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PANEL 3: CHRONIC PAIN, “PSYCHOGENIC” PAIN, AND EMOTION

DAVID SEMINOWICZ, AMANDA PUSTILNIK, AND M. KAYLIE GIOIOSO

SPEAKERS: JENNIFER CHANDLER,* ROBERT DINERSTEIN,** JENNIFER A.
HAYTHORNTHWAITE,*** AND TOR D. WAGER****

I. INTRODUCTION

Emotion and chronic pain are inextricably linked, but not always in the ways represented in law and culture. Whether chronic pain is “physical” or “emotional” can have important legal consequences. In disability and tort law, it remains common for claimants who allege chronic pain to be characterized as suffering from “psychogenic” pain—a variety of conversion hysteria, in which the sufferer is believed to produce a physical symptom to communicate repressed emotional distress.¹ What do we know now about chronic pain and emotion that could inform the ways that law makes these distinctions?

In the legal system, a claimant afflicted with a physical injury might be treated differently from one with an injury that is more psychological or psychiatric in nature. Professor Pustilnik posed to the entire panel and attendees: “I’d like everybody to think about whether a chronic pain

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1. Jennifer Chandler, Robert Dinerstein, Jennifer A. Haythornthwaite, & Tor. D. Wager, *Imaging the Brain, Changing Minds: Chronic Pain Neuroimaging and the Law Symposium, Panel 3: Chronic Pain, “Psychogenic” Pain, and Emotion* (Apr. 25, 2014) [hereinafter *Panel 3*] (transcript on file with the editors).

disorder is a physical impairment or an emotional impairment or both? What do we do with something that straddles that line?"²

The objectives for this panel were to discuss the current scientific and clinical importance of distinctions between organic and psychogenic pain; discuss when legal doctrines do—and when they should—distinguish between these pain etiologies; and discuss the norms in law about the relationship between emotional and chronic pain that may be a disadvantage to pain sufferers or that may impede accuracy in legal outcomes.³

II. "ORGANIC" VERSUS "PSYCHOGENIC" PAIN

The idea of a distinction among organic, social, emotional, physical, real, imagined, or some other sort of pain is important both in the context of research and in the legal context. We begin by asking if such distinctions are made in disability and other areas of law, and whether a claimant's pain that is classified as "organic" or "psychogenic" would have an impact on a legal proceeding.⁴

A. *Distinctions in the Law Between Physical Injury and "Emotional" Injury*

Professor Dinerstein suggested that in disability law, there is usually some effort to determine whether the pain is debilitating in a way to which one could relate.⁵ For a given case, the questions that usually arise are "how can we know whether something is causing pain [and] how do we know whether something is affecting somebody in a way? Physically, we feel we

2. *Id.* at 5.

3. *Id.* at 1, 3.

4. *Id.* at 1. A separate issue that was not discussed in the panel but is relevant to the overall topic is the relationship between chronic pain, cognitive function, and mood and affective disorders. Several studies have indicated that people who suffer from chronic pain have emotional and cognitive impairments. *See, e.g.,* Apkarian V. Apkarian, *Chronic Pain Patients are Impaired on an Emotional Decision-Making Task*, 108 J. PAIN 129, 132–35 (2004) (noting that chronic pain may result in cognitive disruption, which may negatively affect patients' performance on certain tasks). These impairments tend to be relatively mild. *Id.* For example, cognitive impairments can include minor reductions in task accuracy or reaction times, decision making, and working memory. *Id.*

5. *See* Panel 3, *supra* note 1, at 22 (noting that we should look at what we know about psychological impairment and find solutions regarding how to handle it rather than characterize it); *see also* RICHARD C. RUSKELL, *SOC. SEC. DISABILITY CLAIMS HANDBOOK* § 2:16 (2014 ed.) (noting that supportive evidence is necessary in most cases to prove that pain is not imaginary or exaggerated).

can [know, but] with emotional or psychological harm, we may not.”⁶ Juries may be able to empathize with a plaintiff’s claim of physical harm more than with a claim of emotional or psychological harm.⁷

B. Tort Law

Tort law provides compensation for physical injuries, but generally not for pure “emotional” injuries.⁸ Thus, characterizing pain as “physical” versus “emotional” can lead to completely different outcomes. As Professor Chandler noted, in a tort case, “the burden of proof is on the plaintiff, [as he or she] has to prove that their condition was caused by the defendant’s wrongful act”⁹ In other words, “the plaintiff has to marshal this evidence linking [a] chronic pain condition to the defendant’s wrongful act.”¹⁰

In tort law, courts evaluate physical disabilities in regards to what the “reasonable person” with those disabilities would or should be able to do.¹¹ Courts do not expect a blind person, for example, to have the same capabilities as someone who is sighted.¹² But the precise definition of the reasonable blind person is difficult to pin down, as “if you’re blind, must you have a service animal with you? Must you have a cane? Well maybe

6. See Panel 3, *supra* note 1, at 1.

7. See *id.* (noting that juries are composed of people selected out of the general population, and the general population often has trouble connecting to emotional or psychological harm); see also Jonathan P. Vallano, *Psychological Injuries and Legal Decision Making in Cases: What We Know and What We Do Not Know*, 6 PSYCHOL. INJ. & LAW 99, 110 (2013) (noting that plaintiffs with psychological injuries are not fairly compensated, most likely because of improper perceptions of the legitimacy of such injuries).

8. Panel 3, *supra* note 1, at 12; see also M. Lee Huffaker, *Recovery for Infliction of Emotional Distress: A Comment on the Mental Anguish Accompanying Such a Claim in Alabama*, 52 ALA. L. REV. 1003, 1008 (2001) (noting Professor Chandler’s thoughts as to how, unlike in the United States, Canada and other commonwealth countries recognize torts of intentional and negligent infliction of psychiatric and psychological harm).

9. See Panel 3, *supra* note 1, at 14; see generally JACOB A. STEIN, STEIN ON PERSONAL INJURY DAMAGES TREATISE § 11:16 (3d ed. 2014) (enumerating that a plaintiff must prove that the defendant had a duty to the plaintiff, that the duty was breached, and that the breach was the cause of plaintiff’s injuries).

10. See Panel 3, *supra* note 1, at 14.

11. *Id.* at 3; see also Kristin Harlow, *Applying the Reasonable Person Standard to Psychosis: How Tort Law Unfairly Burdens Adults with Mental Illness*, 68 OHIO ST. L.J. 1733, 1735–36 (2007) (highlighting the need for a subjective standard of liability for persons with mental disabilities that is comparable to the standard that exists for people with physical disabilities).

12. Panel 3, *supra* note 1, at 3; see also *Coker v. McDonald’s Corp.*, 537 A.2d 549, 550–51 (Del. Sup. Ct. 1987) (stating that a blind person must only exercise due care because he is not bound to perceive all that a sighted person would).

you choose not [to] do those things. And choosing not [to] use those things might be reasonable in some circumstances and might not in others.”¹³

Professor Chandler noted that in examining Canadian tort cases involving chronic pain,

there is often a lot of discussion about [the] thin skull [doctrine].¹⁴ This is an unusual response to [a] chronic pain condition. It suggests there is an unusual vulnerability in the plaintiff. . . . Thin skull rules . . . basically [means] you take your victim as you find him, the extent to which they have an unusual . . . reaction [is the defendant’s problem] But, here’s where the problem occurs for the plaintiff. There’s this other rule, the crumbling skull, [which] says instead, if you’ve got someone whose condition is deteriorating already, injury arrives, it’s then not the defendant’s problem anymore because it was going to happen anyway. It was on its way. Unless the defendant did something [to speed] it up or [aggravate] it. “It was going to happen anyway, you were crumbling, it’s not my problem,” says the defendant.¹⁵

Professor Chandler noted that a lot of chronic pain cases seem to be affected by this crumbling skull rule, particularly when there were “signs that the plaintiff had preexisting psychological problems, usually of the anxiety or mood disorder type”¹⁶ The demonstration of a preexisting

13. Panel 3, *supra* note 1, at 3–4. The D.C. case *Poyner v. Loftus* demonstrates this imprecise standard. *Poyner*, 694 A.2d 69, 73 (D.C. 1997). In *Poyner*, a blind man who had never used a cane and knew the area well was injured when he fell off an elevated sidewalk. *Id.* at 70. The sidewalk previously had a barrier of shrubs, on which the man depended to guard the edge. *Id.* Once the shrubs were removed unbeknownst to the plaintiff, he fell and was injured. *Id.* The court ruled that the reasonable blind person should have been using a cane, even though there was no applicable law in D.C. and the plaintiff had gone years without a cane. *Id.* at 71. The standards for physical disability are not yet clearly delineated, and as one could imagine, the standards for mental or emotional disabilities are even blurrier. For a discussion of white cane laws and a trenchant critique of the *Poyner* case, see Adam A. Milani, *Living in the World: A New Look at the Disabled in the Law of Torts*, 48 CATH. U. L. REV. 323, 346–53 (1999).

14. See Panel 3, *supra* note 1, at 14; see *Schafer v. Hoffman*, 831 P.2d 897, 901 (Colo. 1992) (noting that under the thin skull doctrine, a tortfeasor takes the plaintiff as is).

15. Panel 3, *supra* note 1, at 14; see also Ian Aikenhead, *Thin Skull Versus Crumbling Skull*, AMJ LAW, <http://www.amjlaw.ca/thin-skull-versus-crumbling-skull/> (last visited Mar. 17, 2015) (noting the difference between thin skull and crumbling skull, and the increased liability of the tortfeasor in the former).

16. Panel 3, *supra* note 1, at 14; see also Stephen Cavanaugh, *Important “Crumbling Skull” and Threshold Decision*, CAVILLATIONS (Oct. 14, 2004), <http://www.cavanaugh.ca/blog/?p=84>

vulnerability can also affect claimants because “when courts set about evaluating the damages payable, they look at . . . the contingencies of life.”¹⁷ In the cases where a claimant is considered vulnerable to chronic pain, the amount paid over time might be adjusted.¹⁸ “Causation was not established for chronic pain because the court said we think you have the personality that would somatize, in essence, this kind of stress, and [that you] were going to [develop chronic pain] anyway.”¹⁹

C. *Clinical and Research Perspectives on “Organic” and “Psychogenic” Pain*

From a clinical point of view, Professor Haythornthwaite noted that the distinction between “organic” and “psychogenic” pain might be “a disservice to the patients that we care for in health care settings [as well as] the people that we’re trying to serve in society when we talk about these things.”²⁰ Professors Haythornthwaite and Wager shared their perspectives on this issue, and Haythornthwaite pondered the idea of a “reasonable person” with chronic pain.²¹

Professor Haythornthwaite argued that, “while we may be able to make fine distinctions in a moment under highly controlled circumstances of somebody . . . we see that these things covary quite reliably in many different circumstances.”²² To Professor Haythornthwaite, physical and emotional pain are inextricably tied up in one another.²³

She continued that

Across many, many different studies, across many, many different populations, and across both acute pain and chronic pain, there is a robust literature that suggests that the experience of pain is influenced by people’s emotional state. . . . [F]or example, symptoms of depression and

(discussing *Hartwick v. Simser*, 2004 CanLII 34512 (Can. Ont. S.C.), a case in which the “crumbling skull” defense was applied when anxiety led to physical pain as early as two years prior to the accident).

17. Panel 3, *supra* note 1, at 14.

18. *Id.* at 23; *see also* George Mendelson, *Chronic Pain and Compensation: A Review*, 1 J. PAIN & SYMPTOM MGMT. 135, 136 (1986) (noting the compensation system for those with chronic pain).

19. Panel 3, *supra* note 1, at 14 (referencing a hypothetical case).

20. *Id.* at 8.

21. *Id.* at 8, 15–16.

22. *Id.* at 8.

23. *Id.* at 20.

anxiety are predictive of the level of post-operative pain. . . . There is growing data suggesting that people who have anxiety and depressive symptoms—[but not] a diagnosis of anxiety or depression in the psychiatric [nomenclature]— . . . have different responses to medicines.²⁴

Professor Haythornthwaite also addressed a further complication in distinguishing organic and psychogenic pain: chronic pain and psychiatric illnesses can co-occur.²⁵ She argued that it will be difficult to use neuroimaging to distinguish emotional and physical components of pain as “we have a brain that processes all of these kind of in a concurrent and overlapping way that’s very hard to pull apart, and it’s certainly very hard to pull apart in chronic pain.”²⁶

Professor Wager provided a somewhat different perspective. In his view, the distinction between psychogenic and organic pain is useful because pain may be caused by peripheral disease processes (organic) or processes within the brain itself (psychogenic).²⁷ In addition, pain and emotional distress are truly different things.²⁸ Both psychogenic and organic pain, however, are real and both can be considered pain and lead to similar amounts of suffering.²⁹ He argued that determining whether pain is really organic or emotional in nature depends on many factors:³⁰

24. *Id.* at 8; see also R.N. Jamison et al., *Relationship of Negative Affect and Outcome of an Opioid Therapy Trial Among Low Back Pain Patients*, 13 PAIN PRACTICE 173, 179 (2013) (acknowledging that many of the measures used in this study were obtained through self report, but noting that opioids tend to be less effective for people with a negative mood); A.D. Wasan et al., *The Association Between Negative Affect and Opioid Analgesia in Patients with Discogenic Low Back Pain*, 117 J. PAIN 450, 459 (2005) (noting that psychopathology in patients decreases the effectiveness of chronic pain treatments).

25. Panel 3, *supra* note 1, at 8–10; see also Richard H. Gracely et al., *Fibromyalgia and Depression*, PAIN RES. & TREATMENT 1, at 4–5 (2012), available at <http://dx.doi.org/10.1155/2012/486590> (focusing on the similarities of fibromyalgia and depression, including the drugs used to target them and environmental factors that affect them, among other similar features); Gordon J.G. Asmundson & Joel Katz, *Understanding the Co-occurrence of Anxiety Disorders and Chronic Pain: State-of-the-Art*, 26 DEPRESSION & ANXIETY 888, 888–98 (2009) (noting that chronic pain often accompanies anxiety disorders).

26. Panel 3, *supra* note 1, at 9.

27. *Id.* at 16–18; see also LUDWIG OMBREGT, A SYSTEM OF ORTHOPAEDIC MEDICINE 320 (2013) (noting that pain may be the result of physical or psychogenic dysfunction).

28. See Panel 3, *supra* note 1, at 17–18; see also OMBREGT, *supra* note 27 (highlighting that pain may be caused by physical or psychological factors, and that the latter greatly influences the way that people experience pain).

29. See Asmundson & Katz, *supra* note 25, at 889 (explaining that the contemporary understanding of pain includes sensory and psychological influences).

30. Panel 3, *supra* note 1, at 16.

we can't ask if [emotional pain is] biologically real, because of course it's biologically real. In my world, every thought, every feeling has a neurophysiological basis. The real question is can we measure it? Can we understand it? Can we know what caused it and how to treat it? And that seems like the distinction has to be based not on whether it's happening in your brain or not, but in the kinds of ways in which a person can be expected to mitigate or prevent it.³¹

D. Stigma

Although the panelists disagreed to some extent as to whether a distinction should exist between organic and psychogenic pain, they unanimously agreed that society attaches a certain stigma to people who have “non physical pain.”³² Specifically, the panelists agreed that the medical communities, legal communities, and laypersons have a tendency to legitimize pain that is perceived to be physical while delegitimizing pain that is perceived to be emotional.³³

Professor Dinerstein offered the contrasting examples of a claimant who is paraplegic as a result of a motorcycle accident versus a claimant who has schizophrenia or bipolar disorder.³⁴ In the first scenario, society tends to “value” the pain and life experiences of the individual. In the second scenario, on the other hand, society would be more likely to devalue the pain of the schizophrenic individual or to express the sentiment that he or she should “get over it.”³⁵

31. *Id.*

32. *See, e.g., id.* at 19–20 (explaining how the distinction relates not only to the different sources of pain but also to the different interpretations of physical and emotional pain); *see also* *Martin v. Workers' Comp. Bd. of N.S.*, [2003] 2 S.C.R. 504, 514, 517 (Can.) (noting that the Worker's Compensation Act discriminates against chronic pain sufferers).

33. *See* Panel 3, *supra* note 1, at 29–30 (describing the way a layperson fails to acknowledge the mental component of physical pain, and how the courts and the medical community initially treated fibromyalgia as something other than physician pain); *see also* Danijela Serbic & Tamar Pincus, *Diagnostic Uncertainty and Recall Bias in Chronic Low Back Pain*, 155 J. PAIN 1540, 1540 (2014) (describing the vague and varied diagnoses provided to patients when the doctor could not find a mechanical reason for the pain).

34. *See* Panel 3, *supra* note 1, at 1–2 (describing how society accepts the actions of a paraplegic as opposed to a schizophrenic, whose actions are seen as “less predictable” and “less justifiable”).

35. *See id.* (describing how society's expectation of how someone handles depression versus paraplegia reflects the different societal expectations between physical and emotional pain).

Professor Chandler agreed, describing the common suspicion that people with psychological problems and chronic pain are “motivated by secondary gain” or are simply weak.³⁶ A 1994 Canadian trial court decision embodied this suspicion, referring to fibromyalgia as a disorder “often found in individuals who will not or cannot cope with everyday stresses of life and convert this inability into acceptable physical symptoms to avoid dealing with reality.”³⁷ While perhaps a particularly unsympathetic example, this case demonstrates how society’s biased sentiments toward particular types of illnesses seep into the courtroom.

This stigma has further implications for the realm of disability law in the workplace, as Americans have a particularly strong perception of the “ideal worker.”³⁸ Professor Dinerstein argued that individuals with chronic pain who request reasonable accommodations in the workplace are perceived to be asking for undeserved special attention.³⁹ He goes on to say that “as a consequence of that, you are seen or perceived as a less than ideal worker—a ‘less than’ as compared to the ‘equal to’ that you would seek to be. And that gets tricky.”⁴⁰ Society typically responds less favorably to individuals requesting this “special attention” than it does to those who are able to be productive without any accommodations.⁴¹

In Canadian law, Professor Chandler noted, the Supreme Court of Canada aimed to dispel the notion of the less than ideal worker in a 2003

36. See *id.* at 13 (explaining that society would tell someone suffering from emotional pain to “buck up [and] snap out of it”); see also Macon Jones, *Protecting Dr. Smith While Treating the Chronic Pain of Mrs. Jones: Why the Indiana Medical Licensing Board Should Pass Guidelines for Using Controlled Substances for Pain Treatment*, 9 IND. HEALTH L. REV. 696, 712 (2012) (finding that doctors are concerned that those suffering from chronic pain can become addicted to opioids).

37. See Panel 3, *supra* note 1, at 13; see also Mackie v. Wolf, 1994 CanLII 8994, para. 222 (Can. Alta. Q.B.).

38. See Panel 3, *supra* note 1, at 8 (explaining how mental health diseases become a problem when employers are thinking about medical insurance costs); see also Robert D. Dinerstein, “Every Picture Tells a Story, Don’t It?”: *The Complex Role of Narratives in Disability Cases*, 15 NARRATIVE 40, 44 (2007) (explaining how employers see disability law as applying to a very narrow group of individuals).

39. See Panel 3, *supra* note 1, at 2 (explaining that a sufferer of chronic pain would not necessarily be discriminated against, but may instead be seen as seeking special accommodations); see also Nicole Buonocore Porter, *Mutual Marginalization: Individuals with Disabilities and Workers with Caregiving Responsibilities*, 66 FLA. L. REV. 1099, 1108–09 (2014) (describing how disabled workers are seen as requesting special accommodations).

40. See Panel 3, *supra* note 1, at 2; see also Porter, *supra* note 39, at 1101 (highlighting that workers with disabilities are not able to meet the expectations of an “ideal worker”).

41. See Panel 3, *supra* note 1, at 2 (examining the different societal views of a blind person who forgoes reasonable accommodations compared to an individual suffering from chronic pain); see also Porter, *supra* note 39, at 1108–09 (indicating that workers with disabilities are stigmatized by employers and co-workers when asking for “special” accommodations).

workers' compensation case.⁴² In an attempt to decrease spending on workers' compensation in Nova Scotia, the provincial government passed a law that decreased the benefits of chronic pain claimants in order to "motivate [a] return to the workforce."⁴³ The court based on its belief that the Nova Scotia law perpetuated "negative assumptions" about people with chronic pain and thus rejected the decrease in benefits.⁴⁴ The court's legitimization of chronic pain and denunciation of the related stigma has had far reaching effects for both workers' compensation and tort law.⁴⁵

E. Is it Time to Dispense with the Distinction Between "Neurological" Disorders and "Psychiatric" Disorders?

Chronic pain is just one example of a disease that has both physical and mental components. The distinction between mental versus physical, or psychiatric versus neurological is often made in legal, medical, and social settings.⁴⁶ Building on the idea of emotional pain and the concerns regarding the stigmatization of certain types of pain but not others, panelists commented on whether the distinction between emotional and physical pain retains any utility, or if it should be done away with completely.⁴⁷

Professor Haythornthwaite reiterated her position that the distinction should be eliminated, arguing that it has potentially harmful effects on individuals who are told that their pain is "in their head."⁴⁸ Often times,

42. See Panel 3, *supra* note 1, at 13; see also *Martin v. Workers' Comp. Bd. of N.S.*, [2003] 2 S.C.R. 504, 517 (Can.) (recognizing that laws can perpetuate negative assumptions and attitudes).

43. Panel 3, *supra* note 1, at 13; see also *Workers' Compensation Act*, S.N.S. 1994-95, c.10, s. 10B. (Can.).

44. See Panel 3, *supra* note 1, at 13; see also *Martin*, 2 S.C.R. at 517 (Can.) (determining that the law discriminates against sufferers of chronic pain, and denies "the reality of the pain suffered").

45. See *Martin*, 2 S.C.R. at 517 (Can.) (finding that the Workers' Compensation Act discriminates against those suffering from chronic pain); see also Joanna L. Noonan & Shannon L. Wagner, *Chronic Pain Compensation in Canada*, 4 INT'L J. DISABILITY, COMMUNITY, & REHABILITATION, no. 1, 2005, at 4-5, http://www.ijdr.ca/VOL04_01_CAN/articles/wagner.shtml (finding that the holding in *Martin* required all provinces with discriminatory policies to formulate new policies within six months).

46. See Panel 3, *supra* note 1, at 27 (noting that the mental components of chronic pain are measured differently in the legal and medical contexts); see also Mark A. Lumley et al., *Pain and Emotion: A Biopsychosocial Review of Recent Research*, 67 J. CLINICAL PSYCHOL. 942, 943-44 (2011) (stating that the concept of chronic pain is accepted as encompassing "neurobiological, psychological, and social changes").

47. See Panel 3, *supra* note 1, at 24 (discussing the difficulty of public perceptions when relying on the idea that emotional pain has a physical component).

48. See *id.* at 30 (discussing the possibility that patients who are told their symptoms are "in their head" will go through numerous unnecessary diagnostic test and surgeries); see also *Martin D. Cheate, Depression, Chronic Pain, and Suicide Overdose: On the Edge*, 12 PAIN MED. S43,

these patients will “escalate their behavior” when doctors are unable to identify a “physical” source of their pain, which frequently results in misguided surgeries or diagnostic tests.⁴⁹

Professor Dinerstein agreed that the misdiagnosis of an ailment when there is no physical source that could be identified has historically “done a lot of damage,” such as when “supposedly frigid mothers [were blamed] for autism.”⁵⁰ Accordingly, he discussed the need for a “healthy dose of humility about what we really understand and what we don’t, and how to act on it” when making potentially harmful distinctions between different types of pain.⁵¹

Professor Wager pushed this concept further, noting that “the distinction between physical and mental [pain] is a placeholder” for something else.⁵² He added that “the other critical thing for me is not the physical/mental [distinction], but what is the cause and how much of it has to do with something you do have control over or should have control over?”⁵³

III. NEUROIMAGING AND THE RELATIONSHIP BETWEEN EMOTION AND PAIN

A. *Neuroimaging of Pain*

Professor Wager provided insight to the evolving science of pain detection and imaging, noting that many important questions remain unanswered.⁵⁴ Some of the important research questions he mentioned included how much control a person has over pain and whether certain

S43–S44 (2011) (showing that patients who suffer from chronic pain are more likely to be depressed and suicidal).

49. See Panel 3, *supra* note 1, at 30 (discussing the tendency of patients who are told that the symptoms are in their head continually go back to their physician seeking a diagnosis); *see also* Serbic & Pincus, *supra* note 33 (describing the difficulty that individuals with social, cognitive, and emotional impairments face when seeking a chronic pain diagnosis).

50. Panel 3, *supra* note 1, at 30; *see also* Robert L. Barkin et. al., *Management of Chronic Pain. Part II*, 42 DISEASE-A-MONTH 459, 469 (1996) (describing how many chronic pain diseases cannot be diagnosed through traditional diagnostic means); Cheatle, *supra* note 48 (finding that chronic pain increases the risk factors for depression and suicide).

51. Panel 3, *supra* note 1, at 30 (arguing that society should recognize that chronic pain is not completely understood, and therefore society should not judge those suffering from it).

52. *See id.*

53. *Id.*; *see also id.* at 19 (describing how pain is manipulated through stimuli and voluntary regulation).

54. *Id.* at 18; *see also id.* at 2 (describing the advancements of functional magnetic resonance imaging and positron emission tomography in investigating emotions in the brain).

people might be predisposed to developing chronic pain.⁵⁵ Neuroimaging can be useful in helping us understand the neural basis of different types of pain and the factors—such as mood and anxiety—associated with pain.

B. *Interactions of Pain and Emotion*

Professor Wager offered the case of Philip Pizzo as an illuminating example of the interplay of the physical and emotional symptoms of pain.⁵⁶ Pizzo, the former Dean of Stanford Medical School, injured his back while lifting his suitcase onto a conveyor belt at the airport and “went from being very high functioning to showing signs of depression.”⁵⁷ Even with his prominent position in the medical community, Pizzo found it difficult to obtain a proper diagnosis, as doctors wondered whether his symptoms were fictional.⁵⁸ Although Pizzo’s pain was eventually discovered to be a result of a “rare and hard to detect impingement of his sciatic nerve,” Wager opines that “it’s likely that [Pizzo’s] experience with chronic pain changed his outlook, and so caused his depression.”⁵⁹ Consequently, Wager argues that emotional trauma or pain can cause physical pain.⁶⁰ Accepting these principles as true, additional questions arise: “where does one end and the

55. *See id.* at 9 (referencing a Boston and Veteran’s Administration study indicating that some individuals do not respond to medication).

56. *See id.* at 16–17 (examining how chronic pain caused Dr. Pizzo to slip into depression); *see generally* Philip A. Pizzo, *Lessons in Pain Relief—A Personal Postgraduate Experience*, 369 *NEW ENG. J. MED.* 1092, 1092 (2013), *available at* <http://www.nejm.org/doi/full/10.1056/NEJMp1306467> (describing his year long experience seeking a diagnosis for lower back pain).

57. Panel 3, *supra* note 1, at 16; *see also* Pizzo, *supra* note 56 (describing how he began to develop symptoms of depression due to the inability to diagnosis his pain).

58. *See* Pizzo, *supra* note 56 (explaining that some of Pizzo’s physicians believed that the pain was neuropathic in origin, but without a defined trigger to explain it); *see also* Ruthann Richter, *A Physician’s Personal Odyssey with Chronic Pain*, *SCOPE* (Sept. 18, 2013), <http://scopeblog.stanford.edu/2013/09/18/a-physicians-personal-odyssey-with-chronic-pain/> (quoting Phillip Pizzo’s journey in diagnosing his pain, where physicians suggested his condition was largely psychological).

59. *See* Panel 3, *supra* note 1, at 16, 29; *see also* Pizzo, *supra* note 56, at 1092 (explaining that after 10 months of pain and many negative exams and ineffective treatments, his condition was finally diagnosed as relating to the sciatic nerve).

60. *See* Panel 3, *supra* note 1, at 29 (stating that physical pain was not more real than pain that comes from a less ascertainable and correctable source); *see also* Susanne Babbel, *The Connections Between Emotional Stress, Trauma, and Physical Pain*, *PSYCHOL. TODAY* (Apr. 8, 2010), <https://www.psychologytoday.com/blog/somatic-psychology/201004/the-connections-between-emotional-stress-trauma-and-physical-pain> (stating that those who experience trauma are often at a higher risk to experience chronic pain).

other begin? Are they really the same thing? Do they use the same brain systems or mechanisms? Or are they two sort of very separate things that can interact in other ways?”⁶¹

C. *Distinct Circuits for Physical and Social Pain*

Professor Wager presented the “common systems view.”⁶² He stated,

the theory is that we evolved a physical pain system, a nociceptive system, [to respond to and avoid injury and other threats to bodily integrity,] and on top of that, we developed brain mechanisms for representing the social world, for thinking about what you’re thinking about me and whether you like me or not, whether you’re rejecting me or accepting me. Those circuits that process physical pain are being co-opted by these social and emotional processes.⁶³

Wager argues against a strong form of this theory, proposing instead that physical and emotional pain involve separate brain circuits and should be discriminable with neuroimaging.⁶⁴

One weakness in the “common systems view” is that it seems to overlook the multiple potential functions of a single anatomical brain region. While several studies point to the anterior cingulate as a region commonly activated in both social and physical pain, Professor Wager pointed out that this brain area has neurons that seem to respond specifically to nociceptive stimuli as well as neighboring cells that respond to cognitive demands.⁶⁵ “If you activate the anterior cingulate in the fMRI

61. Panel 3, *supra* note 1, at 16–17 (stating that these questions arose after finding that the distinctions were unclear when comparing pain that caused a change in outlook and depression, and where emotional trauma and depression causes physical pain).

62. *Id.* at 17.

63. *Id.* at 17. For example, a well known paper reported that emotional pain experienced with social rejection activates the same brain pattern as physical pain. Naomi I. Eisenberger et al., *Does Rejection Hurt? An fMRI Study of Social Exclusion*, 302 *SCIENCE* 290–91 (2003).

64. Panel 3, *supra* note 1, at 27–28.

65. *Id.* at 17; see W. D. Hutchison et al., *Pain-Related Neurons in the Human Cingulate Cortex*, 2 *NATURE NEUROSCIENCE* 403, 404 (1999) (identifying cortical neurons that were responsive to painful stimuli in humans, resembling those classified as nociceptive specific or high threshold in animal studies); Kristin L. Hillman & David K. Bilkey, *Neural Encoding of*

scanner, you're averaging over many, many billions of neurons. Every bit that we measure in [a] fMRI is a ballpark five and half million neurons, and they do different things."⁶⁶ In Wager's view, the circuits associated with social and physical pain might appear similar only because functional maps are blurred together at the spatial resolution that the current neuroimaging technology provides.⁶⁷

Despite the number of questions that remain unanswered, Professor Wager remains optimistic that science will "be able to address issues and use brain imaging to actually provide signals that can tell us whether emotional pain and physical pain are the same thing, and how much physical pain somebody is feeling, at least in the area of acute pain."⁶⁸

D. Achieving Accuracy with Neuroimaging Markers of Physical and Emotional Pain

In order to get around these unanswered questions, some use neuroimaging to "identify something that really sensitively tracks how much pain somebody is feeling and tracks that specifically, so it can't respond to other things that clearly aren't pain."⁶⁹ There have been several attempts at doing so, typically classifying whether a healthy subject is experiencing pain with an accuracy rate higher than 80 percent.⁷⁰ In a

Competitive Effort in the Anterior Cingulate Cortex, 15 NATURE NEUROSCIENCE 1290, 1293, 1296 (2012) (finding reward aversion and adjacent reward seeking responsive neurons in the anterior cingulate cortex of mice).

66. Panel 3, *supra* note 1, at 18.

67. *See id.* at 18 (stating that while the image appears to look the same because it is blurry, a higher resolution may reveal that they are different); *see also* Hiroaki Mano & Ben Seymour, *Pain: A Distributed Brain Information Network?*, PLOS BIOLOGY 3 (Jan. 6, 2015), <http://www.plosbiology.org/article/fetchObject.action?uri=info:doi/10.1371/journal.pbio.1002037&representation=PDF> (explaining that there is wiggle room for a theory of a single subjective pain region because it is very possible that this exists but that it is just not discernable with current neuroimaging technology).

68. Panel 3, *supra* note 1, at 18; *see also* Choong-Wan Woo et al., *Separate Neural Representations for Physical Pain and Social Rejection* 4 (Jan. 6, 2015) (published in NATURE COMMUNICATIONS) (on file with NIH) available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4285151/> (showing separate fMRI pattern representations for physical and social "pain").

69. Panel 3, *supra* note 1, at 18; *see also* Tor D. Wager et al., *An fMRI-Based Neurologic Signature of Physical Pain*, 358 NEW ENG. J. MED. 1388, 1390 (2013) (discussing a study on the sensitivity and specificity of pain).

70. *See* Justin E. Brown et al., *Towards a Physiology-Based Measure of Pain: Patterns of Human Brain Activity Distinguish Painful from Non-Painful Thermal Stimulation*, PLOS ONE 4 (Sept. 13, 2011), <http://www.plosone.org/article/fetchObject.action?uri=info:doi/10.1371/journal.pone.0024124&representation=PDF> (establishing the feasibility of physiology based pain detection, at an 80.6

recent paper co-authored by Wager, accuracy was even higher, with accuracy between 90–100 percent.⁷¹ This “pain signature”—called the Neurologic Pain Signature (“NPS”)—was specific to physical (thermal) pain, and did not respond to social pain, despite clear overlapping activity patterns between the two types of pain.⁷² Since that study was published, Wager and his team have been testing the NPS in other ways.⁷³ According to Wager, “you can’t think it up and down and you can fool it with a placebo.”⁷⁴ With regard to the first claim, Wager’s group recently showed that changes in pain caused by increasing stimulus intensity were mediated by the NPS while changes in pain caused by cognitive self regulation (imagining pain to be damaging and dangerous versus non-bothersome and non-harmful) were mediated by a separate system.⁷⁵ With regard to the second claim, Wager’s study⁷⁶ showed that when the NPS tracked relief that was caused by a pain relieving opioid drug (Remifentanyl), there were no effects on people’s beliefs that they were given a drug (placebo effects), in spite of significant placebo effects on the pain those participants reported.⁷⁷ In other, ongoing studies, the NPS is similarly unaffected by standard manipulations of expectations that create changes in pain reports.⁷⁸ Wager said: “What that might mean is with this pain system, it’s not that if you decide you need more compensation or you need to communicate that something hurts more that you’ll turn up this brain signal. It’s giving us

percent accuracy rate); see also Enrico Schulz et al., *Decoding an Individual’s Sensitivity to Pain from the Multivariate Analysis of EEG Data*, 22 CEREBRAL CORTEX 1118, 1120 (2011), available at <http://cercor.oxfordjournals.org/content/22/5/1118.full.pdf+html> (discussing a study of decoding an individual’s sensitivity to pain with an accuracy of 83 percent).

71. See Wager et al., *supra* note 69, at 1396 (indicating that the neurologic signature showed sensitivity and specificity of 94 percent or higher).

72. *Id.* at 1394, 1395 (suggesting overlapping but different responses to physical and social pain); see also Panel 3, *supra* note 1, at 18 (citing to their study, where they found that pain was specific to physical pain and did not respond to emotional events or stimuli).

73. Panel 3, *supra* note 1, at 18, 19 (stating that Wager’s team is finding that the intensity of emotional pain can be tracked in different ways); see also Choong-Wan Woo et al., *Distinct Brain Systems Mediate the Effects of Nociceptive Input and Self-Regulation of Pain*, PLOS BIOLOGY 2 <http://www.plosbiology.org/article/doi/10.1371/journal.pbio.1002036> &representation=PDF (Jan. 6, 2015) (finding that pain could be tracked in various brain systems).

74. Panel 3, *supra* note 1, at 18.

75. Woo, *supra* note 73, at 1 (finding that pain reports are associated with two dissociable functional systems).

76. Lauren Y. Atlas et al., *Dissociable Influences of Opiates and Expectations on Pain*, 32 J. NEUROSCIENCE 8053 (2012), available at <http://www.jneurosci.org/content/32/23/8053.full.pdf+html>.

77. *Id.* at 8053 (finding that Remifentanyl and expectancy of drug delivery both reduced pain, but the drug effects on the pain reports and the fMRI activity did not interact with expectancy).

78. See Wager et al., *supra* note 69 *supp. app.* at 29 (the supporting online material for the article indicated that pain signature responses were mainly influenced by the drug itself, rather than expectation of drug delivery).

something that is independent of that. That might be useful in a legal context.”⁷⁹ Other ongoing work is determining different detectors of emotional pain independent of physical pain.⁸⁰ “That means that we’re moving closer to having a readout of what’s the real sort of acute pain, at least, and what’s the overlay of emotional response. And, at least in the cases we’ve tested, they don’t turn out to be the same thing.”⁸¹

E. Isolating Brain Circuits for Emotional and Physical Chronic Pain

A remaining issue was whether a pain signature or an emotional signature would be effective in isolating physical pain from emotional pain in a chronic pain patient. Professor Haythornthwaite suggested that the limitation with the current state of technology (described above)⁸² is that the studies involved provocation of physical pain or emotional/social pain.⁸³ In chronic pain, there can be no apparent provocation.⁸⁴ Professor Haythornthwaite stated,

the definition of pain includes an emotional component, which captures the unpleasantness of it, and what we see in people as they live with persistent pain conditions is that their emotional life is influencing their experience of pain, and pain is influencing their emotional life. And it’s hard to tease the two apart.⁸⁵

79. Panel 3, *supra* note 1, at 18–19.

80. *See, e.g.*, Mary Helen Immordino-Yang et al., *Correlations Between Social Emotional Feelings and Anterior Insula Activity are Independent from Visceral States but Influenced by Culture*, *FRONTIERS HUMAN NEUROSCIENCE* 1, 6 (Sept. 16, 2014), <http://journal.frontiersin.org/article/10.3389/fnhum.2014.00728/full> (finding that emotional pain could be stimulated through the anterior insula as well as through external factors).

81. Panel 3, *supra* note 1, at 19; *see also* Wager et al., *supra* note 69, at 1393 (noting that the average signature responses were differentiated from painful and non-painful conditions).

82. Panel 3, *supra* note 1, at 18; *see also* Mano & Seymour, *supra* note 67 (explaining the limitations in current neuroimaging technology).

83. Panel 3, *supra* note 1, at 19.

84. *See* Mark Laslett, *Evidence-Based Diagnosis and Treatment of the Painful Sacroiliac Joint*, 16 *J. MANUAL & MANIPULATIVE THERAPY* 142, 143–44 (2008) (explaining that when comparing the efficacy of sacroiliac joint tests, provocation was not considered an effective test in chronic pain).

85. Panel 3, *supra* note 1, at 20; *see also* Naomi I. Eisenberger & Matthew D. Lieberman, *Why Rejection Hurts: A Common Neural Alarm System for Physical and Social Pain*, 8 *TRENDS COGNITIVE SCI.* 294, 294 (finding that social pain and emotional pain overlap in their neural and computational mechanisms).

Professor Wager concurred with this point and added his belief that “it’s a feedback cycle.”⁸⁶ He also noted that even in the case where he could potentially isolate physical and emotional components of a chronic pain patient’s condition, it would not change the reality of the patient’s suffering.⁸⁷ Professor Haythornthwaite added that suffering is the real issue in chronic pain, and suffering is clearly emotional.⁸⁸ Thus, although the distinction between emotional and physical pain might be much simpler to conceptualize in experiments involving healthy subjects, in the case of chronic pain, it is unclear whether emotional and physical components can be isolated.⁸⁹

IV. CHALLENGES FOR NEUROIMAGING AND FUTURE DIRECTIONS

A. *Limitations in the Interpretation of Neuroimaging Data*

Dr. James Pekar of Johns Hopkins University and the F. M. Kirby Research Center for Functional Brain Imaging at the Kennedy Krieger Institute, and Dr. Karen Davis both spoke about the current limitation of neuroimaging for problems like chronic pain.⁹⁰ Professor Pekar noted that the interpretation of neuroimaging data is subject to important limitations.⁹¹ Specifically, fMRI signals are highly dependent on “inter-individual differences in physiology.”⁹² Factors such as physical fitness, elevation levels, corresponding hematocrit levels, and even variations in a woman’s monthly cycle can all greatly affect fMRI scans.⁹³ So for example, the reading of a brain scan from an individual who flew in from a place with a

86. Panel 3, *supra* note 1, at 20; *see also* Thomas J. Scheff, *Community Conferences: Shame and Anger in Therapeutic Jurisprudence*, 67 REVISTA JURIDICA UNIVERSIDAD DE PUERTO RICO [REV. JUR. U.P.R.] 97, 108 (1998) (describing a negative feedback cycle and the difficulty in separating emotion from pain).

87. Panel 3, *supra* note 1, at 20; *see also* *Capelouto v. Kaiser Found. Hosps.*, 500 P. 2d 880, 883 (Cal. 1972) (noting that the infliction of emotional pain results in no less of a compensable injury).

88. Panel 3, *supra* note 1, at 20–21.

89. *See* Michael Finch, *Law and the Problem of Pain*, 74 U. CIN. L. REV. 285, 287–78 (2005) (showing how chronic pain overlaps with psychiatric and medical diagnoses).

90. Panel 3, *supra* note 1, at 17, 25.

91. *Id.* (commenting that fMRI scans are susceptible to changes caused by individual factors).

92. *Id.* at 25; *see also* Laurence R. Tancredi & Jonathan D. Brodie, *The Brain and Behavior: Limitations in the Legal Use of Functional Magnetic Resonance Imaging*, 33 AM. J.L. & MED. 271, 280 (2007) (critiquing the interpretational accuracy of fMRI scans).

93. *See* Panel 3, *supra* note 1, at 25 (explaining how various environmental factors influence how physicists interpret fMRI readings); *see generally* Tancredi & Brodie, *supra* note 92 (stressing that changes in different bodily systems can affect the fMRI’s reading of neural activity).

high altitude like Colorado would have to be interpreted differently than a similar brain scan from an individual who resides at sea level.⁹⁴ Similarly, very different brain scans may not indicate differing levels of pain, but rather may be a result of a “difference in hematic rate, or difference in the amount of red blood cells they have because of the elevations that they’ve been living at.”⁹⁵

Professor Wager acknowledged the importance of recognizing these limitations, but argued that they are not insurmountable.⁹⁶ The first step in mitigating these limitations is to know more about the person whose brain is being scanned.⁹⁷ If an individual’s particular circumstances—like a person’s residence at a high altitude—are known, then the studies can be calibrated to account for these differences.⁹⁸ Once this is done, inter-individual differences are less problematic in the neuroimaging of pain.⁹⁹

B. Future Research Directions in the Area of Emotion and Chronic Pain

Offering suggestions as to how to move forward, the panelists stressed the need for additional research and data.¹⁰⁰ Professor Haythornthwaite commented on the need for a more diverse sample population, as current studies lack equal representation across lines of sex, race, age, and education.¹⁰¹ There was also a suggestion that the courts could perform

94. See Panel 3, *supra* note 1, at 25 (explaining the nuances of fMRI interpretation).

95. *Id.*; see also *Concomitant Physiologic Changes as Potential Confounds for BOLD-Based fMRI: A Checklist*, PRACTICAL FMRI: THE NUTS & BOLTS (Dec. 8, 2014), <http://practicalfmri.blogspot.com/2014/12/concomitant-physiological-changes-as.html> (describing “hematic rate” and variation in fMRI readings).

96. See Panel 3, *supra* note 1, at 27 (responding to Dr. Pekar’s discussion of outside influences on fMRI scans).

97. See *id.* (describing the need to control for individual circumstances); see also Stuart W.S. MacDonald et al., *Intra-Individual Variability in Behavior: Links to Brain Structure, Neurotransmission and Neuronal Activity*, 29 TRENDS NEUROSCIENCES 474, 474 (2003), available at <http://drsmorey.org/bibtex/upload/MacDonald:etal:2006.pdf> (highlighting the need to include intra-individual variability to predict outcomes).

98. See Panel 3, *supra* note 1, at 27 (alluding to test calibrations of other disciplines such as biology); see also Xin Di et al., *Calibrating BOLD fMRI Activations with Neurovascular and Anatomical Constraints*, 23 CEREBRAL CORTEX 255, 255 (2013), available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.368.6282&rep=rep1&type=pdf> (describing fMRI calibration methods, which can account for individual differences).

99. See Wager et al., *supra* note 69, at 1396 (describing the necessary calibration of inter-individual differences for clinical studies of pain).

100. See, e.g., Panel 3, *supra* note 1, at 27 (stressing the need for clearer standards in brain scanning).

101. See *id.* at 10 (remarking that the current lack of diverse samples reduces the legitimacy of results); see also Carmen R. Green et al., *The Unequal Burden of Pain: Confronting Racial and*

their own data collection and research.¹⁰² Professor Wager added that we also need more rigorous neuroimaging research.¹⁰³ Neuroimaging technology and tools to perform data analysis will certainly continue to improve,¹⁰⁴ and the answer to the question of whether the technology will be good enough to isolate independent circuits seems certain to be “yes,” while the answer to the question of whether a chronic pain experience can be broken down in terms of such circuits is less clear.

V. AN INTERNATIONAL PERSPECTIVE

Professor Chandler described several differences and similarities between Canadian and U.S. law as they relate to the myriad of issues mentioned above.¹⁰⁵ For example, she suggested that from the perspective of the philosophy of mind, American law tends to lean toward dualism, while Canadian law is in some (but not all) cases more materialist.¹⁰⁶ She stated that “as we’re moving in the direction of collapsing the mind into the brain, . . . this is a very interesting challenge that is throughout the law and plays out in very interesting ways.”¹⁰⁷ In particular, this comparison was made on the basis of various rules of tort law that draw distinctions between mental and physical phenomena in the United States, which are not present in Canada.¹⁰⁸ Professor Chandler illustrated this apparent difference in dualism/materialism:

This is a rule called the doctrine of mitigation or the doctrine of avoidable consequences . . . which essentially says that if you are a plaintiff and you’re going to get

Ethnic Disparities in Pain, 4 PAIN MED. 277, 277 (2003) (highlighting the ethnic disparities in pain studies).

102. See Panel 3, *supra* note 1, at 20–21 (proposing judicial reforms that could spur progress); see also David R. Williams & Toni D. Rucker, *Understanding and Addressing Racial Disparities in Health Care*, 21 HEALTH CARE FIN. REV. 75, 82 (2000) (arguing that better data collection is required to ameliorate differences in racial impact).

103. See Panel 3, *supra* note 1, at 20 (claiming that advances such as higher resolution will improve the tracking of different kinds of pain).

104. See Jean-Baptiste Poline et al., *Data Sharing in Neuroimaging Research*, 6 FRONTIERS NEUROINFORMATICS 1 (Apr. 5 2012), <http://journal.frontiersin.org/article/10.3389/fninf.2012.00009/full> (describing expected improvements in neuroimaging).

105. Panel 3, *supra* note 1, at 11.

106. See *id.* (discussing the theoretical underpinnings of dualism and materialism as it relates to Canadian and American law).

107. *Id.*

108. See *id.* (including the Canadian doctrine of mitigation that applies to plaintiffs).

compensation from a tortfeasor, you are expected to take reasonable steps to limit your harm. . . . In Canada, judges, . . . including in the chronic pain context, will require claimants/plaintiffs to do what is called psychiatric mitigation.¹⁰⁹

For example, if a claimant had seen a doctor who recommended that the claimant take antidepressants, the judge can cut down the damages or disentitle the claimant if the claimant did not follow the recommended mitigation.¹¹⁰ In the U.S. courts, Chandler believes that there is less of this psychiatric mitigation, but stated that U.S. courts would uphold a recommendation to follow the treatment recommendations for non-psychiatric illnesses (for example, taking diabetes medication).¹¹¹ While this is only a single example of differences in policies between countries, it serves as a reminder that taking an international perspective might be useful in exploring the strengths and weaknesses of alternative approaches to similar social and legal problems.

VI. CONCLUSION

The distinction between whether a condition is reflected by physical or emotional disability can have a profound effect on outcomes in various legal settings.¹¹² Chronic pain has both physical and emotional components,¹¹³ indeed, it might be argued that without both components in

109. *Id.* at 11; see also Yehuda Adar, *Comparative Negligence and Mitigation of Damages: Two Sister Doctrines in Search of Reunion*, 31 QUINNIPIAC L. REV. 783, 783–84 (2013) (outlining the doctrine of mitigation); see also Vaughan Black, *Cultural Thin Skills*, 60 UNIVERSITY OF NEW BRUNSWICK LAW JOURNAL [U.N.B.L.J.] 186, 191 (2010) (Can.) (describing the doctrine of psychiatric mitigation in Canadian practice).

110. Panel 3, *supra* note 1, at 11; see also Olga Redko, *Religious Practice as a “Thin Skull” in the Context of Civil Liability*, 72 UNIVERSITY OF TORONTO FACULTY OF LAW REVIEW [UT FAC. L. REV.] 41, 48–49 (2014) (Can.) (describing a Canadian court’s view of a plaintiff’s post-injury obligations and limits of a defendant’s responsibility).

111. Panel 3, *supra* note 1, at 11; see also Kevin Klein, *Mitigation of Psychological Damages: An Economic Analysis of the Avoidable Consequences Doctrine and Its Applicability to Emotional Distress Injuries*, 29 OKLA. CITY U. L. REV. 405, 409 (2004) (describing mandatory treatment requirements for plaintiffs in order to mitigate damages).

112. See Habib Hanna, *Heads I Win, Tails You Lose: The Disparate Treatment of Similarly Situated Taxpayers Under the Personal Injury Income Tax Exclusion*, 13 CHAP. L. REV. 161, 162–63 (2010) (highlighting a form of disparate legal treatment between persons suffering emotional and physical injuries, respectively).

113. See Rickey S. Miller, *Psychological Approaches to Chronic Pain: Assessment and Treatment*, 7 ADVOC. Q. 148, 148 (1987) (highlighting the dual nature of pain).

concert, the nature of pain is very different.¹¹⁴ Neuroimaging studies have provided evidence for the emotional and physical sides of pain, even allowing us to isolate physical and emotional pain in highly controlled experimental settings.¹¹⁵ But for chronic pain, there is still limited evidence that emotional or physical characteristics can be isolated. Legal systems dealing with chronic pain should have an understanding of the mechanisms related to the development and maintenance of chronic pain, and the results from human neuroimaging studies can be particularly instructive to this end.

114. Pain has distinct unpleasantness and sensory aspects, but even distinguishing those components can be difficult. See Howard L. Fields, *Pain: An Unpleasant Topic*, 82 J. PAIN S61, S61–S62 (Supp. 1 1999) (discussing the proper modalities of pain).

115. See Naomi Eisenberger, *Understanding the Moderators of Physical and Emotional Pain: A Neural Systems-Based Approach*, 19 PSYCHOL. INQUIRY 189, 190 (2008) (demonstrating advances in neuroimaging).