



The use of neuroscientific evidence in Canadian criminal proceedings

Jennifer A. Chandler*

Common Law, University of Ottawa, 57 Louis Pasteur St., Ottawa, ON, K1N 6N5, Canada

*Corresponding author. E-mail: chandler@uottawa.ca

ABSTRACT

This article addresses the question of how neuroscientific evidence is currently used in the Canadian criminal justice system, with a view to identifying the main contexts in which this evidence is raised, as well as to discern the impact of this evidence on judgements of responsibility, dangerousness, and treatability. The most general Canadian legal database was searched for cases in the five-year period between 2008 and 2012 in which neuroscientific evidence related to the responsibility and recidivism risk of criminal offenders was considered. Canadian courts consider neuroscientific evidence of many types, particularly evidence of prenatal alcohol exposure, traumatic brain injury, and neuropsychological testing. The majority of the cases are sentencing decisions, which is useful given that it offers an opportunity to observe how judges wrestle with the tension that evidence of diminished capacity due to brain damage tends to reduce moral blameworthiness, while it also tends to increase perceptions of risk and dangerousness. This so-called double-edged sword of the biological explanation of criminal behavior was reflected in this study, and raises questions about whether and when the pursuit of such evidence is advisable from the defense perspective.

KEYWORDS: Canadian criminal justice system, criminal law, law and neuroscience, brain damage, fetal alcohol spectrum disorder, FASD, traumatic brain injury

*Jennifer A. Chandler, Associate Professor in the Faculty of Law, University of Ottawa, Canada, where she teaches courses in mental health law and neuroethics, medical-legal issues, tort law and legal theory. Her research focuses on the law and the biosciences, particularly related to the socio-legal impact of emerging neuroscience.

INTRODUCTION

Interest in the impact of neuroscience on the law has been growing rapidly in recent years.¹ Among the topics of interest is the possibility that forms of neuroimaging such as functional magnetic resonance imaging ('fMRI') or electroencephalography will be used for novel purposes in the legal system such as detecting deception and memory,² or aiding in the psychiatric evaluation of criminal offenders.³ Another controversial topic in law and neuroscience is the question of whether evidence about the neurological underpinnings of problematic behavior is in fact relevant to the criminal justice system. On one hand, some argue that as we learn more about brain abnormalities associated with offending behavior, we will come to realize that punishment based on moral blame is incoherent and should be abandoned in favor of consequentialist objectives of punishment.⁴ Others point out that the law is actually interested in an offender's level of capacity to respond to reasons, rather than in the neurological reasons for that capacity or incapacity.⁵ There have been some intriguing studies of how neuroscientific evidence about behavioral problems might affect retributive judgement, including a study by Aspinwall, Brown and Tabery, which found that a biological explanation of psychopathy reduced the sentences imposed by judges in a hypothetical case.⁶ This is not the only possible reaction to the idea that a neurological abnormality is an explanation of criminal behavior, as judges could also regard biological explanations as suggesting an offender is irremediably damaged and dangerous. This might push in favor of longer or more onerous custodial or supervisory sentences.

This article seeks to answer the question of how neuroscientific evidence is currently used in the Canadian criminal justice system, with a view to identifying the main contexts in which this evidence is raised, as well as to discern the impact of this evidence on judgements of responsibility, dangerousness, and treatability. This study is parallel to similar projects carried out in the United States, the United Kingdom, the Netherlands, and Singapore and Malaysia. The intention is that our joint efforts may allow for some interesting comparative analysis as the project proceeds.

METHODOLOGY

The database 'All Canadian Court Cases' within the Canadian legal service LexisNexis Quicklaw was used to search Canadian case law for reported cases involving the use of

¹ Oliver R. Goodenough and Micaela Tucker, *Law and Cognitive Neuroscience*, 6 ANN. REV. LAW SOC. SCI. 61, 92 (2010); Deborah Denno, *The Myth of the Double-Edged Sword: An Empirical Study of Neuroscience Evidence in Criminal Cases*, BOSTON COLLEGE L. REV. 56(2), 493 (2015); Owen D. Jones & Francis X. Shen, *Law and Neuroscience in the United States* in INTERNATIONAL NEUROLAW: A COMPARATIVE ANALYSIS 351 (Tade M. Spranger ed., 2012), mentioning the increase in law review publications on the topic.

² The use of fMRI and EEG for this purpose has been attempted and rejected in the United States, but the use of a form of 'brain fingerprinting' using EEG appears to have been used in multiple cases in India. See D.A. Puranik et al. *Brain Signature Profiling in India: Its Status as an Aid in Investigation and as Corroborative Evidence—As Seen from Judgments Proc.* INDIA FORENSIC SCI. CONF. 815, 822 (Jaipur, Nov. 15–17, 2009).

³ Davide Rigoni et al., *How Neuroscience and Behavioural Genetics Improves Psychiatric Assessment: Report on a Violent Murder Case*, 4 FRONT. BEHAV. NEUROSCI 160 (2010).

⁴ Joshua Greene & Jonathan Cohen, *For the Law, Neuroscience Changes Nothing and Everything*, 359 PHIL. TRANS. ROYAL SOC. B. BIO. SCI. 1775, 1785. Anthony R. Cashmore, *The Lucretian Swerve: The Biological Basis of Human Behavior and the Criminal Justice System*, 107 PROC. NATL. ACAD. SCI. 4499, 4504 (2010).

⁵ Stephen J. Morse, *Lost in Translation: An Essay on Law and Neuroscience*, in 13 CURRENT LEGAL ISSUES: LAW AND NEUROSCIENCE 529 (Michael Freeman ed., 2010) ch. 28.

⁶ Lisa G. Aspinwall, Teneille R. Brown & James Tabery, *The Double-Edged Sword: Does Biomechanism Increase or Decrease Judges' Sentencing of Psychopaths?*, 337 SCIENCE 846, 849 (2012).

neuroscientific evidence in the five-year period between 2008 and 2012. This database is a group source containing the full text judgements made available by Canadian courts to the company, and includes provincial and territorial courts (first instance and appeal) as well as the federal court (first instance and appeal) and the Supreme Court of Canada. This database does not include decisions from administrative boards and tribunals that play a role in the criminal process, such as the Review Boards, which consider the disposition of people found not criminally responsible by reason of mental disorder (NCRMD). The coverage of the boards and tribunals in the separate 'All Boards and Tribunals' database in LexisNexis Quicklaw is incomplete. Only two provincial Review Boards are represented and other relevant boards such as the Parole Board of Canada do not make their decisions searchable by the public. This study may be extended in future to include the decisions of those provincial Review Boards that are searchable. This might provide further information on how neuroscientific evidence is or is not being used in the context of risk assessment and prognosis in the case of offenders found incapable of criminal responsibility.

Multiple search terms were employed in an attempt to ensure comprehensiveness as well as to gain a picture of the frequency with which different types of evidence are presented, although this created overlapping results. All were reviewed according to the inclusion and exclusion criteria outlined below, and duplicates were discarded as the searches progressed. Table 1 lists the search terms, all of which included the term 'criminal' in addition to the listed phrases.⁷ For the purposes of this study, searches were conducted over the five-year period between January 1, 2008 and December 31, 2012.

These results were filtered according to the inclusion and exclusion criteria set out in Table 2 before being coded and included within a searchable database in Excel.

This filtering process produced a set of 279 cases, which were read more closely for inclusion in the database. In the course of analysing these cases, it became apparent that judges mentioned neuroscientific evidence in a range of different ways. This included discussions in which evidence of brain injury or cognitive impairment linked to some neurological cause was accepted as bearing upon an offender's responsibility, capacity, risk of recidivism, or prospects for rehabilitation ('evidence impact'). There were 133 cases in which discussions of this type occurred, and these cases were retained for further detailed analysis (see the section Results, below). The larger set of 279 cases also included 146 cases in which neuroscientific evidence was mentioned very briefly with no discernible impact, where comments were made on the significance of the lack of neuroscientific evidence, or for other purposes that are described in Table 3. These cases were not coded in detail for further analysis.

LIMITATIONS

Various limitations of this study affect the conclusions that may be drawn about the use of neuroscientific evidence in Canadian criminal cases. The discussion and conclusions should be read with these limitations in mind.

First, it is not known what proportion of the total number of Canadian criminal proceedings are included in the legal database from which our set of cases was drawn.

⁷ The search syntax in this database makes use of the expressions '/n' to indicate that words must fall within 'n' words of each other, and the exclamation point '!' indicates that all variants of the word after the truncated stem are to be included. Phrases included in quotation marks must be present exactly as written.

Table 1. Search terms.

<i>Search terms: 'criminal and....'</i>	<i>Results</i>
Brain /1 injury	433
Brain /3 abnormal!	10
Brain /3 (tumor or tumour)	27
(eeg or electroencephalo! or electro-encephalo!)	16
Brain /1 disorder	16
Brain /1 dysfunction	18
Neuro!	591
Neurotrans!	5
Amygdala!	1
Temporal /1 lobe	23
Executive /1 (control or function)	52
Organic /1 brain	39
'To the brain'	106
Brain /2 damage	211
('CT scan' or 'CAT scan' or tomog!)	154
('SPECT scan' or 'S.P.E.C.T. scan')	1
('PET scan' or 'P.E.T. scan' or positron /1 emission)	0
Frontal /1 lobe	47
Brain and automatis!	28
Seroton!	17
Dopamine!	7
(Mri or fmri or 'magnetic resonance')	111
(Fetal /1 alcohol or FAS!)	219
Head /1 injury and not 'brain injury' and not 'brain damage' and not 'to the brain' and not neuro! and not automatis! and not fetal alcohol and not FAS! and not mri and not 'CT scan' and not 'CAT scan' and not eeg	211
TOTAL	2342

Table 2. Inclusion and exclusion criteria.

	<i>INCLUSION</i>	<i>EXCLUSION</i>
Language of judgement	English	French
Type of case	Criminal (any stage of process)	Other (eg child welfare proceedings, civil lawsuits, immigration proceedings, constitutional cases not involving a criminal prosecution, etc.)
Type of evidence	Neuropsychological testing Neuroimaging Electroencephalography Medical history (eg head injury, infections affecting the brain, prenatal alcohol exposure)	Psychiatric or psychological testing (eg psychiatric diagnoses based on symptoms of mental illness). Forensic risk assessments Irrelevant neurological conditions (eg peripheral neuropathies) Transient intoxication or dissociation without discussions of permanent brain damage.
Subject of the neuroscientific evidence	Accused person or convicted offender	Victims, or others (eg witnesses)
Related proceedings		Other proceedings related to the same prosecution unless they appear independently in the keyword searches during the time period searched.

Furthermore, there are systematic biases in the type of decisions that are reported. For example, there will be no trial decision in cases in which an accused person pleads guilty, although a sentencing decision may be reported for those cases.⁸ In addition, in cases that do proceed to trial, no decision will be rendered in jury trials, although there may be a sentencing decision later reported in the case of convictions. As a result, we may expect to see more sentencing decisions than decisions on guilt within the sample. Even in proceedings where reasons must be given (such as at sentencing⁹), the reasons may not be reported to the legal databases. It is safe to say, however, that only a small fraction of proceedings are contained in the legal databases. Statistics Canada reports that

⁸ There is little up to date research on the frequency of plea bargaining in Canada, although it appears to be reasonably common. Simon Verdun Jones, *Plea Bargaining in CRIMINAL JUSTICE IN CANADA* 163, 177 (Michelle G. Grossman & Julian V. Roberts eds. 4th ed., 2012).

⁹ The Criminal Code of Canada, R.S.C. ch. C-46, § 762.2 (1985) requires that the judge enter the terms and reasons for sentence into the record of proceedings.

Table 3. Cases not coded in the further analysis.

<i>Reason</i>	<i>Description</i>	<i>Number of cases</i>
No discernible impact of the evidence	Brain damage was suggested but there was little detail included about the evidence, little discussion by the judge and no discernible impact on the outcome.	75
No evidence for claimed brain damage	Brain damage was suggested but it was explicitly rejected by the judge due to a lack of adequate evidence.	19
No apparent abnormality revealed by testing.	The judge comments that assessments for possible brain damage revealed no abnormalities.	16
Assessments for brain damage should be arranged by correctional authorities.	The judge's response to the issue of brain damage in the offender was to encourage correctional authorities to arrange proper assessment in order to tailor rehabilitation programs properly.	12
Comment on the absence of any brain damage as an explanation.	The judge explicitly points out that there is no evidence of brain damage in order to show that it (1) furnishes no explanation for behavior, memory gaps, or apparent intoxication, or (2) provides no argument that statements or pleas were involuntary.	8
Complaint about the lack of neuroscientific evidence	The judge observes that there should have been assessments for possible brain damage, or adjourns or delays proceedings in order to await this type of evidence.	6
Concern that incarceration would be particularly harmful due to an offender's brain damage.	The judge considers the possibility that incarceration would be a problem due to an offender's brain damage because incarceration would aggravate a medical condition, put the offender's safety at risk (eg due to mistreatment by other prisoners) or impede rehabilitation.	6
Lack of brain damage is interpreted as positive for possible rehabilitation efforts.	The judge notes that the absence of brain damage will facilitate treatment and rehabilitation efforts, or allows for more optimism about the potential success of those efforts.	2
Brain damage suffered in the criminal event or later in jail is considered as mitigating.	The judge notes that the offender has already been punished by injuries incurred during the criminal act, or has suffered an injury in jail (usually while awaiting trial).	2
TOTAL		146

about 386,000 to 410,000 cases were completed per year in adult criminal courts in Canada during the study period, although it cautions that this underestimates the total given a lack of data from a large number of provincial superior courts.¹⁰ Youth court statistics for the same period were about 48,000 to 58,000 per year.¹¹ A crude estimate of the annual volume of criminal cases reported in the legal database used in this study ('All Canadian Court Cases' LexisNexis Quicklaw) is about 10,000.¹² This overestimates the proportion of criminal cases reported in the database because this number includes cases that were not actually criminal cases despite containing the word 'criminal', and it will also include multiple proceedings in the same case (eg procedural and evidentiary motions, trial, sentencing decisions, etc.) Nonetheless, this crude measure suggests that about 2 per cent (and much likely fewer) of the total number of criminal cases generate reported decisions. Despite this, the legal databases offer the best source of data for a study of this type because they offer the most comprehensive searchable collection of legal decisions available in Canada. Furthermore, it is only reported decisions that form part of the body of legal precedent in the Canadian legal system. As a result, it is only the reported decisions that may be invoked in future decisions as a statement of Canadian law within the Canadian common law system. Thus, while the reported case law may not offer a robust foundation upon which to make general statements about what is currently occurring in all types of cases in all Canadian criminal courts, it does offer a good picture of the law that may be cited as persuasive and binding precedent in future cases.

Other limitations may also exist. It is possible that relevant cases may have been missed although considerable effort was made to cast a wide net by using a large number of alternative search terms. The study excludes French language decisions and so it does not capture the use of neuroscientific evidence from provinces in which cases are mostly reported in French (eg Quebec). Finally, another set of limitations has to do with the analysis of those decisions that were located and included in the study. The decisions reflect a judge's understanding of the evidence as well as his or her choices about what to include in the reasons for the decision. A deeper understanding of the type of evidence presented, and of the judge's use of that evidence could be obtained in future research by examining the transcripts and case files. Finally, as is the case with qualitative analyses, some subjective interpretation of the stated reasons for judgement is inescapable in identifying the sometimes implicit impact of neuroscientific evidence on the decisions. Furthermore, some imprecision is introduced by the need to fit a wide variety of cases into a limited set of categories that provides an adequate depiction of the data while at the same time remaining manageable and informative.

¹⁰ Jillian Boyce, Table 1 Charges and Cases Completed in Adult Criminal Court, Canada 2005/2006 to 2011/2012 in *Adult Criminal Court Statistics, 2011/2012*, STATISTICS CANADA (2013), <http://www.statcan.gc.ca/pub/85-002-x/2013001/article/11804-eng.htm> (accessed May 23, 2015).

¹¹ Mia Dauvergne, Table 1 Charges and Cases Completed in Youth Court, Canada 21991/1992 to 2011/2012 in *Youth Court Statistics in Canada, 2011/2012*, STATISTICS CANADA, <http://www.statcan.gc.ca/pub/85-002-x/2013001/article/11803-eng.htm>. (accessed May 23, 2015)

¹² This estimate was produced by searching for the words "criminal or criminel" in the period between Jan. 1 and Dec. 31, 2011. The English and French language terms are used to capture decisions in both official languages. This search generated 10,029 hits in this period.

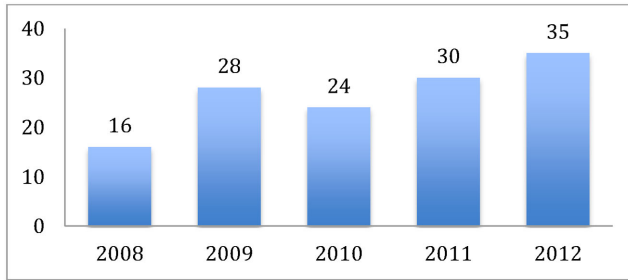


Figure 1. Total number of cases mentioning one or more types of neuroscientific evidence per year. (These data are presented broken down by evidence type in the Appendix, Table A1.)

RESULTS

The 133 cases retained in this study were analysed and coded in detail in order to understand the type of neuroscientific evidence mentioned, the context in which the neuroscientific evidence was considered (ie stage of the criminal proceeding), the charges that were associated with the use of the neuroscientific evidence, the ethnicity of the offenders in these cases, and finally the impact of the neuroscientific evidence on the outcome.

Trend in the presence of neuroscientific evidence

Over the five years reviewed in this study, there appears to be an upward trend in the number of cases in which evidence of brain injury or cognitive impairment linked to some neurological cause was accepted as bearing upon an offender's responsibility, capacity, risk of recidivism, or prospects for rehabilitation ('evidence impact') (Fig. 1).

Type of neuroscientific evidence

The three most common types of neuroscientific evidence mentioned in the set in each of the five years for which the data are being presented were evidence of prenatal alcohol exposure [fetal alcohol spectrum disorder ('FASD'), fetal alcohol effects ('FAE'), or alcohol-related neurodevelopmental disorder ('ARND')], traumatic brain injuries ('TBI'), and neuropsychological testing (Fig. 2).

As noted above, the dataset includes only those cases in which evidence is suggested for a neurological cause of cognitive impairments and behavioral problems, and the Canadian criminal courts evidently encounter a much larger group of cases involving cognitive and behavioral problems than is represented here. By far the most common neuroscientific evidence mentioned has to do with the diagnosis of impairments due to prenatal alcohol exposure. As will be discussed later, this does not necessarily mean that this form of brain damage is more common within the population of accused persons and criminal offenders than other forms of neurological damage, but may instead reflect that it is more commonly raised and better documented than other types. In fact, it would appear that some level of TBI is quite common among criminal offenders. Williams reviews the evidence from multiple countries linking TBI to an increased risk of criminal offending, concluding that '[w]hile less than 10 per cent of the general population has experienced a head injury, studies from across the world have typically

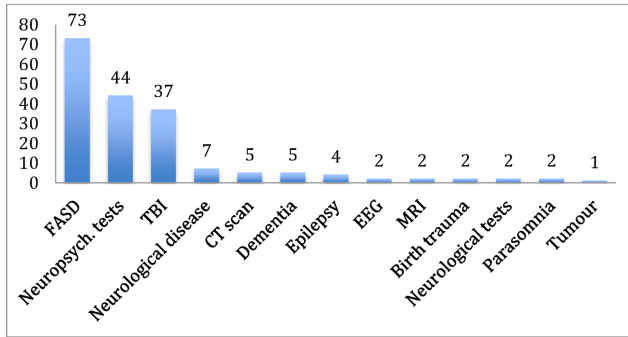


Figure 2. Number of references to each evidence type ($n = 186$). (Note that within the set of 133 cases, certain cases referred to several types of neuroscientific evidence. These data are presented broken down by year in the Appendix, Table A1.)

shown that this is between 50–80 per cent in offender populations'.¹³ Recent evidence from Canada is consistent with this observation. Colantonio et al. recently found that 50 per cent of men and 38 per cent of women in a sample of Ontario inmates reported a history of TBI.¹⁴

Neuropsychological testing (such as IQ, memory, executive function, and other tests that look for abnormalities or defects in cognitive functioning often associated with brain damage) is not a novel form of neuroscientific evidence, nor is a medical history of brain injury. These are nonetheless included here and are of interest as forms of well-established brain-related evidence that can shed light on how the courts react to evidence meant to explain and sometimes excuse behavior or to shed light on recidivism risk and treatment options. If and when other forms of neuroscientific evidence enter Canadian courts, they may be treated in similar ways.

Brain imaging and electroencephalography were infrequently mentioned in the set of cases. A supplementary search of the same database of Canadian case law updated to August, 2014 reveals only two cases making reference to fMRI or functional magnetic resonance imaging, neither of which involve a criminal matter. One case from 2013 was a civil case involving end of life decision-making for a severely brain-injured patient and refers to the work of Dr Adrian Owen in using fMRI to detect covert awareness in patients thought to be in a vegetative state or minimally conscious.¹⁵ The other case had to do with a constitutional challenge to the statutory cap on insurance recovery for minor injuries suffered in motor vehicle accidents, and contains a discussion of expert evidence related to the neuroanatomy of post-traumatic stress disorder.¹⁶

¹³ Huw Williams, *Repairing Shattered Lives: Brain Injury and its Implications for Criminal Justice*. REPORT COMMISSIONED BY THE BARROW CADBURY TRUST (2012), <http://www.barrowcadbury.org.uk/wp-content/uploads/2012/11/Repairing-Shattered-Lives-Report.pdf> (accessed May 23, 2015).

¹⁴ Angela Colantonio et al., *Traumatic Brain Injury and Early Life Experiences among Men and Women in a Prison Population*, J. CORRECT. HEALTH CARE (2014). DOI: 10.1177/1078345814541529

¹⁵ Ng v. Ng (Committee of) 2013 BCSC 97.

¹⁶ *Hartling v. Nova Scotia (Attorney General)* 2009 NSSC 2.

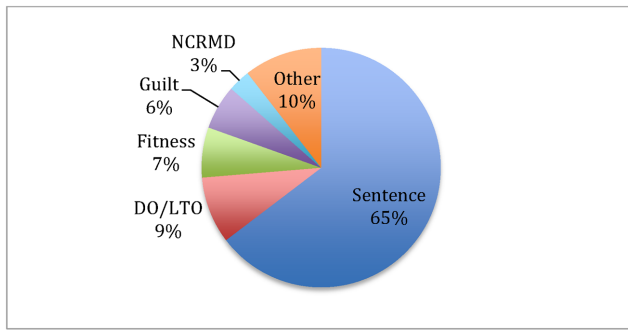


Figure 3. The context in which the neuroscientific evidence is considered. (These detailed data are presented in tabular form in the Appendix, Table A2.)

Context in which the neuroscientific evidence was considered

The set of 133 cases included 112 cases before judges at first instance (including pre-trial procedures related to bail (release pending the judicial hearing), motions (proceedings related to the admissibility of evidence, the validity of pleas, challenges to the suitability of jurors, etc.), trials before judge alone,¹⁷ sentencing hearings (including applications for dangerous or long-term offender designation), and judicial reviews of decisions by the Review Boards (the bodies that review the dispositions made in relation to offenders found not criminally responsible by reason of mental disorder). Another 21 cases were heard by Provincial Courts of Appeal, sitting with a panel of three judges. These appeal cases primarily involved appeals from sentencing decisions, but there were also appeals from Review Board decisions, decisions related to fitness to stand trial, and appeals from acquittals and convictions.

Neuroscientific evidence was most commonly mentioned in sentencing decisions and decisions on whether to designate an offender as a dangerous or long-term offender ('DO' or 'LTO'), as indicated in Fig. 3 (above). The DO and LTO designations may be sought in the case of serious repeat offenders who pose a reasonably high recidivism risk. Dangerous offenders are those who have committed a serious personal injury offense and are thought to pose a reasonable likelihood of causing death or serious harm to others in the future. They may be subject to an indeterminate period of preventive detention that extends beyond the sentence applied for their crime. Long-term offenders have committed serious offenses and pose a substantial risk of re-offense, but a finding is made in their cases that there is a reasonable possibility that this risk may be controlled in the community. Both types of offender may be subject to long-term supervision orders ('LTSO') of up to 10 years, which are meant to monitor and control risk.

The frequency of sentencing and DO/LTO decisions in our set of cases is not surprising for several reasons. First, the Canadian Criminal Code requires courts to provide reasons for the sentence imposed.¹⁸ While this does not mean that those reasons will be reported to legal databases such as LexisNexis Quicklaw, it does increase the

¹⁷ Criminal trials in which juries decide on the facts of the case do not generate written reasons for the finding of guilt, innocence or non-responsibility due to mental disorder.

¹⁸ Criminal Code, R.S.C. 1985, ch. C-46, §.762 (2) (1985).

chance that this stage of the criminal proceeding will be available. In contrast, decisions to acquit or convict will produce reasons only where the trial takes place before a judge alone and not in the case of jury trials,¹⁹ leading to fewer reasons for verdict potentially being reported than for sentence.

Second, information related to the background and character of the offender may be made available either through pre-sentence reports prepared by probation officers or through evidence introduced by the defense or the Crown. The Court may order pre-sentence reports for the purpose of sentencing, which comment on offenders' 'age, maturity, character, behaviour, attitude and willingness to make amends' as well as on the offenders' responses to alternative measures used to deal with them in the past, if any.²⁰ These reports often comment on the general background, family, education, employment record, physical, and mental health of the offender among other things. In addition, the defense and Crown may introduce evidence about the background of the offender, and hearsay evidence is admissible.²¹ In the case of DO/LTO applications, an expert assessment must be prepared, and typically includes information about the offender's background, mental health, and recidivism risk.

In addition, Aboriginal Canadians are overrepresented within the criminal justice system. The Supreme Court of Canada has noted that the history of cultural dislocation and dispossession experienced by Aboriginal communities has contributed to this overrepresentation.²² The Canadian government has specifically addressed Aboriginal offenders in the Criminal Code of Canada, which states that 'all available sanctions other than imprisonment that are reasonable in the circumstances should be considered for all offenders, with particular attention to the circumstances of [A]boriginal offenders'.²³

The Supreme Court of Canada interpreted this provision in the case of *R. v. Gladue*,²⁴ where it directed sentencing judges to consider the 'unique systemic or background factors which may have played a part in bringing the particular aboriginal offender before the courts', and 'the types of sentencing procedures and sanctions which may be appropriate in the circumstances for the offender because of his or her particular aboriginal heritage or connection'.²⁵ While the offender may waive the right to have particular attention paid to his or her circumstances as an Aboriginal offender, the Supreme Court has made it clear that there is a duty resting on counsel to adduce relevant evidence to assist the judge, and, where counsel does not (eg if the offender is unrepresented), the judge must attempt to acquire this information.²⁶ This has led to the practice of preparing what are called 'Gladue reports'. Thus, evidence related to brain damage is very likely to come before the courts within the sentencing context where Aboriginal offenders are involved, particularly where that brain damage is related to conditions of deprivation that are attributable to those systemic or background factors that tend to disadvantage Aboriginal communities in general.

¹⁹ STEVEN PENNEY, VINCENZO RONDINELLI & JAMES STRIBOPOULOS, *CRIMINAL PROCEDURE IN CANADA* 689 (2011).

²⁰ Criminal Code, R.S.C. ch. C-46, §721(3) (1985).

²¹ Criminal Code, R.S.C. ch. C-46, §723 (1985).

²² *R. v. Gladue* [1999] 1 S.C.R. 688, para. 67, 68.

²³ Criminal Code, R.S.C. ch. C-46, §718.2(e) (1985).

²⁴ *R. v. Gladue* [1999] 1 S.C.R. 688.

²⁵ *Id.* para. 93.

²⁶ *Id.* para. 83, 84.

Evidence about mental capacity is also relevant on the question of guilt prior to sentencing because it may satisfy the high threshold required for a finding that the offender is not criminally responsible by reason of mental disorder, or call into question the capacity to form the specific intent for a particular crime and lead to a finding of guilt on a lesser included offense (eg a person unable to form the requisite intent to commit murder might be found capable in relation to the lesser offense of manslaughter).²⁷ However, evidence of mental incapacity is relevant at sentencing for a broader range of purposes than at the stage of assessing guilt for the offense charged. Not only does it bear upon moral blameworthiness, but also upon the whole range of consequentialist objectives of punishment such as deterrence, rehabilitation, and public protection via incapacitation of the offender.²⁸ The predominance of sentencing cases in this dataset thus enables a broad range of potential uses of neuroscientific evidence to be explored. Moral blameworthiness is not supposed to be at issue in dangerous and long-term offender applications, where the courts are directed to consider the issue of whether measures to protect public safety will be required at the conclusion of an offender's sentence for the index offense.

The charges associated with neuroscientific evidence

Many of the cases in the set of 133 in this study included multiple offenses. In order to simplify the categorization and to try to identify whether the type of neuroscientific evidence presented varies by offense type, the offenses were grouped in broad categories arranged in Table 4. The order roughly tracks the seriousness of the offense type as demonstrated by the median length of incarceration in Canada.²⁹ Of course there is a fair amount of variation in seriousness and sentencing within many of these categories.

Where a case in our set involved multiple charges it was assigned to the category of the most serious charge, on the assumption that this would be the major factor in the sentencing. The most frequent offense types in the dataset are the more serious offenses of sexual assault (28 cases), homicide (23 cases), assault (20 cases), and robbery (19 cases). It is not possible on the basis of this dataset to explain the skewing toward the more serious offenses, but there are a variety of possible explanations for this pattern. The higher prevalence of the more serious offenses may be due to an increased likelihood that decisions in more serious cases will be reported to the legal database. It could also be due to an increased likelihood that neuroscientific evidence will be presented in the more serious cases, or it may be the case that offenders with brain injuries have an increased risk that their offenses will include serious offenses when compared to other offenders.

Ethnicity of the offenders

In the majority of the cases, the ethnicity of the accused or offender was not specified. The one exception relates to Aboriginal persons, where ethnicity is usually mentioned for the reasons mentioned above related to *Gladue* reports and the legislative direction

²⁷ HY BLOOM & RICHARD D. SCHNEIDER, MENTAL DISORDER AND THE LAW 132 (2013).

²⁸ *Id.* at 230; Criminal Code, R.S.C. ch. C-46, § 718, 718(1) (1985).

²⁹ The data collected by the Government of Canada for adult criminal court sentences in 2011–12 were used to identify the typical sentences imposed by offence type in Canada: Statistics Canada, *Adult Criminal Court Statistics in Canada 2011/2012*. JURISTAT (2013), <http://www.statcan.gc.ca/pub/85-002-x/2013001/article/11804/tbl/tbl05-eng.htm> (accessed May 23, 2015).

Table 4. Number of cases per offense category.

<i>Group name</i>	<i>Types of offenses in our dataset</i>	<i>Number of cases</i>
Homicide	First degree murder	23
	Second degree murder	
	Manslaughter	
	Attempted murder	
Robbery	Robbery	19
Sexual assault	Sexual assault and aggravated sexual assault against adults	28
	Sexual offenses against children including child pornography	
Drugs	Trafficking and importation	6
Break and Enter	Break and enter	8
Assault	Assault and aggravated assault	20
Motor	Impaired driving	12
	Dangerous driving	
Threats	Threats, criminal harassment, extortion, and intimidation	3
Theft	Theft and fraud	9
Other	Miscellaneous	5
Total		133

to consider the circumstances of Aboriginal offenders in particular. This serves to explain the pattern in our cases that is set out in Fig. 4.

As was noted above, Aboriginal Canadians are overrepresented in the criminal justice system. The proportion of Aboriginal offenders in the dataset (38 per cent) exceeds the proportion of Aboriginal offenders in the federal correctional system (19 per cent in 2011–12) and in Canadian society in general (15 per cent).³⁰ As explained earlier, the courts are required to consider systemic background reasons for the criminal offending in the case of Aboriginal offenders, and so evidence about brain damage is perhaps more likely to be investigated and mentioned in relation to Aboriginal offenders than others. The type of neuroscientific evidence mentioned most often in the cases of Aboriginal offenders has to do with brain damage due to prenatal alcohol exposure (FASD) (see Fig. 5, below). Of course, FASD occurs in the non-Aboriginal population in Canada as well. Indeed, of the 73 cases in which evidence of prenatal alcohol exposure was cited,

³⁰ Public Safety Canada 2012 *Corrections and Conditional Release Statistical Overview* (2012), <http://www.publicsafety.gc.ca/cnt/rsrccs/pblctns/2012-ccrs/index-eng.aspx#c16> (accessed May 23, 2015).

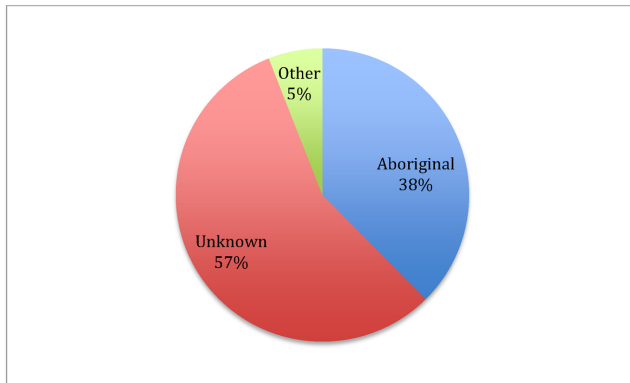


Figure 4. Ethnicity of the offender ($n = 133$). (The detailed data broken down by year and ethnic category are presented in the Appendix, Table A3.)

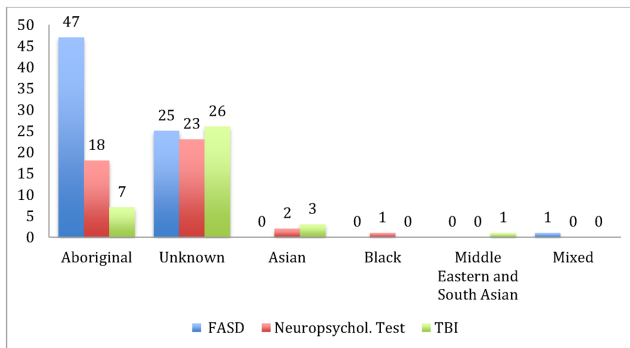


Figure 5. Frequency with which the three most common types of neuroscientific evidence were presented by ethnic group. (The detailed data are presented in tabular form in the Appendix, Table A4.)

25 related to offenders of unknown ethnicity and 47 involved offenders identified as Aboriginal (Fig. 5). It is possible that the numbers of non-Aboriginal offenders affected in this way is actually higher than it appears if there is a reduced tendency to look for this problem in the non-Aboriginal population so that cases are not identified and mentioned at sentencing. Unfortunately, there do not seem to be confirmed statistics on the prevalence of FASD and associated conditions in Canada, although a 2006 Canadian government estimate is 0.9 per cent of births, with the rate ‘significantly greater in Aboriginal populations, and in rural, remote and northern communities’.³¹

³¹ Health Canada, *Fetal Alcohol Spectrum Disorder: It’s Your Health* (2006), <http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/diseases-maladies/fasd-etcaf-eng.php> (accessed May 23, 2015).

The impact of the neuroscientific evidence

The impact of the neuroscientific evidence was often challenging to identify in the legal decisions. As noted above, a fairly large proportion of cases were excluded on the basis that there was no apparent impact of the neuroscientific evidence. Many of these cases lacked any real discussion of the evidence apart from a perfunctory reference to a possible historical head injury, for example, and no discussion of its significance. These cases were all coded as having had no impact (Table 3). In the remaining set of 133 cases, one finds a range of types of impact of the neuroscientific evidence. These have been divided into several themes in Table 5, below.

As expected due to the prevalence of sentencing decisions in the dataset, questions about whether brain damage was a mitigating or an aggravating factor at sentencing predominated (104 of 140 instances of impact of neuroscientific evidence in the 133 cases). The results suggest that the presence of evidence of brain damage as an explanation for criminal behavior can be helpful to offenders, serving to mitigate moral blameworthiness. This is not a risk-free strategy however. Even for judges who mentioned a reduction in moral blameworthiness, a large number of cases showed that judges viewed brain damage as a source of increased risk of recidivism or pessimism about treatment. They weighted incapacitation and public protection more highly or focused on how to obtain intensive supervision, treatment, and control for the purposes of rehabilitation. For an offender preferring liberty, neither reaction is desirable.

It is challenging to draw robust conclusions from a limited set of cases. Further difficulties stem from the imprecision introduced in trying to interpret and categorize legal texts that are rarely specific about the exact impact of the neuroscientific evidence alone. However, the following analysis attempts to identify some patterns as a basis for further exploration of how this type of evidence is currently being used by Canadian criminal courts and how it might come to be used in future.

When one separates out the type of impact of the neuroscientific evidence by type of charge, certain suggestive patterns are revealed. The following analysis should be read with the caveat in mind that the numbers of cases are small, and that there is considerable variation in the nature of the offenses and the offenders within the categories, both of which make it difficult to identify reliable patterns in the impact of the neuroscientific evidence.

One pattern is that explicit judicial statements that brain damage *does not* mitigate responsibility are more likely toward the more serious end of the offense spectrum, whereas explicit statements that it *does* mitigate responsibility are more evenly spread (Fig. 6). This may be because the potential public safety (and possibly psychological) costs of recognizing diminished responsibility are higher for more serious offenses.

Another pattern is that there appears to be a greater focus on public safety, treatment and recidivism risk as opposed to moral blameworthiness in relation to sexual offenses than for the other violent offenses of homicide, robbery, and assault (Fig. 7). This is consistent with the statistics in Canada for the preventive detention of dangerous offenders. Seventy five per cent of those designated dangerous offenders in Canada have had at least one conviction for a sexual offense.³²

³² Public Safety Canada, 2012 *Corrections and Conditional Release Statistical Overview* (2012), <http://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/2012-ccrs/index-eng.aspx> (accessed May 23, 2015).

Table 5. Impact of the neuroscientific evidence in the cases (2008–12).

<i>Evidence impact</i>	<i>Description</i>	<i>Number of cases</i>
Factors affecting sentencing		
Reduces moral blame	Statement that the impairments due to brain damage diminish the responsibility of the offender.	35
Mixed reaction	The acknowledgment that the offender is not at fault for brain damage is paired with concern about increased risk to public safety due to that brain damage.	25
Hopes or suggestions for treatment and risk reduction	Statements that certain forms of treatment, assessment, or supervision ought to be attempted to meet the risk posed by the offender.	19
Pessimism about treatment and risk reduction	Suggestions that due to brain damage, prospects for treatment and risk reduction are very poor.	18
Does not reduce moral blame	Explicit suggestion that the presence of brain damage does not reduce the moral blameworthiness of the offenders' acts.	7
Factors affecting determination of guilt (mens rea)		
No responsibility	A small number of cases involved evidence on the point of whether the offender was not criminally responsible due to involuntariness [seizures or dissociative states ('automatism')], or mental disorder sufficiently severe to meet the threshold for non-responsibility (Huntington's disease, dementias, tumors, or severe cognitive impairment due to prenatal alcohol exposure or head injury).	11
Explanation of impairment	One case relied upon the accused's multiple sclerosis and Parkinson's disease in the motor vehicle context to explain that impairment was not due to alcohol intoxication.	1
Factors affecting fitness determinations		
Fitness to stand trial	A set of cases used the neuroscientific evidence to assess whether the offender met the relatively low threshold of cognitive capacity required to be fit to stand trial.	10

Table 5. Continued

Evidence impact	Description	Number of cases
Factors affecting the admissibility of statements or the validity of guilty pleas		
Operating mind	Statements to police were excluded in some cases because they were not the product of an operating mind or guilty pleas were rejected as insufficiently informed due to the reduced capacity of the offender.	6
Other		8
Total^a		140

^aThe number exceeds 133 because the neuroscientific evidence was used for multiple purposes in some cases.

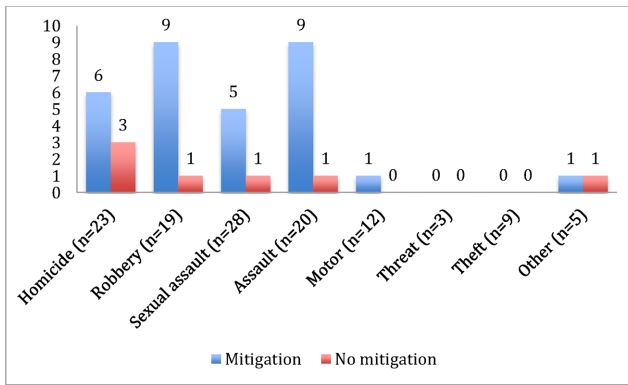


Figure 6. Frequency of judicial statements that brain damage mitigates or does not mitigate responsibility by offense type. (The detailed data are presented in Appendix, Table AS.)

There are other possible reasons for this pattern—one is the higher perceived rate of recidivism among sex offenders than among other offenders although this does not appear to be the case for sex offenders as a general category.³³ One more speculative idea is that the focus is shifted toward risk control in the case of sex offenses due to the availability of direct ‘biological’ methods of behavioral control with anti-androgen drugs (so-called chemical castration), whereas biological methods of control may be less available for other types of violent offending.

In the more serious categories of offense, statements showing pessimism about the prospects for treatment outstripped more hopeful statements. Indeed, a kind of treatment nihilism in the case of offenders with more serious cognitive limitations due to brain damage was mentioned in 18 judgements (Table 5, pessimism, above). In addition, within the set of cases that were excluded from the full analysis, a couple of judges

³³ Stacey Katz-Schiavone, Jill S. Levenson & Alissa R. Ackerman, *Myths and Facts about Sexual Violence: Public Perceptions and Implications for Prevention*, 15 J. CRIM. JUST. POP. CULTURE 291, 311 (2008).

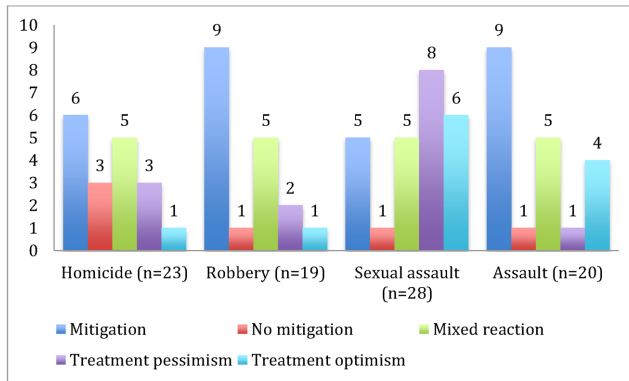


Figure 7. Frequency of cases in which neuroscientific evidence affects judgements of responsibility (mitigation or no mitigation), treatment and risk (optimism or pessimism), or mixed reactions by offense type. (The detailed data are presented in Appendix, Table A5.)

commented that the absence of brain damage created optimism for successful treatment and risk control (Table 3, above). For example, the judge in *R. v. Duff*³⁴ quoted the therapist who contributed to the pre-sentence report to the effect that there were numerous factors suggesting reduced risk including that the offender had ‘no indications of organic brain syndrome’³⁵ That being said, the judge in that case based the sentence primarily upon denunciation and focused on moral responsibility. In contrast, in *R. v. P.N.*,³⁶ the judge cited the absence of neurological deficits as a factor justifying sentencing two young offenders under the more lenient rules applicable to youths and not as adults as requested by the Crown:

... They have no neurological deficits, or brain damage, or intellectual deficits which prevent them from being unable to control violent impulses. This is to be differentiated between people who are, for example, suffering from Fetal Alcohol Syndrome, or who suffer from brain damage, or who have some other intellectual deficit which makes it difficult or impossible to control their impulses, violent or otherwise. This does not exist here.³⁷

Another predictable pattern is that the impact of neuroscientific evidence in the dangerous and long-term offender context has to do with risk and treatability (Fig. 8, below), unlike the other sentencing cases in which there are also discussions of moral blameworthiness (Fig. 9, below). This is to be expected given that the Criminal Code specifies that the fundamental principle of sentencing in the usual case is that ‘a sentence must be proportionate to the gravity of the offense and the degree of

³⁴ 2010 ONCJ 493, a case involving a 51-year old man who pleaded guilty to two counts of possession of child pornography.

³⁵ *Id.* para. 9.

³⁶ 2008 BCPC 32, a case involving two youths (15 and 17 years old at the time) who pleaded guilty to an aggravated assault on another youth, which caused a brain injury and permanent neurological damage to the victim.

³⁷ *Id.* para. 52.

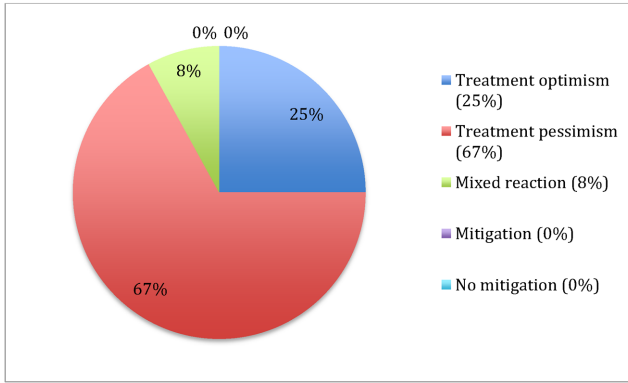


Figure 8. Impact of neuroscientific evidence in dangerous offender and long-term offender application cases ($n = 12$). (Detailed data are presented in the Appendix, Table A6.)

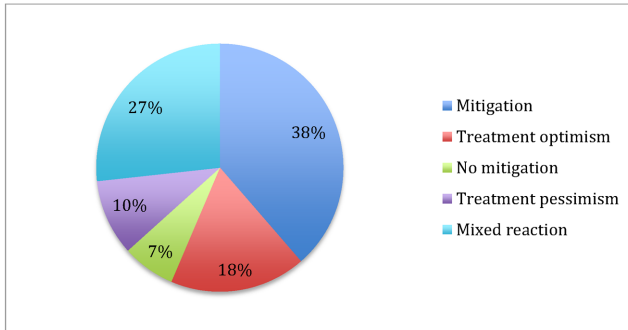


Figure 9. Impact of neuroscientific evidence in sentencing [non-dangerous or long-term offender ('DO' or 'LTO')] cases ($n = 90$). (Detailed data are presented in the Appendix, Table A6.)

responsibility of the offender'.³⁸ These criteria for designating offenders as dangerous or long-term offenders, on the other hand, are restricted to issues of risk and the prospects for control of that risk by treatment or other means. Moral blameworthiness and proportionality between the sentence and the crime are applied to the index offenses for which dangerous and long-term offenders are punished, but these considerations are usually not the central focus in deciding whether to designate them DO/LTO or what additional preventive measures to apply to forestall future offending.

DISCUSSION

The double-edged nature of neuroscientific (or other biological) explanations of criminal behavior is well known.³⁹ Offenders whose behavior is attributed to biological disorders are considered less morally blameworthy due to their presumed diminished capacity. At the same time, if these disorders are considered irremediable, they increase

³⁸ Criminal Code, R.S.C. ch. C-46, §718 (1) (1985).

³⁹ Aspinwall et al., *supra* note 6, at 846.

the perception that the risk of recidivism is uncontrollable. It is at sentencing that these two reactions, often simultaneous, come into conflict since reduced moral blameworthiness is mitigating while risk to the public is aggravating.

This study of the use of neuroscientific evidence in Canadian criminal cases produced a dataset largely made up of sentencing decisions (65 per cent), in which the most frequently mentioned types of neuroscientific evidence had to do with prenatal alcohol exposure (39 per cent), neuropsychological testing (24 per cent) or TBI (20 per cent). These cases illustrate that this double-edged sword applies in Canadian criminal cases. At sentencing, evidence of brain damage was sometimes said to be mitigating (38 per cent), but nearly equally as often the evidence was not necessarily beneficial. In 27 per cent of the sentencing decisions, it was cited as a reason for pessimism about rehabilitation or public safety and in another 7 per cent the judge explicitly refused to recognize any mitigating impact of the evidence.

As for the judges' attitude toward treatment, judges sometimes cited the evidence in a hopeful or positive manner, making suggestions as to how an offender's brain damage might be best addressed to reduce risk and promote rehabilitation (18 per cent), but in 17 per cent of the cases they were pessimistic about the future because of the brain damage. These numbers reflect the mixture of sentencing and DO/LTO decisions. The balance is slightly more favorable for general sentencing (18 per cent hopeful and 10 per cent pessimistic) but overwhelmingly negative in dangerous and long-term offender decisions (25 per cent hopeful and 67 per cent pessimistic), contributing to the decision that risk management would be difficult or impossible.

The cases reviewed in this study show the 'double-edged' sword of neuroscientific explanations of criminal behavior (sometimes invoking the sword metaphor itself). For example, in *R. v. Zaakir*,⁴⁰ the judge sentenced a 20-year-old offender with brain damage due to FASD for several offenses including theft. The judge noted that FASD contributed to his behavioral problems and his lack of success in treatment, but considered that there is no cure for FASD and that the protection of the public required incarceration.⁴¹ Zaakir's lawyer argued against incarceration on the ground that it would not serve the goal of specific deterrence due to the offender's difficulty in learning from the consequences of his actions due to FASD. The judge responded that:

[t]he FASD sword cuts both way however. It also interferes with the effectiveness of programs aimed at rehabilitating offenders. It also gets in the way of promoting a sense of responsibility in offenders and acknowledgement of the harm done to victims and to the community. The only principle of sentence not adversely impacted by FASD is removal of the offender from the community.⁴²

Cases illustrating the way in which evidence of brain damage may mitigate blameworthiness, and may also be considered important for crafting sentences with the greatest hope for success in rehabilitation include *R. v. Harper*,⁴³ where the judge sentenced a man for the sexual assault of a 13-year-old girl. He had severe FASD and a lengthy criminal history including four other convictions for sexual assault. Despite the seriousness of

⁴⁰ 2011 ONCJ 862.

⁴¹ *Id.* para. 58.

⁴² *Id.* para. 61, 62.

⁴³ 2009 YKTC 18.

his offense, he received a significantly lighter sentence because of his FASD.⁴⁴ The judge noted that it was ‘manifestly unfair to make an individual pay for their disability with their freedom’,⁴⁵ the utility of specific deterrence was reduced due to Harper’s FASD-related cognitive deficits,⁴⁶ and general deterrence in a case like this would amount to using a cognitively disabled man as a ‘whipping boy ... in order to deter others who should [be] and are capable of knowing better’.⁴⁷ In the judge’s view, only public safety and rehabilitation are appropriate goals in sentencing FASD-affected offenders:

I am of the opinion that separation (where necessary for the protection of society) and rehabilitation should be the primary focus of judges involved in sentencing FASD-affected offenders. Separation does not equate with jail, however. Separation can and should be achieved in a secure community setting in most instances. We do not jail children under the age of 12 in Canada and when they are under the age of 18 years, they are detained separately from adults. FASD-affected individuals who function at the level of children should only be placed in jail as a last resort and then in a facility separate from adults in order to avoid the victimization experienced by Mr. Harper when he was in custody. Similarly, rehabilitation for Mr. Harper must accommodate his cognitive disabilities and can not be achieved through typical offender programming.⁴⁸

On the other hand, an FASD diagnosis is sometimes cited to explain why a more onerous sentence is required to protect the public. In *R. v. Becker*,⁴⁹ the judge refused the defense request for a conditional sentence to be served in the community and incarcerated an offender with FASD, possible brain injury, ADHD, and substance abuse. One of the reasons cited for rejecting the defense request was that Becker’s behavioral problems were ‘both challenging to treat and difficult to manage’⁵⁰ so that a conditional sentence would not adequately protect public safety. An extreme case, cited by Roach and Bailey in their study of FASD cases in Canada is *R. v. I.D.B.*⁵¹ IDB was convicted of the sexual assault and murder of his support worker when he was 14 years old.⁵² A preliminary issue in the case was whether he should be transferred to adult court, where he would be exposed to the much longer sentence of life imprisonment. The judge decided he should be sentenced as an adult because he concluded that IDB could not be rehabilitated given the severity of his disabilities and required life-long supervision—something that could not be imposed under the sentencing options for youth offenders. The Court of Appeal dismissed IDB’s appeal of the transfer, stating that:

[t]he evidence reinforces the inescapable conclusion [that this youth’s condition is so severe that rehabilitation cannot be expected to reduce the risk of his re-offending, nor can it provide the necessary supervision this condition requires for the rest of his life. From the

⁴⁴ *Id.* para. 61.

⁴⁵ *Id.* para. 38.

⁴⁶ *Id.* para 43, 46.

⁴⁷ *Id.* para. 47.

⁴⁸ *Id.* para 48.

⁴⁹ 2009 ABPC 227.

⁵⁰ *Id.* para. 41.

⁵¹ Kent Roach & Andrea Bailey, *The Relevance of Fetal Alcohol Spectrum Disorder in Canadian Criminal Law from Investigation to Sentencing*, 42 UBC LAW REV. 1, 68 (2009).

⁵² 2005 ABCA 99, aff’g 2004 ABPC 219; 2005 ABQB 421.

totality of the evidence, it is clear that the two objectives of protection of the public and rehabilitation cannot be reconciled. Protection of the public accordingly must prevail.⁵³

Subsequently, the sentencing judge observed that ‘[e]verything that I have heard or read indicates to me unfortunately that this young man, through no fault of his own, is likely beyond redemption’,⁵⁴ and sentenced him to life imprisonment.

Thus, from the defense perspective, the question of whether to pursue and present evidence of brain damage is an important strategic issue. This question intersects in interesting ways with current calls for reform of the manner in which the Canadian criminal justice system addresses FASD. In marked contrast to the other parallel studies being conducted in the United Kingdom, the Netherlands, Singapore and Malaysia and the United States, FASD is a prominent part of this dataset. FASD is also currently a topic of considerable discussion in the legal community in Canada and in Parliament. There have been multiple recent calls for reform to the rules of criminal procedure to enable judges to order FASD assessments of adult offenders, as well as calls for the amendment of the Criminal Code to specify that FASD should be deemed to be a mitigating factor at sentencing.⁵⁵ A private member’s bill was introduced in Parliament in 2014 that would have made both of these changes.⁵⁶ During the parliamentary debates on the Bill, the spokesperson for the Minister of Justice raised several concerns about the Bill and proposed that the matter be referred to a committee for further study. One of the concerns had to do with why FASD should be the only mental disability addressed.⁵⁷ Although issues related to how brain damage due to FASD is treated in the Canadian criminal justice system are very much in the public eye in Canada, these issues can be generalized to offenders with brain damage due to other causes as well.

One of the reforms proposed has been to increase the assessment and diagnosis of offenders by enabling judges to order assessments for FASD. However, it is unclear whether an offender will benefit from an explicit diagnosis of brain damage. The reform proposals are motivated by the hope that the diagnosis will enable an appropriate acknowledgement of an offender’s reduced moral blameworthiness and may support the crafting of sentences that may ultimately achieve better outcomes—along the lines of the *Harper* decision, above. But it is also possible that an explicit diagnosis may fuel more pessimism about rehabilitation and recidivism risk than would otherwise be the case. A case suggesting this possibility is *R. v. Steppan*,⁵⁸ in which the judge denied the

⁵³ 2005 ABCA 99, para. 15.

⁵⁴ 2005 ABQB 421, para. 38.

⁵⁵ Canadian Bar Association, *Resolution 13–12-A: Accommodating the Disability of FASD to Improve Access to Justice* (Aug. 17–18, 2013), <http://www.cba.org/CBA/resolutions/pdf/13-12-A-ct.pdf> (accessed May 23, 2015). Institute of Health Economics, *Consensus Statement on Legal Issues of Fetal Alcohol Spectrum Disorder (FASD)*, Sept. 18–20, 2013 at 22, <http://www.ihe.ca/publications/legal-issues-of-fasd-proceedings-from-a-consensus-development-conference-table-of-contents/> (accessed May 23, 2015).

⁵⁶ Bill C-583 was defeated in November 2014 and the issue was referred to committee for study. The MP who proposed the bill explained that time had run out for it to proceed through the legislative process before the next federal election. Rather than having it die on the Order Paper, the MP indicated his intention to reintroduce the bill after the election. Myles Dolphin, *Leaf Pulls FASD Bill from Parliament*, YUKON NEWS, NOV. 26, 2014 <http://www.yukon-news.com/news/leaf-pulls-fasd-bill-from-parliament/> (accessed May 23, 2015).

⁵⁷ Robert Goguen (Parliamentary Secretary to the Minister of Justice, CPC), Hansard – 145 (Nov. 20, 2014) 17:40, <http://www.parl.gc.ca/HousePublications/Publication.aspx?Pub=Hansard&Doc=145&Parl=41&Ses=2&Language=E&Mode=1> (accessed May 23, 2015).

⁵⁸ 2010 MBPC 9.

Crown's application to designate a violent sex offender a dangerous offender. Instead he was designated a long-term offender on the basis that there was a reasonable chance that his risk of recidivism could be controlled in the community with appropriate treatment. Steppan had various personality disorders and paraphilias and FASD was suspected. One of the psychiatric experts testified that it was difficult to diagnose FASD in adults. Furthermore, according to the expert, if Steppan's problem were mainly FASD 'this would not be a helpful prognosis for him as there would be less cause for hope because FASD involves fixed deficits and those are more difficult to work with than personality problems or sexual arousal problems'.⁵⁹ The judge's response underscored the potentially negative impact of a serious FASD diagnosis:

While there is evidence that Steppan has some intellectual and cognitive limitations and there is a possibility of FASD, which might make it more difficult for him to learn and retain information offered in treatment and programming, it is clear from all the evidence in this case that Steppan's limitations are not severe, and that he is quite capable of learning.⁶⁰

Further research would be advisable to determine whether an explicit diagnosis of brain damage as an explanation for cognitive limitations and behavioral problems produces greater pessimism about rehabilitation than the observation of those symptoms alone. In *Steppan*, the hope for success in treatment may have been tied to the evidence that his cognitive limitations were not too severe, but it may also have been positively affected by the lack of an FASD diagnosis.

Another important issue suggested by both this study's set of cases and also the legal reform proposals outlined above is the challenge of what to do in the case of brain-damaged offenders who do pose a significant risk to the public. The judge in *Harper* acknowledged the need to separate such offenders from society, but argued that jail was inappropriate and instead 'secure community settings' ought to be used. The absence or inadequacy of such alternatives to jail would frustrate the reform objectives outlined above, such as the call to recognize FASD as a mitigating factor. Even if diminished moral blameworthiness is recognized, a judge may still be left with a problem of public safety and inadequate alternatives to jail. Several cases in the dataset illustrated this conundrum.

In *R. v. Kendi*,⁶¹ the judge sentenced an offender with FASD for assaulting his spouse. The judge observed that the brain damage associated with FASD could not be cured and that rehabilitation in the context of offenders with FASD was 'really about adjusting our expectations to their abilities, ... about setting up a situation which maximizes his chances of being successful within the community, and that is really all about structure, support, and supervision. A situation in which there are others around him to provide, in the absence of his ability to do so, that executive brain functioning to help him to make appropriate decisions'.⁶² However, in *Kendi*'s case there was not yet an adequate placement available and so a term of incarceration was imposed. The judge wrote that:

⁵⁹ *Id.* para. 259.

⁶⁰ *Id.* para. 430.

⁶¹ 2011 YKTC 37.

⁶² *Id.* para. 11.

[m]y biggest struggle in this particular case, when I am weighing protection of the public against rehabilitation for Mr. Kendi, is really about knowing what the options are for release in this particular case. It is evident to me that jail is not going to be capable of changing Mr. Kendi's behaviour in any way, shape or form. It does, however, provide a situation whereby the public is protected so long as he is in custody. My preference, given his disability, obviously, would be to have an appropriate structured and supervised placement for him within the community that would provide that same protection of the public but would not require him to be warehoused in a jail situation. In this particular case, I do not have that.⁶³

The lack of alternative placements arose in an even more drastic manner in *R. v. Kudlak*.⁶⁴ In this case, the Crown sought to have Kudlak designated a dangerous offender subject to an indeterminate period of preventive detention, while the defense maintained that the risk he posed could be controlled in the community with adequate supervision and so he should be designated a long-term offender subject to an LTSO. Kudlak had cognitive deficits due to FASD and a long criminal record including, inter alia, multiple sexual assaults. On the point of whether Kudlak's risk of recidivism could be managed, the expert testified that it might be possible to do so with various measures that had not yet been tried, such as anti-libidinal drugs or pharmacological treatment of his alcohol abuse, and 24-hour supervision within a group home targeted for developmentally delayed sex offenders.⁶⁵ The judge explored whether such a placement was available in the community but testimony from correctional authorities made it clear that this type of intensive supervision was not available. The defense objected that '[t]he lack of readily available resources to meet [the conditions required for a reasonable possibility of controlling risk] should not govern the determination' of whether Kudlak is a long-term offender whose risk can be managed in the community or a dangerous offender whose risk cannot be managed.⁶⁶ The defense took the position that the government's failure to supply the necessary supervisory resources ought not to lead to the imprisonment of offenders as dangerous offenders if their risk could be adequately controlled with proper supervision. The Crown said that if the necessary conditions to control risk replicated jail, 'then the appropriate thing to do is to commit the offender to jail'.⁶⁷

The trial judge concluded that Kudlak was a dangerous offender, and imposed upon him an indeterminate period of preventive detention. The judge rejected the argument that provincial resource allocation decisions ought not to drive the decision of whether someone is a long-term offender or not. He said that if it were a matter of an existing treatment program required for a limited duration in order to reduce the risk and there were no places due to government underfunding, that was a different matter. In this case, however, the recommendations were for a highly specific individualized supervisory program, and '[t]he state cannot be expected to allocate scarce resources to any and all treatment programs, particularly ones that are highly specific to single

⁶³ *Id.* para. 14.

⁶⁴ 2011 NWTSC 29.

⁶⁵ *Id.* para. 66.

⁶⁶ *Id.* para. 73.

⁶⁷ *Id.* para. 72.

individuals⁶⁸ and which are required in perpetuity as there is no reasonable prospect of success in treatment.⁶⁹ The judge concluded that what was being suggested for Kudlak was ‘management’ not ‘treatment’.⁷⁰

CONCLUSION

Canadian courts are already considering neuroscientific evidence of many types, (although the use of cutting-edge techniques such as fMRI to detect abnormal brain functioning does not appear to have entered the Canadian criminal justice system). For legal reasons, evidence related to brain damage flowing from prenatal alcohol exposure is the most common form of evidence considered, followed by medical history of TBI and neuropsychological testing. The majority of the cases are sentencing decisions, which is useful given that it offers an opportunity to observe how judges wrestle with the tension at the heart of the justifications of punishment in the criminal law. Neuroscientific evidence suggesting diminished capacity tends to reduce moral blameworthiness—a factor central to the retributive philosophy underpinning the requirement of proportionality between the degree of wrongdoing and the punishment—and yet it also tends to increase judgements about risk and dangerousness, given the view (expressed often in the cases reviewed here) that brain injuries can sometimes be managed but not cured. This makes neuroscientific evidence a ‘double-edged sword’ from the offender’s perspective.

There have been recent calls for legal reform to address how the Canadian criminal justice system handles cases involving brain damage to prenatal alcohol exposure. It is currently uncertain whether the proposed reforms (increased powers of judges to order FASD assessments, and modification of the Criminal Code to indicate that evidence of FASD should be a mitigating factor at sentencing) will be adopted. However, these proposals raise larger questions about neuroscientific evidence in general. As was pointed out in the Parliamentary debates, should such reforms not apply to all cases of brain damage that diminish an offender’s capacity, regardless of whether the damage is caused by prenatal alcohol exposure? An additional question is whether an explicit diagnosis is in an offender’s interests, given that evidence of brain damage tends to produce pessimism about rehabilitations and the risk of recidivism. Whether or not the symptoms alone (without a causal explanation in the form of a diagnosis) would produce the same level of pessimism is an interesting question for future exploration. Finally, the cases in this study showed that a problem facing Canadian judges who may already persuaded that brain damage mitigates moral blameworthiness is that there may not be an adequate alternative to jail in the case of brain-damaged offenders who pose a serious risk. The lack of alternatives may frustrate the objectives of those calling for reform to how we handle brain damage in the Canadian criminal justice system.

ACKNOWLEDGEMENTS

Many thanks to Marisa Keating, Jennifer Saville, Zac DeLong, John Wallace, Melissa Anyan, Lisa Danay and Sonia Athwal for their assistance in preparing the database of Canadian criminal cases.

⁶⁸ *Id.* para. 101.

⁶⁹ *Id.* para. 102.

⁷⁰ *Id.* para. 104.

APPENDIX

Table A1. Number of cases mentioning each type of neuroscientific evidence by year.

	2008	2009	2010	2011	2012	Total
FASD	7	17	8	19	22	73
TBI	6	3	11	7	10	37
Neuropsychological tests	6	11	7	8	12	44
CT scan		2	3			5
Neuro disease	1	3		1	2	7
EEG	1	1				2
MRI		1			1	2
Dementia		3	1	1		5
Epilepsy	1	1	1	1		4
Birth trauma		1			1	2
Neurological tests			1	1		2
Parasomnia	1	1				2
Tumour			1			1
Total number of times each type of evidence appeared/year	23	44	33	38	48	
Number of unique cases/year ^a	16	28	24	30	35	

^aNote that some cases referred to multiple types of neuroscientific evidence.

Table A2. The context in which the neuroscientific evidence appears by year.

	2008	2009	2010	2011	2012	Total	% of total
Sentence	11	20	11	21	23	86	65%
DO/LTO	2	2	2	4	2	12	9%
Fitness	1	3	1	3	1	9	7%
Guilt	1	1	2	1	3	8	6%
NCRMD	1	1	2			4	3%
Other		1	6	1	6	14	11%
Total	16	28	24	30	35	133	100%

Table A3. Ethnicity of the offender by year.

	2008	2009	2010	2011	2012	Total	% of total
Aboriginal	5	11	5	13	17	51	38%
Asian	3					3	2%
Black			1			1	1%
MESA ^a				1		1	1%
Mixed					1	1	1%
Unknown	8	17	18	16	17	76	57%
Total	16	28	24	30	35	133	100%

^aMESA refers to Middle Eastern or South Asian.

Table A4. Type of evidence by ethnicity of offender.

	<i>Aborig</i>	<i>Asia</i>	<i>Black</i>	<i>MESA</i>	<i>Mixed</i>	<i>Unknown</i>	<i>Total^a</i>
FASD	47				1	25	73
TBI	7	3		1		26	37
Neuropsych. tests	18	2	1			23	44
CT scan						5	5
Neuro disease						7	7
EEG						2	2
MRI						2	2
Dementia						5	5
Epilepsy	1					3	4
Birth trauma						2	2
Neurological tests						2	2
Parasomnia						2	2
Tumor						1	1
Total # cases	51	3	1	1	1	76	

^aNote that multiple forms of neuroscientific evidence may have been adduced in a given case, and this column thus exceeds 133 (the number of cases in the dataset).

Table A5. Impact of the neuroscientific evidence by offense category.

	<i>Homi-cide</i>	<i>Rob-bery</i>	<i>Sexual</i>	<i>Drugs</i>	<i>B & E</i>	<i>As-sault</i>	<i>Motor</i>	<i>Threat</i>	<i>Theft</i>	<i>Other</i>	<i>Total</i>
No mitigation of responsibility	3	1	1			1	0			1	7
Mitigation of responsibility	6	9	5	3	1	9	1			1	35
Mixed	5	5	5	1	1	5	1	1	1		25
Treatment pessimism	3	2	8		1	1			3		18
Treatment suggestions	1	1	6	1	3	4	1	1	1		19
Overall cases with factors affecting sentencing	18	18	25	5	6	20	3	2	5	2	104
Operating mind	1		1				3		1		6
No responsibility	2		2		1	1	2	1	2		11
Fitness	1		2		1	1	2		2	1	10
Explanation							1				1
Other	2	1	1	1			1			2	8
Overall cases	23	19	28	6	8	20	12	3	9	5	133

Table A6. Impact of the neuroscientific evidence by procedural context.

	<i>Sentence</i>	<i>DO/LTO</i>	<i>Fitness</i>	<i>Guilt</i>	<i>NCRMD</i>	<i>Other</i>	<i>Total</i>
No mitigation of responsibility	6			1			7
Mitigation of responsibility	35						35
Mixed	24	1					25
Treatment negative	9	8				1	18
Treatment recommended	16	3					19
Overall cases with factors affecting sentencing	90	12					104
Operating mind	1					5	6
No responsibility	1			6	4		11
Fitness			9			1	10
Explanation	1						1
Other				1		7	8
Overall cases	86	12	9	8	4	14	133
<i>Percentages within set of cases with factors affecting sentencing</i>							
No mitigation of responsibility	7%	0%					7%
Mitigation of responsibility	39%	0%					34%
Mixed	27%	8%					24%
Treatment negative	10%	67%					17%
Treatment recommended	18%	25%					18%