

PTSD, BIOMARKERS, AND RAPE PROSECUTIONS

Betsy J. Grey*

ABSTRACT

Courts traditionally have been reluctant to admit PTSD evidence in rape cases. Prosecutors often attempt to introduce such evidence to establish that the victim did not consent to the sexual contact, but courts have been concerned that the jury will improperly use the evidence for other purposes, such as proof that the rape occurred. This essay questions whether judicial hostility to PTSD evidence should be reconsidered, given how science is developing biological markers, or objective physiological measures, of PTSD. It concludes that, even with these scientific developments, courts should remain skeptical about admitting PTSD evidence. The main concern persists that PTSD evidence may be overly persuasive in suggesting that rape was the stressor that caused the psychiatric disorder. Nor does use of biomarkers eliminate the voicing problem raised by the testimony of psychiatric experts, who must still rely on the accuser's account of the experience—the stressor event—that supposedly caused the PTSD. Moreover, an open door to PTSD biomarker evidence may introduce new evidentiary problems, as the defense may try to use the absence of biomarkers to support the claim of consent.

I. INTRODUCTION

Proving rape is a difficult and complex problem.¹ This is primarily because rape allegations often lack corroborating forensic evidence, particularly in

* Professor of Law and Alan A. Matheson Fellow at Arizona State University's Sandra Day O'Connor College of Law. I am grateful to Robert Bartels, Bob Dauber, Joshua Dressler, Erik Luna, Joel Nomkin, Michael Saks, and Mary Sigler for reading earlier drafts of this essay and providing many insightful comments. I also thank participants at the Society for Evolutionary Analysis in Law Conference and the Conference on Governance of Emerging Technologies: Law, Policy and Ethics. Mukunda Shanbhag and Ken Ralston provided excellent research assistance.

1. A note on terminology. The term "sexual assault" is sometimes used interchangeably with the term "rape" and sometimes used to define a broader definition of sexual assault (e.g. unwanted sexual contact). *Rape and Sexual Violence*, U.S. DEP'T OF JUSTICE (Oct. 11, 2016), <http://www.ncj.gov/topics/crime/rape-sexual-violence/pages/welcome.aspx>. State statutory definitions of rape also vary. JOSHUA DRESSLER, *UNDERSTANDING CRIMINAL LAW* 574

non-stranger rape cases, which typically turn on conflicting testimony between the alleged victims and the accused.² Some statistics suggest that few alleged rapists are convicted.³ In addition, sexual assault is one of the most underreported violent crimes.⁴ Among other things, this underreporting may be attributed to embarrassment and shame, fear of criticism or not being believed, fear of the perpetrator, guilt or self-blame, or fear of poor treatment in court.⁵

(7th ed. 2015). This paper uses the term “rape” to mean experiences involving non-consent, force or threat of force, and penetration.

2. See Katharine K. Baker, *Why Rape Should Not (Always) Be a Crime*, 100 MINN. L. REV. 221, 235 n.53, 236 (2015) (“Once there is a plausible story of consent . . . the problems of proof become paramount.”). Even if it is available, DNA evidence may not be useful in these cases. See Stephanie A. Parks, *Compelled DNA Testing in Rape Cases: Illustrating the Necessity of an Exception to the Self-Incrimination Clause*, 7 WM. & MARY J. WOMEN & L. 499, 500 n.12 (2001) (suggesting that DNA is not very helpful in date rape cases where the act of intercourse is uncontested). The lack of forensic evidence can have a significant impact on the verdict. See Gwen Jenkins & Regina A. Schuller, *The Impact of Negative Forensic Evidence on Mock Jurors’ Perceptions of a Trial of Drug-Facilitated Sexual Assault*, 31 LAW & HUM. BEHAV. 369, 369–70 (2007) (reporting that the absence of forensic evidence had a negative impact on date rape cases; certain date rape drugs have a very short half-life and cannot be detected more than twelve hours after the ingestion). Furthermore, jurors have developed an expectation that prosecutors will use the most advanced technology available. See Donald E. Shelton et al., *A Study of Juror Expectations and Demands Concerning Scientific Evidence: Does the “CSI Effect” Exist?*, 9 VAND. J. ENT. & TECH. L. 331, 359 (2006) (finding that in rape cases and other cases based on circumstantial evidence, jurors are more likely to acquit if the prosecutor did not proffer some form of scientific evidence).

3. Baker, *supra* note 2, at 232 (“[T]he number of rape reports that lead to arrest has declined significantly since 1970.”); BRIAN A. REAVES, U.S. DEP’T OF JUSTICE, NCJ 243777, FELONY DEFENDANTS IN LARGE URBAN COUNTIES, 2009 - STATISTICAL TABLES 24 (2013) <http://www.bjs.gov/content/pub/pdf/fdluc09.pdf> (showing that under 40% of defendants charged with rape were convicted of felony rape).

4. See Marjorie R. Sable et al., *Barriers to Reporting Sexual Assault for Women and Men: Perspectives of College Students*, 55 J. AM. C. HEALTH 157, 158 (2006).

5. See *id.* at 157–61.

The issue of credibility often presents challenges in this area.⁶ Another complexity stems from the related issues of consent and coercion.⁷ This is particularly true when the victim and the assailant know each other and when alcohol or drugs are involved in the contact.⁸ Frequently, determining consent depends solely on conflicting accounts by the accuser and the accused.⁹

To address these challenges, prosecutors of rape charges sometimes try to support their cases with evidence of the alleged victims' Post-Traumatic Stress Disorder (PTSD).¹⁰ Prosecutors typically proffer evidence of PTSD to buttress the credibility of the accuser and to corroborate claims of coercion and non-consent.¹¹ Courts have not allowed PTSD evidence to show that sexual contact occurred, but usually have admitted PTSD evidence to speak to an ancillary question such as explaining the post-incident behavior of the alleged victim, and sometimes have admitted PTSD evidence on the issue of consent.¹²

PTSD is a unique psychiatric diagnosis that draws a causal relationship between a given traumatic event—the “stressor”—and a mental disorder.¹³

6. False accusations of rape are statistically rare. See Philip N.S. Rumney, *False Allegations of Rape*, 65 CAMBRIDGE L.J. 128, 142–44 (2006) (citing studies from the United States on false rape reports). However, false accusations seem to hold a disproportionate place in the public imagination. *Id.* at 128–29; see *Prosecuting Rape Without Conclusive DNA Evidence*, NPR (Apr. 12, 2006, 1:00 PM), <http://www.npr.org/templates/story/story.php?storyId=5338512> (explaining that jurors still remain suspicious of the victim in rape cases). In one notorious example, *Rolling Stone Magazine* published “A Rape on Campus,” which alleged that a freshman named Jackie was gang-raped at a fraternity house during a party. Sabrina Rubin Erdely, *A Rape on Campus: A Brutal Assault and Struggle for Justice at UVA*, ROLLING STONE (Nov. 19, 2014), <http://web.archive.org/web/20141119200349/http://www.rollingstone.com/culture/features/a-rape-on-campus-20141119>. When the allegations in the story could not be verified, the magazine subsequently retracted the story. Sheila Coronel et al., ‘*A Rape on Campus*’: What Went Wrong, ROLLING STONE (Apr. 5, 2015), <http://www.rollingstone.com/culture/features/a-rape-on-campus-what-went-wrong-20150405>.

7. See Baker, *supra* note 2, at 235–40 (describing problems with proving nonconsensual sex between acquaintances).

8. See Meichun Mohler-Kuo et al., *Correlates of Rape While Intoxicated in a National Sample of College Women*, 65 J. STUD. ALCOHOL 37, 40 (2004) (stating that 72% of college rape victims reported being intoxicated during the rape).

9. See Baker, *supra* note 2, at 235–41.

10. See *State v. Allewalt*, 517 A.2d 741, 751–53 (Md. 1986) (admitting PTSD evidence and allowing an expert to opine that the alleged rape caused the disorder); cf. *Chapman v. State*, 18 P.3d 1164, 1169–74 (Wyo. 2001) (holding that expert testimony concerning PTSD is limited to explaining the victim’s behavior, such as why there was a delay in reporting the abuse, and cannot be used to prove that the victim’s claims were true).

11. See *infra* Part II.

12. See *id.*

13. See Deirdre M. Smith, *Diagnosing Liability: The Legal History of Posttraumatic Stress Disorder*, 84 TEMP. L. REV. 1, 1–2 (2011).

PTSD presents with varying symptoms, including re-experiencing the trauma, avoidance of traumatic stimuli, and hyperarousal reactions to reminders of the trauma.¹⁴ Although extensive research has identified a variety of risk factors that are associated with PTSD in trauma victims,¹⁵ its diagnosis is still based mostly on clinical symptoms and self-reporting by the patient.¹⁶ As such, it is subject to skepticism and challenge.¹⁷

In contrast, biological markers, or “biomarkers,” are objective physiological measures of a disease or condition.¹⁸ In particular, advances in neuroscience provide a greater ability to examine the physiological changes that occur in the brain after experiencing a traumatic event.¹⁹ Although research has not yet identified a specific biomarker for PTSD,²⁰ it does suggest the possibility of identifying several biomarkers that are associated with PTSD symptoms and vulnerability.²¹ Once these markers are identified, it will transform our diagnostic classification approach from one based mostly on clinical symptomology to one that features neurobiological metrics.

14. AM. PSYCHIATRIC ASS’N, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS § 309.81, at 271–80 (5th ed. 2013) [hereinafter DSM-5]. The trauma is re-experienced in various ways, such as in dream and involuntary. A person suffering from PTSD will also attempt to avoid distressing memories and external reminders of the trauma, such as people, places, conversations, objects, and situations. *Id.* at 273.

15. See Vasiliki Michopoulos et al., *Diagnostic Biomarkers for Posttraumatic Stress Disorder (PTSD): Promising Horizons from Translational Neuroscience Research*, 78 BIOLOGICAL PSYCHIATRY 344, 344 (2015).

16. See Andrew P. Levin et al., *DSM-5 and Posttraumatic Stress Disorder*, 42 J. AM. ACAD. PSYCHIATRY & L. 146, 150–52 (2014); F. Don Nidiffer & Spencer Leach, *To Hell and Back: Evolution of Combat-Related Post Traumatic Stress Disorder*, 29 DEV. MENTAL HEALTH L. 1, 13 (2010) (“At present, PTSD is primarily diagnosed by self-report and interview measures.”); Smith, *supra* note 13, at 55 (“There are . . . concerns about the heavy reliance during the diagnostic process on subjective reporting by the patient of both the stressor event and the resulting reactions.”); Lei Zhang et al., *A Strategy for the Development of Biomarker Tests for PTSD*, 73 MED. HYPOTHESES 404, 404 (2009).

17. See Melissa Hamilton, *Reinvigorating Actus Reus: The Case for Involuntary Actions by Veterans with Post-Traumatic Stress Disorder*, 16 BERKELEY J. CRIM. L. 340, 387 (2011) (describing repeated criticism of PTSD diagnosis as subjective and reliant on the patient’s own account).

18. See Zhang et al., *supra* note 16.

19. See Eloise A. Stark et al., *Post-Traumatic Stress Influences the Brain Even in the Absence of Symptoms: A Systematic, Quantitative Meta-Analysis of Neuroimaging Studies*, 56 NEUROSCIENCE & BIOBEHAVIORAL REV. 207, 208–19 (2015) (conducting meta-analysis of brain research on PTSD).

20. See Zhang et al., *supra* note 16, at 405.

21. See Michopoulos et al., *supra* note 15; *infra* Part II.C.

The identification of biomarkers associated with PTSD will have profound implications for the law. This essay focuses on one implication—the use of biomarkers for PTSD diagnosis as evidence in a rape case. Admissibility depends on the balance struck between the probity and prejudice of relevant evidence, as generally required by rules of evidence.²² I examine whether biomarkers will change the balance reflected in current patterns of admissibility of PTSD evidence.²³ The main concern in admitting clinically-diagnosed PTSD evidence is that it may be overly persuasive in implying that the rape was the stressor that caused the psychiatric disorder. Is the biomarker evidence of PTSD more probative? If so, is it nevertheless unduly prejudicial? Put simply, will a more reliable diagnosis clarify causal links in this context and thus strike a different balance between probity and prejudice?

Part I of this essay discusses the psychiatric disorder of PTSD, briefly reviewing the diagnostic criteria for the disorder. Part II examines the use of PTSD in criminal rape cases, tracing its original usage within the social science framework of Rape Trauma Syndrome (RTS) and its current role in

22. These standards are reflected in the Federal Rules of Evidence that govern admissibility of evidence. Rule 402 states that all relevant evidence is admissible, unless it is subject to a special exclusion. FED. R. EVID. 402. Evidence is relevant if “it has any tendency to make a fact more or less probable than it would be without the evidence” *Id.* 401. Under Rule 403, the court must weigh the probity of the evidence against its prejudicial impact: “The court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.” *Id.* 403. Moreover, expert testimony is subject to Rule 702, which requires the court to determine that relevant expert evidence will “help the trier of fact to understand the evidence or to determine a fact in issue” *Id.* 702. If a matter is within the understanding and experience of jurors, the expert testimony will not be admitted for fear of usurping the role of the jury. *Id.* 702(a) (expert witnesses may testify as to matters of opinion if the opinion “will help the trier of fact to understand the evidence or to determine a fact in issue.”). If the court determines that the expert evidence may help the jury, the proponent of the evidence must demonstrate that it satisfies the threshold requirements of Rule 702. *Id.* 702(b)–(d) (expert testimony must both be “based on sufficient facts or data” and be “the product of reliable principles and methods,” and the expert must have “reliably applied the principles and methods to the facts of the case”). Finally, expert clinical testimony is also governed by Rule 703, under which an expert may base his opinion “on facts or data that the expert has been made aware of or personally observed,” even if those facts or data are inadmissible. *Id.* 703. State evidence codes also impose similar requirements for admissibility of evidence, although sometimes they impose a more restrictive standard for admitting expert testimony. See Andrea C. Pustilnik, *Imaging Brains, Changing Minds: How Pain Neuroimaging Can Inform the Law*, 66 ALA. L. REV. 1099, 1147 (2015).

23. Calls are already being made to increase use of PTSD evidence in rape prosecutions, based on advancements in neuroscience. See Bradley A. Muhs, Note, *Fighting the Unfair Fight: Post-Traumatic Stress Disorder and the Need for Neuroimaging Evidence in Rape Trials*, 35 WOMEN’S RTS. L. REP. 215, 241 (2014) (arguing that evidence of victims’ brain scans in rape prosecutions should more effectively secure convictions of rapists).

rape prosecutions. It then highlights some recent scientific advances in developing diagnostic biomarkers of PTSD. Part III considers how the development of biomarkers to aid in the diagnosis of PTSD might change the legal landscape in rape cases. It discusses the relevancy of the biomarker evidence, whether its prejudicial effect would outweigh its probative value, and whether the evidence (or its absence) could be used by the defense as well. This analysis suggests that the development of biomarkers may increase the reliability of the PTSD diagnosis, but that it may not address the other concerns with admission of PTSD evidence in a rape case, particularly the prejudicial impact of implying that the stressor for the PTSD was rape. Although PTSD biomarkers may validate an individual's dysfunction through a bio-chemical response to an event, the diagnosis is still circumstantial evidence and does not create an artifact of the event itself. As such, use of the PTSD diagnosis as a proxy for causal determinations remains problematic. Use of biomarker diagnostics does not eliminate the vouching problem raised by the testimony of psychiatric experts, who will still rely on the accuser's account about the existence and nature of the reported stressor event in diagnosing PTSD.

II. PTSD AS A MEDICAL DIAGNOSIS

PTSD is an anxiety disorder triggered by an extreme stressor.²⁴ Although only a small percentage of individuals exposed to trauma develop PTSD,²⁵ it

24. See DSM-5, *supra* note 14, at 274. PTSD was first recognized by the American Psychiatric Association in 1980 in the third edition of the DSM. AM. PSYCHIATRIC ASS'N, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS 236–38 (3d ed. 1980) [hereinafter DSM-III]. But the symptoms of what we now call PTSD have been noted for at least a hundred years and perhaps earlier. See Matthew J. Friedman et al., *PTSD: Twenty-Five Years of Progress and Challenges*, in HANDBOOK OF PTSD: SCIENCE AND PRACTICE 3, 3–6 (Matthew J. Friedman et al. eds., 2007). For an exhaustive survey of the history of PTSD, see Smith, *supra* note 13. As Deirdre Smith describes, the recognition of PTSD resulted from heavy lobbying by Vietnam veterans' groups. *Id.* at 3. At the same time, the *Handbook of PTSD* notes that the women's movement brought attention to reactions to interpersonal violence and research "resulted in descriptions of child abuse syndrome, the rape trauma syndrome, and the battered woman syndrome" that were "much like those [descriptions of responses from] millions of Vietnam veterans who had returned from war." Friedman et al., *supra*, at 4. Soon after its acceptance in the DSM-III, plaintiffs and defendants sought to introduce psychological testimony of PTSD in various settings, including sexual assault cases. See Smith, *supra* note 13, at 34–36.

25. See Nicoletta Brunello et al., *Posttraumatic Stress Disorder: Diagnosis and Epidemiology, Comorbidity and Social Consequences, Biology and Treatment*, 43 NEUROPSYCHOBIOLOGY 150, 151 (2001) (only 10–20% of individuals exposed to trauma

is a disorder that has entered the popular lexicon and is commonly associated with veterans returning home from war and survivors of life-threatening accidents.²⁶ A variety of symptoms are associated with PTSD, including flashbacks, intrusive memories, hyper-vigilance, sleep disturbance, avoidance of traumatic stimuli, numbing of emotions, social dysfunction, and physiological hyper-responsivity.²⁷ The most recent version of the Diagnostic and Statistical Manual of Mental Disorders (DSM), DSM-5, lists five criteria for PTSD:

- A. Exposure to actual or threatened death, serious injury, or sexual violence . . . :
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- B. Presence of one (or more) . . . intrusion symptoms associated with the traumatic event(s) . . . :
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- C. Persistent avoidance of stimuli associated with the traumatic event(s) . . . :

develop PTSD); DSM-5, *supra* note 14, at 276 (stating that in the United States, projected lifetime risk for PTSD is 8.7%).

26. Articles in popular media tend to focus on war veterans suffering from PTSD. See e.g., Sebastian Junger, *How PTSD Became a Problem Far Beyond the Battlefield*, VANITY FAIR (June 2015), <http://www.vanityfair.com/news/2015/05/ptsd-war-home-sebastian-junger>. But the diagnosis has become a powerful term in our culture. See Smith, *supra* note 13, at 2 (“Affixing the label of PTSD to an individual suggests that the person was once mentally healthy and, as a result of a distinct and horrific experience, is now psychologically damaged and scarred.”). Criterion A of the DSM-5 defines qualifying stressors “actual or threatened death, serious injury, or sexual violence.” DSM-5, *supra* note 14, at 271; see Matthew J. Friedman et al., *Considering PTSD for DSM-5*, 28 DEPRESSION & ANXIETY 750, 753–55, 764 (2011) (reviewing literature on distinguishing between “traumatic” and “non-traumatic” events as triggers for PTSD and finding “very few people meet full PTSD diagnostic criteria without prior exposure to a recognizable traumatic event” and “[e]xposure to a traumatic event is a necessary condition that precedes the later development of PTSD”). Some research suggests that events that are not life-threatening may cause symptoms of PTSD as well. See, e.g., Samantha J. Anders et al., *Variations in Criterion A and PTSD Rates in a Community Sample of Women*, 25 J. ANXIETY DISORDERS 176, 182–83 (2011) (suggesting that events such as serious conflicts in a relationship, the loss of a job, and serious financial stress may also trigger symptoms of PTSD); Andrea Roberts et al., *The Stressor Criterion for Posttraumatic Stress Disorder: Does It Matter?*, 73 J. CLINICAL PSYCHIATRY 264, 264 (2012) (finding that PTSD symptoms may not vary significantly among stressors, regardless of whether it was traumatic or non-traumatic).

27. DSM-5, *supra* note 14, § 309.81(B); see also V. Francati et al., *Functional Neuroimaging Studies in Posttraumatic Stress Disorder: Review of Current Methods and Findings*, 24 DEPRESSION & ANXIETY 202, 202 (2007).

....

D. Negative alterations in cognitions and mood associated with the traumatic event(s) . . . :

....

E. Marked alterations in arousal and reactivity associated with the traumatic event(s) . . .²⁸

The importance of sexual violence as a specified stressor in the DSM-5 is reflected in studies that show that rates of PTSD following rape were higher than the PTSD rates associated with other traumatic events.²⁹ Sexual violence as a stressor is not restricted to rape and includes “forced sexual penetration, alcohol/drug-facilitated sexual penetration, abusive sexual contact, noncontact sexual abuse, [and] sexual trafficking.”³⁰ As the DSM-5 indicates, biological measures are not yet used in the PTSD diagnostic criteria.³¹

Although listing a cluster of symptoms is typical for diagnostic criteria in the DSM, PTSD is unique among the disorders because “it has a determination of causation built into the definition.”³² In other words, it requires the diagnostician to assign causal responsibility to the fact that a stressor or triggering event occurred.³³ Some studies have suggested the

28. DSM-5, *supra* note 14, § 309.81(A)–(E). This is sometimes referred to as “Criterion A.” See Andrew P. Levin et al., *DSM-5 and Posttraumatic Stress Disorder*, 42 J. AM. ACAD. PSYCHIATRY & L. 146, 148 (2014).

29. See Sarah E. Ullman & Liana C. Peter-Hagene, *Longitudinal Relationships of Social Reactions, PTSD, and Revictimization in Sexual Assault Survivors*, 31 J. INTERPERSONAL VIOLENCE 1074, 1075 (2016) (“PTSD is a common psychological consequence of sexual assault . . . ”). See generally Ronald C. Kessler et al., *Posttraumatic Stress Disorder in the National Comorbidity Survey*, 52 ARCHIVES GEN. PSYCHIATRY 1048, 1052–53 (1995); Heidi S. Resnick et al., *Prevalence of Civilian Trauma and Posttraumatic Stress Disorder in a Representative National Sample of Women*, 61 J. CONSULTING & CLINICAL PSYCHOL. 984 (1993). Other studies show that sexual assault victims report more symptoms of PTSD than victims of other traumas. See, e.g., Sarah E. Ullman, *Adult Trauma Survivors and Post-Traumatic Stress Sequelae: An Analysis of Reexperiencing, Avoidance, and Arousal Criteria*, 8 J. TRAUMATIC STRESS 179, 179 (1995). See generally DAVID L. FAIGMAN ET AL., MODERN SCIENTIFIC EVIDENCE: THE LAW AND SCIENCE OF EXPERT TESTIMONY §§ 14:11–14:16 (2015–2016 ed. 2015) (reviewing literature).

30. DSM-5, *supra* note 14, at 274.

31. See *id.* § 309.81. The DSM-5 also outlines the diagnostic features. *Id.* at 274–76.

32. Smith, *supra* note 13, at 2.

33. See Robert L. Spritzer et al., *Revisiting the Institute of Medicine Report on the Validity of Posttraumatic Stress Disorder*, 49 COMPREHENSIVE PSYCHIATRY 319, 319 (2008) (“[A] key distinguishing feature of PTSD is that it is not agnostic to etiology . . . PTSD rests on the assumption of a specific etiology, whereby a distinct set of events (criterion A) is assumed to be the uniformly most potent contributor to outcome.”). This may be why the diagnosis of PTSD

potential for “confirmatory” bias when the clinician is aware of an individual’s exposure to a stressor.³⁴ As noted earlier, the listed symptoms of PTSD are largely based on self-reporting and difficult to verify independently.³⁵ In this light, it is understandable why scientists have been searching for biomarkers associated with the injured brain state to allow medicine to move beyond a subjective clinical diagnosis to more objective measures.³⁶

III. USE OF PTSD EVIDENCE IN RAPE PROSECUTIONS

Dr. Allan Stone recognized early on the potential impact of PTSD on law:

No diagnosis in the history of American psychiatry has had a more dramatic and pervasive impact on law and social justice than post-traumatic stress disorder The diagnosis of PTSD has also given a new credibility to a variety of victims who come before the courts either as defendants or plaintiffs.³⁷

In a rape prosecution, PTSD evidence could inform the determination of whether a rape occurred or whether consent was given, or provide additional context for understanding victim behavior. These potential uses stem from the possibility that the alleged victim’s PTSD was caused by the trauma of rape. For example, one of the elements of rape that the state bears the burden of proving beyond a reasonable doubt is that the alleged victim did not consent.³⁸ Evidence of the accuser’s PTSD may make it more probable that she experienced trauma and thereby undermine the claim of consent. That potential use must be examined against the backdrop of the comparative analysis that the Federal Rule of Evidence 403 demands: the relative

used in criminal cases is often disputed, unlike other psychiatric diagnoses. See Olav Nielssen et al., *The Reliability of Evidence About Psychiatric Diagnosis After Serious Crime: Part I. Agreement Between Experts*, 38 J. AM. ACAD. PSYCHIATRY L. 516, 520–23 (2010) (describing a study that shows poor level of agreement between experts and treating physicians in PTSD diagnosis, unlike other psychiatric diagnoses used in criminal prosecutions).

34. See Marilyn L. Bowman, *Problems Inherent to the Diagnosis of Posttraumatic Stress Disorder*, in *PSYCHOLOGICAL INJURIES AT TRIAL* 820, 820–39 (Izabela Z. Schultz & Douglas O. Brady eds., 2003); see also Deirdre M. Smith, *The Disordered and Discredited Plaintiff: Psychiatric Evidence in Civil Litigation*, 31 CARDOZO L. REV. 749, 775–76, 810 (2010) (discussing bias in PTSD diagnosis that may be undetectable by factfinders in court).

35. See *supra* note 16.

36. See discussion *infra* Part II.C.

37. Allan A. Stone, *Post-Traumatic Stress Disorder and the Law: Critical Review of the New Frontier*, 21 J. AM. ACAD. PSYCHIATRY & L. 23, 23 (1993).

38. See DRESSLER, *supra* note 1, § 33.04.

probative value of the evidence against the dangers of admitting the evidence, such as “unfair prejudice, confusing the issues, [or] misleading the jury.”³⁹

This section reviews use of PTSD evidence as corroborating evidence in rape cases. In that context, it plots the development of the use of PTSD in sexual assault cases from the earlier social science framework of rape trauma syndrome to its current use. It then turns to a brief review of scientific advances in the search for biomarkers of PTSD, to examine their potential use in rape prosecutions.

A. Rape Trauma Syndrome

Evidence of PTSD in the rape context was originally described as “rape trauma syndrome” (RTS).⁴⁰ RTS, a term tracing back to an article published in 1974,⁴¹ describes the characteristic behavior of victims of rape, typically dividing the behavior into two phases: Phase I, or the “acute phase,” occurring immediately after the attack, and, Phase II, the long-term behavioral characteristics victims experience sometime after the attack.⁴² RTS sometimes is viewed as a subset of PTSD, with rape as the stressor.⁴³

39. FED. R. EVID. 403.

40. For a thorough description of the history and theory of RTS, see Toni M. Massaro, *Experts, Psychology, Credibility, and Rape: The Rape Trauma Syndrome Issue and Its Implications for Expert Psychological Testimony*, 69 MINN. L. REV. 395, 424–32 (1985). See generally CHRISTOPHER B. MUELLER & LAIRD C. KIRKPATRICK, FEDERAL EVIDENCE § 351 (2d ed. 1994 & Supp. 1995) (although social framework evidence is not a diagnosis, it “brings to trials the insight of social science and psychology.”); David McCord, *The Admissibility of Expert Testimony Regarding Rape Trauma Syndrome in Rape Prosecutions*, 26 B.C. L. REV. 1143 (1985); Laurens Walker & John Monahan, *Social Frameworks: A New Use of Social Science in Law*, 73 VA. L. REV. 559 (1987).

41. Ann Wolbert Burgess & Lynda Lytle Holmstrom, *Rape Trauma Syndrome*, 131 AM. J. PSYCHIATRY 981 (1974) (describing study of ninety-two rape victims and characteristic behavior following rape).

42. *Id.* at 982–83.

43. See, e.g., State v. Allewalt, 517 A.2d 741, 748 (Md. 1986); see also State v. Taylor, 663 S.W.2d 235, 237 (Mo. 1984) (en banc); FAIGMAN ET AL., supra note 29, § 14:1 (distinguishing RTS as “the entire body of research on the effects of rape” from PTSD that is rape related); MUELLER & KIRKPATRICK, *supra* note 40, at 633; cf. Alphonso v. Charity Hosp. of La., 413 So. 2d 982, 986 (La. Ct. App. 1982) (stating that PTSD and RTS are distinct conditions, but not drawing any relevant inference from the distinction).

Courts traditionally did not admit RTS to show that sexual contact actually occurred.⁴⁴ RTS evidence was criticized as scientifically unreliable,⁴⁵ prejudicial,⁴⁶ and unhelpful.⁴⁷ While courts still express these criticisms today,⁴⁸ they have been more receptive to using RTS evidence to explain the post-incident behavior of rape victims. For example, it is not uncommon for victims to delay reporting their assault.⁴⁹ Prosecutors have been able to introduce syndrome evidence to show that this is an identifiable behavioral and psychological trait of rape victims.⁵⁰

The admissibility of RTS evidence to show that the accuser did not consent to intercourse⁵¹ has proven more complicated.⁵² In *State v. Saldana*,⁵³ the accused did not deny sexual intercourse but claimed that it was

44. *State v. Saldana*, 324 N.W.2d 227, 229 (Minn. 1982) (“Rape trauma syndrome is not the type of scientific test that accurately and reliably determines whether a rape has occurred. The characteristic symptoms may follow *any* psychologically traumatic event.”); *see* Patricia A. Frazier & Eugene Borgida, *Rape Trauma Syndrome: A Review of Case Law and Psychological Research*, 16 LAW & HUM. BEHAV. 293, 295–99 (1992); McCord, *supra* note 40, at 1144–45 (describing early attempts to introduce RTS evidence resulting in extensive criticism and inconsistent decisions). *See generally* FAIGMAN ET AL., *supra* note 29, § 14:2.

45. *Saldana*, 324 N.W.2d at 230 (holding that RTS is therapeutic tool used to help treat the victim but lacking the scientific validity to be admissible as evidence to speak toward consent).

46. *Taylor*, 663 S.W.2d at 240.

47. *Saldana*, 324 N.W.2d at 229 (ruling that the probative value and reliability of the scientific evaluation of RTS had not surpassed the value of common sense deliberation by a jury).

48. *See In re Jordan R.*, 140 Cal. Rptr. 3d 222, 238–39 (Ct. App. 2012) (finding RTS evidence scientifically unreliable); *State v. Obeta*, 796 N.W.2d 282, 289–90 (Minn. 2011) (reaffirming *Saldana*, which found RTS testimony unhelpful); *Carlton v. Vancouver Care LLC*, 231 P.3d 1241, 1250 (Wash. Ct. App. 2010) (finding RTS evidence prejudicial on the ultimate issue of rape); FAIGMAN ET AL., *supra* note 29, § 14:2 (“Most courts stress in unequivocal terms that RTS cannot be used to prove . . . that a rape occurred.”).

49. *People v. Williams*, 987 N.E.2d 260, 263 (N.Y. 2013).

50. *See, e.g.*, *State v. Gonzalez*, 834 A.2d 354, 358 (N.H. 2003) (holding that expert testimony concerning sexual abuse victim denials and recantations is admissible when it gives the trier of fact useful information about the behavior of rape victims that would not be known to the common juror, but not to establish that the abuse occurred); *see also Williams*, 987 N.E.2d at 263 (stating that expert testimony of RTS is only admissible when it is used to explain behavior, such as “why a child may not have immediately reported sexual abuse.”); *State v. Rizzo*, 640 N.W.2d 93, 98 (Wis. 2002) (ruling that rape trauma evidence is admissible to show that a child’s behavior was consistent with the behaviors of sexual assault victims). *But see State v. Alberico*, 861 P.2d 192, 209–10 (N.M. 1993) (finding the distinction between expert testimony that an alleged victim exhibits rape-related behavior from testimony that bolsters the credibility of the witness to be illusive).

51. *See FAIGMAN ET AL.*, *supra* note 29, § 14:1 (“This testimony is used predominantly in criminal cases to corroborate the prosecution’s claim that . . . [i]f the intercourse had been consensual . . . the complainant would not be experiencing symptoms of trauma.”).

52. *See id.* at § 14:2.

53. *See generally* *State v. Saldana*, 324 N.W.2d 227 (Minn. 1982).

consensual.⁵⁴ Although the trial court admitted evidence on RTS, the Minnesota Supreme Court reversed, ruling that the probative value of admitting RTS testimony was outweighed by “the danger of unfair prejudice, confusion, or misleading the jury.”⁵⁵ The court reasoned that (1) the characteristic symptoms used to identify RTS may follow any traumatic event, not just rape; (2) the case must be decided on the basis of what happened in the case at hand, not on typical reactions to rape; (3) the reliability of the scientific evaluation of RTS has not surpassed the value of common sense deliberation by a jury; and (4) RTS is a therapeutic, rather than a fact-finding, tool and thus would not assist the jury in its fact-finding function.⁵⁶ As a result, the evidence would unfairly prejudice the accused “by creating an aura of special reliability and trustworthiness”⁵⁷ and infringe on the jury’s role as the trier of fact.⁵⁸

Other jurisdictions also have refused to admit RTS evidence when the defendant has claimed consent.⁵⁹ In *State v. Taylor*, for example, the Missouri Supreme Court was concerned about the prejudicial effect of RTS evidence on the jury, drawing attention to the fact that the expert’s identification of RTS necessarily was based on his acceptance of the accuser’s claim that the rape had, in fact, occurred.⁶⁰ The court reasoned the expert’s testimony therefore “fully supports that the attack occurred as the victim related . . . [and] vouches too much for the victim’s credibility and supplies verisimilitude for her on the critical issue of whether defendant did rape her.”⁶¹

In contrast, some jurisdictions have admitted RTS evidence to refute the defense’s claim of consent.⁶² In *State v. Marks*,⁶³ the Kansas Supreme Court found that RTS evidence was relevant to the issue of consent and not overly prejudicial because the expert was subject to cross examination, allowing the

54. *Id.* at 229.

55. *Id.*

56. *Id.* at 229–30.

57. *Id.* at 230.

58. *Id.* at 231; see also *State v. McGee*, 324 N.W.2d 232, 233 (Minn. 1982) (admission of expert RTS testimony was a “fundamental error and sufficiently prejudicial to require a new trial for the reasons set forth in *State v. Saldana*.”).

59. See *State v. Taylor*, 663 S.W.2d 235, 241 (Mo. 1984).

60. *Id.* at 240.

61. *Id.*; see also *People v. Bledsoe*, 681 P.2d 291, 300 (Cal. 1984) (ruling that when the defense to an alleged rape is consent, RTS cannot be admitted because it is a therapeutic tool; therapists do not question the reliability of their patient’s account in the course of their treatment).

62. See *State v. Marks*, 647 P.2d 1292, 1299 (Kan. 1982).

63. *Id.*

jury to determine the weight of the testimony.⁶⁴ The court also discounted the issue of the expert's tacit acceptance of the victim's account, finding that because the expert relied on accounts that had been admitted into evidence as well as his own psychological evaluations, "[i]n this sense his conclusions were based on data personally perceived by him."⁶⁵

In recent years, the use of RTS evidence has declined and been replaced by PTSD evidence. The decline of RTS may be attributed to various criticisms lodged against it, including the failure to develop a consensus in the field, and not being subject to empirical examination.⁶⁶ The PTSD model is described as superior, both conceptually and empirically.⁶⁷ Even so, admissibility of PTSD evidence in this context has been uneven, as described below.

B. PTSD evidence

Unlike RTS syndrome evidence, PTSD is a psychiatric medical diagnosis, of the sort courts more readily admit.⁶⁸ As a recognized psychiatric disorder,

64. *Id.*

65. *Id.* at 1300. Other states have similarly ruled that expert testimony on RTS was admissible when the accused argued consent because the expert would be subject to cross-examination and the jury could weigh the evidence themselves. *See State v. Huey*, 699 P.2d 1290, 1294 (Ariz. 1985); *State v. Liddell*, 685 P.2d 918, 923 (Mont. 1984); *State v. McCoy*, 366 S.E.2d 731, 736–37 (W. Va. 1988); *see also State v. Jackson*, 383 S.E.2d 79, 83 (W. Va. 1989) (ruling that expert testimony on RTS was admissible to explain the State's direct evidence in its case in chief, subject to the expert not being allowed to testify that the rape occurred, either explicitly or implicitly, even when the defense was consent).

66. *See* William O'Donohue et al., *Examining the Scientific Validity of Rape Trauma Syndrome*, 21 PSYCHIATRY PSYCHOL. & L. 858, 871 (2014) (comprehensive review of RTS finding that it is "vague and imprecise"; "[D]ue to the original study's multiple methodological problems, lack of valid ways to measure RTS and a lack of subsequent research directly evaluating RTS, the evidentiary status of RTS has been and continues to be quite problematic"). *See generally* David L. Faigman et al., *Group to Individual (G2i) Inference in Scientific Expert Testimony*, 81 U. CHI. L. REV. 417, 469–70, 474 (2014) ("[T]he primary danger of framework evidence . . . is not that the jury will misunderstand it or disregard it but rather that it will give the evidence too much weight"; it is important to differentiate between framework and diagnostic evidence.); James T. Richardson et al., *The Problems of Applying Daubert to Psychological Syndrome Evidence*, 79 JUDICATURE 10, 12–15 (1995) (explaining that syndrome evidence is frequently not sufficiently developed as theory, lacks empirical support, and is not subject to error rate analysis).

67. *See* O'Donohue et al., *supra* note 66; *see also* *State v. Martens*, 629 N.E.2d 462, 467–68 (Ohio Ct. App. 1993) (PTSD evidence is less prejudicial than RTS).

68. *See* Smith, *supra* note 34, at 772–73, 776 (noting that courts readily admit psychiatric diagnoses into evidence, although use of those diagnoses for causal determinations remains controversial).

it has established diagnostic criteria and has undergone more extensive empirical examination, achieving a greater consensus in the scientific field, than RTS evidence.⁶⁹ But regardless of whether it is cast as RTS or PTSD evidence, the critical issue for admissibility in rape prosecutions is the purpose for which the evidence is proffered. As with RTS evidence, courts have been hesitant to admit evidence of PTSD to establish that the alleged sexual assault actually occurred.⁷⁰ Instead, courts generally have held that evidence of PTSD is only admissible when it is used to explain the behavior of the accuser.⁷¹

However, again as with RTS, some courts have allowed admission of expert testimony on PTSD to refute a defense of consent.⁷² Admission of such evidence may be affected by the states' definitions of consent and rape, which differ by jurisdiction. Many jurisdictions expressly define rape as requiring force.⁷³ Other jurisdictions define rape as penetration in the absence of verbal consent.⁷⁴ The American Law Institute (ALI), recognizing the varied definitions of consent among states, has grouped the approaches into categories in its draft proposal of changes to the Model Penal Code on the question of consent.⁷⁵ According to the ALI, of the 53 jurisdictions (50 States, the District of Columbia, the United States, and the military), only 32 define

69. See O'Donohue et al., *supra* note 66, at 867–68 (listing empirically supported measures of PTSD symptoms and treatments). See generally CHRISTOPHER SLOBOGIN, PROVING THE UNPROVABLE: THE ROLE OF LAW, SCIENCE, AND SPECULATION IN ADJUDICATING CULPABILITY AND DANGEROUSNESS 24–25 (Ronald Roesch ed., Oxford Univ. Press 2007) (stating that, in contrast to medical diagnostic testimony, framework testimony “tends to rely on off-the-rack data or impressions about a group of people, presented by an expert who may never have seen the defendant or witness to whom it is applied”).

70. State v. Alberico, 861 P.2d 192, 207 (N.M. 1993).

71. See *id.* at 210 (holding that evidence of PTSD is only admissible when it goes toward explaining the behavior of the victim). Some jurisdictions have further qualified the admissibility of PTSD evidence, ruling that it is only admissible when the defendant has brought to issue the question of the victim's behavior. See State v. Fairweather, 863 P.2d 1077, 1081–82 (N.M. 1993) (evidence of PTSD improperly admitted as to the truthfulness of victim).

72. See United States v. Morris, No. 2:08-CR-90, 2009 WL 290601, at *3 (E.D. Tenn. Feb. 5, 2009) (expert testimony on PTSD is admissible and relevant to the issue of victim's consent); State v. Allewalt, 517 A.2d 741, 751 (Md. 1986) (testimony from expert that complainant suffered from PTSD and that PTSD was caused by rape was admissible).

73. Oregon's statute concerning rape, OR. REV. STAT. § 163.305 (2016), is a good example of this. The statute defines rape through what it calls “forcible compulsion,” which includes the use of, or the threat of the use of, force. *Id.* Consistent with this view of rape, the statute expressly authorizes a jury to consider a lack of resistance in determining whether consent existed. *Id.* § 163.315.

74. See, e.g., COLO. REV. STAT. § 18-3-404 (2016); D.C. CODE § 22-3006 (2016).

75. MODEL PENAL CODE § 213.0 reporter's note at 3 (AM. LAW INST., Council Draft No. 3 2016).

consent by statute, out of which 6 provide that consent exists in the absence of physical or verbal refusal, 13 require an affirmative expression of assent, and 9 view the complainant's conduct in the totality of the circumstances.⁷⁶ In states that do not define consent by statute, many judicial formulations require some form of "voluntary agreement" or "affirmative permission,"⁷⁷ as in Hawaii.⁷⁸ Other states approach it negatively, through a common law definition of non-consent.⁷⁹

This range of approaches exemplifies the complexity of the concept of consent. On one end of the spectrum, it may be understood as a subjective state of mind of the woman, or attitudinal.⁸⁰ On the other end, it may be viewed as "an expressive . . . , or external, concept" that requires an external act to indicate agreement.⁸¹ Even if consent is considered an expressive concept, a difficult issue is how to deal with silence on the part of the alleged victim—whether to place the burden on the male to seek consent or on the female to expressly refuse it.⁸²

Although some patterns emerge from comparing the various definitions of consent among jurisdictions and the admissibility of evidence of RTS and

76. *Id.*

77. *Id.* These categories are fluid, however. For example, as noted in the proposed MPC draft, the court in *State v. Adams*, 880 P.2d 226, 230 (Haw. Ct. App. 1994), stated that it must adopt the "plain and obvious meaning" of consent and borrowed the definition in Webster's Third New International Dictionary, which states that consent is "voluntary agreement or concurrence." *Id.* at 234. However, the court found that although physical resistance is not necessary to prove an absence of consent, such evidence of a lack of consent may be admitted as it holds probative value. *Id.* at 235.

78. See *id.* at 234 (adopting the plain meaning of consent as "voluntary agreement or concurrence").

79. See *State v. Ruth*, 21 Kan. 583, 589–91 (1879) (holding that consent does not exist when one submits to sexual intercourse due to a legitimate threat of force). More recent cases from Kansas are consistent with this view. See *State v. Brooks*, 317 P.3d 54, 62 (Kan. 2014) (stating that sexual intercourse induced by force or fear indicates a lack of consent).

80. See DRESSLER, *supra* note 1, at 581.

81. *Id.*; see FLA. STAT. § 794.011(1)(a) (2016) (defining consent as being "intelligent, knowing, and voluntary consent and does not include coerced submission" and "shall not be deemed or construed to mean the failure by the alleged victim to offer physical resistance to the offender"); cf. NEB. REV. STAT. §§ 28-318(8)(a)(ii)–(iii) (2015) (defining lack of consent as when "the victim expressed a lack of consent through words . . . [or] conduct"). Earlier law demanded that the victim demonstrate physical resistance, a standard that has since been widely rejected. MODEL PENAL CODE § 213.0 reporter's note at 11 (AM. LAW INST., Preliminary Draft No. 6 2016). The current MPC Proposal recommends a definition based on observable behavior as assessed under the totality of the circumstances. See *id.* at 1.

82. See DRESSLER, *supra* note 1, at 581.

PTSD,⁸³ no firm connections can be identified. However, the goal of both the statutory and common law approaches is clear—it is to strike an appropriate balance between the policy need to conceptualize consent (and protect the defendant from inappropriate charges) and the practical need to give the trier of fact objective, operational tools with which to decide the issue.⁸⁴

Could biomarkers provide some of these tools? The subsection below highlights some advances in the scientific search for biomarkers of PTSD.

C. Potential Biomarker Evidence

Biomarkers are “measurable and quantifiable biological parameters . . . which serve as indices for health- and physiology-related assessments . . .”⁸⁵ Biomarkers are identified in bodily fluids like blood, saliva, cerebral spinal fluid, urine, and tissues; in physiological parameters like blood pressure, heart beat, metabolites; and in structural and functional brain changes.⁸⁶ For biomarkers of disease and disorder detection, it is desirable to have a test with high reliability, sensitivity, specificity, and predictive values.⁸⁷

83. Arguably, jurisdictions that define consent negatively, by lack of consent through coercion, will more readily admit evidence that speaks to coercion, such as testimony of RTS and PTSD, than jurisdictions that take a positive approach to defining consent (defining consent itself, rather than lack of consent). For example, Kansas uses a definition of non-consent. *See Brooks*, 317 P.3d at 62 (stating that sexual intercourse induced by force or fear indicates a lack of consent). Drawing on this definition, the Kansas Supreme Court allowed the prosecution to admit evidence of RTS, reasoning that the defense has the opportunity to cross-examine the witness. *See State v. Marks*, 647 P.2d 1292, 1299 (Kan. 1982). Minnesota, which take a positive approach to defining consent, is less willing to admit evidence of RTS. *See State v. Saldana*, 324 N.W.2d 227, 229–30 (Minn. 1982); cf. FAIGMAN ET AL., *supra* note 29, § 14:2 (discussing the treatment of RTS by different courts).

84. This is seen clearly in *State v. Risen*, an Oregon case. *State v. Risen*, 235 P.2d 764 (Or. 1951). Oregon is a jurisdiction that falls in the “requiring resistance” category in the proposed MPC draft. *See OR. REV. STAT. § 163.305* (2015) (explaining that for purposes of first degree rape, victims must be “unconscious or for any other reason [be] physically unable to communicate unwillingness”). In *Risen*, the court ruled that alleged victims must show resistance to the best of their ability depending on the circumstances. *Risen*, 235 P.2d at 765–66. Although this is a standard that the proposed MPC draft implicitly condemns as negatively “traditional,” underlying the reasoning is Oregon’s concern that sexual assault accusations are almost always “he said, she said,” and are almost never as clear cut as they first may seem. *Id.* at 768 (“[A] charge of rape is easily made and difficult to disprove.”).

85. Zhang et al., *supra* note 16.

86. *Id.* at 405.

87. *Id.* Reliability means that the marker is robust enough to have consistent results in repetitive testing. Ulrike Schmidt et al., *Biomarkers in Posttraumatic Stress Disorder: Overview and Implications for Future Research*, 35 DISEASE MARKERS 43, 43 (2013). High specificity

Highlighted below are a few studies that have looked at potential biomarkers for PTSD detection in chemical markers (such as proteins and hormones), non-chemical markers (such as physiological measurements in neuroimaging), and genetic markers.⁸⁸ One significant challenge in this search is to make sure the biomarker has sufficient specificity and can distinguish PTSD from other psychiatric disorders.⁸⁹ For example, although small hippocampus values may indicate exposure to traumatic events,⁹⁰ studies in animals indicated that hippocampal shrinkage was a general consequence of traumatic stress, not just as a symptom of PTSD.⁹¹

means that the biomarker would have few false positives and only trigger for PTSD. In other words, it would discriminate sufficiently among different disorders. *Id.* High sensitivity means that the biomarker would correctly test positive often. *Sensitivity*, THE CAMBRIDGE DICTIONARY OF STATISTICS (4th ed. 2010). Finally, if a biomarker is highly predictive, it would be highly correlative with PTSD. *Positive Predictive Value*, THE CAMBRIDGE DICTIONARY OF STATISTICS (4th ed. 2010). When measuring progression and response to therapy, sensitivity and specificity do not matter as much because patients are measured against their own baseline values. *Id.*

88. Research in this area is substantial. See generally Sabra S. Inslicht et al., *Increased Cortisol in Women with Intimate Partner Violence-Related Posttraumatic Stress Disorder*, 1071 ANNALS N.Y. ACAD. SCI. 428 (2006); Nela Pivac et al., *Platelet Serotonin in Combat Related Posttraumatic Stress Disorder with Psychotic Symptoms*, 93 J. AFFECTIVE DISORDERS 223 (2006); Ulrike Schmidt et al., *Searching for Non-Genetic Molecular and Imaging PTSD Risk and Resilience Markers: Systematic Review of Literature and Design of the German Armed Forces PTSD Biomarker Study*, 51 PSYCHONEUROENDOCRINOLOGY 444, 445 (2015) (reviewing literature); Guillaume Vaiva et al., *Relationship Between Posttrauma GABA Plasma Levels and PTSD at 1-Year Follow-Up*, 163 AM. J. PSYCHIATRY 1446 (2006); Rachel Yehuda, *Advances in Understanding Neuroendocrine Alterations in PTSD and Their Therapeutic Implications*, 1071 ANNALS N.Y. ACAD. SCI. 137 (2006).

89. Schmidt et al., *supra* note 87, at 444, 453 (in review of 9 imaging and 27 molecular studies of biomarkers of PTSD risk, several potential PTSD markers lacked the specificity to be viable in a clinical setting). Another significant challenge is one that occurs in biomarker studies generally: we use our old tools (a prior PTSD diagnosis based on traditional clinical methods) to validate our new tools. *Id.* (discussing how soldiers in the study were given psychological assessments that were quantified with the Post-Traumatic Stress Diagnostic Scale). The biomarkers being developed do not yet answer the question whether an individual suffers from PTSD; the researcher must look to other indicia. *Id.* (including psychological assessments and self-rating questionnaires). Accordingly, we use the clinician's identification in individual patients of the cluster of symptoms outlined by Criterion A of the DSM-5 to develop biomarkers. *Id.* at 445 ("PTSD patients suffer from intrusion symptoms, avoidance, hyperarousal, and negative alterations in cognitions and mood."). Most of the biomarker studies thus far have only been validated when comparing the results to controls (without PTSD) and those with PTSD as identified by conventional testing. See Zhang et al., *supra* note 16, at 405. We have not yet reached the point at which the biomarkers are an independent (and potentially more accurate) measure. We need further longitudinal studies to get to that point. *Id.* at 408.

90. Schmidt et al., *supra* note 87, at 453.

91. *Id.* (stating that the biomarker test lacks specificity as other diseases may cause the specific alteration).

Additionally, hippocampal shrinkage occurred in other psychiatric disorders including depression.⁹²

Notwithstanding this challenge, studies have had positive results for specifically detecting PTSD. Several studies have focused on chemical biomarkers.⁹³ For example, in a large review of hundreds of studies, researchers concluded that inflammation of the central nervous system could be linked to the presence of PTSD.⁹⁴ They found that an increased presence of small proteins secreted by immune response cells called cytokines⁹⁵ in blood serum or in the cerebral spinal fluid—including the pentraxin C-reactive protein (CRP)—correlated with chronic PTSD.⁹⁶ Another study supported the association between CRP and PTSD by measuring baseline and post-deployment levels of CRP in Marines and Sailors deployed to Iraq or Afghanistan.⁹⁷ The researchers found that individuals with a lower CRP concentration pre-deployment were more resilient to PTSD, while those with higher pre-deployment CRP concentrations were more predisposed to PTSD,⁹⁸ which suggests that CRP levels not only have potential for detecting PTSD, but also potential for predicting risk of future PTSD.⁹⁹

92. *Id.*

93. See, e.g., Dewleen G. Baker et al., *Biomarkers of PTSD: Neuropeptides and Immune Signaling*, 62 NEUROPHARMACOLOGY 663 (2012) (reviewing studies that have shown a link between the central nervous system, immune system, and brain, which may provide signals for detecting PTSD).

94. *Id.* at 665.

95. Cytokines are small proteins, secreted by immune response cells, for communication and interactions with other cells. Jun-Ming Zhang et al., *Cytokines, Inflammation and Pain*, 45 INT'L ANESTHESIOLOGY CLINICS 27, 27 (2007).

96. Baker et al., *supra* note 93, at 665–66; see also Viola Vaccarino et al., *Posttraumatic Stress Disorder is Associated with Higher C-Reactive Protein Levels*, 55 J. AM. C. CARDIOLOGY A176, A176 (2010).

97. Satish A. Eraly et al., *Assessment of Plasma C-Reactive Protein as a Biomarker of Posttraumatic Stress Disorder Risk*, 71 JAMA PSYCHIATRY 423, 424 (2014) (studying 2,555 Marines and Sailors).

98. See *id.* at 428; see also Daphna Canetti et al., *Inflamed by the Flames? The Impact of Terrorism and War on Immunity*, 27 J. TRAUMATIC STRESS 345, 345 (2014) (finding PTSD was significantly related to CRP levels in a study of Israelis who had been exposed to high levels of rocket and terrorist attacks).

99. See Eraly et al., *supra* note 97, at 428. Along with CRP, several other inflammatory cytokines have shown promise as biomarkers, linking the immune systems to the neuroendocrine stress system during a post-traumatic time period. Baker et al., *supra* note 93, at 668; see also Michopoulos et al., *supra* note 15, at 347 (linking elevated pro-inflammatory cytokines IL-6, IL-1 β , IL-2 to PTSD); Panagiota Pervanidou et al., *Elevated Morning Serum Interleukin (IL)-6 or Evening Salivary Cortisol Concentrations Predict Posttraumatic Stress Disorder in Children and Adolescents Six Months After a Motor Vehicle Accident*, 32 PSYCHONEUROENDOCRINOLOGY 991, 991–92 (2007) (finding higher than average levels of IL-6 and salivary cortisol (a stress hormone)

Non-chemical biomarkers also hold promise to detect PTSD.¹⁰⁰ For example, neuroimaging suggests that PTSD is associated with greater amygdala activity, lower activation of the ventromedial prefrontal cortex (involved with fear extinction in processing emotional memories), and decreased hippocampal volume than found in control samples.¹⁰¹ Some researchers believe that a combination of biomarkers selected from chemical pathways and response stimuli connected with PTSD could be an effective and objective tool for identifying risk potential and diagnosing PTSD.¹⁰²

Genetic markers are another fruitful area of study.¹⁰³ These markers could help identify individuals at high risk of developing PTSD and expression of

in children involved in car accidents who developed PTSD six months later); Annette Sommershof et al., *Substantial Reduction of Naïve and Regulatory T Cells Following Traumatic Stress*, 23 BRAIN BEHAV. & IMMUNITY 1117, 1117–18 (2009) (finding that PTSD is associated with substantial reductions of a type of white blood cells called T cells, which may explain why PTSD patients have been shown to be more susceptible to infection). PTSD has also been linked to hormones associated with the sympathetic nervous system, which activates the flight-or-fright response and serves to accelerate heart rate, constrict blood vessels and raise blood pressure. See MICHAEL S. GAZZANIGA ET AL., COGNITIVE NEUROSCIENCE: THE BIOLOGY OF THE MIND 39 (4th ed. 2014) (defining sympathetic nervous system); see also Michopoulos et al., *supra* note 15, at 344–45 (finding that the stress hormone norepinephrine is raised in PTSD patients and in those responding to threatening stimuli). Another system linked with PTSD is the hypothalamic-pituitary-adrenal (HPA) axis, which is a major part of the neuro-endocrine system that controls reactions to stress, among other things. See Sean M. Smith & Wylye W. Vale, *The Role of the Hypothalamic-Pituitary-Adrenal Axis in Neuroendocrine Responses to Stress*, 8 DIALOGUES CLINICAL NEUROSCIENCE 383, 383 (2006); see also Michopoulos et al., *supra* note 15, at 345–47 (linking several potential chemical biomarkers involved with the HPA axis to PTSD, including cortisol, glucocorticoid negative feedback, estradiol, testosterone, and Neuropeptide Y).

100. See Michopoulos et al., *supra* note 15, at 348 (linking an increase in heart rate and skin conductance to PTSD when patients have been shown imagery and read scripts that remind them of the trauma they experienced).

101. See *id.* at 349. Greater amygdala activity results in exaggerated fear response and dysregulation of emotional processing. *Id.* Lower activation of the vmPFC has been shown to disrupt fear extinction. *Id.* Finally, reductions in the hippocampus have been related to increased vulnerability to PTSD and as an acquired trait with trauma exposure. *Id.*; see also Lisa M. Shin et al., *Amygdala, Medial Prefrontal Cortex, and Hippocampal Function in PTSD*, 1071 ANNALS N.Y. ACAD. SCI. 67, 68 (2006) (citing cellular changes to the brain stemming from extreme stress). Additionally, there may be other avenues for collecting data from patients. See Susann Steudte et al., *Hair Cortisol as a Biomarker of Traumatization in Healthy Individuals and Posttraumatic Stress Disorder Patients*, 74 BIOLOGICAL PSYCHIATRY 639, 639 (2013) (finding that hair cortisol is greatly decreased (59% lower) in PTSD patients than controls). See generally Betsy J. Grey, *Neuroscience, PTSD, and Sentencing Mitigation*, 34 CARDOZO L. REV. 53, 87–89 (2012).

102. See Michopoulos et al., *supra* note 15, at 349.

103. See generally Lauren A. M. Lebois et al., *Neuroimaging Genetic Approaches to Posttraumatic Stress Disorder*, 284 EXPERIMENTAL NEUROLOGY 141, 144–48 (2016) (reviewing literature on neuroimaging genetics studies with participants who have PTSD).

these genes (the process by which information from a gene is used to synthesize a gene product like proteins)¹⁰⁴ could indicate PTSD severity.¹⁰⁵ For example, based on findings that higher levels of CRP are found in individuals with PTSD, researchers set out to discover whether variations of the CRP gene (which regulates CRP levels) are associated with PTSD.¹⁰⁶ Researchers conducted an analysis of 137 individuals from a low-socioeconomic, inner city population with a high trauma rate.¹⁰⁷ They found that genetic variations in the CRP gene were associated with the level of CRP in bodily serum as well as the severity of PTSD symptoms.¹⁰⁸

Combining genetic biomarkers with current clinical methods to test for PTSD may provide more accurate results to diagnose PTSD.¹⁰⁹ In a 2013 study, researchers combined traditional screening tools, which focus on PTSD symptoms, with testing for the presence of known genetic markers for

104. MEDICINE.NET.COM, <http://www.medicinenet.com/script/main/art.asp?articlekey=3564> (last visited Jan. 10, 2017) (defining gene expression).

105. Determining which genes may increase susceptibility to PTSD is difficult because PTSD is caused by a traumatic event, which is variable and cannot be influenced. See Brit F.P. Broekman et al., *The Genetic Background to PTSD*, 31 NEUROSCIENCE & BIOBEHAVIORAL REV. 348, 350 (2007). Scientists typically use powerful studies called linkage studies to investigate DNA markers that are linked to a particular disorder. *Id.* Linkage studies look through the entire genomes of subjects afflicted with a disease and compare them to healthy controls. *Id.* However, linkage studies are difficult to implement for diseases like PTSD because trauma is difficult to simulate and PTSD infliction is variable. *Id.* Scientists use association studies to examine gene markers in a complex disease like PTSD because these studies link a particular genetic variant with a particular disorder. *Id.*; see also DNA LEARNING CTR., <https://www.dnalc.org/view/2020-Linkage-versus-association-studies.html> (last visited Jan. 10, 2017) (describing the difference between linkage and association studies). Using association studies, several potential genes have been linked to PTSD and more will undoubtedly be found. See Broekman et al. *supra*, at 349–51 (linking serotonin transporter gene 5-HTT to PTSD); Casey Sarapas et al., *Genetic Markers for PTSD Risk and Resilience Among Survivors of the World Trade Center Attacks*, 30 DISEASE MARKERS 101, 101–02 (2011) (a study of twenty individuals who developed PTSD after 9/11 attacks identified the genetic marker FKBP5 down-regulation as indication of PTSD risk and severity).

106. See Vasiliki Michopoulos et al., *Association of CRP Genetic Variation and CRP Level with Elevated PTSD Symptoms and Physiological Responses in a Civilian Population with High Levels of Trauma*, 172 AM. J. PSYCHIATRY 353, 353 (2015).

107. See *id.* at 354.

108. See *id.* at 353. Furthermore, the researchers found that a single nucleotide polymorphism (i.e. a single nucleotide that is unique in a chain of DNA) was significantly associated with PTSD symptoms. *Id.* at 358.

109. See Joseph Boscarino et al., *Predicting PTSD Using the New York Risk Score with Genotype Data: Potential Clinical and Research Opportunities*, 9 NEUROPSYCHIATRIC DISEASE & TREATMENT 517, 517 (2013).

PTSD.¹¹⁰ They found that the addition of these genetic biomarkers improved both specificity and sensitivity for testing for PTSD.¹¹¹

Although biomarkers to detect the presence of PTSD have not yet been implemented on a clinical basis as a diagnostic tool, these advances are significant and will have an impact on the legal landscape. The next section examines the potential impact specifically in rape cases.

IV. WILL (AND SHOULD) DEVELOPMENT OF PTSD BIOMARKERS INCREASE ADMISSIBILITY OF PTSD EVIDENCE IN RAPE PROSECUTIONS?

As discussed earlier, the diagnosis of PTSD under Criterion A of the DSM-5 depends on the individual directly experiencing a traumatic event.¹¹² In making the diagnosis, the psychologist accepts that the victim experienced some traumatic event, but this does not entail a determination that a particular traumatic event (rape of the accuser by the defendant) in fact occurred, which is the ultimate question before the trier of fact and what the prosecution must prove.¹¹³ Courts find admission of PTSD evidence problematic in rape prosecutions for at least two key reasons. First, because the diagnosis of PTSD accepts the traumatic event claimed by the alleged victim, it seems to go to the judgment that the traumatic event occurred and caused the PTSD.¹¹⁴ In addition, a PTSD diagnosis does not provide any basis for distinguishing between victims of rape and victims of other traumas.¹¹⁵ These concerns are why courts generally do not admit evidence of PTSD to prove that the sexual contact has occurred.

However, courts sometimes strike the probity-prejudice balance differently when the evidence is proffered to dispute consent. Evidence that the alleged victim has symptoms that are consistent with experiencing a traumatic event is sometimes considered admissible in that situation.¹¹⁶ How

110. See *id.* These alleles included FKBP5, COMT, CHRNA5, and CRHRI, which comprise genetic encoding of various binding proteins, hormone receptors, and other markers of PTSD. *Id.* at 520. The researchers combined the results of the presence or absence of these genetic markers with the traditional screening tests and a combination of other factors (including sleep deprivation, access to health care, and existence of major depression). *Id.*

111. See *id.* at 521.

112. See DSM-5, *supra* note 14, § 309.81(A).

113. See FAIGMAN ET AL., *supra* note 29, § 14:2.

114. See *id.*

115. *Id.*

116. See *id.*; see also State v. Gettier, 438 N.W.2d 1, 6 (Iowa 1989).

do courts support that distinction? Examining a series of cases in Maryland may shed light on this question.

In *State v. Allewalt*,¹¹⁷ the defendant did not deny that sexual contact had occurred but instead claimed consent as a defense.¹¹⁸ The court admitted expert testimony of a psychologist who opined, based on the patient-furnished history, the patient suffered from PTSD caused by the alleged rape.¹¹⁹ An intermediate appellate court reversed the conviction, reasoning that the probative value of the diagnosis of PTSD was outweighed by its prejudice “[as it] does not reliably prove that a victim did not consent to sexual intercourse, but only indicates that the victim displays certain symptoms.”¹²⁰ The Court of Appeals (Maryland’s highest court) reversed and reinstated the conviction in a divided opinion, stating that the intermediate court’s standard for admitting the evidence was too high, as it would require the expert to establish conclusively that the rape had occurred.¹²¹ It held that the trial court’s admission of expert testimony on PTSD was not an abuse of discretion when the judge “believes that the existence of the disorder coupled with the absence of any triggering trauma, other than the evidence of rape, will aid the jury.”¹²² To protect against prejudice, the court stated that allowing liberal cross-examination and giving proper jury instructions can “prevent any impression that the psychiatric opinion is like a chemical reaction.”¹²³

The Maryland Court of Appeals distinguished *Allewalt*’s holding in *Hutton v. State*,¹²⁴ in which the defendant denied sexual contact with the accuser altogether.¹²⁵ The trial court admitted the testimony of an expert who

117. *State v. Allewalt*, 517 A.2d 741 (Md. 1986).

118. *Id.* at 741.

119. *Id.* at 741–42. The trial court concluded that PTSD is an accepted diagnosis that “has been around for a long time” and the expert testimony would “assist [the] jury in making a determination as to [the alleged victim’s] state of mind at the time of the event on the basis of post event findings.” *Id.* at 743. On cross examination, however, the expert admitted that he had accepted the alleged victim’s claim that she had been raped by the defendant: “I think it is more important that the individual reporting, that is the patient or person you are evaluating, believes that it took place. But . . . the whole diagnosis is predicated on the assumption that some traumatic incident occurred.” *Allewalt v. State*, 487 A.2d 664, 666 (Md. Ct. Spec. App. 1985), vacated, 517 A.2d 741 (Md. 1986).

120. *Allewalt*, 487 A.2d at 669.

121. *Allewalt*, 517 A.2d at 747.

122. *Id.* at 751.

123. *Id.*

124. *Hutton v. State*, 663 A.2d 1289 (Md. 1995).

125. *Id.* at 1293.

concluded that the victim was suffering from PTSD due to the alleged rape,¹²⁶ drawing his conclusions from interviews with the victim as well as reports from a clinical social worker.¹²⁷ The high court held that when the defendant denies sexual contact altogether, the stressor is not objectively identifiable because it is based solely on the victim's claim that the offense occurred.¹²⁸ From this, the court concluded that the expert's testimony was inadmissible for two reasons: 1) the expert's testimony implied that the rape claimed by the victim in fact had occurred, rather than suggesting that sexual contact possibly had occurred and could have been the precipitating stressor; and 2) admitting testimony on the diagnosis creates a great risk that the jury will not realize that the expert opinion on the stressor was solely dependent on the veracity of the victim.¹²⁹ The court distinguished *Allewalt*, where the sexual contact was conceded, concluding that while evidence of PTSD may be admitted to prove lack of consent or explain behavior that may be viewed as being inconsistent with the assault having occurred, it cannot be admitted to prove that the sexual contact did in fact occur.¹³⁰

This difference in approach may be illusory. Drawing a distinction between not admitting PTSD evidence to prove that rape had occurred and admitting PTSD evidence to imply that the accuser did not consent is a difficult line to draw. Although in one case sexual contact was disputed and in the other the contact was conceded, in both settings, the evidence fundamentally is being proffered to suggest that rape caused the PTSD of the alleged victim. On that ground, the relevance and amount of probative value of the diagnosis does not seem to change between these two settings. So the critical inquiry is whether the prejudicial impact of the PTSD testimony differs significantly under the two scenarios. It is hard to say that there is a real difference in the degree to which the jury might overvalue the evidence or that protections like cross-examination will work more effectively in one setting than the other. Thus, to pick and choose among issues for admissibility of PTSD evidence in rape prosecutions may not be logical.¹³¹

Assuming that courts continue to maintain these distinctions, however illogical, the question I examine is whether PTSD biomarker evidence will

126. *Id.* at 1292–93.

127. *Id.* at 1291–92.

128. *Id.* at 1300.

129. *Id.*

130. *Id.* at 1301.

131. Cf. FAIGMAN, *supra* note 29, § 14:2 (stating that the line between use of RTS evidence to prove that a rape occurred, which is not allowed, and to disprove consent, which may be allowed, “is not very bright”).

affect the balance struck between the probity and prejudice of PTSD evidence for admissibility in both contexts. One beneficial consequence of the introduction of biomarker evidence is that its use may lead to closer judicial scrutiny of the basis for the proffered expert testimony.¹³² Although courts generally do not subject psychiatric diagnosis to testing under *Daubert* standards,¹³³ the use of more objective scientific evidence will likely trigger that testing.¹³⁴ This means that biomarker evidence will need to meet judicial standards for sufficient reliability¹³⁵ and have sufficient sensitivity, specificity, and predictive values for use in court.¹³⁶

The question remains, however, whether diagnosing PTSD using objective biomarkers (over solely relying on more subjective behavioral indicators as is done now) will alleviate the concern that the diagnosis will

132. Courts generally do not critically assess the proffered PTSD diagnosis for reliability and the defendant almost never questions the accuracy of the diagnosis in this context. Rather, the paramount concern is usually whether the prejudice that may ensue from the requirement of the identification of a stressor may be overcome by allowing proper cross-examination by the defense. *See State v. Allewalt*, 517 A.2d 741, 751–52 (Md. 1986). In contrast, when PTSD is raised in a criminal case by the defendant, either as a defense or a mitigating factor in sentencing, concerns about malingering are often raised. *See SAMUEL JAN BRAKEN & ALEXANDER D. BROOKS, LAW AND PSYCHIATRY IN THE CRIMINAL JUSTICE SYSTEM* 118–23 (F.B. Rothman 2001) (describing the malingering phenomenon associated with PTSD); Ralph Slovenco, *The Watering Down of PTSD in Criminal Law*, 32 J. PSYCHIATRY & L. 411, 415 (2004) (noting that symptoms of PTSD are easily falsified).

133. *See Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 589–90 (1993) (ruling that courts should consider whether a theory or technique has been subjected to peer review, whether it has a known error rate, and whether it has garnered widespread acceptance within its field); *see also CHRISTOPHER SLOBOGIN, PROVING THE UNPROVABLE: THE ROLE OF LAW, SCIENCE, AND SPECULATION IN ADJUDICATING CULPABILITY AND DANGEROUSNESS* 28–29 (Oxford Univ. Press 2007) (describing why clinical testimony is usually not subject to *Daubert* testing); Bruce D. Sales & Daniel W. Shuman, *Science, Experts, and Law: Reflections on the Past and the Future, in EXPERT PSYCHOLOGICAL TESTIMONY FOR THE COURTS* 9, 24–25 (Mark Constanzo et al. eds., 2007) (noting that courts do not apply *Daubert* criteria “rigorously” to “clinical opinion testimony”); Smith, *supra* note 34, at 772–73, 776 (noting that courts readily admit psychiatric diagnoses into evidence).

134. *See Biomarkers as Evidence of Injury and Exposure to a Toxic Agent?*, 1 TOXIC TORTS PRACTICE GUIDE § 3:8 (2016) [hereinafter *Biomarkers as Evidence*].

135. *See FED. R. EVID. 702* (explaining that an expert by knowledge, skill, experience, training or education may testify if their testimony is based on sufficient facts or data, is a product of reliable principles and methods, and if the expert has reliably applied these principles and methods to the facts of the case); Frederick Schauer, *Can Bad Science Be Good Evidence? Neuroscience, Lie Detection, and Beyond*, 95 CORNELL L. REV. 1191, 1192 (2010) (describing standards for admission of scientific evidence).

136. *See Biomarkers as Evidence, supra* note 134. Relatedly, the timing of the biomarker testing may prove critical. PTSD may take a while to develop, so that conducting the testing soon after the sexual contact occurs may not be effective. *See Michopoulos et al., supra* note 15, at 348.

lend overly prejudicial credibility to the accuser's claim of rape and non-consent. Although use of biomarkers for PTSD detection may increase the reliability of the diagnosis, it would not be conclusive. More important, biomarker evidence would not enhance the ability to identify the cause or stressor of PTSD.¹³⁷ It thus is unlikely to affect the paramount concern of admitting this evidence—that “the expert would be a conduit for the hearsay statements of the alleged victim.”¹³⁸ Its use may even create additional problems. Admitting it into evidence could heighten the potential for prejudice by triggering something like the C.S.I. effect because of the tendency for lay people to give (arguably) too much credence to new technology and quantifiability.¹³⁹ Further, with increased usage of diagnostic biomarkers, the prosecution may hesitate even to bring a case against an alleged rapist if biomarkers of PTSD detection are not found in the victim.

Even with biomarker validation, the PTSD evidence remains circumstantial.¹⁴⁰ Consequently, prosecutors would still need to show the causal connection between the alleged rape and PTSD as part of their burden of proof. If there is evidence of PTSD, it might be the result of some earlier event (or later, if report of the crime is delayed).¹⁴¹ The prosecution may need

137. New research raises the intriguing possibility that some PTSD could be physically caused, particularly by blast exposure in war, and have a signature physical symptom in that setting. See Sharon Baughman Shively et al., *Characterisation of Interface Astroglial Scarring in the Human Brain After Blast Exposure: A Post-Mortem Case Series*, 15 LANCET NEUROLOGY 944, 945 (2016) (reporting findings of a distinctive pattern of physical damage to human brains after blast exposure; brains of service members who died shortly after blast exposure displayed same pattern of scarring as brains of those who had a chronic history of blast injury and previously had been diagnosed with PTSD, suggesting that PTSD may be related to physical trauma).

138. FAIGMAN ET AL., *supra* note 29, § 14:6.

139. See Tamara F. Lawson, *Before the Verdict and Beyond the Verdict: The CSI Infection Within Modern Criminal Jury Trials*, 41 LOY. U. CHI. L.J. 119, 121–26 (2009) (describing the debate about the effect that viewing fictional criminal investigations has had on jury decision making).

140. PTSD may eventually be treated like evidence of physical injury, given the movement in science and medicine away from treating physical and emotional harm as separate categories. See Betsy J. Grey, *The Future of Emotional Harm*, 83 FORDHAM L. REV. 2605, 2623–34 (2015). As this distinction erodes, admissibility of a psychiatric disorder in rape trials may be treated more like evidence of physical harm, such as evidence of a broken nose in a battery case, which may be admissible as relevant and probative even though it is circumstantial evidence and there are a number of causes that explain the victim's broken nose.

141. See Bowman, *supra* note 34, at 832. As Marilyn Bowman stated:

Life events occur as part of a continuous stream in which acts, thoughts, and emotions are all events that can function simultaneously as stimulus, personal interpretation, response, and outcome, depending upon where the clinician sets the starting point. Causal explanations of PTSD try to pull out a

to rule out other potential alternative stressors of PTSD that the victim might have experienced, which may be a high burden. Would defense attorneys be able to rebut on that basis as well? It might be difficult for the defense to cross-examine or otherwise discover such evidence, which goes to its potential for unfair prejudice.¹⁴² If admission is allowed, it may offend rape shield laws, which are designed to protect the victim from investigation of prior sexual conduct.¹⁴³

Other problems might arise. On one hand, if biomarker evidence of PTSD detection was admitted to show lack of consent, could the lack of PTSD biomarkers be used by the defense as exculpatory evidence to show consent?¹⁴⁴ There are strong arguments against admission of such exculpatory evidence. Not every rape victim develops PTSD.¹⁴⁵ Some people are more predisposed to PTSD and others are more resilient.¹⁴⁶ Accordingly, there is a substantial chance that the absence of PTSD biomarkers could be a false negative, and this suggests that the defense lawyer should not be able to use its absence to support the defendant's claim of consent. But would it be fair to allow the prosecution to introduce the biomarker evidence on the issue of lack of consent, but not allow the defense to show consent based on the lack of PTSD biomarkers? On the other hand, sexual encounters are intense emotional experiences; there may be something problematic about the encounter that does not amount to a crime—a victim may feel exploited, abused, or misused. Even if there is a high association between rape and PTSD, as indicated by research and recognized by the DSM-5, will these other types of distressing encounters engender PTSD biomarkers as well?¹⁴⁷

specific unit of life that is set to begin with an event and end with a mental disorder (response) so it can be understood in a causal way.

Id. Thus, using a longer perspective “may show that focusing on that short-term event-PTSD unit distorts the meaning and diagnosis of the distress.” *Id.*

142. See LIZA H. GOLD, SEXUAL HARASSMENT: PSYCHIATRIC ASSESSMENT IN EMPLOYMENT LITIGATION 110 (American Psychiatric 2004) (“Questions regarding alternative and proximate causation may also require evaluation of psychological, sexual, and trauma history.”).

143. See, e.g., FED. R. EVID. 412.

144. *Cf. State v. McQuillen*, 689 P.2d 822, 830 (Kan. 1984) (ruling that a showing of the absence of RTS cannot be used to support an assertion of consent and finding that “[t]here are no statistics to show that there is any value to a negative finding that the rape trauma syndrome is not exhibited by the alleged victim”).

145. See Brunello et al., *supra* note 25.

146. See FAIGMAN ET AL., *supra* note 29, § 14:13 (discussing PTSD prevalence rates in rape victims).

147. Although the DSM-5 recognizes specific stressors for triggering PTSD, some research suggests that other events may cause symptoms of PTSD as well. See Anders et al., *supra* note

What if the female consents (however that is defined) and then later deeply regrets her decision? As she grows deeply upset by her decision, will PTSD biomarkers be found in those circumstances? If so, the PTSD diagnosis would not be relevant to proof in the case. The prosecution would bear a high burden to rule out these other potential triggers.

The research on PTSD biomarkers will continue to advance and eventually, biomarkers of detection may indicate a significantly higher-than-normal probability of exposure to stressful events that would qualify under Criterion (A) of DSM-5. This may dispose of the need to draw a causal connection between a given traumatic event and the mental disorder. So far, the research has not gone in that direction.¹⁴⁸ But if biomarker evidence could support such a finding (meeting the *Daubert* standards for scientific evidence) expert testimony about such markers, without testimony suggesting any particular stressful event, may eliminate the vouching problem of PTSD evidence and might meet the requirements of admissibility under the Federal Rules of Evidence, particularly Rules 401, 403, and 703.¹⁴⁹

CONCLUSION

PTSD helps us understand human behavior and reaction to sexual aggression. Scientific research will advance to the stage where victims of PTSD are identified in ways beyond clinical behavioral symptomatology by using measurable neurobiological metrics. Using objective symptom measures will create a more standard and reliable diagnosis following a psychologically distressing event. Will advances in science clarify causal links to the stressor of PTSD sufficient to overcome previous concerns of prejudicial impact in rape cases?

Generally, we assume that a more objective and reliable diagnosis is better evidence. But that may not be true with regard to PTSD biomarker evidence introduced in rape cases. The same concerns about prejudicial effect arise as before and the biomarker evidence may even introduce new problems. Validating the condition of PTSD still should not be confused with

26, at 176–84. The DSM-5 lists “sexual abuse” as a potential stressor but does not define it, so it is unclear what types of events it encompasses. See Levin et al., *supra* note 16, at 148; *supra* note 26.

148. Cf. Shively et al., *supra* note 137 (studying damage to human brains after blast exposure, its relationship to PTSD, and suggesting that PTSD could have a physical cause).

149. See *supra* note 22. Further exposition of the answers to these questions awaits a future paper. Both the doctrinal and jurisprudential issues raised will need to be explored. For example, assuming the expert testimony is admissible, what weight should be given this evidence and who should bear the burden of showing whether it can be used to ascertain an event or a state of mind?

establishing the stressor for the condition. Although the biomarker evidence may indicate that the victim suffers from PTSD, that fact does not establish that the alleged rape is the stressor, but merely that it could be. Even though rape can cause PTSD, that does not mean that the presence of PTSD biomarkers proves the victim did not consent to the contact.

At some point, PTSD evidence may be treated more like other circumstantial evidence, such as a black eye or a broken arm, to suggest force and non-consent, or DNA evidence, to suggest sexual contact. We admit that evidence more freely and rely on the adversarial system to test and challenge the evidence. But we will not be at that point even with biomarker evidence. PTSD remains a psychological echo; it does not establish a hard connection between the event and the reaction to it, and yet the C.S.I. effect of shiny technology may be too hard to overcome. And the tighter the connection the prosecution can show between rape and PTSD, the stronger the case for the defense to offer its absence as exculpatory evidence.