics and "non-shared environment" have a far greater influence on child development outcomes. While other reasons for the "best interests" rule may ultimately justify it, maximizing positive child development is not a justification supported by science.

I. PROLOGUE—A SCIENTIFIC APPROACH TO LEGAL SCHOLARSHIP

This article had its genesis in the popular book written by Judith Rich Harris, *The Nurture Assumption.*[1] This author's research included consulting many of the scientific articles and books cited by Harris. Her work directed the author to the basic science research literature in the area of behavioral genetics.

The behavioral genetics literature is fascinating not only on a substantive level, but also on a procedural level. Although the authors of the relevant articles and books have engaged in extensive, highly sophisticated studies and analyses, they use their findings to make rather modest points. The points they make are modest in two senses. First, they advance the knowledge in their field in small, incremental steps. Their writings neither reveal great leaps in knowledge, nor articulate comprehensive solutions, but rather

* Dean and Professor of Law, University of Pittsburgh School of Law; B.B.A. 1980, University of Michigan; J.D. 1985, University of Michigan Law School. Professor Herring would like to thank James Flannery, Lawrence Frolik, Arthur Hellman, Margaret Mahoney, Francis Barry McCarthy, Alan Meisel, Sean O'Connor, Brent Plummer, and Lu-in Wang for comments and support.

1. JUDITH RICH HARRIS, THE NURTURE ASSUMPTION: WHY CHILDREN TURN OUT THE WAY THEY DO (New York: Free Press 1998).

convey the cooperative nature of their endeavor and their own limited role within a community of scientific colleagues. Second, they invariably present their findings as tentative steps of discovery, acknowledging the possibility, even likelihood, that their findings will be discredited, and certainly modified. In fact, they expressly hope for these results.

For these two reasons, and likely several others, the nature of scientific scholarship and the role of the scientific scholar stand in sharp contrast to the general nature of legal scholarship and the primary role of legal scholars. Legal scholarship tends to engage in comprehensive discussions of large issues and to propose grand solutions. The scholarly steps in the legal field tend to be large and to be expressed with deliberate certainty and finality.

A scholarly approach characterized by a common effort in which individual scholars take small, careful steps is valid not only in the attempt to discover basic knowledge about the functioning of the world. This scholarly approach is also valid in the attempt to apply basic knowledge to human problems and systems—the primary focus of the legal scholar. This article is an experiment in utilizing this approach to examine a discrete rule of decision—namely, the best interests of the child standard applied in child custody disputes involving fit parents.

II. INTRODUCTION

Behavioral genetic studies challenge one of the basic assumptions that underlie the best interests of the child standard. This assumption is that parental nurture is the primary source of children's differential developmental outcomes in terms of personality traits.[2] There are other potential justifications for the best interests of the child standard, such as maximizing current child happiness or socioeconomic status. These are outside the scope of this article, which examines the best interests of the child standard only insofar as it is justified by securing optimal child development outcomes. Part III of this article describes the findings from behavioral genetic studies. Part IV explores the implications of these findings for the best interests of the child decision rule.

2. *Id.* at 15.

III. BEHAVIORAL GENETICS

Robert Plomin and Denise Daniels wrote a landmark article in 1987, posing the question, "Why are children in the same family so different from one another?"[3] This question arose from human behavioral genetic studies utilizing the two major designs: the adoption design and the twin design. These designs

> were developed to circumvent the problem of conflating genetic and environmental influences in studies of family members who share heredity and family environments. By doing so, the designs partition environmental variance into two components: one shared by members of a family and the other consisting of the remainder of the environmental variance, which is referred to as nonshared environment.[4]

Behavioral genetic studies allow researchers to determine the proportion of a specific developmental outcome attributable to each of three general influences: an individual's genetic inheritance, the portion of an individual's environment that she shares with other members of her family, and the portion of an individual's environment that she does not share with other members of her family.

So, how do twin and adoption studies allow for the attribution and quantification of causes of developmental outcomes? Twin studies compare the personality-trait resemblance of identical twins with that of same-sex fraternal twins. Adoption studies compare genetically-related individuals who are raised in different family environments or genetically unrelated individuals who are raised within the same family environment. Twin studies are examined first.

As described by Plomin and Daniels, the genetic coefficient (a measure of the degree of relatedness between two people) for a parent and his biological child is .50.[5] In other words, they share

---

3. Robert Plomin & Denise Daniels, *Why Are Children in the Same Family So Different From One Another?*, 10 BEHAVIORAL & BRAIN SCIENCES 1 (1987).

4. *Id.* at 2.

5. *Id.* at 2–4. *See, e.g.*, ROBERT TRIVERS, SOCIAL EVOLUTION (1985). *See also* DAVID REISS ET AL., THE RELATIONSHIP CODE: DECIPHERING GENETIC AND SOCIAL INFLUENCES ON ADOLESCENT DEVELOPMENT 6 (Harvard University Press 2000). While it is true that every human shares the vast majority of his or her genes with every other human, the degree of relatedness for genetic material that determines differences among individuals corresponds to the coefficients identified by Reiss et al. and described in the text of this article.

half of their segregating genetic code. The genetic coefficient for full biological siblings is also .50, except for identical twins, whose genetic coefficient is 1.00. Identical or monozygotic twins share all of their genetic material. Fraternal or dizygotic twins are the same as any other set of siblings, sharing only half of their genetic makeup. Half siblings have a genetic coefficient of .25, while biologically unrelated individuals such as a parent and an adopted child have a genetic coefficient of 0 because they do not share genetic material.

These varying degrees of relatedness allow behavioral geneticists to design and conduct studies that calculate the percentage of correlation between individuals attributable to genetic factors. For example, twin studies compare the resemblance of identical twins with that of same-sex fraternal twins. As noted above, identical twins are twice as similar genetically as fraternal twins. Plomin and Daniels explain the relevance of this genetic information for twin studies:

> If heredity affects a trait, the twofold greater genetic similarity of identical twins will make them more similar than fraternal twins with respect to a particular trait. The difference between the correlations for identical twins and fraternal twins is an estimate of roughly half of the genetic variance in the population because the coefficient of genetic relationship is 1.0 for identical twins and .50 for fraternal twins. Thus, for a trait completely determined by heredity, the expected correlations are 1.0 for identical twins and .50 for fraternal twins. If the pattern of twin correlations were .75 and .50 for identical and fraternal twins, respectively, heredity would be estimated to explain half of the phenotypic variance for the trait. If heredity does not affect the trait, the twofold greater genetic similarity of identical twins will not make them more similar than fraternal twins for the particular trait.[6]

Twin studies not only allow for a determination of the percentage of correlation attributable to shared genes, but also the percentage of correlation attributable to shared environment and nonshared environment. Plomin and Daniels give two examples to illustrate this point.

First, take the case in which the correlation for a trait between identical twins is .50 and the correlation between fraternal twins is .25. In this case .50 of the variance is genetic and .50 is nongenetic.

---

6. Plomin & Daniels, *supra* note 3, at 3.

(Genetic variance is calculated as twice the difference between identical twin correlation and fraternal twin correlation. In mathematical terms, this calculation is as follows: correlation between individuals with 100% shared genetic material—correlation between individuals with 50% shared genetic material x 2 = 100% of genetic variance among individuals.) And because identical twins are identical genetically, the .50 correlation is all attributable to genetic similarities. There are no similarities beyond this and thus there is no room to assign a portion of the correlation to shared environmental factors. The .50 noncorrelation must be due to nonshared environmental factors or measurement error in calculating the trait correlation between individuals.[7]

Second, take the case in which the correlation for a trait between identical twins is .75 and the correlation between fraternal twins is .50. As in the first example, .50 of the variance is genetic and .50 is nongenetic (again, genetic variance is calculated as twice the difference between identical twin correlation and fraternal twin correlation). Because identical twins are identical genetically, .50 of the correlation between them is explained by their shared genes—the maximum possible attributable to genetic effects. The remaining .25 of correlation is attributable to shared environmental factors and the .25 of noncorrelation is attributable to nonshared environmental factors and measurement error.[8]

Plomin and Daniels have described the implications of the methodology derived from twin studies:

> [T]he twin design provides a direct estimate of nonshared environment—the component of phenotypic variance that is not shared by members of identical twin pairs. In addition, the twin design provides an indirect estimate of shared family environment: It is the component of phenotypic variance that remains after accounting for genetic variance and nonshared environmental variance.[9]

The results of actual twin studies illustrate the usefulness and implications of this methodology. A specific example is provided by a study of over 12,000 twin pairs in Sweden that focused on the two important personality traits of extroversion and neuroticism.[10] The study revealed twin correlations of .51 and .21 for identical

7. *Id.* at 4.
8. *Id.*
9. *Id.*
10. *Id.* at 5.

and fraternal twins, respectively, for extroversion and correlations of .50 and .23 for neuroticism.[11] These results indicate that virtually all the measured correlation is attributable to genetic variance, with the measured noncorrelation being attributable to nonshared environmental variance. Although the nonshared environmental percentage may include measurement error, it is important to note that there is little room to attribute any correlation to shared environmental factors.

Plomin and Daniels discuss a collection of twin studies that focus on various personality traits and find that the study of Swedish twins is representative.[12] Twin studies, overall, indicate that variation among individuals in terms of personality traits is due 40% to genetic variance, 50% to nonshared environmental variance and 10% to shared environmental variance. In other words, sharing a family environment accounts for only 10% of the variance between individuals within the family and individuals not included in the family. The remainder of the variance among individuals is attributable to genetic differences and environmental factors peculiar to the specific individuals.[13]

Adoption studies, the second major design utilized in human behavioral studies, allow behavioral geneticists to test the findings from twin studies and to explore additional correlation data.[14] Adoption studies compare genetically-related individuals who are raised in different family environments, or genetically unrelated individuals who are raised within the same family environment. The classic and most powerful example of the first type of adoption study involves identical twins adopted into separate homes at birth and reared in uncorrelated environments. In such a study, the resemblance of the twins is a direct estimate of variance among individuals in a population that is due to genetic factors. A correlation of .40 for identical twins reared apart implies that 40% of the phenotypic variance within a population is genetic in origin. The noncorrelation measurement of .60 indicates that 60% of the variance within a population is not explained by genetic differences, but by environmental differences. It is important to note that this type of adoption study does not allow for the specific identification of shared environmental factors and nonshared environmental factors.

---

11. *Id.*
12. *Id.*
13. *Id.*
14. *See id.* at 2–3.

Other adoption study designs do allow for the identification of shared and nonshared environmental factors.[15] For example, researchers can compare relatives adopted into separate family environments with relatives reared together. If relatives reared together are more alike than relatives reared apart, the difference in correlations provides an estimate of shared environmental effects. For example, if identical twins raised together correlate at .60 and identical twins raised apart correlate at .40, 20% of the variance within a population would be attributable to shared environment.

A more direct estimate of shared environment comes from adoption studies examining unrelated individuals who have been adopted into the same family. These individuals share many environmental factors—parents, socioeconomic status, neighborhood, schools, etc. However, these individuals do not share heredity. Based on these facts, the correlation of traits between unrelated children adopted together directly estimates the amount of variation among individuals in a population that is due to shared environmental factors. Thus, a correlation of .20 for a trait between unrelated children adopted into the same home at birth indicates that 20% of the variation in the trait is explained by shared environment. And as Plomin and Daniels state, "A correlation of zero for pairs of adoptees, . . . implies that shared environment contributes nothing to phenotypic variance, which implies that all of the environmental variation is nonshared."[16]

This last type of adoption study methodology has yielded results that corroborate the findings of twin studies concerning the relatively insignificant effect of shared environmental factors.[17] For personality traits, the average adoptive sibling correlation is .04. Thus, these studies indicate that 4% of the variation in personality traits within a population is attributable to shared environment. (This is actually quite a bit lower than the 10% attributable to shared environment based on the findings of twin studies. As Plomin and other researchers have speculated, twin studies may overestimate the effects of shared environment because identical twins share more experiences than fraternal twins or non-twin siblings).[18]

Particularly interesting are adoption studies in the area of cognition. Early adoption studies indicated that shared environment

15. *See id.* at 3.
16. *Id.*
17. *See id.* at 5.
18. *See* DAVID ROWE, THE LIMITS OF FAMILY INFLUENCE: GENES, EXPERIENCE, AND BEHAVIOR 44–46 (New York: The Guilford Press 1994); REISS ET AL., *supra* note 5, at 53–55.

had a substantial impact on differences in IQ among individuals.[19] The average IQ correlation for adoptive siblings is .30, suggesting that 30% of the variance in IQ scores is due to shared environmental factors. These studies, however, involved only relatively young adoptive siblings still living within the family home.[20]

Other adoption studies related to IQ have examined post adolescent adoptive siblings. These studies indicate that the correlations between adoptive siblings for cognitive abilities approaches 0. These studies thus indicate that shared environmental factors have no lasting effect and do not explain the differences in cognitive abilities among individuals.[21] After examining one such study, Plomin and Daniels state, "Thus, this study leads to the conclusion that shared environmental influence on IQ and specific cognitive abilities is of negligible importance by the end of early adolescence."[22]

Summarizing their discussion of twin and adoption studies, Plomin and Daniels state:

> [N]onshared environmental influence is a major component of variance for personality, psychopathology, and IQ (after childhood). We conclude that nonshared environment explains perhaps as much as 40% to 60% of the total variance for these domains. Although one can quibble with the magnitude of our estimates, they would have to be substantially in error before they would affect our argument that most of the environmental variance is nonshared.[23]

Twin and adoption studies clearly indicate that nonshared environmental factors, along with genetic factors, account for a significant percentage of the variance among individuals within a population. In contrast, the environmental factors shared by members of a family do not account for a significant percentage of variance among individuals. These findings appear counterintuitive, even radical, at first. But they do not mean that family environments and parents are unimportant. In order to understand more fully what these findings mean, the phrases "shared environment" and "nonshared environment" must be defined with more rigor.

---

19. *See* Plomin & Daniels, *supra* note 3, at 6.

20. *Id.*

21. *See id.*; *see also* Robert Plomin et al., *Nature, Nurture and Cognitive Development From 1 to 16 Years: A Parent-Offspring Adoption Study*, 8 PSYCHOL. SCIENCE 442 (1997).

22. Plomin & Daniels, *supra* note 3, at 6.

23. *Id.*

Shared environment consists of circumstances that equally affect two or more individuals in a family.[24] The usual focus is on siblings who live within the same household with their adult parents. A possible example of a component of the shared environment would be the specific parents' overall approach to discipline. The parents may subject all their children to "time-outs," to verbal reprimands, or to physical discipline such as spanking. Each of the children in the family share experiences as a result of the parents' disciplinary methods. Other possible aspects of the shared environment include the parents' decision as to where to send all their children to school, the neighborhood setting within which the family resides, and the type of food consumed at family meals. There are many more circumstances that children may share within a specific family context.

In contrast, nonshared environment consists of circumstances that are different for siblings in the same family. As Reiss states, "The sum total of these sibling-unique effects on psychological development is now known by the term 'nonshared environment.' "[25] An example of a nonshared environmental factor is disparate disciplinary approaches in a family in which a parent uses harsh physical discipline in dealing with one child's misbehavior, but uses only verbal reprimands in dealing with her other child's misbehavior. Another example of a sibling-unique effect contributing to the nonshared environment is a difference in emotional connection in a family in which a depressed mother withdraws from one of her children but not another.

It should be noted that the examples of shared environmental factors are set forth only as possibilities because the definition of the nonshared environment leaves open the possibility that seemingly shared experiences are actually not shared. For instance, parents may decide to send all of their children to the same elementary school. This parental decision seemingly gives rise to the possibility of many shared experiences among the children. The children, however, are likely to be in different grades, and even if they are in the same grade, they are likely to be in different classrooms. As a result, the children from this family would interact with different teachers and different peers. The school setting, although it may provide a degree of shared experience, will also provide many sibling-unique experiences.

---

24. *See* REISS ET AL., *supra* note 5, at 5; Plomin & Daniels, *supra* note 3, at 7.
25. REISS ET AL., *supra* note 5, at 5.

More fundamentally, children within the same family may perceive like treatment very differently.[26] For example, a parent may use physical discipline in dealing with all the children in the family, but a particular child may view the parent as being especially harsh with her. Or a particular child may be especially sensitive to physical discipline, causing the felt experience to depart significantly from her sibling's experience.

Because of this potential for seemingly shared environmental factors to result in nonshared experiences, the line between shared and nonshared environmental factors is not clear, and in fact, is quite ambiguous. But this fact merely makes the scientific task more difficult. Attributing effects to these two causal domains will be incredibly complex and require creative research strategies, but this complexity does not undermine the basic concept of dividing environmental causation between shared and nonshared factors.[27]

In their 1987 paper, Plomin and Daniels expressly challenged behavioral scientists to design studies that would allow them to identify nonshared environmental factors and their relation to specific developmental outcomes.[28] Plomin and Daniels focused researchers on the nonshared environment because of the results of twin and adoption studies that reveal nonshared environmental factors to have the strongest influence on differential development. Plomin has recently stated:

> The message of the [1987] paper was upbeat: there is a new way, and an empirical tool to study the environment. Namely, it is to study more than one child per family to find out why they are so different. Three steps were identified for this research program: (1) document differential experiences, which requires the construction of measures of the environment that are specific to each child in the family; (2) document the association between such differential experiences and differential outcomes; and (3) investigate the extent to which associations between differential experiences and differential outcomes are causal.[29]

The 1987 paper included a listing of possible sources of nonshared environment, spurring several researchers to begin

---

26. *See* Plomin and Daniels, *supra* note 3, at 9; Robert Plomin, Kathryn Asbury & Judith Dunn, *Why Are Children in the Same Family So Different? Nonshared Environment a Decade Later*, 46 CANADIAN J. PSYCHIATRY 225, 228–29 (2001).

27. *See* Plomin, Asbury & Dunn, *supra* note 26, at 228–29; REISS ET AL., *supra* note 5.

28. Plomin and Daniels, *supra* note 3, at 15.

29. Plomin, Asbury & Dunn, *supra* note 26, at 226.

examining specific sources of nonshared environment such as family composition and dynamics, sibling interactions, peers, and nonsystematic factors.[30]

The largest study undertaken to address Plomin and Daniels' challenge is the decade-long Nonshared Environment in Adolescent Development (NEAD) project.[31] David Reiss, a psychodynamic family therapist, led this study in which he collaborated with behavioral geneticist Plomin and child psychologist E. Maris Hetherington. As Plomin has stated, "The NEAD project aimed to address all three steps in the program of research listed [in the 1987 paper], focusing on measures of the family environment and their effect on adolescent psychopathology in a genetically sensitive design."[32] The NEAD study involved two, two-hour visits at three year intervals to 720 families with two same-sex sibling children ranging in age from 10 to 18 years. A battery of questionnaires and interviews were administered to both parents and children, and parent child relationships were videotaped through discussions of problems in family relationships. These research methodologies yielded highly reliable composite measures.[33]

The most interesting aspect of the design of the NEAD study concerns its sensitivity to genetic factors. In order to identify and parse out genetic effects, the NEAD project included families that varied in composition in terms of the genetic relatedness among members.[34] Namely, the 720 NEAD families were selected to include adolescent children who are identical twins, fraternal twins, full non-twin siblings, half siblings, and genetically unrelated siblings. Through the inclusion of these different types of families, the NEAD project allowed for a sophisticated multivariate genetic analysis.

In the first step of the research program set out by Plomin, the project staff identified differential experiences of siblings.[35] The children's reports of their family interactions yielded correlations that were only moderate, indicating a significant degree of differential experience. These reports were corroborated by similar findings based on third-party observations of parent/child interactions.[36]

---

30. *Id.*; Plomin & Daniels, *supra* note 3, at 9.
31. REISS ET AL., *supra* note 5; Plomin, Asbury & Dunn, *supra* note 26, at 227.
32. Plomin, Asbury & Dunn, *supra* note 26, at 227.
33. *See id.* at 230.
34. *See id.*; REISS ET AL., *supra* note 5, at 1–10.
35. *Id.* at 169–71.
36. *See id.*; Plomin, Asbury & Dunn, *supra* note 26, at 230.

Once differential experiences were identified, the second step in the research program was to determine if the nonshared experiences related to psychological outcomes.[37] The NEAD project identified several relationships between specific nonshared experiences and developmental outcomes. Plomin described an example of these types of results:

> [N]egative parental behaviour directed specifically to one adolescent sibling (controlling for parental treatment of the other sibling) relates strongly to that child's antisocial behaviour and, to a lesser extent, to that child's depression. Most of these associations involve negative aspects of parenting, such as conflict, and negative outcomes, such as antisocial behaviour. Associations are generally weaker for aspects of positive parenting, such as affection.[38]

These findings led to the tentative conclusion that parents treat children differently and this differential treatment relates to differential adjustment.

The third step in the research program, however, undermined this tentative conclusion. Namely, addressing the question of whether differential parenting is a cause of children's development or an effect of children's behavior and development called into question the presumption that differential parenting causes differential development.[39]

The NEAD study, with its genetically sensitive design, allowed the researchers to estimate the genetic mediation of the covariance between family environment and adolescent outcome. This type of analysis yielded an unexpected finding when, for example, the associations between parental negativity and adolescent adjustment were examined. The NEAD researchers found that most of the associations were mediated by genetic factors.[40] As Plomin has summarized,

> [t]he finding of genetic mediation implies that, to a substantial extent, differential parental treatment of siblings reflects genetically influenced differences between the siblings. As implausible as this finding might seem on first encounter, it is part of the second great discovery of genetic research at the interface between nature and nurture—genetics contributes

37. *Id.*
38. *Id.*
39. *See id.*
40. *See* REISS ET AL., *supra* note 5, at 251.

> substantially to experience. The NEAD quest for non-shared environment led to genotype-environment correlation; that is, children select, modify, construct, and reconstruct their experiences in part on the basis of their genetic propensities.[41]

In essence, the NEAD project found that children's genetic makeup is a primary cause of the differential environments that they experience within the family.[42] Thus, the family environment does appear to influence development, but it is the environment that is constructed by children's genetic makeup and the behavioral propensities that result from that genetic makeup.

The NEAD project failed to identify nonshared environmental links with differential sibling outcomes. This failure likely resulted from the NEAD project's focus on nonshared environmental factors that arise only within the family.[43] Because of this failure, researchers should now focus on extra-familial factors as good candidates for components of the nonshared environment that affect development. Possible extra-familial factors include peer group interactions, interactions with adults other than parents, and chance events or occurrences.[44] These types of factors could constitute the nonshared environment independent of genetic effects. The bottom line is that further research is required to discover nonshared environmental factors that have an independent effect on development.

Despite the failures of the NEAD project, it did reveal useful information concerning the importance of nonshared environment in the development of personality traits and cognitive skills. To begin, it confirmed many previous studies that found significant genetic effects and significant environmental effects on personality and cognitive development.[45] NEAD also confirmed the importance of nonshared environmental factors, with these factors having a significantly larger impact on personality and cognitive development than shared environmental factors.[46]

More specifically, the NEAD project analyzed the genetic and environmental influences on seven major measures of adolescent

---

41. Plomin, Asbury & Dunn, *supra* note 26, at 231.
42. *See id.*; REISS ET AL., *supra* note 5.
43. *See* Plomin, Asbury & Dunn, *supra* note 26, at 231.
44. *See id.* at 229, 231.
45. *See* REISS ET AL., *supra* note 5, at 206–42.
46. *See id.* at 240–41.

adjustment at two distinct points.[47] These seven measures are antisocial behavior, depression, cognitive agency, sociability, autonomy, social responsibility, and self-worth. Antisocial behavior included measures of whether a child exhibited behavioral problems at school, was a bully or was mean to others, stole, lied, cheated, skipped school, or engaged in aggressive behavior during the past week to three months. Depression included whether a child had experienced sudden changes in mood, felt sad, withdrawn, depressed or lonely, or exhibited depressed affect, poor appetite, or poor sleep during the past week to three months. Cognitive agency included measures of a child's school performance in several areas, degree of positive regard in cognitive areas, and industriousness and orientation toward schoolwork. Sociability consisted of assessments of a child's activities in social organizations, number of friends, positive peer activity, involvement in organized pro-social activity, and quality of peer network. Autonomy was made up of measures of a child's engagement in independent and self-reliant activity, initiation of activities and transactions with community services, taking care of self and belongings, and independent pursuit of leisure and work activities. Social responsibility assessed whether a child adhered to adult norms, exhibited helping and sharing behavior, presented social maturity and internalized moral principles. Self-worth measured a child's tendency to view self positively.

For each of the seven measures, genetic influences were significant.[48] Genetic influences were especially substantial for antisocial behavior, cognitive agency, and social responsibility. The NEAD data indicated that the degree of heritability for each of these three dimensions of adjustment is in excess of 65%. The heritability for the other four measures approached 50%.

Environmental effects were also significant.[49] Even for the three measures for which genetic influences accounted for approximately 65% of the variation, environmental influences accounted for approximately 35% of the variation. For five measures nonshared environmental factors constitute the exclusive or preponderant environmental component. These measures include antisocial behavior, depression, cognitive agency, social responsibility, and self-worth. Shared environmental factors have little or no influence on the development of individual variations in these areas of development. These findings from the NEAD project are consistent with prior studies.

---

47. *See id.* at 113–18.
48. *See id.* at 209–11.
49. *See id.* at 211.

The NEAD project found that shared environmental factors are the preponderant environmental influences for both sociability and autonomy.[50] This finding concerning the importance of shared environment is new and does not reflect the findings from prior studies.[51] Further studies are thus necessary in order to verify the findings of the NEAD project concerning the effect of the shared environment on development in the areas of sociability and autonomy.

In addition to the findings across the seven measures, it is instructive to examine the detailed findings for each specific measure of adolescent adjustment. The cognitive agency measure provides a good starting point. As noted above, this measure examines a child's development of cognitive skills, largely assessed through reports and observations of school performance. Attaining a high level of achievement in school may constitute an important goal and a detailed examination of the factors that affect development in this area could be quite useful.

The NEAD project data indicated that at time 1 (earlier adolescence) there was substantial genetic influence on cognitive agency, with genetic factors accounting for 85% of the differential development among individuals.[52] Also at time 1, nonshared environmental factors accounted for 15% of individual differences and shared environmental factors did not affect cognitive agency.[53] Three years later, at time 2 (later adolescence), genetic factors accounted for 68% of the differences among individuals in terms of cognitive agency, nonshared environment accounted for 30% of differences, and shared environment accounted for 2% of differences.[54] Thus, at both points genetic influences were relatively strong, nonshared environment factors were significant, and shared environment factors had a minimal impact on the development of differences in cognitive agency among individuals.

In addition to these snapshots at specific points, the NEAD project also examined change over the three-year period by determining the degree of stability for each measure of adolescent adjustment.[55] Initially, the NEAD project data indicated that cognitive agency is very stable between earlier adolescence and later adolescence, with a correlation factor of .71. This means that

50. *Id.*
51. *Id.*
52. *See id.* at 225–27.
53. *Id.*
54. *Id.*
55. *Id.*

children who are doing well in school at early adolescence will likely be doing well at late adolescence and those who are performing poorly at early adolescence will likely be performing poorly at late adolescence.

Beyond this general finding of stability, the model testing results from the NEAD data revealed that genetic influences were the primary contributors to stability in cognitive agency.[56] Genetic influences account for 94% of the stability. Thus, most of the genetic effects at time 1 remained at time 2 and played a substantial role in maintaining stability in cognitive agency across time.

Of course, cognitive agency measures did not correlate 100% from time 1 to time 2. Some change does occur from earlier adolescence to later adolescence. The model testing results from the NEAD data indicated that changes in the nonshared environment account for 67% of the change in cognitive agency during this period, while genetic factors account for 33% of the change.[57]

Reiss concludes the discussion of cognitive agency by stating, "most of the genetic effects shown as important at each time period are involved in maintaining stability in cognitive agency across time. Virtually all the nonshared effects change over time and are associated with change in cognitive agency from earlier to later adolescence."[58] It is clear that nonshared environmental factors play an important role in a child's development in terms of cognitive agency during this stage of life.

Another measure of adolescent adjustment that is useful to examine is depression. Depression measures a child's mood, affect, feelings of sadness, withdrawal, loneliness, eating habits, and sleeping quality. These measures are important in assessing a child's daily functioning and happiness. Many who assess child wellbeing would be likely to find such measures relevant to their effort and would be interested in a detailed examination of the factors that affect development in this area.

The NEAD project data at time 1 revealed substantial genetic influences on depression.[59] Genetic factors account for 75% of differential development among individuals in the area of depression. Also important at time 1 were nonshared environmental factors, accounting for 25% of individual differences. Shared environmental factors exhibit no influence on depression measures at time 1. At time 2, the influence of genetic factors was much less,

56. *See id.*
57. *Id.*
58. *Id.* at 225–27.
59. *See id.* at 224–25.

accounting for 44% of individual differences. Nonshared environmental factors were much more important, accounting for 53% of differences. Shared environmental factors remained weak, accounting for 3% of differences. Thus, as opposed to cognitive agency measures, there are significant changes in the relative contributions of the three relevant factors on depression. However, at both points, genetic influences are significant, nonshared environmental factors are strong, and shared environmental influences are very weak or nonexistent.

As with cognitive agency, change in depression measures occur from earlier adolescence to later adolescence, with differing contributions to stability and change being made by the three relevant components.[60] The model testing results from the NEAD data showed that genetic factors account for the preponderant component of stability (73%). Conversely, the NEAD data revealed that nonshared environmental factors account for 73% of change in depression measures. The shared environment plays no role in either stability or change in depression. Describing his conclusions on depression, Reiss states:

> [W]e can recognize, even from analyses at two single or cross-sectional points in time, that genetic influence declines substantially from earlier to later adolescence and that there is an increase in nonshared influences in later adolescence. Indeed, [NEAD data clarify] that the majority of genetic influences during this developmental period account for stability, but that most of the nonshared influences account for change.[61]

Thus, as for cognitive agency, one interested in affecting depression during this period of development would be wise to focus on the components of a child's nonshared environment.

The findings related to cognitive agency and depression are representative of the other three measures of adolescent adjustment that reveal substantial nonshared environmental influences and minimal shared environmental influences (i.e., antisocial behavior, social responsibility, self-worth).[62] Stability is largely driven by genetic factors, and to a lesser degree, shared environmental

60. *See id.* at 225.
61. *Id.*
62. *See id.* at 220–34.

factors (i.e., antisocial behavior), while change is primarily driven by nonshared environmental factors.

However, the two measures of adolescent adjustment that reveal significant shared environmental influences differ. Although the findings indicating significant shared environmental influences in the areas of sociability and autonomy are new and have yet to be verified, they should not be ignored. In fact, the NEAD project did not ignore them, subjecting them to a full analysis concerning stability and change.

The measures of sociability provide a good example of this analysis. Sociability measures a child's organized social activity, number of friends and quality of peer network. These measures are important in assessing the development of associational skills, the possession of which may be considered desirable for adults in a large pluralistic democratic society.

The NEAD project data at time 1 revealed significant genetic influences on sociability.[63] Genetic factors accounted for approximately 60% of differential development among individuals in the area of sociability. Also at time 1, shared environmental influences accounted for appropriately 30% of differences, and nonshared environmental factors accounted for appropriately 10% of differences. At time 2, the relative influence of genetic, shared environmental, and nonshared environmental factors was about the same as at time 1. Thus at both points, genetic influence was substantial, shared environmental influence was significant, and nonshared environmental influence was important, but less important than the shared environment.

These findings gave rise to the possibility that shared environmental factors have a significant impact, independent of genetic influences, on adolescents' development in the area of sociability. Examination of the sources of stability and change in this area, however, diminished the likelihood of this possibility. While shared environmental factors account for 41% of stability in sociability from time 1 to time 2, these factors play virtually no role in change in sociability.[64] Genetic influences account for 77% of change during this period of adolescence, with nonshared environmental factors accounting for the remainder of change.[65] Thus, as with the other five measures of adolescent adjustment discussed above, one attempting to effect change during this

63. *See id.* at 210, 227–29.
64. *Id.* at 227–29.
65. *Id.*

period in the area of sociability would be wise to focus on nonshared environmental factors.

Autonomy is the only measure of adolescent adjustment for which the NEAD findings do not lead one to focus on the nonshared environment.[66] Although shared environmental factors contribute substantially to stability in autonomy during adolescence, these factors also account for 32% of change in autonomy. And although nonshared environmental factors contribute almost exclusively to change in autonomy, they are insignificant in magnitude. Thus, autonomy is the one area of adolescent adjustment that points to shared environmental factors as having the potential to influence development in the period from earlier to later adolescence.

Overall, the NEAD project data confirm prior behavioral genetic studies that identified components of the nonshared environment as the primary environmental factors that account for differential development among individuals within a population. During the period from earlier to later adolescence, the nonshared environment constitutes the primary influence for developmental change in the areas of antisocial behavior, depression, cognitive agency, sociability, social responsibility and self-worth.

However, as discussed above, the NEAD project failed in its effort to identify specific components of the nonshared environment that lead to specific developmental changes and outcomes. The specific nonshared environmental factors that contribute to certain developmental outcomes remain a mystery. The only insight on this subject is provided by the finding that nonshared environmental factors that arise from experiences within the family do not appear to have a significant impact on differential development. Thus, the nonshared environmental factors that contribute significantly to differential development during adolescence must arise from experiences outside the family association.[67] Furthermore, the nature and identity of these developmentally significant nonshared environmental factors remains uncertain.[68] In conclusion, uncertainty reigns in the area of adolescent development. How to affect development during adolescence through the manipulation of environmental factors is largely a mystery.

---

66. *See id.* at 229–32.
67. *See* Plomin, Asbury & Dunn, *supra* note 26, at 231.
68. *See id.*; REISS ET AL., *supra* note 5, at 417–26.

The findings from behavioral genetic studies to date call for additional studies of child development that involve more than one child from each family unit, and thus, are genetically sensitive. These types of studies hold out the hope of identifying environmental influences on differential development. In light of the NEAD project results, researchers should focus on environmental influences that arise outside the family association and constitute part of a child's unique, nonshared environment. Such influences may include relationships with peers, interactions with adults other than parents, and discrete chance events (e.g., accidents, illnesses, trauma).[69]

As Reiss points out, these types of studies are extremely difficult to design and implement.[70] They also require a good deal of time, with the twelve year NEAD project illustrating this point. In light of these difficulties, it is highly unlikely that researchers will identify the primary environmental influences on differential development anytime soon. The scientific endeavor will proceed incrementally, adding slowly to our knowledge of differential development at the various stages of childhood.

But the fact that the whole picture has not been developed, and is currently only a fuzzy vision labeled "nonshared environment," should not prevent legal scholars from beginning to use what we know and from preparing to address future findings. As stated above, what we do know is that the nonshared environment is the primary influence on differential development once a certain minimal level of care has been provided. This finding raises the question of whether the laws related to child wellbeing are focused on relevant considerations. The best interests of the child decision rule which is used by judges in resolving divorce custody disputes between two fit parents provides a specific context in which to raise this question. This raises the further question of whether a rational child-focused rule of decision in this specific area is plausible in light of the uncertainty surrounding the factors that influence differential development. The remainder of this article uses the knowledge from behavioral genetic studies to address these two specific questions.

---

69. Plomin, Asbury & Dunn, *supra* note 26, at 229, 231.

70. REISS ET AL., *supra* note 5, at 7; *see also* Plomin, Asbury & Dunn, *supra* note 26, at 231.

IV. AN EXAMINATION OF THE BEST INTERESTS OF THE CHILD DECISION RULE

Before examining factors included in a state's actual best interests of the child decision rule, it is useful to illustrate the process of critique this article employs in examining such factors. Such an illustration makes the logic of critique clear.

Take for example, a best interest of the child decision rule that seeks to assure optimal developmental outcomes by including the number of books in the home as an important factor in awarding custody between two fit parents. If an adolescent child's father has an extensive, age-appropriate library and actively encourages reading, he will "win" on this factor when compared to the child's mother who merely maintains two adult news magazines in her home. The father will have significantly enhanced his chances of obtaining custody by maintaining the extensive library.

The findings from behavioral genetic studies would call such a factor into serious question. The number of books in the home is a classic component of the shared environment. All children in the family are likely to share this environmental condition. But shared environmental conditions do not affect differential adolescent development to a significant degree. The inclusion of the books-in-the-home factor thus appears misguided because it is largely irrelevant to the goals of the decision rule.

This same critique could be made for other classic shared environmental factors such as parental choice of residential neighborhood and parental socioeconomic status. These factors are not relevant to the goal of securing optimal child developmental outcomes. They may be relevant to other goals such as maximizing current child happiness or determining parental interests, but their inclusion in the decision rule must be justified on grounds other than securing optimal developmental outcomes.

The examination of factors included in an actual best interests of the child decision rule does not yield as clear a picture as the illustrations above. This is because the actual factors are not as clearly focused on shared environmental factors. But an examination of these factors and how the courts have applied them does indicate a focus on shared environmental factors, and thus, allows for a critique similar to that used in the illustrations.

The definition and application of the best interests of the child decision rule in Michigan reflects the approach taken in many

states.[71] The decision standard has been defined by the Michigan legislature. The applicable statute begins by stating, "As used in this act, 'best interests of the child' means the sum total of the following factors to be considered, evaluated, and determined by the court."[72] The statute then lists eleven provisions and adds "any other factor considered by the court to be relevant to a particular child custody dispute."[73]

Despite the open-ended catchall provision at the end, the Michigan courts have primarily focused on the eleven provisions delineated by the legislature.[74] An examination of recent court decisions reveals that judges, both at the trial and appellate court levels, have wrestled with applying the eleven provisions to the specific facts presented in the cases before them. The courts appear to score each parent on each provision, with the parent who is favored by such scoring being awarded primary physical custody.

The overarching goal of the best interests of the child decision rule is for a judge to choose the best caretaking environment (usually between those offered by two fit parents) that will allow for the

---

71. *See* Carl E. Schneider, *Discretion, Rules, and Law: Child Custody and the UMDA's Best-Interest Standard*, 89 MICH. L. REV. 2215 (1991); David J. Herring, *Rearranging the Family: Diversity, Pluralism, Social Tolerance and Child Custody Disputes*, 5 S. CAL. INTERDISC. L.J. 205 (1997).

72. Mich. Comp. Laws Ann. § 722.23(3) (West 2002). The eleven provisions are: (a) The love, affection, and other emotional ties existing between the parties involved and the child; (b) The capacity and disposition of the parties involved to give the child love, affection, and guidance and to continue the education and raising of the child in his or her religion or creed, if any; (c) The capacity and disposition of the parties involved to provide the child with food, clothing, medical care or other remedial care recognized and permitted under the laws of this state in place of medical care, and other material needs; (d) The length of time the child has lived in a stable, satisfactory environment and the desirability of maintaining continuity; (e) The permanence, as a family unit, of the existing or proposed custodial home or homes; (f) The moral fitness of the parties involved; (g) The mental and physical health of the parties involved; (h) The home, school, and community record of the child; (i) The reasonable preference of the child, if the court considers the child to be of sufficient age to express preference; (j) The willingness and ability of each of the parties to facilitate and encourage a close and continuing parent-child relationship between the child and the other parent or the child and the parents; (k) Domestic violence, regardless of whether the violence was directed against, or witnessed by the child; and (l) Any other factor considered by the court to be relevant to a particular child custody dispute.

73. *Id.*

74. *See, e.g.*, Ireland v. Smith, 547 N.W.2d 686 (Mich. 1996); MacBeth v. MacBeth-Scarlett, No. 226912, 2000 WL 33389853, at *2–*4 (Mich. Ct. App. Dec. 26, 2000); Hilliard v. Schmidt, 586 N.W.2d 263, 266–68 (Mich. Ct. App. 1998), *overruled by* Molloy v. Molloy, 637 N.W.2d 803, 804 (Mich. Ct. App. 2001), *aff'd in part and vacated in part*, 643 N.W.2d. 574 (Mich. 2002); McCain v. McCain, 580 N.W.2d 485, 487–88 (Mich. Ct. App. 1998); Harper v. Harper, 502 N.W.2d 731, 733–36 (Mich. Ct. App. 1993); Bowers v. Bowers, 497 N.W.2d 602, 606–08 (Mich. Ct. App. 1993).

best chance of healthy development and positive adult outcomes.[75] With this long-term developmental goal in mind, it is important to assess whether the factors identified as relevant by the legislature truly matter in terms of child developmental processes and outcomes. The information from behavioral genetic studies allows us to make such an assessment of each provision.

Nine of the eleven provisions enunciated by the Michigan legislature relate primarily to shared environmental factors. Provision (c) stands somewhat apart among these nine in that it appears to focus on securing a minimally adequate caretaking environment for children affected by a custody dispute. This provision requires the court to assess "the capacity and disposition of the parties involved to provide the child with food, clothing, medical care . . ., and other material needs."[76] This provision appears to require the courts to determine whether each party can provide a minimal baseline of care for the child.

This is an important determination even though it is primarily a measure of shared environmental factors. (Each child in the party's custody would likely have similar experiences in terms of the level of food, clothing, medical care and material provisions.) This provision focuses the judge's attention on whether the family environment is minimally adequate. Because behavioral genetic studies have only examined shared family environments that are at or above a minimally acceptable level of care,[77] these studies have not called into question the importance of determining whether a proposed family environment is minimally adequate. In fact, researchers have expressly noted that family environments that fall below a minimally adequate level because of abuse or neglect are not part of their studies or their findings concerning the relatively insignificant impact of shared environmental factors.[78] Thus, it seems appropriate for judges to assess the capacity of each party seeking custody to establish a minimally adequate family environment.

The other eight provisions within the Michigan law that focus on shared environmental factors address family conditions that

---

75. *See* Wilson v. Upell, 325 N.W.2d 611, 613–14 (Mich. Ct. App. 1982); Robert H. Mnookin, *Child-Custody Adjudication: Judicial Functions in the Face of Indeterminancy*, LAW & CONTEMP. PROBS., Summer 1975, at 226, 251, 257, 260–61.

76. Mich. Comp. Laws Ann. § 722.23(3)(c) (West 2002).

77. *See* David C. Rowe, *Are Parents to Blame? A Look at the Antisocial Personalities*, 8 PSYCHOL. INQUIRY 251, 254 (1997); *see also* Robert Plomin, *Two Views About the Nurture Assumption: Parents and Personality*, 44 CONTEMP. PSYCHOL. APA REV. BOOKS 269, 270 (1999).

78. *See* Plomin, Asbury & Dunn, *supra* note 26, at 226; Rowe, *supra* note 77; Plomin, *supra* note 77.

mostly extend beyond a determination of basic, minimally adequate fitness. For example, provision (f) directs the court to assess the "moral fitness" of the parties involved.[79] The moral fitness of the custodial parent will primarily contribute to the construction of environmental circumstances that will be shared by any child within the family. Although a certain degree of moral fitness may be required in order to assure minimally adequate caretaking, trial courts have applied this factor to assess relative moral fitness on matters that do not relate to the establishment of minimally adequate conditions for child development.[80]

Provisions (g) and (k) are similar to factor (f). These provisions direct the courts to consider the "mental and physical health" of the parties involved and the "domestic violence" history for each party.[81] As with (f), these provisions go primarily to the construction of a certain type of shared environment and trial courts have applied them to examine conditions unrelated to securing only a minimally adequate environment.[82] Courts use these provisions primarily to compare the parties' capacity to structure a desirable shared family environment and to award custody to the parent deemed "best."

Provisions (d) and (e) direct the court to assess the stability and permanence of the proposed custodial homes.[83] The degree of stability offered by each parent relates to environmental circumstances shared by children within the family unit. For the most part, children placed with a particular parent will experience a similar degree of stability and permanence.

In addition, provisions (a), (b), and (j) direct the judge to assess the love and affection provided by each parent, the educational choices and religious training provided by each parent, and each parent's support for visitation with the other parent.[84] Again, each child within the proposed family unit will experience these provisions mostly in the same way. The parent is likely to provide each child with a similar degree of love and affection, to make similar educational and religious choices for each child, and to support a

79. Mich. Comp. Laws Ann. § 722.23(3)(f) (West 2002).

80. *See* Fletcher v. Fletcher, 526 N.W.2d 889, 895–96 (Mich. 1994); *Hilliard*, 586 N.W.2d 263, 267; *Wilson*, 325 N.W.2d at 613; *but see Bowers*, 497 N.W.2d 602, 607–08 (holding that the trial court completely failed to assess relative moral fitness of the parents).

81. Mich. Comp. Laws Ann. § 722.23(3)(g), (k) (West 2002).

82. *See Bowers*, 497 N.W.2d at 608; *Wilson*, 325 N.W.2d at 613; *but see Hilliard*, 586 N.W.2d at 267–68 (holding that trial court properly considered the mental and physical health of the parties and the domestic violence history for each party); *Harper*, 502 N.W.2d 731, 735–36.

83. Mich. Comp. Laws Ann. § 722.23(3)(d), (e) (West 2002).

84. Mich. Comp. Laws Ann. § 722.23(3)(a), (b), (j) (West 2002).

similar degree of visitation for each child.[85] In summary, the eight provisions discussed in this paragraph primarily focus the courts on an assessment of shared environmental factors.

Two of the eleven provisions set out by the Michigan legislature have the potential to focus the courts on factors that constitute a child's nonshared environment. Provision (h) calls for the court to assess the "home, school, and community record of the child."[86] With a flexible interpretation of the word "record," this provision could be construed to direct the courts to conduct an assessment of environmental influences outside the family setting that would affect each child in a unique manner. Such influences are important components of the nonshared environment, especially in light of the NEAD study's findings concerning the lack of significant nonshared environmental influences arising within the family.[87]

Unfortunately, in deciding custody disputes, the courts have largely failed to use this provision to examine the nonshared environmental influences that will result from their decisions.[88] Judges use this factor mostly to assess the child's past progress and current status in school. If the child appears to be doing well, the claim of the current custodial parent is enhanced through an implicit assumption that this parent can provide the child with the "best" family setting when compared to the other parent. Thus, the potential this factor presents for a detailed assessment of important nonshared environmental influences is largely unrealized.

Provision (i) directs the courts to consider the "reasonable preference of the child."[89] Listening to a specific child certainly offers a judge an opportunity to explore the unique perceptions and feelings of the subject child. These unique perceptions and feelings may constitute and/or reflect the child's nonshared environment. However, this process is extremely limited as a tool for assessing nonshared environmental factors. The NEAD project's findings indicate that a child's differential or unique perception of shared events within the family does not constitute a significant environmental influence on differential development.[90] Judges,

---

85. *See* Rowe, *supra* note 18, at 4.

86. Mich. Comp. Laws Ann. § 722.23(3)(h) (West 2002).

87. *See* REISS ET AL., *supra* note 5, at 409.

88. *See, e.g.*, *MacBeth*, No. 226192, 2000 WL 33389853, at *3; *McCain*, 580 N.W.2d 485, 488; DeRush v. DeRush, 554 N.W.2d 322, 323 (Mich. Ct. App. 1996); *Harper*, 502 N.W.2d 731, 736.

89. Mich. Comp. Laws Ann. § 722.23(3)(i) (West 2002).

90. See REISS ET AL., *supra* note 5, at 417–26; Plomin, Asbury & Dunn, *supra* note 26, at 231.

unfortunately, tend to focus their examination of children on aspects of the shared environment within the family context.[91]

Examination of the Michigan provisions that are relevant to a determination of a child's best interests indicates that the focus is primarily on shared environmental influences. This focus is likely the result of the common assumption that parental nurture is a primary source of a child's differential developmental outcomes.[92] But behavioral genetic studies challenge this assumption in the strongest terms. Parental nurture largely goes into constructing a child's shared environment, and the studies indicate that the shared environment has a minimal influence on differential child developmental outcomes.[93] This is especially true for the period from earlier to later adolescence as examined in the NEAD study.[94]

It necessarily follows that these studies call into question the common approach to assessing the best interests of an adolescent child. Beyond the assurance of a minimally adequate family environment, the shared environment created through parental nurture does not affect adolescent development to a significant degree. The primary influences on differential development occur in the nonshared environment—an environment that exists largely outside the general nurturing environment provided by parents to all children within the family. The courts' current approach to applying the best interests of the child standard is largely misdirected in cases involving two fit parents, each of whom can provide their adolescent children with a minimally adequate family environment, because it primarily focuses on factors that constitute a child's shared environment.

This misdirected effort may open the door to the expression and exercise of judicial bias. Judges, like many individuals, often have a preconceived notion of an appropriate or "best" shared family environment. As has been noted by numerous critics of the best interests of the child standard, these individual judicial biases render the standard indeterminate and unfair.[95] The findings from behavioral genetic studies add another basis for criticizing this decision rule. Not only are judicial assumptions and biases given free reign under the best interests of the child standard, but these assumptions and biases arise out of largely irrelevant considerations related to a child's shared environment.

---

91. *See, e.g.*, *Hilliard*, 586 N.W.2d 263; *Bowers*, 497 N.W.2d 602, 607–08.

92. *See* HARRIS, *supra* note 1.

93. *See* Plomin, Asbury & Dunn, *supra* note 26, at 225.

94. *See* REISS ET AL., *supra* note 5, at 307.

95. *See* Mnookin, *supra* note 75; Schneider, *supra* note 71, at 2216; Herring, *supra* note 71, at 223.

Although the data from behavioral genetic studies indicate that, as currently applied, the best interests of the child standard is largely misguided, these same data do not identify the appropriate inquiries for a determination of a child's best interests. The factors that cause differential development during the adolescent period remain shrouded. The NEAD project researchers identified some general components of the nonshared environment that appear to affect differential development, but they also admitted that they had failed to identify specific elements of the nonshared environment that cause differential outcomes.[96] Thus, the behavioral genetic research completed to date does not provide a basis for specifying the environmental conditions relevant to a determination of a child's best interests.

What the data do reveal is that uncertainty reigns in the area of child development. Thus, behavioral genetic studies to date verify and reinforce Robert Mnookin's perceptive insights into the best interests standard. In his classic article in 1975, Professor Mnookin described the problems confronted by judges applying the best interests standard.[97] Using decision theory concepts, he explained three requirements for a rule of decision to function effectively. First, the decisionmaker needs a great deal of information so that she can identify and specify possible outcomes. In the context of a child custody decision,

> the judge would require information about how each parent had behaved in the past, how this behavior had affected the child, and the child's present condition. Then the judge would need to predict the future behavior and circumstances of each parent if the child were to remain with that parent and to gauge the effects of this behavior and these circumstances on the child. He would also have to consider the behavior of each parent if the child were to live with the other parent and how this might affect the child. If a custody award to one parent would require removing the child from his present circumstances, school, friends, and familiar surrounding, the judge would necessarily wish to predict the effects these changes would have on the child.[98]

---

96. *See* REISS ET AL., *supra* note 5, at 417–26; Plomin, Asbury & Dunn, *supra* note 26, at 231.

97. Mnookin, *supra* note 75.

98. *Id.* at 257.

Professor Mnookin questioned the capacity of any judge to ascertain the necessary information.

The rational decisionmaker would need not only a great deal of information, but also the capacity to assess the probability of alternative outcomes engendered in a specific decision. Only in this way could the decisionmaker calculate the predicted value of a specific decision and rationally compare all possible decisions.

> [E]ven where a judge has substantial information about the child's past home life and the present alternatives, present-day knowledge about human behavior provides no basis for the kind of individualized predictions required by the best-interests standard. There are numerous competing theories of human behavior, based on radically different conceptions of the nature of man, and no consensus exists that any one is correct. No theory at all is considered widely capable of generating reliable predictions about the psychological and behavioral consequences of alternative dispositions for a particular child.[99]

The difficulty of calculating predicted values for the range of decisions possible in a specific child custody case is formidable.

Even if the judge could gather sufficient information to generate accurate predictions and could competently assess the probabilities for each predicted outcome in order to assign predicted values to each possible decision, the judge would also need a set of values to apply in determining a child's best interests. Professor Mnookin articulated the difficult questions raised by this requirement for rational decisionmaking. For example, should the judge focus on the child's happiness, the child's spiritual training, or the child's ultimate economic productivity? Noting that these questions could be elaborated endlessly, Mnookin stated:

> And yet, where is the judge to look for the set of values that should inform the choice of what is best for the child? Normally, the custody statutes do not themselves give content or relative weights to the pertinent values. And if the judge looks to society at large, he finds neither a clear consensus as to the best child rearing strategies nor an appropriate hierarchy of ultimate values.[100]

---

99. *Id.* at 258.
100. *Id.* at 260–61.

Mnookin concluded that "[d]eciding what is best for a child poses a question no less ultimate than the purposes and values of life itself."[101] The hope that a judge would be able to answer this ultimate question is quite unrealistic. In addition, calling on a state actor such as a judge to answer this ultimate question is very troubling within a large pluralistic democratic society.[102]

The findings from behavioral genetic studies are especially pertinent to the first two requirements of rational decisionmaking articulated by Professor Mnookin. As noted above, these findings reveal that uncertainty reigns in the area of child development. This uncertainty is so fundamental that we do not even know what information to gather for a rational decision in this area. What we know is that the nonshared environment is the primary influence on a child's development, especially during the period from earlier to later adolescence. However, we do not know what specific aspects of the nonshared environment impact child development or how nonshared environmental factors affect development.

The results of the NEAD project indicate that the nonshared environmental factors that significantly impact differential development do not arise within the family association. Plomin speculates that the relevant factors may arise within peer groups, from interactions with adults outside the family setting, or from chance events that affect the individual child in a unique manner.[103] The latter possibility is the null hypothesis, but it stands as a very real possibility that must be kept in mind as research proceeds. Plomin notes that two findings from behavioral genetic research point to the importance of chance:

> We also need to consider the gloomy prospect that chance contributes to nonshared environment in terms of random noise, idiosyncratic experiences, or the subtle interplay of a concatenation of events .... Our view, nonetheless, is that chance is the null hypothesis, although measures of life events can assess some of its aspects. Systematic sources of nonshared environment need to be thoroughly examined before we dismiss it as chance. Chance might only be a label for our current inability to identify the processes by which children—even pairs of

101. *Id.* at 260.

102. *See* Herring, *supra* note 71 (critiquing the best interests of the child standard and assessing alternative decision standards in light of the political functions of the family in American society).

103. *See* Plomin, Asbury & Dunn, *supra* note 26, at 229, 231.

identical twins—growing up in the same family come to be so different.[104]

Despite Plomin's hope for future research findings, continued failure to identify specific nonshared environmental factors that influence differential development will lead to a conclusion that differential development results primarily from simple chance events or fortuity.

Whether or not future research identifies important specific nonshared environmental influences other than idiosyncratic, chance events, it is obvious that under the current state of knowledge we cannot make valid predictions concerning a child's future development in alternative settings. Judges are unable to gather the information necessary for a valid custody decision for an adolescent child because no one knows what information is relevant. Do they need information that allows them to compare a child's peer relationships within competing custody arrangements? Do they need information on the different school settings? And if they need such information, what specific aspects of peer relationships or school settings impact differential development?

We do not have answers for any of these questions, and thus, a decisionmaker cannot gather relevant information, rationally predict alternative outcomes, assign probabilities to each alternative outcome, or compute predicted values for possible custody arrangements. Therefore, even if we could agree on a set of values to apply in assessing predicted outcomes (Mnookin's third element for rational decisionmaking), we would still be unable to make rational decisions under the best interests of the child standard. Just as Professor Mnookin set out in his article in the mid-1970's, inherent uncertainty reigns in this area.[105] The findings of behavioral genetic studies make this bottom line point even more forcefully.

The other conclusion behavioral genetic studies allow us to reach is that our current belief in the overriding importance of parental influence and the family environment is in error. The NEAD study found that the shared family environment constructed by parents is largely irrelevant to differential development during adolescence.[106] In addition, the findings from earlier studies indicate that the shared environment may be just as irrelevant for younger children.[107] Thus, once a parent establishes that he or she

104. *Id.* at 231–32.
105. *See* Mnookin, *supra* note 75, at 255–61.
106. *See* REISS ET AL., *supra* note 5, at 239.
107. *See id.*; Plomin & Daniels, *supra* note 3.

will provide the child a minimally adequate family environment, a judge contemplating a custody decision would be wise to focus on factors that constitute the child's nonshared environment. These factors are where the action is in terms of differential or distinctive individual development.

In the end, the behavioral genetic studies point to the need for additional genetically sensitive studies. At a minimum, this means that child development researchers should conduct studies that examine more than one child within each family. Only in this way will we be able to identify and understand the specific components of the nonshared environment that contribute to differential development.[108] Such knowledge may someday allow judges to utilize a rational decisionmaking approach in applying the best interests of the child standard. Judges may then be able to gather the necessary information, accurately delineate possible outcomes, assign probabilities to each possible outcome, and calculate a predicted value for each possible custody decision.

Additional studies could be very helpful in answering several extremely pertinent questions even before a rational decisionmaking approach would be fully viable. For example, new studies may help to define what conditions are necessary to establish a minimally adequate family environment below which legal decisionmakers should be concerned with more than the environmental factors that contribute to differential development. Childhood maltreatment at some significant level would likely affect a child even if the maltreatment were a facet of a child's shared environment.[109] By conducting genetically sensitive studies that include children in abusive and neglectful family environments and children in nonabusive, non-neglectful family environments, behavioral geneticists may be able to define the conditions necessary for a minimally adequate shared environment and for minimally adequate parenting. Such definition would be extremely helpful to legal decisionmakers in child dependency matters, and legal scholars should follow the development of knowledge in this area closely, applying new findings to inform and alter legislative and judicial decisionmaking.

If they do not conclude that chance events are the primary influences on differential development, additional studies could also identify specific environmental factors that do matter to differential development once a minimal floor of care exists. Even before a

108. *See* Plomin, Asbury & Dunn, *supra* note 26, at 231.

109. *See id.*; Rowe, *supra* note 77; Plomin, *supra* note 77.

rational decisionmaking approach is fully viable, such knowledge may be helpful to legal decisionmakers. For example, if future studies indicate that peer relationships influence differential developmental to a non-trivial degree, then judges may want to examine the different peer groups the specific child will be exposed to while in the custody of a particular parent. Such an examination would be more useful than examining the degree of love and affection that will be provided by the particular parent to all children in his or her care. Again, legal scholars should call for these types of additional studies and should pay attention to the findings generated within the scientific community.

Until additional studies are undertaken and completed, judicial decisionmakers must do the best they can. With the current state of our knowledge, this probably means two things. First, judges should focus on determining that each parent involved in a particular custody dispute has the capacity to provide affected children with a minimally adequate family environment. Although we do not know with great precision what constitutes a minimally adequate family environment, we do have studies that indicate the negative effects of a seriously abusive or neglectful family environment.[110] These effects are likely to arise, at least in part, independently from genetic factors and as a result of shared environmental factors. Thus, examining shared environmental factors as they relate to minimal adequacy would appear to be feasible and worth a decisionmaker's time and effort.

Once a judge determines that each parent can provide a minimally adequate environment of care, the judge should realize that she does not have the capacity to make a rational custody decision pursuant to the best interests of the child standard. She does not have the capacity to determine which household will be "best" for the affected children even if she has a clear set of social values defining what would constitute optimal child outcomes.

This means that the judge should invoke an alternative rule of decision—one that may be more realistic in terms of our current knowledge of differential child development within a minimally adequate family setting (e.g., flip of a coin, approximate past family settings).[111] It also means that the stakes are lower in terms of child outcomes. Because so much is uncertain, and rational decisionmaking is impossible, a judge cannot be deemed to have made a horrible mistake in awarding custody to one fit parent over another. In addition, these conditions for decisionmaking mean that

110. *See* REISS ET AL., *supra* note 5, at 161; Rowe, *supra* note 77.

111. *See* Herring, *supra* note 71.

the door is open for us to consider goals other than those related to ultimate child developmental outcomes (e.g. securing current child happiness, defining and securing parental interests).[112]

The current lack of knowledge concerning child development affords us another important luxury. It allows us to contemplate how we should proceed once we gain the knowledge necessary to meet Professor Mnookin's first two conditions for rational decisionmaking in the custody area. For example, we could decide to use our developing scientific knowledge to vigorously pursue the best outcomes for children involved in custody disputes. We could work to structure their non-shared environments in a way that we would know would lead to certain types of positive outcomes.

However, we may want to forsake the path of trying to predict ultimate child outcomes. Other social and political goals may lead us to embrace uncertainty in this area. In a large pluralistic democracy there may be a great deal to be said for randomness in terms of child or citizen outcomes.[113] As we come to realize that findings from behavioral genetics studies have destroyed our assumptions concerning our current capacity to determine and secure a child's best interests through decisions in child custody disputes, we should consider whether we want to pursue this goal beyond providing at least a minimally adequate family environment as our knowledge develops.

CONCLUSION

Although this article fails to give guidance in the construction of an appropriate decision rule in child custody disputes, it brings important scientific information to bear on our current practices and calls these practices into question. In doing so, this article provides a starting point for an incremental approach to relating future behavioral genetic research findings to this area of law. In addition, this article encourages us to take advantage of the opportunity provided by our current state of recognized ignorance and uncertainty—an opportunity to carefully and thoughtfully identify our goals in this area of decisionmaking. Legal scholarship needs to address both inquiries simultaneously, with constant

112. *See* Plomin, *supra* note 77.
113. *See* Herring, *supra* note 71.

dialogue and interaction between those engaged in the two scholarly endeavors.