Published in final edited form as:
J Am Acad Psychiatry Law. 2014 ; 42(1): 91–100.

Impact of Behavioral Genetic Evidence on the Adjudication of Criminal Behavior

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Abstract

Recent advances in behavioral genetics suggest a modest relationship among certain gene variants, early childhood experiences, and criminal behavior. Although scientific research examining this link is still at an early stage, genetic data are already being introduced in criminal trials. However, the extent to which such evidence is likely to affect jurors' decisions has not previously been explored. In the present study, a representative sample of the U.S. population (n=250) received a vignette describing an apparently impulsive homicide, accompanied by one of four explanations of the defendant's impulsivity: childhood abuse; genetic predisposition; childhood abuse and genetic predisposition; or simple impulsive behavior. Participants were asked to identify the crime that the defendant had committed and to select an appropriate sentence range. Evidence of genetic predisposition did not affect the crime of which the defendant was convicted or the sentence. However, participants who received the abuse or genetic + abuse explanation imposed longer prison sentences. Paradoxically, the genetic and genetic + abuse conditions engendered the greatest fear of the defendant. These findings should allay concerns that genetic evidence in criminal adjudications will be overly persuasive to jurors, but raise questions about the impact of genetic attributions on perceptions of dangerousness.

Keywords

behavioral genetics; MAOA; culpability; mitigation

Prevention and punishment of crime are major societal concerns. As evidence accumulated over the last several decades to suggest that genetic variables make a substantial contribution to the risk of criminal behavior, defense attorneys began attempting to introduce genetic test results to seek exculpation or mitigation for their clients. (1) These efforts raised concerns regarding the impact of behavioral genetic evidence on criminal adjudication and sentencing, in particular whether it will have a disproportionate influence on the decisions of judges and jurors. (1) Similar concerns have been expressed about other data derived from advances in neuroscience (e.g., structural and functional neuroimaging studies). (2) As rules are developed governing the use of behavioral genetic evidence, knowledge of their likely impact will be important for the development of rational policy.

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Even prior to the studies identifying particular genes as the locus of an effect on criminal behavior, there was good reason to believe that genetic factors play a role in predispositions to criminal behavior. Sibling and twin studies provided evidence of familial aggregation of criminal activity and suggested that genetic factors account for approximately 40–50% of the variance in transmission (3). Two recent large twin studies estimated heritabilities of 37–57% for 5 kinds of aggressive behaviors (4), and 67% for antisocial behavior (5). Following this evidence of genetic influence on criminal behavior, a good deal of effort has focused on identifying specific genes that may be involved, with particular attention to monoamine oxidase A (MAOA), an enzyme that degrades monoamine neurotransmitters.

After suggestive evidence of a link between reduced MAOA activity and criminal behavior in an extended Dutch pedigree (6), Caspi et al. (7) took advantage of a longitudinal epidemiologic study of a birth cohort in Dunedin, NZ to explore the phenomenon further. Examining high- and low-activity polymorphisms in the promoter region of the gene on the X chromosome, they found no effect of MAOA genotype per se, but did find evidence for an interaction between a history of childhood maltreatment and MAOA status. Subjects with an allele associated with reduced MAOA production who had a history of childhood maltreatment comprised only 12% of the sample, but accounted for 44% of convictions for violent crime. Subsequent studies in males largely have confirmed (8–18), but in some cases failed to confirm (19–24), these findings. Integration of the corpus of results is complicated by variation in methods and measures across groups; however, meta-analyses support the association between MAOA and anti-social behavior by maltreated children (14, 25).

Work is ongoing with regard to other genes that may be linked to anti-social behavior, including genes coding for catechol-O-methyltransferase (COMT), dopamine transporter 1 (DAT1), dopamine receptors (DRD2 and DRD 4), and the serotonin transporter (5-HTTLPR) (26). Thus, in addition to the MAOA findings, which at this point are supported by the majority of available data and for which mechanisms are being elucidated (27–28), it seems likely that data regarding other genes associated with increased risk for criminal behavior will continue to appear.

Within only a few years of the initial report of a link between MAOA and antisocial behavior in humans, the legal profession was aware of the data and beginning to explore its implications for the criminal justice system. Hopes were expressed that such data could support claims for exculpation or leniency in sentencing on the grounds of reduced capacity to control behavior (29), perhaps undermining traditional legal notions of free will (30) and contributing to a reorientation of the criminal justice system from punishment to rehabilitation (31). By 1995, a convicted murderer sought unsuccessfully to have his death sentence overturned, in part, on the basis that the trial court had refused to authorize payment for a test of his MAOA allele (*Mobley v. State* [32]). Some forensic evaluators began to obtain MAOA data routinely in serious criminal cases (33), and reports appeared of sentence reductions on the basis of genetic evidence in the U.S. (34) and Italy (35–36).

A lively debate continues in the legal and philosophical literatures on the relevance of genetic data to claims for exculpation and mitigation, with skeptics pointing to the difficulty of linking general propensities to specific acts and questioning whether genetic influences on criminal behavior constitute legitimate excuses (37–39). Surveys of legal cases suggest that courts may be more receptive to genetic data than had been thought, although most such data currently are derived from family histories rather than genetic tests. Genetic information is being introduced for a wide range of purposes, including support for diagnostic conclusions, as well as arguments for mitigation (34, 40).

The debate regarding how genetic data will and should influence criminal adjudications until recently has proceeded without a great deal of empirical grounding. Analogous data regarding the impact of other kinds of neuroscientific information have led to conflicting results. One widely cited study suggested that neuroscientific information, even when irrelevant to the issue in question, lent credibility to poor explanations of behavioral phenomena, although it did not further enhance the credibility of good explanations (41). Using a somewhat different paradigm, another research group showed that brain images, but not other sorts of illustrations, increased perceptions of the quality of scientific reasoning in articles about scientific advances (42). More recently, however, several studies with more precise methodologies have failed to replicate those findings (43–45), and two studies of mock jurors being asked to make decisions about *mens rea* and sentencing have shown no incremental effect of brain images beyond the impact of verbal testimony regarding neuropsychological impairment (46–47). Hence, the likely effect of neuroscientific explanations in legal settings is difficult to anticipate.

A small number of studies have explored the impact of data on behavioral genetics per se in contexts similar to those that would be found in criminal trials. One recent study focused on potential jurors' comprehension of genetic information, and was encouraging in that regard (48). A survey of state trial court judges suggested that they would find data on a link between a defendant's low MAOA activity and psychopathy to constitute a mitigating factor for the purposes of sentencing, with average sentences reduced by approximately one year (49). However, there are no data on how members of the general public view genetic information and its application to determinations of guilt and sentencing. Not only does the public constitute the pool from which jurors are drawn, but even for sentencing determinations, which are not made by jurors in most states (e.g., sentencing [50]), public views may guide the development of rules for the application of behavioral genetic data.

Hence, this study was designed to assess the views of a representative sample of the U.S. population regarding the impact of genetic information on determinations of the degree of a defendant's responsibility for his criminal behavior and on perceptions of appropriate punishment. Our working hypothesis was that genetic information would have a substantial effect on public views of responsibility and punishment, reducing perceptions of responsibility and attenuating punishment.

Methods

Participants

The participant panel in this study was drawn by Knowledge Networks (KN), based on sampled households from its KnowledgePanel®, a probability-based web panel designed to be representative of the population of the U.S. Members of the KnowledgePanel® are recruited through a combination of list-assisted random digit dialing sampling techniques based on a sample frame of the U.S. residential landline telephone universe, combined with address-based sampling techniques to compensate for the growing number of households without landline access. A detailed description of panel recruitment procedures is available at: http://www.knowledgenetworks.com/knpanel/index.html.

When invited to join the panel, households that informed recruiters that they had a home computer and Internet access were asked to take KN surveys using their own equipment and Internet connection. Households without a computer or Internet access were offered a laptop computer and free Internet access in exchange for participation. The typical survey commitment for panel members is one survey per week or four per month, with a duration of 10 to 15 minutes per survey. Incentive points per survey, redeemable for cash, are given to personal computer respondents for completing their surveys. Panel members provided with a laptop computer and free Internet access do not participate in this per-survey points-incentive program. However, all panel members do receive special incentive points for select surveys to improve response rates and/or for all longer surveys as modest compensation for the extra burden on their time.

Prior to drawing a sample for a particular study, known sources of deviation from an equal probability of selection (e.g., historical oversampling of particular geographic areas) are corrected for by base weight sampling. A second adjustment is then made to correct for non-response and non-coverage bias in the overall panel membership, based on distribution of demographic variables in the most recent Current Population Survey (April 2011) conducted by the U.S. Bureau of Labor Statistics and Bureau of the Census. Once the sample is selected, the survey fielded, and all study data collected and finalized, a post-stratification process is used to adjust for any survey non-response as well as any non-coverage or under- and over-sampling resulting from the study-specific sample design. Variables included in this final adjustment are Gender, Age, Race/Hispanic Ethnicity, Education, Census Region, Metropolitan Area, and Internet Access. All data reported below are based on this post-stratification adjustment.

The target population for this study consisted of non-institutionalized adults age 18 and over residing in the Northeast, Midwest, and West of U.S., as defined by the U.S. Census. Emailed invitations were sent to 371 randomly selected KnowledgePanel® participants, with the sampling adjusted as described above, over a one-month period in July and August 2011, with reminders to non-responders sent on day three of the field period. Four additional email reminders were sent to non-responders on days 12, 15, 22, and 27. Recipients of invitations were asked to click on a link that would take them to the questionnaire on the KN system; the questionnaire took an average of 12 minutes to complete. In addition to the usual KN incentives, participants were eligible to win an in-kind prize through a monthly KN sweepstakes.

Two hundred fifty potential participants responded to the invitation to participate, yielding a response rate of 67%. Almost half of the respondents were male (49.2%), and the mean age was 48.9 years (*SD* = 1.1). One hundred eighty-eight (75.2 %) were white, non-Hispanic; 26 (10.4%) were Hispanic; 22 (8.8%) were black; and 14 (5.6%) were in other categories. One hundred sixty (64%) were married or living with a partner, 49 (19.6%) had never been married, and 41 (16.4%) were divorced or widowed. Seventy-three respondents (29%) had at least one child under the age of 18 living in the household. Median household income was between $60,000 to $74,999. 75 (30%) lived in the Northeast, 90 (36%) in the Midwest, and 85 (34%) in West, as defined by the U.S. Census Bureau, with 81.6% residing in a major metropolitan area.

Procedure and Design

KnowledgePanel® participants who clicked on a hyperlink that took them to the online survey first saw a screen with a brief description of the study and were asked to indicate their voluntary consent to participate by advancing to the next screen. Procedures for the study were approved by the New York State Psychiatric Institute Institutional Review Board (IRB).

On the next screen, participants read a vignette that described an apparently impulsive homicide committed during a quarrel between two men over the affections of the perpetrator's girlfriend and the consequent legal proceedings. (See Appendix.) The identity of the perpetrator was not disputed. Four different variations of evidence were presented by the defense to explain the perpetrator's conduct: 1) the defendant was described simply as having acted impulsively; 2) his impulsivity and violence were attributed to a history of abuse as a child; 3) his impulsivity and violence were attributed to a form of a gene that alters brain function; 4) his impulsivity and violence were attributed to abuse as a child combined with a form of a gene that alters brain function. In addition, participants were told that the defendant was either white or black. Because data on the effect of the defendant's race on jurors' verdicts and sentencing decisions are mixed, inconsistent and more complicated than is sometimes assumed (51–52), the defendant's race was counterbalanced solely in order to act as a control for potential confounding variables; there were no substantive or theoretical hypotheses regarding its impact. The design was a 4 (explanation of behavior: impulsivity; abuse; genetics; abuse + genetics) x 2 (race of defendant: black; white) between-participants factorial design. Participants were thus randomly assigned to one of eight possible conditions, using IBM SPSS Dimensions 4.5.

Following the vignette, participants were asked to specify one of four possible crimes of which the defendant should be convicted (manslaughter in the second or first degrees, or murder in the second or first degrees), and were provided with brief definitions based on New York State law. In New York, the crimes differ in the nature of the mental state attributed to the perpetrator, ranging from recklessness (second-degree manslaughter) to intent to cause physical injury (first-degree manslaughter), to intent to cause death (second-degree murder), to intent to cause death in an especially cruel manner (first-degree murder).

Participants were subsequently told that the defendant had been convicted of second-degree murder, and that the defense attorney had argued for leniency on the basis of one of the four conditions described above. They were then asked to select one of four possible prison sentences: 1) 5 to 10 years; 2) 12 to 17 years; 3) 20 to 25 years; 4) 30 to 35 years. Although the recommended sentence range in New York for second-degree murder is 15 years to life, a broader range of options at the lower end was offered here and the upper end was truncated to enhance the likelihood of detecting effects of the experimental manipulation.

Finally, participants were asked to rate their agreement with the following statement: "I would be afraid to have [the defendant] walking the streets." Agreement was rated on a 1–5 scale with higher values reflecting greater agreement. Additional exploratory questions were posed but are not included in the analyses reported here.

To determine whether participants attended to the key elements of the case, they were asked a question about the nature of the explanation offered of the defendant's conduct. Consistent with current practice (53), participants who failed to answer this question correctly were removed from the analysis. Just under 24% (n = 59) of participants who completed the experiment were removed on this basis. This yielded a sample of n = 191.

Results

Table 1 displays the frequencies of participants who selected the criminal charge of which they believed the defendant should be convicted, broken down separately by the various explanations of behavior. The most common choice across all explanations was first-degree manslaughter (n = 86, 46%; "causes the death of another person, with intent to cause serious physical injury to another person"), followed by second-degree manslaughter (n = 52, 28%; "recklessly causes the death of another person"); second-degree murder (n = 38, 20%; "causes the death of another person, with intent to cause the death of another person"); and first-degree murder (n = 13, 7%; "causes the death of another person, with intent to cause the death of another person in an especially cruel manner").

Neither a history of child abuse nor a genetic propensity for impulsive behavior—nor both combined—altered respondents' perceptions of the defendant's mental state at the time of the crime sufficiently to change their views of the crime for which he was responsible ($\chi^2(12, N = 189) = 11.25, p = .51$). Similarly, the race of the defendant did not affect the choice of the crime that respondents believed he had committed ($\chi^2(4, N = 189) = 2.58, p = .63$).

As is apparent in Table 2, most participants believed that the defendant deserved a prison sentence in the mid-range of the scale, either 12 to 17 years (n = 60, 32%) or 20 to 25 years (n = 68, 36%). This is in keeping with the recommended sentence range for second-degree murder in New York, 15 years to life in prison.

Table 2 contains the frequencies and within-column percentages of prison sentence lengths as a function of the various explanations of the defendant's behavior. In contrast to the absence of an effect on the decision regarding the conviction, an omnibus chi-square test detected a significant effect of the explanations of behavior on the length of prison sentence imposed ($\chi^2(9, N = 188) = 19.05, p = .02$). To the extent that a pattern can be discerned, it appears that abuse as an explanation is disfavored and leads to longer sentences; the modal sentence for the impulsivity and genetics conditions is 12–17 years, while for the abuse and abuse + genetics conditions it was 20–25 years. Again, there was no effect for the race of the defendant ($\chi^2(1, N = 188) = 0.85, p = .84$).

Finally, we examined how the various explanations of behavior affected participants' apprehension of the defendant ("defendant fearfulness"), as rated on a 5-point Likert scale in response to the statement, "I would be afraid to have [the defendant] walking the streets." A two-way ANOVA with explanation of behavior and race of defendant as the independent variables and defendant fearfulness as the dependent variable detected a significant main effect for explanation of behavior ($F(3, 188) = 6.56, p < .001, \eta_p^2 = .10$). The main effect for race was not significant ($F(1, 188) < 1$) nor was the interaction of the two ($F(3, 188) < 1$). Figure 1 is a plot of the means +/− 2 S.E. of defendant fearfulness for each explanation of behavior.

As is apparent, the genetic explanation engendered the greatest fear of the defendant, while the impulsivity explanation garnered the least fear. A *post hoc* Bonferroni corrected t-test detected significant differences between the impulsivity and the genetics conditions ($t(98) = 4.46, p < .001$), and between the impulsivity and the genetics + abuse conditions ($t(89) = 3.28, p < .001$), while the difference between the impulsivity condition and the abuse condition was not significant ($t(84) = 1.06, p = .12$). Thus, compared to the simple impulsivity explanation, the genetic explanation made participants more fearful of the defendant while the abuse explanation did not. Although increased fearfulness is associated with selection of longer prison sentences ($\chi^2(9, N = 185) = 54.78, p < .001$), substantial variability in the relationships between fearfulness and sentence, and between genetic evidence and fearfulness, accounts for the lack of a significant association between the condition that evoked the greatest fear (i.e., genetics) and length of sentence selected.

Discussion

In this study of a representative sample of the U.S. population, there was no evidence of a significant effect of genetic evidence on decisions concerning a defendant's degree of responsibility for criminal behavior or appropriate punishment. These data suggest that average citizens do not share the belief that genetic data can help to identify defendants whose behavior is sufficiently beyond their voluntary control to warrant findings of diminished responsibility (e.g., conviction of manslaughter rather than murder) or to mitigate sentences (29–30). Our findings should reassure commentators who question whether genetic influences on behavior are different in kind from environmental influences, such as early childhood deprivation, that typically are not considered to reduce a defendant's degree of responsibility or to affect their punishment (37, 39, 40).

However, we did find an impact of genetic attributions for the defendant's behavior on respondents' apprehension of the defendant: participants reported being more fearful of defendants with genetic predispositions that could lead to violent behavior. This appears to be consistent with the fear that genetic information regarding antisocial propensities will be stigmatizing (54). People tend to link violence with mental disorders, and to desire greater social distance from persons with a genetic predisposition for such disorders (55). Under other circumstances, this fear could translate into more punitive findings of responsibility and more extended incarceration, although we did not detect that effect here.

Our findings differ from those reported in a study of state criminal court judges, whose hypothetical sentences were reduced by evidence attributing the defendant's psychopathy to genetic causes (49). However, in that study genetic data were presented to support a diagnosis of psychopathy rather than directly to explain the criminal behavior. In addition, the methods of the two studies were very different, including the groups whose decisions were studied (members of the general population vs. judges) and the stimuli used (brief vignettes vs. 1200-word descriptions). Moreover, although the judges who were exposed to genetic evidence selected significantly lower sentences, the difference between the average sentences in the two groups was approximately one year (12.93 vs. 13.83 years), an effect of limited real-world impact that would not have been detectable in this study.

The absence of an impact for genetic evidence in our general population sample suggests that fears that jurors will fall prey to a belief in "genetic determinism"—i.e., the belief that one's destiny is entirely dependent on one's genes (56)—may be overstated. Indeed, these findings are consistent with other evidence indicating that members of the public "appreciate the nuances of probabilistic risk and predictive uncertainty, and are correspondingly circumspect in their interpretation of genetic information (57)." In treatment settings, people often incorporate genetic information into their preexisting explanatory schema, thus diminishing its overall impact (58). It is of note that similar fears of disproportionate influence on jurors' decision making have been expressed regarding neuroimaging evidence, yet two recent studies of mock jurors have shown no incremental effect of these images beyond the impact of verbal testimony regarding neuropsychological impairment (46–47). Biological explanations of behavior, at least as far as they are permitted by current science, thus may have less of an effect on the legal system than is often assumed.

An unexpected finding of this study was the apparently paradoxical effect of disclosure that the defendant had a history of child abuse. Both groups of subjects who received this information, whether or not accompanied by information about genetic predispositions to violence, imposed longer sentences compared to the other groups, yet they thought the defendant was relatively less dangerous. Although we cannot rule out the possibility that these findings were affected by group variation after randomization due to dropping those subjects who failed to attend to the evidence introduced on John's behalf, these data are consistent with the findings of Stevenson et al. (59), who explored the reactions of mock juries to information about child abuse in capital sentencing deliberations. Not only were their subjects resistant to accepting histories of abuse as mitigating, but many participants considered them to be aggravating (i.e., as supporting imposition of a capital sentence); defendants who had been abused as children were often portrayed as having evoked abuse by their own bad behavior. Negative reactions to the highly publicized "abuse excuse" (60), and substantive doubts over whether abuse should be mitigating (61), may underlie the seemingly paradoxical reactions observed in the present study.

A number of limitations should be taken into account when considering the implications of our data. On-line surveys as a research tool have certain intrinsic limits, e.g., investigators can never be completely certain that the person who received the invitation is actually the one responding to the survey or that the respondent is taking care in completing the task. However, research suggests that internet survey data tend to be of high quality, with good internal consistency and high test-retest reliability, yielding results similar to those obtained by traditional methods (62–63). Moreover, the Knowledge Networks panel used in this study provides a statistically representative sample of the general population that would not otherwise be easy to obtain.

Methodologic issues that should be considered in assessing our findings include the characteristics of our sample, which though adjusted to be representative of the U.S. population, may not mirror the composition of most juries, and thus may be an imperfect reflection of their tendencies in actual courtroom settings. Moreover, the stimuli provided to participants, which were brief written vignettes, are quite different than the extended oral presentations that would take place at trial; whether our participants would have responded differently to realistic trial testimony—or even to vignettes in which the conditions were described somewhat differently—is unknown. As in all vignette-based research, changes in the wording, length or complexity of the vignettes could have altered the findings.

The use of sentence ranges rather than continua reduced our statistical power, although we presumed that approach would simplify the task for people unaccustomed to selecting penal sentences. In addition, the elimination of that portion of our sample that could not correctly identify the explanation offered for the defendants' behavior may have had disproportionate effects across subject groups that cannot be identified after the fact. Additional characteristics of the defendant, such as prior criminal record, that may impact jurors' decisions were not examined in this study. Finally, it should be emphasized that in most states jurors do not make sentencing decisions for crimes other than capital offenses, although there are exceptions to that rule (64). Hence, the present findings reflect public views about how data on genetic predispositions and child abuse impact criminal sentencing, but those views may not directly influence the behavior of judges who are usually entrusted with that task.

This initial exploration of the impact of genetic attributions for criminal behavior suggests limited direct impact on decisions regarding verdicts and sentencing. Future work with larger samples is needed to confirm these findings, and would allow exploration of additional questions, e.g., whether other variables moderate the influence of behavioral genetic data. As one example, when defendants have previous criminal records or the index crime is more heinous, evidence of genetic propensities for crime may have more impact on adjudication and sentencing, perhaps by heightening fearfulness of the defendant. In addition, since behavioral genetic data increasingly are being paired with neuroimaging and neuropsychological data, whether this combination is synergistic is unknown but of considerable significance to courtroom strategy. Research to date has not explored the impact of behavioral genetic evidence in capital cases or for offenses committed by juveniles; the difficulty of predicting *a priori* whether genetic data in such contexts would be seen as mitigating or aggravating underscores the importance of exploring this directly. Finally, how behavioral genetic data are presented may alter their impact, e.g., specification of the increment in risk associated with a particular genetic variant, as opposed leaving the magnitude of effect unstated, might result in the evidence being seen as more salient and having a greater influence on the outcome. We are now undertaking a series of studies to address these issues. Although confirmatory studies are needed, our data to date are consistent with the conclusion that both the hopes and the concerns that have been expressed about the potential impact of behavioral genetic data in the criminal courts have been overstated.

Acknowledgments

This work was supported in part by grant #1P20HG005535-01 from the National Human Genome Research Institute. The authors thank Andrew Kopelman, MD for his assistance with the study.

Appendix

Vignette

Part 1 – Guilt Phase

John is a 25 year-old [white or black] man. His longtime girlfriend tells him that she has been unfaithful to him and has been secretly involved with his co-worker, Frank. After learning of her infidelity, John angrily drives to Frank's house to confront him about the betrayal. A loud argument develops between the two in Frank's kitchen, and Frank's neighbors call the police. They arrive to find Frank stabbed in the chest with a carving knife. Frank is able to tell the police that as the argument grew more heated, John grabbed a knife that was lying on the kitchen table and stabbed him. Frank ultimately dies in the hospital.

At his trial, John's lawyer concedes that John stabbed Frank, but argues that John didn't really intend to hurt Frank and only acted impulsively.

Child Abuse Explanation—The lawyer introduces evidence that John was repeatedly physically abused when he was a boy by his stepfather, who frequently beat him with a belt or broom handle. An expert witness for the defense testifies that children who were physically mistreated have a much higher risk of impulsive behavior as adults, including violence.

Genetic Explanation—The lawyer introduces evidence from a genetic test showing that John has a specific form of a gene that affects how chemical signals are sent in the brain. An expert witness for the defense testifies that people who have this form of the gene have a much higher risk of impulsive behavior, including violence.

Child Abuse + Genetic Explanation—The lawyer introduces evidence that John was repeatedly physically abused when he was a boy by his stepfather, who frequently beat him with a belt or broom handle. The lawyer also introduces evidence from a genetic test showing that John has a specific form of a gene that affects how chemical signals are sent in the brain. An expert witness for the defense testifies that children who were physically mistreated and have this form of the gene have a much higher risk of impulsive behavior as adults, including violence.

Part 2 – Sentencing Phase

The jury finds John guilty of murder in the second degree. John now has a hearing before the judge to determine his sentence. At the hearing, John's lawyer argues for leniency.

Impulsivity Explanation—He again refers to John's actions as impulsive, and argues that it would not be fair to give him the maximum punishment for the crime.

Child Abuse Explanation—He again refers to John's actions as impulsive. He also refers to the testimony that abused children are far more likely to develop into adults with impulsive behavior, including violence. The lawyer argues that because John has more difficulty than most people in controlling his behavior, it would not be fair to give him the maximum punishment for the crime.

Genetic Explanation—He again refers to John's actions as impulsive. He also cites the results of John's genetic test, as well as the expert testimony that people with the same gene as John are far more likely to develop impulsive behavior, including violence. The lawyer argues that because John has more difficulty than most people in controlling his behavior, it would not be fair to give him the maximum punishment for the crime.

Child Abuse + Genetic Explanation—He again refers to John's actions as impulsive. He also cites John's history of abuse and the results of his genetic test, as well as the expert testimony that abused children with the same gene as John are far more likely to develop into adults with impulsive behavior, including violence. The lawyer argues that because John has more difficulty than most people in controlling his behavior, it would not be fair to give him the maximum punishment for the crime.

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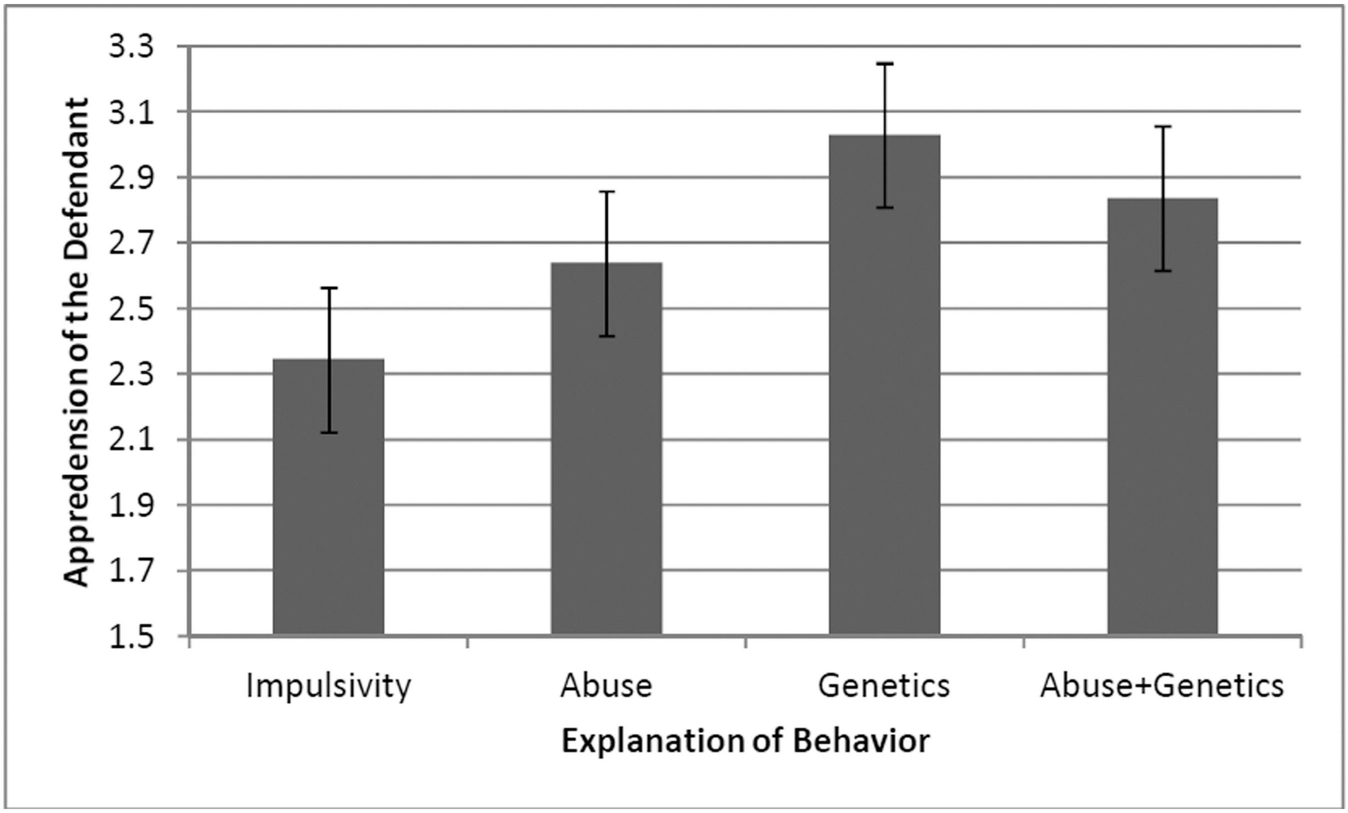

Figure 1.
Mean (+/− 2 S.E.) ratings of defendant fearfulness as a function of the explanation of behavior.

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Table 1

Frequencies and within-column percentages of the crime ascribed to defendant as a function of the explanation of the behavior

		Explanation of Behavior			
Crime	**(n)**	**Impulsivity**	**Abuse**	**Genetics**	**Abuse + Genetics**
2nd Deg. Manslaughter	(52)	19 (40%)	7 (20%)	15 (28%)	11 (22%)
1st Deg. Manslaughter	(86)	19 (40%)	18 (51%)	27 (49%)	22 (43%)
2nd Deg. Murder	(38)	7 (15%)	9 (26%)	9 (16%)	13 (25%)
1st Deg. Murder	(13)	3 (5%)	1 (3%)	4 (7%)	5 (10%)
(total)		48	35	55	51

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Table 2

Frequencies and within-column percentages of length of prison sentence chosen as a function of the explanation of behavior

		Explanation of Behavior			
Length of Sentence	**(n)**	**Impulsivity**	**Abuse**	**Genetics**	**Abuse+Genetics**
5 to 10 years	(33)	14 (29%)	2 (3%)	8 (16%)	9 (16%)
12 to 17 years	(60)	19 (40%)	9 (25%)	20 (39%)	12 (23%)
20 to 25 years	(68)	12 (25%)	17 (50%)	18 (35%)	21 (40%)
30 to 35 years	(27)	3 (6%)	8 (22%)	5 (10%)	11 (21%)
(total)	188	48	36	51	53