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# *Ethics in Behavioral Genetics Research*

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As research in behavioral genetics uncovers the genetic contribution to human behavior, it will undoubtedly further our understanding of normal human variation in many behavioral traits, such as personality, intelligence, and sexuality. This research also shows great potential for the diagnosis, treatment, and prevention of mental illnesses. Recent findings underscore this potential and document the increasing validity of research methods—methods that in the past have led to mistaken inferences about genes "for" violent behavior and homosexuality. Although all research with human subjects requires adequate attention to its ethical aspects, certain ethical issues involved with behavioral genetics are particularly acute and deserve careful attention. This article reviews these selected major ethical issues arising in (1) the conduct of behavioral genetics research; and (2) the application of its research findings. While some of the ethical concerns in the latter category are likely to be of substantial importance and animate considerable popular concern, they currently fall outside the realm of traditional research review. Determining how to deal with these concerns should be a focus of future scholarly work.

*Key Words: behavioral genetics, ethics, genetic research, population genetics, research standards, research subjects*

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Research in behavioral genetics attempts to elucidate the role that genes might play in determining types of human behavior. Its findings can understandably grip our attention because they help explain important aspects of what it means to be human—everything from personality (Munafo et al., 2003) and human memory (Egan et al., 2003) to fear (Hariri et al., 2002) and addiction (Nestler, 2001; Nestler and Landsman, 2001; Lerman and Berrettini, 2003). Results can be controversial, such as the infamous (and yet unsettled) association of the XYY genotype with criminal behavior (Hoffman, 1977; Freyne and O'Connor, 1992; Gotz et al., 1999). In 1992, *Newsweek* magazine featured the search for the "gay gene" on its cover (Gelman et al., 1992); one year later, *Time* magazine (Henry, 1993) reported further on preliminary results in the genetics of male homosexuality (Hamer et al., 1993). About the same time, controversial arguments—interpreted by some to be related to genetics—purportedly explained variations in intelligence between different races and social classes (Herrnstein and Murray, 1994). In the public's mind, the balance of the age-old debate of nature versus nurture appeared to be tipping in favor of "nature," at least until the scientific validity of these results became uncertain (Wickelgren, 1999; Fish, 2002).

Commentators and recent reports from the National Bioethics Advisory Commission (1998), the American Society of Human Genetics (Sherman et al., 1997), and the Nuffield Council on Bioethics (1998; 2002) emphasize that such examples are important and that the ethical and social concerns associated with them deserve attention (Muller-Hill, 2002). Might a genetic basis for intelligence result in its "medicalization"? Will today's variation of normal become tomorrow's stigmatizing illness? Could such findings affect social stigmatization itself, that is, might it decrease (because individuals are no longer to blame because they are "born with it") or increase (by creating an identifiable, biologically-based outcast group)? And how might a genetic basis for behavior change societal notions of responsibility and accountability? For example, if a real genetic predisposition to violent behavior were discovered, would courts use this knowledge to mitigate individual responsibility for crimes, determine punishments, or even prevent violent acts?[1]

Questions such as these are likely to become more acute as behavioral genetics research progresses, fueled by advances in molecular genetics and the completion of the Human Genome Project (HGP). The same techniques used to study normal variations of behavior are often utilized for research in psychiatric illnesses. For example, in the past year, significant genetic discoveries have been published in autism (Shao et al., 2003), schizophrenia (Akil et al., 2003), and dementias, such as Alzheimer disease (Clark and Karlawish, 2003). Recently, a genetic contribution to depression was described (Caspi et al., 2003) as a breakthrough in accomplishing one goal of the HGP: to better characterize disease and tai-

lor therapies based on an individual's genotype (Holden, 2003).

Although the general quest for knowledge about human behavior and attempts to improve the diagnosis, treatment, and prevention of mental illness are compelling, when researchers investigate controversial topics, such as sexual orientation, criminality, or intelligence, protests related to the ethical issues inherent to this work may follow (Byne and Stein, 1997; Schuklenk et al., 1997). It may seem surprising that questions about such ethical issues are not altogether new, but neither is behavioral genetics, which is based on the early 20th century work of Francis Galton (Crow, 1993). Organizations in support of this research, such as the Behavioral Genetics Association, formed as early as the 1970s[2]. What is new is the power of post-HGP techniques to yield insights into the complexities of human behavior and disease (Sher, 2000; Stoltenberg and Burmeister, 2000). Large databases, such as the 1989 National Institute of Mental Health (NIMH) Genetics Initiative—a national database of families afflicted by particular mental illnesses, with 27,000 DNA samples as of 1 February 2003 (Moldin, 2003)—make it possible to conduct research on an extremely wide-scale. As a result, research findings are becoming more robust. This precludes using the relatively easy excuse of "scientific uncertainty" to avoid asking some difficult questions, particularly surrounding the ethical, legal, and social implications of this important research.

One part of addressing these ethical issues is ensuring the integrity of the research itself; another is considering the social implications of the research. In this article, we review some of the fundamental ethical issues arising from behavioral genetics research for those who sponsor, design, conduct, or use its results. We focus on areas manifesting acutely in behavioral genetics, noting where consensus is emerging as well as where additional work is needed. Following roughly the approach used by Sharp and Barrett (2000), we discuss the issues that occur within the context of research and those that involve the application of research findings. The distinction is only heuristic; decisions made regarding issues arising in the research context often affect its application and vice versa. Understandably, some recommendations may be generalizable to other forms of genetics research. Of note, we do not provide a comprehensive review of related laws and regulations regarding these issues; instead, we focus on the larger and perhaps more subtle ethical issues at hand than those that might typically be considered as part of standard review and oversight.

## ISSUES WITHIN THE CONTEXT OF RESEARCH

Like all research with human subjects, research in behavioral genetics should be governed by principles of fairness, avoiding harm, beneficence, trust, and respect for autonomy. These principles are evident in

the immediate concerns confronted in the design and conduct of behavioral genetics research. The full intricacies of research design in behavioral genetics are beyond the scope of this article and have been discussed briefly elsewhere (Finegan, 1998) and in comprehensive reviews (LaBuda and Grigorenko, 1999; Benjamin et al., 2002; Plomin et al., 2002; Bouchard and McGue, 2003). Scientifically flawed research is, by definition, unethical because it unnecessarily exposes human subjects to research risks (Council for International Organizations of Medical Sciences, 2002). This section elaborates the ethical and scientific implications arising in relation to: elucidating the research question; defining the trait; the statistical methods employed; minimizing risks to research subjects; obtaining group input; and informed consent.

## Elucidating the Research Question

In behavioral genetics research, one question of distributive justice (minimally construed as ensuring that the benefits and burdens of research are distributed fairly within society) involves the balance of research into "mental illnesses" (Nuffield Council on Bioethics, 1998) as opposed to "normal human variations" (Nuffield Council on Bioethics, 2002). Similarly, a focus only on common "mental illnesses," such as depression, raises questions analogous to worries over "orphan" diseases and drugs created when research of rare diseases may not be conducted because of insufficient market demand or study populations (Lavandeira, 2002). To illustrate, compare pharmacogenetic research into the treatment of a rare, debilitating form of dementia illness with a similar one into improving cognitive function of normal volunteers (an example that is not outlandish (Turner et al., 2003)). Assuming the two treatments do not overlap, the commercial potential of the latter is perhaps greater than the former, though both might be equally valuable to society. Justice does not necessarily require neglecting either project, but instead dictates a fair balance of research interests. Thus, justice is involved both within individual research studies (e.g., in terms of selecting the study population) as well as between research studies (e.g., when considering funding allocation; Resnik 2003). For the latter, a case exists for considering and achieving balanced interests on a global level (Advisory Committee on Health Research, 2002). When seen in this light, it is clear that short-term concerns over research funding could affect long-term funding interests as well.

## Defining the Trait

In its 1997 report, the NIMH implied that some mental illnesses, such

as schizophrenia and bipolar disorder, were ready for large-scale analyses (NIMH's Genetics Workgroup 1997). This presupposes a well-identified diagnostic standard. When researchers define a behavioral trait to be studied, they must contend with at least three separate issues: uncertain phenotypic definitions, disease heterogeneity, and unclear molecular mechanisms (Pato et al., 2002).

How does the trait definition affect research? Quite simply, the phenotypic definition determines who will be enrolled as a subject (and thus exposed to research risks) and also influences scientific validity. In one segregation analysis of individuals with depression, the transmission pattern observed varied with how the phenotype was defined (Marazita et al., 1997). Behavioral studies, unlike some other types of research, may contend with a paucity of objective data, relying instead on clinical history and subjective reports (McInnes et al., 1998), so standardization of these is crucial. Social and cultural norms are critical to both the development and even the definition of behavioral traits (Mann, 1994). For example, what precisely defines an individual as "homosexual"? Does it require one sexual experience with a member of the same sex, many, or simply sexual attraction? What constitutes a "sexual experience"? Similarly, if one is interested in the genetic contribution to intelligence, how can or should intelligence be measured? How one answers these questions is certain to affect research results. Difficulties in measuring the phenotype of "intelligence" have led to controversial research that ignored the plurality of intelligence (i.e., the idea that intelligence is more than an IQ score) and was confounded by many variables (Herrnstein and Murray, 1994; Fish, 2002). Critics consider some measures of human behavior, such as questionnaires, as representing little more than "virtual" behavior, essentially doubting whether such measures assess what they claim (Balaban, 2002). In addition, because some phenotypic traits are more like syndromes constructed out of a constellation of signs, symptoms, or behaviors, individual genes may exert influence on these signs with or without affecting the syndrome as a whole.

Methods recently have been developed to help alleviate some of these problems. They include the recognition of quantitative trait loci (traits distributed along a continuum in the human population, such as height [Plomin et al., 1994]), endophenotypes (measurable biological traits that appear to be associated with the phenotypic trait of interest [Inoue and Lupski, 2003]) and polydiagnostic approaches (methods that allow for and compare different diagnostic schemas [McGuffin and Farmer, 2001]). However, the debate over appropriate trait definitions will likely persist (Kessler, 2000), fueled by both scientific developments and the value judgments inherent to definitions of behavioral traits, such as homosexuality and intelligence.

## Statistical Methods

The perceived difficulty in isolating and confirming genes that influence human behavior has led to calls for less stringent standards for determining "significant" research findings in some situations (Rao and Gu, 2002). At issue is the tradeoff between accepting false positives (i.e., concluding that a genetic association exists when, in reality, it does not) versus accepting false negatives (i.e., concluding that a genetic association does not exist when, in reality, it does). Relaxing significance thresholds might increase the power of studies to detect associations between genes and behavior. Research studies with greater power at the outset—as might be seen with large DNA databanks—could be sufficiently large to allow more stringent significance thresholds and perhaps fewer false positives (at the potential expense of more false negatives). However, neither false positives nor false negatives are ethically neutral. A profound stigma often attaches to both mental illnesses and some behaviors. In some cases, such as mental illness, or violent behavior, false positive genetic associations might be more dangerous than false negatives. Other behavioral traits, such as intelligence, might be more dangerous when individuals or groups are associated negatively with them. A rule applicable to all cases may be unattainable. Therefore, the optimal balance between false positives and false negatives and determinations of significance may need to be struck on a case-by-case basis, keeping in mind that the concerns are ethical as well as scientific in nature.

## Minimizing Risks

Researchers have an ethical obligation to minimize the risks of research—physical, psychological, social, and economic. Studies that involve withdrawing an individual from his or her current treatment ("washout" or "medication free" studies) or inducing behaviors (such as psychosis) may present unique risks to the research participant (Carpenter et al., 1997; Sharav, 1999; Tishler and Gordon, 1999; Roberts et al., 2003). Most behavioral genetics research, however, involves only observational data and venipuncture for DNA collection purposes. Therefore, physical risks tend to be minimal. Psychological risks in behavioral studies might include stress and anxiety provoked by questionnaires. Social and economic risks potentially involve discrimination and stigmatization. Whereas discrimination is a risk for many genetic studies, stigmatization is especially acute in the behavioral setting. Individuals may feel or experience increased social distance from family members, employers, or even landlords as a result of mental illness (Phelan,

2002). Their relatives or parents may feel responsible for having caused the mental illness or behavioral disposition (Ostman and Kjellin, 2002).

Paying exquisite attention to the privacy and confidentiality of medical information can minimize some of the most critical social and economic risks. This might include attention to the design of databases, as well as obtaining Certificates of Confidentiality, which protect research records from subpoena (Earley and Strong, 1995). For example, Certificates of Confidentiality may be particularly useful in behavioral genetics research when traits such as addiction or violent behavior are involved. These Certificates provide protection from subpoena of research record in civil and criminal proceedings. In this way they may help protect an individual's sensitive information, such as his or her substance abuse history.[3]

## Group Input

Study populations are often created from socially defined groups (e.g., race or culture), or other criteria, such as disease status or geographic location (Foster and Sharp, 2002; Risch et al., 2002). When social categories are deemed necessary for research, the growing opinion that community or group input should be sought prior to conducting research should be taken seriously (Foster et al., 1997; Greely, 1997; Foster et al., 1998; Sharp and Foster, 2000; Clayton, 2002) while also recognizing the limits of such input (Juengst, 1998; Davis, 2000). Group or community input can help reveal and ameliorate concerns that uniquely affect members of the study group—concerns that might otherwise go unnoticed by researchers and review boards (Foster and Sharp, 2000). In other words, group input is one way of respecting groups, identifying, and perhaps reducing some of the psychological and social risks of this research. Recent work has also focused on the benefits and challenges of disease advocacy groups as contributors in the design and conduct of research (Dresser, 2001).

Can one make a case for the benefits of group input in behavioral genetic research? In some cases, the answer appears to be "yes," particularly when it involves historically marginalized groups or sensitive traits (a category to which many behavioral traits belong). This could have a beneficial effect on research participation and trust in the research enterprise. For example, empirical results suggest that potential research participants may be less likely to agree to participate when the research involves stereotypical or stigmatizing traits (Schwartz et al., 2001). Much work remains in defining the exact circumstances for when and how group or advocacy input is most useful (Weijer et al., 1999; Sugarman, 2001).

## Informed Consent

Behavioral genetics research pushes the limits of the protection typically accorded by informed consent in at least two important ways: obtaining consent from individuals who may have reduced decision-making capacity (see Glossary) or competency and determining the scope of consent.

Some, but not all, behavioral genetics research will require research subjects with reduced decision-making capacity (e.g., cognitive impairments, dementia, or schizophrenia). Not enrolling individuals who lack the capacity to give informed consent may protect them from exploitation, but it also excludes them from its potential benefits and impedes valuable research. Several preliminary points deserve emphasis. First, this is not unique to behavioral research; for example, comatose individuals and some people with HIV may demonstrate reduced decision-making capacity when compared to individuals with schizophrenia (Moser et al., 2002). Second, mental illness does not necessarily entail reduced decision-making capacity; for example, considerable debate surrounds whether individuals with depression have decreased capacity as a result of potential depression-induced apathy toward research risks (Appelbaum, 1997; Elliott, 1997; Appelbaum et al., 1999). Finally, the capacity to decide is not static; it may change over time, affect only certain areas of an individual's life, and be modified by the consent process (Jeste et al., 2003).

Detailed and comprehensive discussions exist for protecting these individuals without denying them access to medical research (National Bioethics Advisory Commission, 1998; National Institutes of Health Office of Extramural Research, 1999). The absence of specific federal regulations in the presence of a multitude of state measures for persons with reduced decision-making capacity currently places much of the burden on researchers, review boards, and institutions to provide these protections (Appelbaum, 2002). This is further complicated by a lack of universally accepted methods for determining decision-making capacity (as demonstrated for Alzheimer disease [Kim et al., 2001; Kim and Caine, 2002]).

Two general ways might fulfill the requirement of informed consent for individuals judged to have inadequate decision-making capacity: (1) modifying the traditional informed consent process; or (2) supplanting it with subject assent, prospective authorization, and proxy consent from a legally authorized representative (LARs; see Glossary). As an example of the former, individuals with schizophrenia may benefit from directed educational interventions to aid them in the informed consent process (Carpenter et al., 2000).

For the latter, family members often serve as proxy decision-makers or LARs. Nevertheless, using the consent of related LARs has known

limitations in the clinical setting (Bramstedt, 2003) that may also occur in research (such as the conflicting desire for a family member to reduce the burden of care by enrolling the individual in a research study) or even take a new form. For example, individuals may believe that genetics research on a relative with Alzheimer disease will yield practical risk information for themselves or other family members (this risk might also be reduced by a policy of only rarely disclosing such information). In other words, the LAR acts primarily in his or her own personal interests, and not necessarily those of the subject, violating his or her fiduciary duty as a LAR. Although one might argue that proxy consent is only permissible for minimal risk studies (Karlawish, 2003), this could halt some important behavioral research if review boards deem the psychological risks as greater than minimal suggesting a broader use of proxy consent (National Bioethics Advisory Commission, 1998). However, given the potential difficulties with proxy consent; in some cases, tailoring the consent process (as in the schizophrenia example) may be preferable to proxy consent.

## Reconsent

Many behavioral genetics research projects will involve DNA databanks whose replication would be untenable because of cost or limited resources; therefore, reusing samples and collected data may be the most efficient means of conducting future research that is not or cannot be anticipated at the time the original consent for research is obtained. This raises questions about the appropriate scope of informed consent. One approach currently being employed in some genetics research asks an individual to consent to a *primary* study (e.g., examining the genetic basis of autism) while requesting a separate blanket consent for *secondary* uses of data (e.g., a separate study of autism and gene-environment interactions being conducted by a collaborator).

While this approach may be scientifically efficient, it does not afford the subjects the ability to object to the use of their DNA or medical information in ways they might find particularly objectionable. Conversely, requiring consent for every subsequent data use may place great burdens on researchers to relocate subjects, perhaps biasing the sample should a particular subgroup of subjects be difficult to locate; it might also invade subjects' privacy with intrusive recruitment efforts from the researcher.

Thus, between blanket consent and specific consent for every future use is a balance that allows for relatively broad consent perhaps during a defined period of time, including a general description of potential secondary uses. For example, an individual who gives consent to have his

or her sample in a genetic study of depression should be informed that secondary uses might include other mood disorder research (e.g., bipolar disorder) within the next five years. Reconsent should be considered when a subsequent use lies outside this realm, has substantially different risks, or involves a potentially controversial project (such as a substudy on criminally violent behavior, whether or not it involves a "mood disorder" component). Importantly, consent to one controversial study does not necessarily imply consent to all controversial or even less controversial ones. Researchers and review boards should work together to develop an appropriate breadth of consent.[4]

## APPLICATIONS OF RESEARCH RESULTS

Applications of research results encompass several different issues: benefit sharing and commercialization, the duty to recontact study participants, data sharing, balanced reporting of research findings, and the social and legal implications of the research. The last two deserve specific attention in the context of behavioral genetics research.

### Balanced Reporting

Balanced reporting of results is arguably a component of the responsible conduct of research. Indeed, the duty of researchers to help educate the public via honest and understandable reports of research findings was one focus of the 1997 report by the American Society of Human Genetics (Sherman et al., 1997). In behavioral genetics, this affects at least two areas: the use of animal models, and the social and legal implications of research findings.

The animal model is a staple of biomedical research and has contributed to understanding how genes might influence behavior. Animal models, from mice (Flint et al., 1995) to primates (Palmour et al., 1997), provide a way to move beyond knowledge of *some* hereditary basis toward understanding developmental behaviors and individual variation (Drapeau, 2001). This is part of the broader focus on "top-down" research emphasizing how genes work within the organism as a whole ("bottom-up" approaches focus on individual gene products, their function, and eventual effects on behavior; Plomin and Crabbe, 2000).

Besides the obvious responsibility to adhere to animal care guidelines (National Institutes of Health, 2002; National Institutes of Health Office of Laboratory Animal Welfare and United States Public Health Service, 2002), researchers should realize the limitations of reductionist animal models. Reductionism attempts to explain complex traits or

behaviors in overly simplistic terms, ignoring the concept that some phenotypic traits cannot be fully explained by genotype alone (Rose, 1998a). For example, after researchers reported that small changes in the genotype of voles greatly impact sexual and social behavior (Young et al., 1999), some surmised that this finding could help explain "why some lovers stay" and might even help develop a "monogamy pill" (Sinha, 2002). Society thirsts for such explanations, expressed definitively as the gene "for" a trait (Nelkin and Lindee, 1995). Nevertheless, behaviors such as human sexuality may be influenced by biological, cognitive, and cultural influences, questioning the usefulness of animal models (Van Wyk and Geist, 1995; Bancroft, 2002). Some human characteristics, such as personality, may simply have no animal equivalent (Flint, 2002) or at least a questionable relationship. Perhaps it is no surprise that the study of the "reeler" mouse, once touted as a model of schizophrenia, turned out to both contribute to and oversimplify the genetics of the complex behaviors involved with schizophrenia (Hong et al., 2000; Fatemi, 2001). Similarly, knocking out a gene found to be associated with violent behavior in humans also caused the mice to suffer visual difficulties and shortened life spans (Rose, 1998b). This does not mean that animal models are useless; in fact, even the simplest animal models (e.g., *Caenorhabditis elegans*) reveal many of the complex principles governing behavior (Schaffner, 1999) and serve as useful starting points for human research. Their limitations, however, should be recognized, and the methods continually improved (Tecott, 2003).

Concerns about reductionism intersect balanced reporting. Even if researchers cannot completely control how their findings are interpreted, researchers usually participate in popular reports of their own work. The need for clear and honest communication cannot be overemphasized (Garrett and Bird, 2000).

## Social and Legal Implications

Balanced reporting is closely related to the social and legal implications of research results. Particularly relevant issues include medicalization of behavior and responsibility.

*Medicalization* (Conrad and Schneider, 1992; Nye, 2003) variations of normal medical illnesses (Nuffield Council on Bioethics, 2002). For example, sexuality has been medicalized in several ways such as, 'treatments' for sexual orientation and erectile dysfunction. More recently, views concerning aging and menopause have shifted from expected human processes to those that need to be medically managed. *Geneticization* is a similar concept that reduces individual variation (including behavioral differences) to differences in DNA sequence (Lippman, 1991; Hedgecoe,

2001; ten Have, 2001). Concern for both, however is that conceiving some behaviors as illnesses will lead to far-reaching effects, whether in prenatal diagnosis and pregnancy termination, changing views of people with disabilities (Fitzgerald, 1998), or increased stigmatization of "abnormal" behaviors. For example, some postulate an increase in stigmatization as individuals accept the inevitability of certain behavioral traits as "self-fulfilling prophecies" (Finegan, 1998); or, once having been judged "defective," his or her hope for recovery could be diminished (Jones et al., 1984). A similar worry is that behavioral measures used to quantify traits for research purposes—as in the standardized measures discussed above—could in the end reify the measure as the *single* way to define a trait, even outside the research context (Lederhendler and Schulkin, 2000).

Opposition to research on grounds of increasing stigmatization is not universal. The National Alliance for the Mentally Ill and its "StigmaBusters" consider research a way to reduce stigmatization[5]; others note that the evolving probabilistic nature of genetics will alleviate stigmas (McGuffin et al., 2001). Further, Rothstein (1999b) believes genetics research will merely reinforce most people's preconceived views; those already tolerant of homosexuality, for example, might see a genetic basis as a biological (not a moral) question, whereas intolerant individuals might focus on the "abnormal" gene involved. The question is an open one, but should fear of stigmatization stop research? Convincing arguments in the context of research on intelligence suggest otherwise (Newson and Williamson, 1999; Reiss, 2000). In simplest terms, the mere fact that general cognitive ability has a genetic component may tell society comparatively little about how social policies should be framed in light of this knowledge (Plomin, 1999). In other words, although these risks are real, researchers should focus on minimizing them even if they cannot be eliminated entirely. At the same time, further work in ethics and social policy is clearly needed.

A second set of critical questions surrounding behavioral genetics research is its effect on the legal system with respect to notions of responsibility. For example, will researching a genetic predisposition to violent behavior lead to changes in legal notions of responsibility, or even free will? The courts might use a genetic predisposition to violent behavior for different purposes at different times: to mitigate responsibility or culpability, increase or decrease the severity of punishment, or perhaps initiate preventive detention of those deemed at risk for violent behavior (Andrews, 1999). Many scholars are considering this issue. Some believe that because modern courts do not appear sympathetic to environmentally determined behavior (e.g., as a result of upbringing), they should not be sympathetic to genetic ones either (Alper, 1998; Beckwith and Alper, 2002). Others caution that the legal system, as a mirror of cultural attitudes, has been historically accepting of reduction-

ist or deterministic explanations of behavior (Rothstein, 1999a). Importantly, scientists may increasingly find themselves being asked to serve as "expert witnesses," a role that may create specific duties when reporting research results (Shamoo and Resnik, 2003). Although the question of behavioral genetics in the courtroom awaits more certain associations between genes and behavior—associations that many believe are now on the horizon—the need for balanced reporting is clear.

## FUTURE DIRECTIONS

Ethical, legal, and social issues are embedded in the process of behavioral genetics research, from research design to its conduct and applications. This article has highlighted some of the salient issues related to research into the genetic basis of human behavior that go beyond the typical review of this research required of Institutional Review Boards, in particular, the far-reaching implications of the research (e.g., medicalization and responsibility). In fact, current federal regulations imply that IRBs are prohibited from considering some such implications:

> The IRB should not consider possible long-range effects of applying knowledge gained in the research (for example, the possible effects of the research on public policy) as among those research risks that fall within the purview of its responsibility.[6]

Should the role of IRBs be expanded to include these considerations? If not, who will address such important questions? What impact might the consideration of long-term implications have on scientific advancement? For the time being, researchers and sponsors of this research must pay close attention to these critical questions, seeking scholarly and public opinion where relevant.

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## GLOSSARY (NATIONAL BIOETHICS ADVISORY COMMISSION 1998)

| | |
|---|---|
| decision-making capacity | the ability to evidence a choice, understand relevant information, |

| | |
|---|---|
| | appreciate the situation and its consequences, and manipulate information rationally (see also Appelbaum and Grisso (1988) and American Psychiatric Association (1998)) |
| legally authorized representative | an individual authorized by law (statutory or judicial) or previously published institutional rules to make medical decisions on behalf of another person |
| prospective authorization | a specific advance directive of an individual that indicates his or her preferences for research participation in the event of future loss of decision-making capacity |
| subject assent | authorization of an individual when he or she understands the risks, knows that participation is voluntary, and freely agrees to participate in research (less than and insufficient for informed consent); often contrasted with objection |

## NOTES

1. For example, see the ongoing American Association for the Advancement of Science's Behavioral Genetics Project at http://www.aaas.org/spp/bgenes/. Accessed September 2003.
2. For more information, see http://www.bga.org. Accessed September 2003.
3. For more information, see the recent Office for Human Research Protections Guidelines at http://ohrp.osophs.dhhs.gov/humansubjects/guidance/certconf.htm and the National Institutes of Health background information at http://grants1.nih.gov/grants/policy/coc/background.htm. Accessed December 2003.
4. First Genetic Trust has developed a web based approach to facilitate this type of consent. For more information, see http://www.firstgenetic.com. Accessed September 2003.
5. For more information, see http://www.nami.org. Accessed September 2003.
6. See the Code of Federal Regulations, 46.111a2, at http://ohrp.osophs.dhhs.gov/humansubjects/guidance/45cfr46.htm#46.111. Accessed September 2003.

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