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Behavioral Genetics in Criminal and Civil Courts

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Abstract

Although emerging findings in psychiatric and behavioral genetics create hope for improved prevention, diagnosis, and treatment of disorders, the introduction of such data as evidence in criminal and civil proceedings raises a host of ethical, legal, and social issues. Should behavioral and psychiatric genetic data be admissible in judicial proceedings? If so, what are the various means for obtaining such evidence, and for what purposes should its admission be sought and permitted? How could—and should—such evidence impact judicial outcomes in criminal and civil proceedings? And what are the potential implications of the use of behavioral and psychiatric genetic evidence for individuals and communities, and for societal values of equality and justice? This article provides an overview of the historical and current developments in behavioral genetics. We then explore the extent to which behavioral genetic evidence has—and should—impact determinations of criminal responsibility and sentencing, as well as the possible ramifications of the introduction of such evidence in civil courts, focusing on tort litigation and child custody disputes. We also consider two ways in which behavioral genetic evidence may come to court in the future—genetic theft and subpoena of a litigant's biospecimen data that was previously obtained for clinical or research purposes—and the concerns that these possibilities raise. Finally, we highlight the need for caution and for approaches to prevent the misuse of behavioral genetic evidence in courts.

Keywords

behavioral genetic evidence; criminal responsibility and punishment; compulsory genetic testing; stigma; genetic privacy and confidentiality

Introduction

Consider the following four scenarios: 1) a convicted murderer requests that his punishment be mitigated on the grounds of his mental illness and deprived childhood; 2) a defendant in a

tort suit asks the court to order the plaintiff to undergo psychiatric examination to determine the mental harm caused by the defendant's alleged negligence; 3) a mother challenges a judicial decision to terminate her parental rights on the grounds that neither her child's needs nor the prospective parents' capability to meet her child's needs was properly assessed; and 4) a blood sample of a newborn is collected as part of the state's health program to identify congenital and genetic conditions, after which it is sent to storage at a biobank for future research.

At first glance, these cases seem to have little in common with one another, outside of their general association with law and policy. However, emerging knowledge in behavioral genetics (we use the term to include psychiatric genetics) may soon provide another shared aspect among such scenarios. As litigants in court proceedings request admission of evidence to support their claims, the introduction of genetic data¹ may be especially tempting: because genetics is "hard" science, it may have particular persuasive power.¹ Concurrently, efforts to identify and prevent health risks and conditions through genetic testing are expanding. In addition to the ever more prevalent screenings of fetuses, newborns, women planning pregnancies, and at-risk families for specific, well-established single-gene conditions, arguments are now being made for sequencing the genomes of all newborns at birth,² of many patients undergoing clinical diagnosis, and of individuals from the general population who may unknowingly carry genetic predispositions to certain diseases.^{3,4} Moreover, national biobanks are being created that collect medical, genetic, and other lifestyle information from participants, including most recently, the Precision Medicine Initiative (PMI) in the United States (now called the All of Us Research Program). Hence, genetic information that may reveal predispositions to behavioral and psychiatric conditions—which may become genetic evidence in court—is increasingly available.

These possibilities raise an array of questions: should behavioral genetic data be admissible in judicial proceedings? If so, what are the various means for obtaining behavioral genetic evidence, and for what purposes should its admission be sought and permitted? How could—and should—such evidence impact judicial outcomes in criminal and civil proceedings? And what are the plausible implications of such uses of behavioral genetic data for individuals and communities, and for societal values of equality and justice?

As research into behavioral genetics continues to advance, physicians, policy-makers, and the legal system will be required to consider these questions. Practices that may be useful for research and medical care (e.g., incorporation of genetic results in the medical records of patients and research subjects) may have unintentional negative consequences for litigants, and thus need to be re-evaluated (see below, *The Future of Behavioral Genetic Evidence in Court*). In addition, forensic experts and other mental health professionals will likely have a critical role in the presentation of behavioral genetic evidence in court. Studies indicate that experts' testimony regarding scientific evidence exerts significant sway on jurors' and judges' decisions, and that even if of low quality, judicial actors may imbue it with undeserved credibility.⁵ Thus, forensic scientists and mental health professionals who will

¹In this article, we use the terms "genetic data" and "genetic information" interchangeably to denote data gathered from genetic testing and family history, and "genetic evidence" to refer to genetic data introduced into judicial proceedings.

be called to testify in court will have an added duty to ensure the accuracy of their testimony and an important responsibility in contributing to the administration of justice.

In this essay, we explore the issues that arise from the possible use of genetic evidence in court, bearing in mind that behavioral genetic knowledge is a “moving target.” Notwithstanding the scientific and methodological complexities involved in behavioral genetics research⁶, efforts to understand the nature and origins of human behavior are ongoing, and relevant findings are likely to emerge with the increasingly routine use of next-generation sequencing technologies (such as whole genome and whole exome sequencing) in clinical and research settings. After laying out a brief framework for discussion, we consider the legal landscape relating to the use of behavioral genetic evidence in two broad contexts: criminal cases and civil proceedings. We then discuss various situations in which behavioral genetic evidence may come to court in the future, and finally, we draw some conclusions. The laws and policies governing these contexts—and the types of genetic evidence that may be introduced in them—vary significantly, and preclude an exhaustive discussion of the potentially relevant genetic variants and the legal rules governing their admissibility. However, this exploration allows us to highlight the most pertinent ethical, legal, and social issues that arise, and the need for regulating the acquisition, introduction and use of behavioral genetic evidence in these various legal contexts.

Framework for Discussion: Behavioral Genetics and the Law

The biogenetic study of human behavior is an old one. It is grounded in the belief that almost all personality traits have a genetic basis and that behavioral disorders, including psychiatric ones, “run in families.” Notoriously, this assumption played a key role in eugenicist theories and their implementation under the Third Reich and elsewhere throughout much of the twentieth century. Despite the horrific ends to which such beliefs have been put, the underlying idea of the heritability of behavior is supported by an extensive body of research, encompassing family, twin, and adoption studies. Most behavioral traits are highly heritable, with genetics accounting for 30–50% of the variance in transmission of personality traits, and from 30% to over 70% percent of the variance in psychiatric conditions.⁷ And, although the identification to date of specific biomarkers for behavioral traits has been limited, rapid progress in powerful data analytic and genomic sequencing technologies, and continuing interest in research into the genetic origins of behavior, have raised expectations for substantial advances.

Against this backdrop, a few observations about behavioral genetics inform the discussion in this article. First, behavioral traits are genetically complex, typically influenced by multiple genes, with each gene having only a small influence on a given behavior. Additionally, although the increasing use of whole genome and exome sequencing may help identify copy number variants and other rare variants associated with behavioral traits, relevant research with actionable findings is still only in its infancy. Second, there is perhaps no better scientific field than behavioral genetics to demonstrate the faultiness of the old nature-nurture debate. Indeed, as extensive research has shown, it is not genetics or environment that determines behavior but a life-long interaction between the two.⁸ Concurrently, however, because complex behaviors are not caused by linear, additive sets of causes, it may

be very difficult—some suggest impossible—to specify which environmental factors impact behavioral outcomes and to what extent.⁶

A third observation about behavioral genetics is that most research to date has centered on pathological behaviors, such as aggression, antisocial behavior, and psychiatric conditions (e.g., schizophrenia, bipolar disorder, autism, attention deficit hyperactivity disorder). This focus resonates with the notion that genetic research, as a scientific and medical endeavor, is aimed at developing better diagnosis, treatment, and prevention options. It is important to acknowledge, however, that the line between normal behavioral variation and pathological conditions is often ambiguous and may be dependent on culture and context.⁹ Furthermore, emerging findings about the genetics of positive behavioral traits, such as altruism¹⁰ and empathy,¹¹ may also become relevant to legal proceedings in the near future. Thus, consideration of policies regarding the use of genetic information, including evidentiary rules in civil and criminal proceedings, should take these issues into account.

In spite of the limitations of current genetic research, there is no doubt that genetic data is increasingly being introduced in judicial settings.^{12–21} This trend may have been heightened by the U.S. Supreme Court's *Daubert v. Merrell Dow Pharmaceuticals* (1993)²² decision, which reformed the rules of admissibility of scientific evidence in federal court. Unlike the previously prevailing *Frye* test that required scientific evidence to be sufficiently established to have gained “general acceptance” in the relevant scientific community,²³ the *Daubert* decision only required that the evidence be “relevant to the task at hand” and rest “on a reliable foundation.” Importantly, the *Daubert* decision also empowered judges to determine the validity and admissibility of scientific evidence in court as well as to exclude relevant evidence (including expert testimony) that is prejudicial, confusing and misleading for the jury.^{24,25} Thus, this decision—which was later incorporated in the Federal Rules of Evidence²⁶ and endorsed by most states in the U.S.—not only provided a more flexible standard of admissibility but also substantially strengthened the role of judges as gatekeepers of the scientific evidence in judicial proceedings.

The growing interest in behavioral genetic evidence in judicial proceedings, however, may also reflect a cultural shift. With the increased geneticization of everyday life—that is, the causal attribution to genetics of behaviors such as infidelity,²⁷ political views,²⁸ and coffee preferences²⁹—it may not be surprising that judges are receptive to genetic data³⁰ and that members of the general public may find such evidence to be particularly appealing.³¹ Thus, it seems likely that behavioral genetic information will continue to be introduced in criminal and civil adjudicatory contexts. Nonetheless, the use—and possible misuse—of behavioral genetics in law and policy raises a host of ethical, legal, and social dilemmas that legal and medical professionals should consider.

Behavioral Genetics in Criminal Court

The possible use of behavioral genetic evidence in criminal court has received a great deal of attention in the past several decades. Here, we provide a brief history of the scientific landscape and role of behavioral genetics in criminal proceedings, followed by exploration

of the scholarly discussion that ensued, including empirical work on the impact of such evidence on criminal law, including determinations of responsibility and punishment.

Brief History

Contemporary use of behavioral genetics is not the first instance in which biological evidence has been introduced to explain criminal behavior. In the late 19th and early 20th centuries, claims were made (and later discredited) about the identification of criminals by their phenotypic characteristics, such as body type, strong jaws, heavy brows, and thick lips.³² In the 1960s and early 1970s, genetic researchers suggested an association between men who carry an additional Y chromosome (“XYY syndrome”) and criminal behaviors. Although some studies in correctional settings found a disproportionate number of male inmates with XYY karyotypes, later studies could not establish that such men were more aggressive, though they exhibited other distinctive traits such as being taller, less intelligent, more hyperactive, and more impulsive.^{33,34} In any case, efforts by defendants to use such evidence to avoid criminal responsibility were unsuccessful.^{32,33}

But the findings on behavioral genetics and violence of the past 10 to 15 years are arguably different. Unlike previous genetic claims that lacked the specificity required in criminal proceedings and heritability estimates that only provided information about the amount of variance that can be explained by genetic influences, more recent studies have aimed to identify specific genes that may be linked to aggression and antisocial behavior. And, although replicating results has been challenging, the findings have been indicative of the possibilities of ongoing behavioral genetics research. Studies have found, for example, that an interaction between genes coding for the dopamine D2 and D4 receptors is associated with the development of conduct disorders and adult antisocial behavior in males.³⁵ Other studies have suggested that allelic variation in the genes for the dopamine D2 receptor and DAT1 transporter contribute to violent delinquency,³⁶ and that variants in the GABRA2 gene are associated with a risk for addiction.³⁷ Still other research reported an association between psychopathic traits and the short alleles of the serotonin transporter (5HTT), as well as the Met158 variant of catechol-O-methyl transferase (COMT), an enzyme that degrades catecholamines such as dopamine.^{38–40} Recent research has also suggested an association between a mutation in the progranulin (PGRN) gene and pedophilia.⁴¹

However, studies of the monoamine oxidase-A (MAOA) gene, which codes for a mitochondrial enzyme that degrades neurotransmitters, have been the most promising in establishing a possible association between genetics and antisocial behavior. A study by Brunner et al. in 1993 provided the first affirmation. The study identified a Dutch kindred in which many of the men exhibited borderline intellectual disability and a tendency toward impulsive criminal behavior; the men with these characteristics were found to have a mutation causing an absence of MAOA activity.⁴² Although the particularity of this study—no other probands with this mutation have been identified—limited the impact of the findings, the study paved the way for additional research exploring the association between MAOA and pathological behavior.

Leading in this effort was a study by Caspi et al. of an epidemiologic cohort in New Zealand, which reported an interaction between childhood maltreatment and low-producing

alleles of the MAOA gene that was associated with later antisocial behavior,⁴³ With some exceptions,^{44–48} these findings have been replicated^{49,50} and confirmed in meta-analyses.^{51–53} Subsequent research has further expanded these results. For instance, an emerging body of literature has indicated an interactive effect of MAOA genotype and prenatal adverse environments (e.g., mother's smoking during pregnancy) on aggressive behavior in young adulthood.^{54,55} The research literature also suggests that these individuals' genetic sensitivity to the environment is for better and for worse: they are as likely to benefit disproportionately from supportive environments as to be disadvantaged by adverse ones.^{56–58} And while initial studies on this so-called differential-susceptibility thesis—which has now mostly (but not always⁵⁹) been confirmed^{60,61} by correlational studies,⁶² a few randomized trials,⁶² and a meta-analysis⁶²—have focused primarily on family-based childhood adversity, more recent research demonstrates that adverse childhood environments may also include broader societal settings, such as conditions in schools and neighborhoods.^{63,64}

“My Genes Made Me Do It”? The Legal Debate

These associations between specific genes, adverse childhood environments, and antisocial behavior have evoked interest among legal professionals. Notwithstanding the ongoing challenge of replication, and an emerging concern about the scientific accuracy and overall credibility of these findings,^{65,66} scholars have begun to question how such evidence could—and should—impact criminal law, including determinations of responsibility and punishment. At one extreme, some scholars have insisted that behavioral genetic evidence—at least given the current levels of knowledge—should have no impact on judicial outcomes. As Morse has observed, criminal law uses “folk psychology” to explain human behaviors and mental states, and since “genes do not have mental states and do not commit crimes,” legal presumptions of free will, including the capability to control one's impulses and choose one's conduct would be unaffected.⁶⁷ Other scholars have provided policy-based explanations, highlighting the role of the presumption of free will in reinforcing a desirable social order, regardless of how well it reflects empirical reality.¹⁴ Thus, they have argued, a genetic predisposition to antisocial behavior, even in the presence of relevant environmental factors, cannot and should not negate the legal presumption of human agency.

At the other extreme, several scholars have argued that behavioral genetic evidence undermines concepts of human agency and free will and requires redefinition of crimes and reorganization of the U.S. criminal justice system.^{1,68} These scholars have emphasized that existing notions of justice require that punishment for a crime be proportionate to blameworthiness.⁶⁹ The implication is that individuals who are genetically predisposed to aggression could be held to different standards of accountability, for example, through the expansion of existing defenses, such as the insanity defense.^{1,68} Still other scholars have cautioned that if a defendant were genetically predisposed to aggression, and more likely to become a repeat offender, the need for public protection could justify lengthier—possibly indefinite—detention.^{20,70} Some commentators have warned that such a result may encourage prosecutors to use genetic data as aggravating evidence based on future dangerousness,^{12,41} while others have expressed a concern that behavioral genetic evidence

may increase the stigmatization of racial and ethnic minorities, who are over-represented in the criminal justice system.^{12,34}

The actual introduction of behavioral genetic evidence in courts has further exacerbated the debate. Beginning in 1995, when a convicted murderer was unsuccessful in appealing a trial court decision to deny authorization of payment for a test of his MAOA allele (*Mobley v. State*⁷¹), defense lawyers in the U.S. have sought to admit genetic information in serious criminal cases with increasing frequency.^{12,13} And while in most cases genetic evidence has taken the form of the defendant's family history, individual genetic data has also made its way into the courts. In two widely reported Italian murder cases from 2009 and 2011, the introduction of findings about the defendants' MAOA variants led to lighter sentences after conviction.^{72,73} In another case from Tennessee, a man found guilty of killing his wife's best friend was convicted of manslaughter, instead of first-degree murder, after the defense, through the testimony of a forensic psychiatrist, introduced evidence regarding the defendant's MAOA gene variant and childhood abuse during the guilt phase of the trial (*State v. Waldroup*).⁷⁴ Reports from jurors who served on this case suggest that the genetic evidence played a major role in their decision not to convict Waldroup of murder. As one juror stated, "a diagnosis is a diagnosis, it's there ... a bad gene is a bad gene," while another one reportedly explained that "science helped persuade her that Waldroup was not entirely in control of his actions."⁷⁵ With newspaper headlines declaring "Boys with 'warrior gene' [are] likely to join gangs,"⁷⁶ "Can your genes make you murder"⁷⁵ and "Pity the poor murderer, his genes made him do it,"⁷⁷ it is easy to understand the difficulty that judges and juries may have properly interpreting and weighting genetic evidence. Significantly, this difficulty is only likely to increase. As efforts to improve understanding of behavioral genetics—boosted by the development of powerful data analytic technologies and steep decline of the costs associated with sequencing of the DNA—are ongoing, judicial actors will grapple with more complex and potentially numerous findings that defendants may seek to introduce to negate criminal responsibility.

Rethinking the Genetic Defense and Criminal Responsibility

Notwithstanding these sensational examples and surging concerns, the introduction of behavioral genetic evidence in criminal proceedings has largely failed to impact outcomes. As comprehensive surveys of criminal cases in the U.S. indicate, behavioral genetic evidence has been introduced almost exclusively in death penalty cases, applied predominantly as mitigating evidence at sentencing, and in no instances have judges accepted genetic evidence to exculpate a defendant from legal responsibility.^{12,13} In addition, the impact of such evidence is uncertain, since even when introduced to argue for a reduced sentence, it almost always has been paired with other mitigating factors, including neuropsychological impairment, histories of childhood deprivation and abuse, and diagnoses of severe psychiatric disorders.^{12,13} Moreover, and contrary to speculative concerns, in none of the recent cases have prosecutors attempted to introduce behavioral genetic factors to indicate a defendant's future dangerousness.¹²

Empirical studies using vignettes with experimental manipulation of neurogenetic evidence, including evidence modeled on MAOA, similarly indicate that at most it is likely to have a

modest impact on trial outcomes. However, differences across studies preclude the possibility of drawing definitive conclusions. For instance, studies of judges in the U.S. and Germany found that neurogenetic evidence introduced in cases of aggravated battery reduced perceptions of culpability, although only in the U.S. did it impact sentencing.^{78,79} Yet no such finding emerged from American studies of representative samples of the general public, who were presented with genetic evidence (as well as a combination of genetic and neuroimaging evidence) in hypothetical capital and non-capital cases.^{80,81} This remained true even when respondents were asked to consider a vignette involving a lesser offense (assault with a deadly weapon)⁸² and when neurogenetic findings were introduced along with evidence of an interaction between a genetic propensity and child abuse^{81,82}—a key finding in the literature on genetic predisposition to antisocial behavior and violence.

Although these findings may alleviate concerns that behavioral genetic evidence could allow dangerous criminals “off the hook,” the question of whether it should impact determinations of criminal responsibility and sentencing ultimately rests on views regarding the goals of criminal law. A retributive theory of justice holds that only those who are blameworthy for their conduct deserve to be punished, and that punishment should be proportionate to the severity of the crime. Following this logic, if behavioral genetic evidence were able to negate the presence of free will by establishing an explicit causal link² between genetic dispositions and criminal actions, then the law should take such information into account when determining blameworthiness and punishment.⁸³ Some support for this view may be found in the studies of the general public: participants who were more skeptical about free will were more inclined to treat MAOA evidence as a mitigating factor.^{80,82} Yet this position is at odds with other theories of justice that prioritize deterrence and incapacitation—the need to protect the general public by removing offenders from society—as purposes of criminal law.

Likewise, the use of behavioral genetic evidence may justify a shift from a punishment-based model of criminal justice to a more rehabilitative one. This possibility would coincide with the findings of studies of judges and the public, in which consideration of behavioral genetic evidence for mitigation generated a more medicalized approach to defendants.^{78,82} It would also be in accord with the hopes that growing genomic knowledge could lead to better and more tailored treatment options for individual offenders, which could include the development of rehabilitation programs that individualize behavioral and environmental interventions to defendants’ genetic makeup.⁸⁴ Whether this approach would better serve justice, however, may be open for debate. Aside from the fact that such genetic-based treatments and interventions are not yet available, the concern is that, as the studies of judges and the public have indicated, acceptance of behavioral genetic evidence may increase perceptions of dangerousness^{85–88} and the risk that defendants could be confined for longer periods than they would have been otherwise.⁷⁸

²The term “explicit causal link” is used here in its legal sense, that is, the possibility of explaining the causes of a defendant’s behaviors by the presence of certain genetic variants, rather than its use in behavioral genetics, where it often refers to a statistical correlation between genetic differences and behavioral variation in a population. See Farahany & Coleman (2006).

Behavioral Genetic Evidence in Civil Proceedings

In contrast to criminal law, the use—and potential misuse—of behavioral genetic evidence in civil proceedings has received little scholarly attention. Three main reasons may explain this neglect. First, the purposes of these proceedings are significantly different. Civil cases are typically intended to resolve disputes between individuals regarding their respective legal duties and responsibilities. Crimes, in contrast, are construed as offenses against the state and society as a whole; the aim of the criminal legal proceeding is to punish a blameworthy person for wrongdoing. Thus, the kind of evidence introduced in civil proceedings may not evoke the same level of concern since public order is not at stake. Second, judicial practice in certain civil proceedings, such as child custody disputes, has traditionally grounded the interpretation of key concepts (e.g., child's best interests) in social science research. Thus, to date behavioral genetic evidence has played only a limited role in such civil determinations. Finally, the current level of knowledge of behavioral genetics, especially psychiatric genetics, may limit the usefulness of such evidence in civil cases. Notwithstanding ongoing efforts—with some success—to identify genetic markers associated with psychiatric conditions such as depression, schizophrenia, bipolar disorder, autism, and attention-deficit hyperactivity disorder,^{89–94} replicating findings has been a challenge. Furthermore, because existing genetic tests neither allow for a definitive diagnosis (except in the case of rare genetic syndromes),⁹⁵ nor provide an accurate estimate of when a disorder will occur, its severity, or how it will impact an individual's functioning, behavioral genetic evidence may be too uncertain to have an impact in civil proceedings.

Notwithstanding these limitations, it seems likely that as behavioral genetic data continue to emerge, they inevitably will be introduced in civil proceedings. Here, we consider two specific civil adjudicatory contexts – tort litigation and child custody disputes—to highlight the ethical, legal, and social issues that likely will arise.

Tort litigation

Scientific evidence is a common feature of tort litigation. Because proving causation is key for determination of civil liability, litigants' success often depends upon scientific data and expert testimony on this issue. It is also in this domain of law that the Daubert doctrine regarding admissibility of scientific evidence was formulated.²² In this regard, efforts to introduce genetic evidence about litigants' health status are no different. Indeed, studies indicate that in addition to conventional negligence suits relating to unauthorized disclosure of genetic data,⁹⁶ genetic testing to determine health status and susceptibility to adverse physical outcomes has been introduced in medical malpractice cases¹⁷ and toxic-tort/product-liability litigation to rebut the claim that the defendant's behavior caused the plaintiffs' injuries.^{16–19} It is thus likely only a matter of time before behavioral genetic evidence is introduced in tort litigation as well.

This prospect raises several concerns, including how behavioral genetic data may be obtained and introduced in court. One possibility is that such evidence will be brought to court as part of the litigant's medical records. As psychiatric genetics continues to develop, and to the extent that testing becomes a routine part of clinical care, it is also likely that psychiatric genetic results increasingly will be included in litigants' medical records

(especially electronic ones). A recent Canadian court decision⁹⁷ highlights another way in which behavioral genetic evidence might be obtained: court-ordered testing. In this case, the defendants in a negligence suit successfully requested that the court order the plaintiff, despite her objections, to undergo genetic testing for Huntington's Disease (HD) for the purpose of mitigating the amount of damages awarded (*Adacsi v Amin*).

Initially, neither of these options seems unreasonable. Because tort law is (mostly) a fault-based system, defendants are not held liable for losses they did not cause. Evidence about the extent to which a plaintiff's claimed injuries are the result of the defendant's conduct, including genetic tests that affirm or rebuff such claims, is thus relevant. Furthermore, compulsory genetic testing is not unprecedented in judicial settings. It is in fact routine in criminal cases, for purposes of identification, or in contested paternity claims. Extending such procedures to tort litigation may thus not seem inappropriate.

However, the nature of behavioral genetic evidence complicates the picture. Although courts can require a litigant who places his/her physical or mental health in controversy to provide relevant records and to undergo appropriate examinations, the non-deterministic nature of behavioral genetics necessarily limits the scientific value of such evidence (in contrast, for example, to genetic testing for identification purposes). Concurrently, the stakes of disclosure of behavioral genetic results as a result of compulsory testing are high. Studies consistently demonstrate the pervasive stigma surrounding psychiatric disorders, including stigma attached to genetic findings,⁹⁸ and the role of stigma in limiting access to mental healthcare.^{99–101} Thus, not only are privacy concerns heightened, but insofar as the prospect of disclosure of behavioral genetic results may deter potential litigants from seeking clinical care or participating in genomic research, such a result would be unwelcome. Moreover, psychiatric stigma may unjustly impact legal proceedings. As a survey of civil cases found, evidence of an alleged history or current diagnosis of psychiatric disorder is a powerful tool to impeach a litigant's credibility.¹⁰²

Significantly, requiring litigants to disclose genetic results or compelling them to undergo genetic testing for psychiatric conditions will likely only increase the risk of biased judicial decision-making. Greater public endorsement of biogenetic explanations of psychiatric conditions has not reduced stigma, but actually increased perceptions of dangerousness and unwarranted recommendations for medication and psychiatric hospitalization, along with pessimism about recovery.^{85–88} Consequently, the threat of disclosure of genetic results or of compulsory genetic testing may deter litigants from filing a legitimate suit, and those whose genetic results are disclosed may be at increased risk for unfair prejudice in the proceedings. Thus, even if we assume that justifications exist for overriding a person's autonomy, genetic privacy and informed consent, considerations of justice should be weighed before requiring disclosure of genetic results or compulsory genetic testing for psychiatric disorders.

Another possible use of behavioral genetic evidence in tort cases is to influence determinations of civil liability for behavior that caused physical or property harm to another person. How that might occur is illustrated by considering the facts in the case of *Smith v. Freund*, in which behavioral genetic evidence was not introduced. The case grew out of the actions of William, a 19-year old man with Asperger's syndrome, who lived as a dependent

with his adoptive parents, and who shot and killed two people before going home and committing suicide.¹⁰³ Relatives of the victims filed a negligence suit against the parents, claiming that they had a duty to control their son's conduct. In rejecting the claim, the court emphasized that for such "special relationship" claims to succeed, the foreseeability of the harm needs to be proved. Here, although there was evidence of William's prior aggressive behavior toward his parents, only one such instance was reported against another party. Subsequently, and given expert testimony that there is "no substantial correlation between Asperger's syndrome and physical hostility toward others," the court concluded that the requirement of foreseeability of the harm was not established.

If William had undergone genetic testing and the results had shown low activity of the MAOA gene, and if the results had been disclosed to his parents, would that have changed the judicial decision? Scientifically, the answer should be negative. Because behavioral genetic makeup is not determinative of outcomes, information about William's genetic proclivity is irrelevant without simultaneous consideration of environmental factors. Even then, it is difficult to know which adverse environmental factors to consider besides child maltreatment (which was not present in the case), and how to estimate the relative impact of various environments on behavioral outcomes.⁶ Nonetheless, it is possible that such evidence would have impacted the legal determination. Studies indicate that actors in the judicial process—that is, judges, jurors, and experts who testify in court—have limited genetic knowledge,^{104–106} and that genetic determinism with regard to health status is prevalent among the general public.^{82,107} Insofar as these participants and fact-finders construed genetic predisposition for behavioral and psychiatric disorders—in this case aggressive behavior—as establishing sufficient foreseeability of harm, the determination of liability might have been different.

Child Custody Proceedings

The nature of child custody proceedings may make them particularly welcome ground for the introduction of behavioral genetic evidence.¹⁰⁸ Claims about parental mental instability are common in both custody disputes and proceedings to remove children from parental homes.^{109,110} Indeed, because the child's best interests and psychosocial adjustment are paramount in such decisions, parents' physical and mental health are relevant considerations, and custody evaluators (usually mental health professionals) are frequently requested to assess—and advise the court about—parents' "emotional fitness" to raise a child.^{111,112} Although legally, a psychiatric diagnosis—let alone a genetic proclivity for such a condition—is insufficient to establish parental unfitness,¹¹² the stigma surrounding psychiatric conditions may make the introduction of behavioral genetic data particularly appealing to litigants.¹⁰⁸

This possibility raises a host of ethical, legal, and social issues. These include: compromised genetic privacy through disclosure of medical records (which may discourage treatment seeking) or compulsory genetic testing; increased stigma, which might bias the judicial process; and challenges arising from limited genetic knowledge among law and health professionals whose opinions may impact judicial determinations of child custody.¹⁰⁸ In addition, there is heightened concern that efforts to introduce behavioral genetic evidence in

child custody proceedings will disproportionately affect parents belonging to poor and racial minority groups, especially single mothers of color involved with child protective services. Such families are commonly the least powerful litigants: research indicates that health professionals' bias may lead to unfavorable assessment of parental fitness of parents from racial/ethnic minorities,¹¹³ and as a practical matter, such families have fewer resources for legal assistance.¹⁰⁸ They are also overrepresented in the foster care system,^{110,114} thus already experiencing greater surveillance.

If behavioral genetic research reaches the point at which testing is sufficiently diagnostic, a family or juvenile court could admit the test results to establish or confirm a psychiatric diagnosis. Such a possibility would have a greater resemblance to DNA tests to establish paternity—albeit without the same degree of certainty—commonly used in family law proceedings. Although it could allow a more informed discussion about treatment options and social service supports that the parent should receive before a decision about custody is made,¹¹² the extent to which judicial actors would be able to evaluate genetic evidence objectively is unclear.

To illuminate the difficulties that may reduce the effect of behavioral genetic evidence, consider the case of *Kathy S. v. Department of Child Safety*, in which a mother unsuccessfully appealed a juvenile court decision to terminate her parental rights.¹¹⁵ Although the mother did not dispute her substance abuse, she explained that her chronic use of methamphetamine was the result of an underlying depression, for which she had not received services and assistance, and “a genetic predisposition [to] substance abuse.” No specific genetic evidence was introduced, but even if it had been, common (mis)perceptions of judges about psychiatric disorders and their genetic bases may have negated its impact. Indeed, notwithstanding extensive research about the genetics of depression,^{60,116–122} a study of family court judges found that they view this condition as a common, context-dependent, transitory impairment that does not give rise to concerns about parental capacity to raise a child.¹²³ In contrast, despite evidence about the neurogenetic basis of addiction,¹²⁴ substance abuse is commonly perceived as a personal moral failing and the result of a lack of willpower, a condition that is unaffected by environmental triggers and one for which effective treatment is unavailable.^{125–127} Thus, despite the similar genetic contributions to these conditions, judicial receptiveness to such evidence may depend on judges' preconceptions about the origins and impact of different psychiatric disorders. Genomic education for judges and child custody evaluators is thus essential to ensure that when genetic evidence is introduced, parental claims of psychiatric disorder and subsequent need for services are not rejected on the basis of erroneous perceptions.

A second issue concerns the possible introduction of behavioral genetic data of children involved in such proceedings. Admission of such genetic data could be sought to support a claim for a child's vulnerability and thus for the superiority of custodial arrangements that can provide additional support. In one recent termination of parental rights case, the court accepted the testimony of experts for the state Division of Child Protection and Permanency that a child born to parents with psychiatric conditions may be genetically predisposed to emotional problems, and therefore, that her anxiety symptoms highlighted her need for the permanency offered by her foster parents (*N.J. Div. of Youth & Family Servs. v. B. G.*).¹²⁸

In another case, a mother who was diagnosed with Huntington's Disease (HD) unsuccessfully challenged a decision on adoptability of her child. Her primary claims were that the prospective adoptive parents were neither properly informed that the child might carry the Huntington's gene nor evaluated for their ability to meet the needs of such a child (the child was asymptomatic at the time of the hearing; *In re H.G.*).¹²⁹

These cases clearly differ in their respective scientific bases as, unlike the emotional problems relevant in the first case, HD is a dominantly transmitted neurodegenerative disorder, and a child of a parent who is a HD carrier has a 50% chance of inheriting the condition. However, both cases raise a series of questions that judges, child custody evaluators, and other health professionals would need to consider. Should children involved in child custody or neglect proceedings undergo genetic testing to determine their risk status for behavioral and psychiatric conditions? Members of the general public asked about a hypothetical child who was physically abused by his mother responded positively to this question.¹³⁰ However, this possibility may encourage parents and child protective services involved in court proceedings to test children for predispositions to psychiatric disorders, even if no symptoms exist, which may significantly compromise the interests of children, including the right not to know about such predispositions. The application of the latter right—which finds its origins in notions of individual autonomy and privacy and holds that disclosure of one's genetic makeup should be a matter of choice—may be more limited for children than it is for adults (i.e., parents generally decide whether children should be tested). But the possibility of litigants going on fishing expeditions in search of genetic variants that can be used to support their position in a case—with no prospect of direct medical benefit to the child and yet some likelihood that a range of secondary findings and other non-medically relevant information will be found—is particularly concerning.^{131,132}

Another question is whether children's placement decisions should be based on their genetic makeup? Participants in the aforementioned study of public views expressed a preference for a hypothetical abused child being allowed to return to live with his mother after she had undergone rehabilitation.¹³⁰ Yet, a subsequent question is what sort of services, programs, and treatment biological parents (and prospective adoptive parents) should be offered—or compelled to accept—to ensure that they can suitably meet a child's needs? A growing body of studies has indicated the moderating effect—for better and worse—of parent-child relations on genetic vulnerability and antisocial behavior.^{133–136} However, the ameliorability of various parental behaviors may not be equal. Whereas modification of insensitive parental behavior, for example, arguably constitutes a reasonable goal for intervention,¹³⁶ lack of warmth and empathy may be less easily modifiable, perhaps in part because of their genetic basis.¹¹ Thus, for child custody decisions to be genetically informed, it may be unavoidable that in addition to the child's proclivities for behavioral and psychiatric disorders, information about both the pathological and positive behavioral traits of potential caregivers (including biological, foster and adoptive parents) will be needed. Current behavioral and biomedical research are far from fathoming this complexity.

The Future of Behavioral Genetic Evidence in Court

Thus far, we have considered relatively simple ways in which behavioral genetic evidence may come to court, specifically when a litigant has undergone genetic testing and seeks to introduce the results in judicial proceedings; when genetic data are available in medical records and susceptible to subpoena; and when a court orders a litigant to undergo genetic testing. However, there are two other ways in which such evidence may be introduced in courts that need to be considered.

The first of these is “genetic theft.”¹³⁷ Here, a litigant would collect a genetic sample of an adverse party without the latter’s consent and without a judicial order requiring the party to undergo genetic testing. The genetic profile would then be analyzed and the results submitted as evidence. In theory, samples obtained by genetic theft may be inadmissible, because existing evidentiary rules require that the seizure, custody, control, transfer, analysis and disposition of evidence follow certain requirements (“chain of custody”), which surreptitiously obtained DNA samples do not normally meet.¹³⁸ In practice, collection of genetic data from non-consenting parties without their knowledge already occurs and could, in some instances, be used as evidence in legal proceedings. Law enforcement officers routinely obtain DNA samples from soft-drink cans or cigarette butts used by suspects and others, and direct-to-consumer genetic testing companies offer “legal paternity testing” that is handled by licensed experts and facilities to ensure that judicial admissibility standards are met.¹³⁹ Although these are currently used for identification purposes, it is plausible that, in the future, the analysis of data would expand to include behavioral and psychiatric conditions. This possibility could significantly impact criminal and civil proceedings by incentivizing litigants—especially wealthier ones (such as governmental entities)—to collect genetic data and present them as evidence notwithstanding the considerable privacy infringement involved. Rules regarding genetic theft are fragmentary, and the issue warrants increased attention.^{137,140}

A second way in which behavioral genetic data may be introduced in court would be by discovering the results of an analysis of a litigant’s biospecimen sample that was previously obtained for clinical or research purposes. Although summoning persons to testify or present physical evidence (e.g., documents) in court is common, the possible subpoena of genetic data from biobanks, data repositories, or clinical laboratories is concerning not only because of its potential scope, but also because of its potential implications for scientific endeavors.

In terms of scope, there is no doubt that the number of genetic databases and biobanks is on the rise. A 2012 survey found over 600 registered biobanks in the U.S.,¹⁴¹ and national initiatives that collect genetic information of large populations as part of efforts to improve public health are gaining popularity (e.g., in Estonia, Norway, Iceland, and the UK). In this regard, the All of Us Research Program in the United States, which was announced in January 2015 and is currently under way, is a notable example. This Initiative plans to promote a healthcare model that tailors disease diagnosis, treatment, and prevention to individual variability in genes, environment, and lifestyle by conducting extensive biomedical research and using genomic and other data collected from over one million healthy- and patient-participant volunteers.^{142,143} In addition, the use of genetic testing in

clinical testing is growing, including diagnostic and carrier testing for inherited disorders, predictive and pre-symptomatic testing for adult onset conditions (e.g., BRCA1/2), and pharmacogenomic testing.¹⁴⁴ Mandatory newborn screening programs are another potential source of samples, with 45% of states currently storing residual blood samples for >21 years,¹⁴⁵ and proposals being made to replace current tests with whole genome sequencing.² Thus, the possibility of subpoenaing genetic data potentially could impact a large number of people.

From a scientific perspective, however, such compelled disclosure is concerning, as it could deter potential participants from volunteering to participate in genetic studies or undergoing needed clinical tests. Deterrence may be a problem especially for national biobank initiatives, including the All of Us Research Program, as the collection of data from research participants in these endeavors is not anonymous; indeed, participants are expected to be followed—and to some extent—engaged with this research for many years. Such deterrence, in turn, would sabotage genetic research efforts dependent on the availability of large number of genetic samples.¹⁴⁶ Notions of justice may also be implicated, as genetic research participants would be at greater risk of having their genetic data summoned than other litigants. This would do a disservice to people who volunteered to participate in research for the public good, and violate the idea that all litigants—regardless of their genetic testing history—are equal under the law.

One strategy to mitigate this concern is to require that genetic research entities secure Certificates of Confidentiality before enrolling participants in their studies. Such a certificate permits investigators to refuse to provide participants' names and other identifying data to officials in any "Federal, State, or local civil, criminal, administrative, legislative, or other proceedings," while allowing for only a limited number of exceptions (for example, in situations involving child abuse, threat of harm to self or others, or reportable communicable diseases).¹⁴⁷ In this regard, a survey of court cases in which the discovery of relevant research information was sought is reassuring.¹⁴⁸ It found that certificates have generally been upheld, and that when data were produced, they were limited to non-identifiable data, although some uncertainty about the extent of protection provided by certificates was prevalent among lawyers and judges. However, neither the regulations for Institutional Review Boards nor guidance for NIH-funded studies require that biobanks and investigators secure Certificates of Confidentiality.¹⁴⁶ As a result, the certificate mechanism has been significantly under-utilized by biobanks (a 2003 study found that only 1 of 12 major biobanks in the U.S. had obtained a certificate, and only about quarter of IRBs would require or recommend it).^{146,149} We have yet to see whether the NIH will endorse—and implement—the recommendation of the planners of the All of Us Research Program that all users of identifiable data be required to secure a certificate.¹⁴³ In the meantime, concern remains for all biobanks and genetic research settings, and significantly, for clinical testing laboratories, a domain not covered by a certificate.

Conclusion

The introduction and use of behavioral and psychiatric genetic data in judicial settings is unlikely to cease any time soon. On the contrary, it is likely to increase, at least until its

utility becomes clear, raising ever more challenging questions about when genetic data should be brought to criminal and civil adjudicatory contexts, how they may be collected and introduced, and for what purposes their use should be permitted. Equally important are the possible implications of such evidence for individuals and communities, and for societal values of equality and justice. Unregulated use of behavioral genetic data in judicial proceedings would likely encourage abuse, and even if unintended, have significant consequences for already disenfranchised groups. Legislators, judges, regulators, researchers, and health care professionals—as well as genomically informed members of the public—all have a role to play in avoiding such consequences.

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