EMORY | LAW

Emory Law Journal

Volume 67 | Issue 6 Article 1

2018

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Recommended Citation
Isabel Karpin, *Vulnerability and the Intergenerational Transmission of Psychosocial Harm*, 67 Emory L. Rev. 1115 (2018).
Available at: https://scholarlycommons.law.emory.edu/elj/vol67/iss6/1

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# VULNERABILITY AND THE INTERGENERATIONAL TRANSMISSION OF PSYCHOSOCIAL HARM[†]

*Isabel Karpin*[*]

## A TRIBUTE

*Martha Fineman has been my teacher, mentor, and friend for over twenty-five years, and at every stage she has both challenged me with her ideas and encouraged me with her intellectual generosity. Before I met Martha, I had read a lot of feminist literature in pursuit of my philosophy degree and had been excited by the work of Luce Irigaray, who refused to accept the centrality of oneness. During that time, I had also completed a law degree, but the one barely spoke to the other. Martha provided, through her own work and the Feminism and Legal Theory Project, a way to apply this feminist critique to my law degree and make sense of my discomfort with much of what I had learned in law school. Martha's inevitable dependency thesis, in particular, offered me a way through the doctrinal legalities applied to abstracted and unreal reasonable "men" in my Australian law degree. Martha's work dealt with our exquisite interconnectedness, and championed, rather than denigrated, our reliance upon each other and the state. Today her vulnerability thesis takes this work to a new level, drawing on a model of state responsibility that takes vulnerability as a universal constant. Here in this tribute issue I take Martha's vulnerability thesis and consider how it might be used to inform our legal responses to new scientific research that suggests that inequality and social harms are passed on intergenerationally through our bodies.*

## INTRODUCTION

In the field of science known as the developmental origins of health and disease (DOHaD), there is an emergent body of research examining the biological impact of the psychosocial dimension of harm resulting from sexual and physical abuse. A particular focus has been the way these assaults, when enacted against women, cause levels of stress that can have a biological impact on their future children. While the vast bulk of this research has examined the

[†] This research was funded by the Australian Government through the Australian Research Council and through the University of Technology Sydney, Law Health Justice Centre and PEP Program. Thanks to Ruby Wawn for her research assistance and the editors of the journal who provided invaluable support.

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impact of harms to pregnant women on the health of their future children, a small group of researchers is also drawing attention to the impact of harms enacted in the period prior to pregnancy and conception. This scientific literature, incorporating epigenetic research, argues that harms to the potential mother can lead to disorders in her future children, including neurodevelopmental and psychiatric disorders as well as cognitive and intellectual impairments.[1]

DOHaD is a developing field of inquiry and it is not yet clear how legal responses might unfold. It is, however, plausible that these scientific claims will displace what are perceived to be more speculative sociocultural explanatory discourses when attributing responsibility for transmission of this harm and in so doing prompt a more decisive legal response. Therefore, it is important to ensure that the legal response is nuanced and does not simply and uncritically accept these claims. From a feminist perspective, this is especially concerning because of the way the female body is foregrounded as a conduit for intergenerational harm transmission.[2] While the focus of this Essay is possible legal responses to this scientific inquiry, we require the whole panoply of maneuvers that the humanities—and those sciences that have established themselves from the humanities—can offer to develop a complex, rich account of how we can ensure future well-being.

In the following Parts, I take a close look at scientific studies that reveal an intergenerational impact resulting from harms perpetrated on a woman prior to the conception and birth of her children, with a particular focus on the impact of stress. I consider the way law might play a role in mediating or mitigating those harms using a vulnerability and inevitable dependency approach derived from Martha Fineman's body of work.[3]

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[1] These studies will be discussed later in this paper. *See infra* Parts III–IV.

[2] *See generally* Sarah S. Richardson, *Maternal Bodies in the Postgenomic Order: Gender and the Explanatory Landscape of Epigenetics*, *in* POSTGENOMICS: PERSPECTIVES ON BIOLOGY AFTER THE GENOME 210 (Sarah S. Richardson & Hallam Stevens eds., 2015); Hannah Landecker & Aaron Panofsky, *From Social Structure to Gene Regulation, and Back: A Critical Introduction to Environmental Epigenetics for Sociology*, 39 ANN. REV. SOC. 333, 348 (2013); Megan Warin et al., *Epigenetics and Obesity: The Reproduction of* Habitus *Through Intracellular and Social Environments*, BODY & SOC'Y, Dec. 2016, at 53, 61–63; Jonathan C.K. Wells, *Maternal Capital and the Metabolic Ghetto: An Evolutionary Perspective on the Transgenerational Basis of Health Inequalities*, 22 AM. J. HUM. BIOLOGY 1 (2010).

[3] I will not cite the entire body of Martha Fineman's work as she is, of course, prolific. Key texts include MARTHA ALBERTSON FINEMAN, THE AUTONOMY MYTH: A THEORY OF DEPENDENCY (2004) [hereinafter FINEMAN, AUTONOMY MYTH]; VULNERABILITY: REFLECTIONS ON A NEW ETHICAL FOUNDATION FOR LAW AND POLITICS (Martha Albertson Fineman & Anna Grear eds., 2013); Martha Albertson Fineman, *The Vulnerable Subject: Anchoring Equality in the Human Condition*, 20 YALE J.L. & FEMINISM 1 (2008) [hereinafter Fineman, *Anchoring Equality*]; Martha Albertson Fineman, *The*

## I. THE LEGAL SUBJECT OF SCIENTIFIC INQUIRY

Over the last twenty-five years, there has been a tangible shift in both legal and scientific thinking impelled, at least in part, by a feminist critique that demands attention to the subjective and situated self. This shift has focused attention on the material self, constructed between and among its relationship to other things and changing over time.[4] It is an "embodied and embedded"[5] subject whose existence and well-being is conditioned on the actions of power and privilege that distribute resources unevenly. Feminist legal theorists such as Martha Fineman argue that, in the context of law, individuals who appear impervious, autonomous, and self-determining are, more often than not, the recipients of greater social goods that allow the appearance of unassailable independence but, in fact, evidence deep reliance on others.[6] In a similar vein, in the context of scientific understandings, feminist scientist Evelyn Fox Keller has argued for an adjustment to scientific language to "represent the dynamic interactivity of living systems and describe the kinds of inherently relational entities that can emerge from those dynamics."[7] I draw on these feminist critiques of law and science to explore research being undertaken in the DOHaD field briefly described above and to which I will return in detail in Part III.

Before I do, however, I want to draw out the way in which feminist legal theory's intervention into *legal* subjecthood might offer some additional tools for managing scientific accounts of harm.

## II. FEMINIST LEGAL THEORY AND THE EMBODIED, EMBEDDED LEGAL SUBJECT

In their introduction to *Vulnerability: Reflections on a New Ethical Foundation for Law and Politics*, Professors Martha Fineman and Anna Grear note that the liberal legal subject at its most ideal is a "disembodied, relatively

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*Vulnerable Subject and the Responsive State*, 60 EMORY L.J. 251 (2011) [hereinafter Fineman, *The Responsive State*]; Martha Albertson Fineman, *Vulnerability and the Institution of Marriage*, 64 EMORY L.J. 2089, 2091 (2015) [hereinafter Fineman, *Institution of Marriage*].

[4] For example, from law, Martha Fineman's generative work FINEMAN, AUTONOMY MYTH, *supra* note 3; PATRICIA J. WILLIAMS, THE ALCHEMY OF RACE AND RIGHTS (1991); and from the sciences, see DONNA J. HARAWAY, SIMIANS, CYBORGS, AND WOMEN: THE REINVENTION OF NATURE 183–201 (1991); EVELYN FOX KELLER, THE MIRAGE OF A SPACE BETWEEN NATURE AND NURTURE (2010).

[5] Fineman, *Institution of Marriage*, *supra* note 3, at 2091.

[6] *See* FINEMAN, AUTONOMY MYTH, *supra* note 3.

[7] Evelyn Fox Keller, *Globalization, Scientific Lexicons, and the Future of Biology*, 11 E. ASIAN SCI. TECH. & SOC'Y 373, 375 (2017).

invulnerable self."[8] However, this transcendent entity is only ever an ideal. As noted above, if a particular kind of embodied subjectivity is highly resourced so that its needs and dependencies are attended to without question, those needs become invisible. Indeed, it becomes possible to conceive of that individual as entirely unencumbered by bodily limitations. Fineman and Grear argue that law needs to challenge the apparent immateriality of the liberal legal subject and, as Grear puts it, comprehend the "ethical demand emerging from the implications of living materiality itself."[9] When we do this, we see that the liberal legal subject is, in fact, encumbered, but its bodily limitations are masked by an uneven distribution of resources. The closer individual embodiment approximates normative expectations, the more likely that particular embodied subject will be constituted as an impenetrable, autonomous, independent, rights-bearing legal subject. By contrast, other embodied subjectivities, denied those resources, are perceived as abnormal, messy, and dependent. As Fineman has consistently argued, the normative, impenetrable, self-actualizing individual of legal subjecthood is merely an illusion of invulnerability and independence made possible by an unequal distribution of resources.[10]

It is not enough to recognize that legal subjects are (normatively) embodied, we must also recognize, as Fineman does,[11] that they are embedded in interpenetrating relationships of dependency that are subject to political and structural inequalities. A fundamental fact of the human condition is that we are embedded in our environment, not just materially but psychologically and socially, and in a complex web of relationships to others. The affective environment in all its dimensions is not just a physical location but also a psychosocial space. The scientific literature that examines the intergenerational effects of stress that I turn to below[12] should, in my view, be read in light of this understanding of the environment. It should be recognized that people exist in a web of political, social, psychological, and material relationships, sometimes operating unequally and unfairly. As will be shown below, these relationships

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[8] Martha Albertson Fineman & Anna Grear, *Introduction: Vulnerability as Heuristic—An Invitation to Future Exploration*, *in* VULNERABILITY: REFLECTIONS ON A NEW ETHICAL FOUNDATION FOR LAW AND POLITICS, *supra* note 3, at 1, 3.

[9] Anna Grear, *Vulnerability, Advanced Global Capitalism and Co-symptomatic Injustice: Locating the Vulnerable Subject*, *in* VULNERABILITY: REFLECTIONS ON A NEW ETHICAL FOUNDATION FOR LAW AND POLITICS, *supra* note 3, at 41, 41 (emphasis omitted).

[10] *See* VULNERABILITY: REFLECTIONS ON A NEW ETHICAL FOUNDATION FOR LAW AND POLITICS, *supra* note 3; Fineman, *Anchoring Equality*, *supra* note 3; Fineman, *The Responsive State*, *supra* note 3.

[11] *See* Fineman, *Institution of Marriage*, *supra* note 3, at 2091.

[12] *See infra* Parts III–IV.

ultimately make a fundamental contribution to people's capacity to function well and be "well" both now and for generations to come.

If then, as Martha Fineman suggests, the construct of a fully autonomous and independent legal person is a "static figment of the liberal imagination,"[13] what can we make of the subject of scientific inquiry who is at the center of the DOHaD research briefly described above? When one considers that this DOHaD research examines the impact of harms experienced by a woman on her future children, it becomes clear that neither the woman nor the future child constitutes the subject of scientific inquiry, rather it is the relationship between them that is the *subject* of examination.[14] This focus on the in-between is, according to feminist scientist Evelyn Fox Keller, what "[m]ost biologists now agree on."[15] She says they accept "the need to shift their focus away from the construction of a parts list to understanding the interaction between and among individual parts, and even to the dynamics of these interactions."[16] In that manner, she argues that what is needed is to "explore the dynamic interactions not only that bind parts into wholes but also, and equally, that reveal the ways in which those interactions constitute the parts themselves."[17] Whether we call them "interactions" or "interconnections" or "interrelations," what is crucial is that in this framework the *subject* exists in the space between bodies as well as in the bodies themselves. This radical revision challenges the primacy of the inviolate and impenetrable liberal individual as an organizing principle for scientific investigation and legal regulation.

Fineman argues that the true *legal* subject is "a socially and materially dynamic *vulnerable legal subject*, based on a richer account of how actual people's lives are shaped by an inherent and constant state of vulnerability across the life-course."[18] Fineman's model of the vulnerable legal subject, one that is always open to the exigencies of being in the world, can be used, then, to understand the subject of scientific inquiry. Just as vulnerable legal subjects are "embodied creatures who are inexorably embedded in social relationships and

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[13] Martha Albertson Fineman, *Introduction* to PRIVATIZATION, VULNERABILITY, AND SOCIAL RESPONSIBILITY: A COMPARATIVE PERSPECTIVE 1, 3 (Martha Albertson Fineman et al. eds., 2017).

[14] An extended discussion of this DOHaD research follows in Part III.

[15] Keller, *supra* note 7, at 374.

[16] *Id.*

[17] *Id.*

[18] Fineman, *supra* note 13, at 3 (emphasis added).

institutions"[19] and "experience the world with differing levels of resilience,"[20] so too is the subject of scientific inquiry. Fox Keller notes:

> The more we learn about how the parts work in interaction not only with each other but also with the larger entities in which they are *embedded*, about the extraordinarily complex and versatile systems of gene regulation, about the large repertoire of signals mediating all the different levels of organization, and about the variety of epigenetic mechanisms of inheritance at play and the evolutionary feedback between the different mechanisms at work, the more compelling the need for an entirely new lexicon, one that can represent the dynamic interactivity of living systems and describe the kinds of inherently relational entities that emerge from those dynamics.[21]

Thus, we see that the subject of scientific inquiry is imbricated in its environment, as is the legal subject. The woman who is abused and comes before the law for redress is the same woman who, as shown in Part III, comes before the scientists as a biologically altered entity that can pass her harms to her future child.

For Fineman, the unequal distribution of resources (which results in what she calls "the inequality of resilience")[22] "is at the heart of vulnerability theory,"[23] and a reframing of the legal subject as always already vulnerable and dependent would ensure a more responsive state. Fineman says: "No one is born resilient. Rather, resilience is produced within and through institutional relationships that confer privilege and power."[24] This does not, however, mean that Fineman views our inherent vulnerability as a failing, just as she did not conceive of our inevitable dependency as a weakness in her earlier work.[25] Instead Fineman argues for a recuperation of the idea of vulnerability as an organizing framework—a provocation to express an alternative way of structuring the law. If vulnerability becomes the organizing principle, then the inevitability of need and dependency must frame our interactions with each other. The state will be called upon to distribute resources not as a one-off form of defense against loss and incursion, but rather with the long-term and

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[19] *Id.*

[20] *Id.* (emphasis omitted).

[21] Keller, *supra* note 7, at 374–75 (emphasis added).

[22] Fineman, *supra* note 13, at 3.

[23] *Id.*

[24] *Id.* at 3–4.

[25] *See* Martha Albertson Fineman, *The Inevitability of Dependency and the Politics of Subsidy*, 9 STAN. L. & POL'Y REV. 89 (1998).

continuous aim of sustaining our existence in a world of contingency and sociality. "Resilience" then is unequally distributed when the "assaults" of inequality turn ordinary vulnerability (and dependency) into a politically amplified source of embodied and abiding psychosocial harm. As Fineman says: "The state is responsive when it recognizes the universality and constancy of vulnerability, as well as the need for providing mechanisms for building resilience. It is responsive when it acts to monitor and adjust institutions and relationships when they do not function in a just manner."[26]

Thus, we see that the embodied and embedded legal subject of scientific inquiry is enlivened or oppressed by the distribution of power and privilege. Making these relationships of power and privilege visible, in order to acknowledge their origins and create a more equal distribution of social resources, has long been part of the feminist critiques of law and science.

In Parts III and IV, I bring those critiques to bear on a specific area of scientific investigation, namely, the recent expansion in scientific research on the impact of maternal stress on the health and well-being of future generations.

## III. DOHaD AND EPIGENETICS

In the field of DOHaD and the developing field of epigenetics, there is an expanding body of claims that psychosocial harms (such as those associated with sexual and physical abuse, sexism, racism, stress, and PTSD) transmitted through women's bodies will have an effect on future generations. DOHaD research developed out of the study of the fetal origins of adult disorders when its early pioneers saw a correlation between environmental factors during the early life course and later health outcomes.[27] Epigenetics is the study of gene regulation and although it has not replaced the importance of the study of genetics, which reached cult status with the mapping of the human genome in 2003,[28] in recent years it has emerged as a significant area of scientific focus.[29] Epigenetics places an emphasis on gene interactions with the environment,

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[26] Fineman, *supra* note 13, at 4.

[27] *See* Pathik D. Wadhwa et al., *Developmental Origins of Health and Disease: Brief History of the Approach and Current Focus on Epigenetic Mechanisms*, 27 SEMINARS REPROD. MED. 358, 358–59 (2009).

[28] *See* Leroy Hood & Lee Rowen, *The Human Genome Project: Big Science Transforms Biology and Medicine*, GENOME MED., Sept. 13, 2013, at 1; David Le Breton, *Genetic Fundamentalism or the Cult of the Gene*, BODY & SOC'Y, Dec. 2004, at 1.

[29] *See* Ute Deichmann, *Epigenetics: The Origins and Evolution of a Fashionable Topic*, 416 DEVELOPMENTAL BIOLOGY 249 (2016).

among other things, and the way these interactions cause some genes to turn off and others to turn on.[30] This has been identified through a number of mechanisms including the study of DNA methylation, an epigenetic mechanism that influences whether a gene is switched on or off.[31] Importantly for this discussion, the DNA methylation that inhibits or propels gene processes may be passed on from one generation to the next. This is akin to what Fox Keller describes as "a shift in focus away from the basic constituents of living cells (e.g., DNA, RNA, protein, metabolites, etc.) and toward the basic processes and activities in which these constituents are involved."[32] The significant element of this research, however, is that the transference of "disorders" from one generation to the next, rather than being determined by genetic traits, can be traced instead to the way the body responds to environmental factors where the "environment" is construed broadly as capturing not just the material world but the psychosocial as well.[33] The impact of this discovery has encouraged a dialogue between scholars in the fields of law, anthropology, sociology, and science precisely because the object of study is what Grear has called "bio- and socio-materiality."[34] For instance, scientists are making claims about the biological and intergenerational impact of harms as diverse as slavery, the Holocaust, sexual assault and child abuse, and racism and socioeconomic

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[30] *See generally* John M. Greally, Comment, *A User's Guide to the Ambiguous Word "Epigenetics,"* 19 NATURE REVS. MOLECULAR CELL BIOLOGY 207 (2018); *What Is Epigenetics?*, NAT'L LIBR. SCI.: GENETIC HOME REFERENCE (Mar. 20, 2018), https://ghr.nlm.nih.gov/primer/howgeneswork/epigenome.

[31] *See* Peter A. Jones & Daiya Takai, *The Role of DNA Methylation in Mammalian Epigenetics*, 293 SCI. 1068, 1068 (2001); *see also* Nada Borghol et al., *Associations with Early-Life Socio-economic Position in Adult DNA Methylation*, 41 INT'L J. EPIDEMIOLOGY 62, 63 (2012); Agata Chmurzynska, *Fetal Programming: Link Between Early Nutrition, DNA Methylation, and Complex Diseases*, 68 NUTRITION REVS. 87, 88 (2010); K.M. Radtke et al., *Transgenerational Impact of Intimate Partner Violence on Methylation in the Promoter of the Glucocorticoid Receptor*, TRANSLATIONAL PSYCHIATRY, July 19, 2011, at 1.

[32] Keller, *supra* note 7, at 380.

[33] *See infra* note 35.

[34] Grear, *supra* note 9, at 41; *see also* Arline T. Geronimus, *Deep Integration: Letting the Epigenome Out of the Bottle Without Losing Sight of the Structural Origins of Population Health*, AM. J. PUB. HEALTH, Oct. 2013, at s56, s58; Landecker & Panofsky, *supra* note 2, at 336; Maurizio Meloni, *Heredity 2.0: The Epigenetics Effect*, 34 NEW GENETICS & SOC'Y 117, 122–23 (2015); Mark A. Rothstein et al., *The Ghost in Our Genes: Legal and Ethical Implications of Epigenetics*, 19 HEALTH MATRIX 1, 3–4 (2009); Michael Rutter, *Gene–Environment Interdependence*, 9 EUR. J. DEVELOPMENTAL PSYCHOL. 391, 408 (2012); Shannon Sullivan, *Inheriting Racist Disparities in Health: Epigenetics and the Transgenerational Effects of White Racism*, 1 CRITICAL PHIL. RACE 190, 213 (2013); Warin et al., *supra* note 2, at 55–56.

status.[35] They are arguing that the injuries of these environments are not just limited to the people who were directly exposed to them, but have had harmful physical effects manifesting in changes in gene expressions that will affect generations to come. For example, as I have noted elsewhere,[36] researchers Michele Loi, Lorenzo Del Savio, and Elia Stupka claim "a steady gradient of health outcomes across social classes."[37] They point to a study by Dagmara McGuinness et al. in 2012 which "reported the association between [socioeconomic status] and global DNA-methylation."[38] Loi, Del Savio, and Stupka also note a study by Nada Borghol et al., also in 2012, which identified "higher methylation, and thus repression, of sensory perception of smell and taste in low [socioeconomic status] individuals."[39] They went on to suggest that "[e]pigenetics might provide a measureable magnitude of the extent to which environmental insults have, indeed, caused harm in a person's genome," and they ask us to "[i]magine a society in which people can be informed by their family physician of the accumulation of risk factors due to specific environmental insults, including those arising prenatally and in early childhood for which people cannot be held responsible."[40] Given the focus on the transference of harm through the body of the mother, however, it is possible that in a liberal legal system in which individuals are held responsible for outcomes related to their actions, those women would indeed be held responsible. The meeting with the family physician referred to by Loi et al. can offer nothing other than an invitation to take action to avoid the transmission of those harms when deciding whether to reproduce.

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[35] For the Holocaust, see Mallory E. Bowers & Rachel Yehuda, *Intergenerational Transmission of Stress in Humans*, 41 NEUROPSYCHOPHARMACOLOGY REVS. 232 (2016). For slavery, see Grazyna Jasienska, *Low Birth Weight of Contemporary African Americans: An Intergenerational Effect of Slavery?*, 21 AM. J. HUM. BIOLOGY 16 (2009). For racism, see Bridget J. Goosby & Chelsea Heidbrink, *The Transgenerational Consequences of Discrimination on African-American Health Outcomes*, 7 SOC. COMPASS 630 (2013); Christopher W. Kuzawa & Elizabeth Sweet, *Epigenetics and the Embodiment of Race: Developmental Origins of US Racial Disparity in Cardiovascular Health*, 21 AM. J. HUM. BIOLOGY 2 (2009). And for child abuse, see Natalie Weder et al., *Child Abuse, Depression, and Methylation in Genes Involved with Stress, Neural Plasticity, and Brain Circuitry*, 53 J. AM. ACAD. CHILD & ADOLESCENT PSYCHIATRY 417 (2014).

[36] Isabel Karpin, *Regulatory Responses to the Gendering of Transgenerational Harm*, 31 AUSTL. FEMINIST STUD. 139, 145 (2016).

[37] Michelle Loi et al., *Social Epigenetics and Equality of Opportunity*, 6 PUB. HEALTH ETHICS 142, 143 (2013).

[38] *Id.* at 145 (citing Dagmara McGuinness et al., *Socio-economic Status Is Associated with Epigenetic Differences in the pSoBid Cohort*, 41 INT'L J. EPIDEMIOLOGY 151 (2012)).

[39] *Id.* at 146 (citing Borghol et al., *supra* note 31, at 62).

[40] *Id.* at 147.

If we replace the liberal legal system with one that frames our responsibilities and duties around inherent vulnerability and inevitable dependency, can we avoid this unjust outcome?

Fineman suggests that "the ultimate objective of a vulnerability analysis is to argue that the state must be more responsive to, and responsible for, vulnerability."[41] She argued similarly in her early work on inevitable dependency,[42] and in moving to frame the subject through a vulnerability approach she carries forward that idea of inevitable dependency into a subject that is embodied and embedded in a way that cannot deny the sociality of obligations to care and be cared for.

How then might this be applied to the kind of scientific research being done that identifies the mother's body as the conduit of harm? I now turn to a consideration of some of those studies.

## IV. INTERGENERATIONAL TRANSMISSION OF MATERNAL STRESS

One area that has become a particular focus of scientific study has been the psychobiological effects of maternal stress. While much of the research examines the impact of stress during pregnancy on both fetal development and health and well-being once born alive, there are a significant number of studies that consider the preconception effect of stress. In other words, they examine the impact on a future child of stress suffered by a woman before that future child was conceived. Some of these studies are discussed below. These studies draw on developments in the science of epigenetics that provide some of the explanatory mechanisms that underlie the psychobiological effects of stress and its enduring adverse effects on fetal and childhood development.[43] In these studies, the term "maternal stress" is used to describe not just the form of stress that occurs while pregnant or mothering (or that is brought on by pregnancy or mothering), but also when a woman suffers acute stress at an earlier stage in her life, including prior to becoming a mother or conceiving. In that case, it is argued, stress from sources such as child abuse and other early life trauma causes physical changes (neurological, chemical, and epigenetic) to the woman herself,

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41 Fineman, *Anchoring Equality*, *supra* note 3, at 13.

42 *See* Fineman, *supra* note 25.

43 *See, e.g.*, Olena Babenko et al., *Stress-Induced Perinatal and Transgenerational Epigenetic Programming of Brain Development and Mental Health*, 48 NEUROSCIENCE & BIOBEHAVIORAL REVS. 70 (2015); A.S. Zannas & A.E. West, *Epigenetics and the Regulation of Stress Vulnerability and Resilience*, 264 NEUROSCIENCE 157 (2014).

which will pass to her future offspring.[44] Although perhaps unintentional, in some of these studies, women who were subject to stress as children or before they became mothers are recast, through their *potential* maternality, as conduits for harms to their future children rather than as victims of harm.

Andrea Roberts et al., for example, conducted a study of women who were exposed to childhood abuse and charted its association with an elevated risk of autism in the offspring of those women.[45] In that study the researchers state: "Our study identifies an intergenerational association between a woman's childhood exposure to violence and risk for a severe developmental disorder in her children."[46] To support this conclusion, they suggest that "exposure to acute psychosocial stressors may increase secretion of androgen, and some evidence suggests that exposure to high prenatal concentrations of androgen is associated with autistic traits."[47] They go on to stress, however, that "whether childhood abuse leads to persistently elevated maternal androgens is unknown."[48]

Having identified the possibility that childhood abuse might contribute to autism in the children of those who suffer such abuse, the authors suggest that this has three clinical implications. First, they note it provides "another compelling reason to increase efforts to prevent childhood abuse."[49] It is unnecessary to point out that we have reason enough to prevent childhood abuse without the need to show that it hurts future generations too, but it is worth noting two things about this claim: (a) there is an underlying assumption that autism is a harm significant enough to justify these scientific studies and efforts to avoid it, a controversial claim to say the least; and (b) in this justificatory calculus, the woman is framed as a conduit for harm and her own harm—the harm of childhood abuse—is secondary or deferred. Second, the researchers note that they are identifying "a population at elevated risk for having a child with autism, namely, women with a history of moderate or serious childhood abuse," and third, that the solution offered is the **"**prevention of adverse perinatal

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[44] These articles are discussed below. See, for example, my discussion of Bowers & Yehuda, *supra* note 35; Sarah R. Brand et al., *The Impact of Maternal Childhood Abuse on Maternal and Infant HPA Axis Function in the Postpartum Period*, 35 PSYCHONEUROENDOCRINOLOGY 686 (2010); Quetzal A. Class et al., *Maternal Stress and Infant Mortality: The Importance of the Preconception Period*, 24 PSYCHOL. SCI. 1309 (2013); Andrea L. Roberts et al., *Association of Maternal Exposure to Childhood Abuse with Elevated Risk for Autism in Offspring*, 70 JAMA PSYCHIATRY 508 (2013).

[45] Roberts et al., *supra* note 44.

[46] *Id.* at 513.

[47] *Id.* at 512.

[48] *Id.*

[49] *Id.* at 513.

circumstances" that created the risk.[50] It is not clear how these adverse perinatal circumstances are to be prevented when the researchers have already noted that "[a]ll adverse perinatal circumstances except low birth weight were more prevalent among women abused in childhood."[51] Although this study and the studies discussed below internally express significant qualifications and limitations around their conclusions, they nevertheless give rise to a real, though no doubt unintentional, potential for discriminatory or stigmatizing outcomes. In a neoliberal context, where individual responsibility is emphasized and the free market in reproductive technologies is at play, it is possible that a woman, advised of the impact of her childhood abuse on her not-yet-conceived child, might be discouraged from reproducing or, where economic status permits, discouraged from using her own gametes.

A study by Sarah R. Brand et al. found that "exposure to child abuse may have transgenerational effects, with offspring of abuse victims showing similar neuroendocrine profiles as their mothers."[52] Interestingly, they also noted that the effects of "maternal trauma" on offspring "may only be evident under particular circumstances, such as when occurring in combination with additional life stress."[53] This is both good and bad news. It suggests that more social resources to assist women during their post-abuse life course could avoid or at least mitigate intergenerational transmission of these harms, but it also squarely positions the individual woman as a target for intervention and management of risk. Arguably, this uses a liberal legal model in which individual action and inaction are foregrounded. This is not the case when we shift our framework to a vulnerability model, and I will come to this below.

Abuse is just one kind of stress identified by these studies. Quetzel A. Class et al., for instance, used death of a first-degree relative of the mother as the factor of stress in their study *Maternal Stress and Infant Mortality: The Importance of the Preconception Period*.[54] That study showed that preconception stress might increase the risk of infant mortality whereas prenatal stress did not. Mallory Bowers and Rachel Yehuda, in their study *Intergenerational Transmission of Stress in Humans*, remark that "[s]evere stress exposure in a parent—the kind that can result in mental disorders such as depression, anxiety, or post-traumatic stress disorder (PTSD)—is a risk factor for a number of adverse outcomes,

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50 *Id.*

51 *Id.* at 508.

52 Brand et al., *supra* note 44, at 686.

53 *Id.* at 692.

54 Class et al., *supra* note 44.

including psychopathology, in offspring."[55] Throughout their paper they refer to sources of stress as diverse as the Holocaust, the Dutch famine, and terrorism.[56] They attempt to distinguish between stress exposures that occur before conception, at the time of conception, at the time of pregnancy, or in the early postnatal period.[57] They go on to say, "Studies consistently demonstrate that offspring of extremely stressed or traumatized parents are at higher risk for mental and physically adverse outcomes. This has been demonstrated in instances where exposure predated conception or exposure occurred during pregnancy, supporting the idea that transmission can occur via gametes and/or the fetus."[58]

For cases in which stress is the direct result of illegal behavior such as child abuse or assault, the question of an appropriate institutional and legal response arises. The acceptance that we are all vulnerable and that legal systems should be crafted around vulnerability and dependence rather than fortification and independence, would provide a compelling argument to create a society in which resources are directed to buffer the impact of stress rather than to individualize it.

Instead, however, while DOHaD research has embraced the idea "that the early life environment has widespread consequences for later health,"[59] the target of this research is not the inequality prevalent in social environments but the women who are subject to that disparity and in some senses constitute the early life environment. One has to assume that if women are subject to environmental stress, then so too are men. Yet there are significantly fewer peer reviewed articles on "paternal stress" compared to "maternal stress."[60] Although still far fewer, there are DOHaD studies that are drawing links between preconception stress "effects" in males and the health implications for their

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[55] Bowers & Yehuda, *supra* note 35, at 232.

[56] *Id.*

[57] *Id.* at 234–35.

[58] *Id.* at 235.

[59] Matthew W. Gilman et al., *Meeting Report on the 3rd International Congress on Developmental Origins of Health and Disease (DOHaD)*, 61 PEDIATRIC RES. 625, 625 (2007).

[60] A search was conducted on the University of Technology Sydney, Library's Primo Central Index using the search terms "maternal stress" and "paternal stress" and restricting the range to titles of peer-reviewed articles. The Primo Central Index is a centralized index of articles and other information sources. It covers all subject and discipline areas and includes articles and other publications from major academic publishers. Among the "peer-reviewed" journal articles, there were 11,126 with "maternal stress" in the title and just 468 with "paternal stress" in the title on March 18, 2018.

offspring.[61] Despite these findings, the emphasis remains very much on the consequences of maternal stress.

As Fineman makes very clear, "while human vulnerability is universal, constant, and complex, it is also particular," and as she also notes our "experience of vulnerability varies according to the quality and quantity of resources we possess or can command."[62] So it may seem odd to consider it problematic that there is an over-resourcing of scientific studies into the impact of maternal stress compared to paternal stress. However, a vulnerability approach requires attention not just to the level of resourcing but how those resources are deployed and to what purpose. In a system in which individual responsibility is attributed without regard to differing levels of opportunity, and access to social and economic advantages, those resources can be deployed to police rather than assist, or to diminish access to opportunities rather than to promote them. Rather than tackling social inequality, women may be constituted as hostile or as potentially hostile "environments" for future people. If the net effect of these studies is to identify women who have been stressed at some stage in their life as the cause of harm to their future children, it is not hard to imagine a solution in the form of more regulatory and social constraints on women.

Although it is never explicitly stated, in a system where the lines of responsibility are individualized and privatized, one logical conclusion is that the women, the subject of these studies, should not be reproducing at all. Yet as most women know, the very act of being in the world for a woman can constitute a threat to her well-being. Sarah M. Woods et al.'s 2010 study *Psychosocial Stress During Pregnancy* revealed that 78% of pregnant women reported low-moderate psychosocial stress, with 6% reporting high levels.[63] Depression, panic disorder, drug use, domestic violence, and having more than two medical comorbidities were significantly associated with high psychosocial stress during pregnancy.[64] Naomi Swanson's 2000 article *Working Women and Stress* highlights that many women report occupational stress, often at high levels.[65] It states that common workplace stressors for women include sexual harassment,

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[61] *See, e.g.*, Jonathan Day et al., *Influence of Paternal Preconception Exposures on Their Offspring: Through Epigenetics to Phenotype*, 5 AM. J. STEM CELLS 11 (2016); Harleen Hehar et al., *Intergenerational Transmission of Paternal Epigenetic Marks: Mechanisms Influencing Susceptibility to Post-concussion Symptomology in a Rodent Model*, SCI. REP., Aug. 2, 2017, at 1.

[62] Fineman, *The Responsive State*, *supra* note 3, at 268–69.

[63] Sarah M. Woods et al., *Psychosocial Stress During Pregnancy*, 202 AM. J. OBSTETRICS & GYNECOLOGY 61.e1 (2010).

[64] *See id.*

[65] Naomi G. Swanson, *Working Women and Stress*, 55 J. AM. MED. WOMEN'S ASS'N 76 (2000).

discriminatory hiring practices, and conflict between work and family roles.[66] Finally it notes that there are significant health effects associated with workplace stress, including psychological distress, increased sickness and absenteeism, depressive symptoms, significantly increased blood-pressure, shorter menstrual cycles, and even cardiovascular complications.[67]

Drawing on Martha Fineman's vulnerability theory, I argue, consistent with feminist and disability studies critiques, that the ideal of the autonomous individual as "normal" is unsustainable. Rather than demanding that women find a way to defend themselves against the insults of the environment, the vulnerability thesis tells us that the state must create a society in which resources function to support the very essence of a human—a vulnerable (dependent) embedded and embodied subject.

Michael Thomson and Sam Lewis argue in relation to neuroscience that vulnerability theory can provide a theoretical framework that more effectively and justly translates contemporary life science claims into state responsibilities.[68] Vulnerability theory has a similar and vital contribution to make in the field of DOHaD.

If the scientific findings regarding the relationship between stress and its impacts on future children that I have described above are accepted at face value—and the gendered construction of stress is one reason not to do so—a real concern arises that the wrong legal and moral responses will be activated, thus burdening women with the impossible responsibility of avoiding gamete and uterine-environment-damaging stress. For example, referring to recent DOHaD research on the epigenetic impact of obesity on future children, Megan Warin et al. argue "that reproduction (and more specifically women's reproduction) is now a key discursive site in which intergenerational cycles of obesity are being culturally produced and reproduced."[69] They argue that "[a] new and powerful meta-discourse has emerged in which women are blamed for both their reproductive physiology and their social role as mothers, thus constructing women as potentially contaminating future generations by creating obesity lineages."[70] This is fantastically evocative language. Warin et al. astutely note

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[66] *See id.* at 77.

[67] *See id.* at 76.

[68] Sam Lewis & Michael Thomson, Social Bodies & Social Justice 16 (Mar. 29, 2018) (unpublished manuscript) (on file with author).

[69] Megan Warin et al., *Mothers as Smoking Guns: Fetal Overnutrition and the Reproduction of Obesity*, 22 FEMINISM & PSYCHOL. 360, 361 (2012).

[70] *Id.* (emphasis omitted).

such meta-discourse, when "[c]oupled with a neoliberal agenda that emphasises self-governance and individual responsibility," leads to gendered individualization of the responsibility for the harm.[71] But which harm exactly? Given that research increasingly demonstrates that "childhood sexual abuse might be a key predictor of obesity and overweight in adulthood," it seems clear that obesity may itself be a marker of environmental stress and psychosocial harm.[72] It is not insignificant then that there are legal cases in which mothers have been prosecuted for neglect and abuse for raising obese children.[73]

Is this individualization of blame a real concern? Certainly we know that mothers have been blamed for not protecting their young children from domestic violence, and so it seems all too plausible then that they may be held responsible for the epigenetic consequences of their own obesity, especially when the relevant research purports to demonstrate the connection between maternal adiposity prior to pregnancy and detrimental outcomes. For example, A study in Denmark by Rodriguez et al. claims to show, without asserting causality, that "[c]hildren of women who were both overweight and gained a large amount of weight during gestation had a 2-fold risk of ADHD symptoms . . . compared to normal-weight women,"[74] and a study of 2,734 mothers and children undertaken in Boston claims to have found a connection between maternal prepregnancy obesity and pregestational diabetes with a risk for autism spectrum disorder (ASD).[75] The list of potential harms in the broader literature is diverse and includes links between maternal obesity and childhood asthma, altered brain development, and more.[76] What then might the legal response be (and what should it be) to scientific claims that psychosocial harm is transmitted intergenerationally? How might the law respond, for instance, to studies such as

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[71] *Id.*

[72] Olga Khazan, *The Second Assault*, ATLANTIC (Dec. 15, 2015), https://www.theatlantic.com/health/archive/2015/12/sexual-abuse-victims-obesity/420186/.

[73] Tanya Zivkovic et al., *In the Name of the Child: The Gendered Politics of Childhood Obesity*, 46 J. SOC. 375 (2010).

[74] A. Rodriguez et al., *Maternal Adiposity Prior to Pregnancy Is Associated with ADHD Symptoms in Offspring: Evidence from Three Prospective Pregnancy Cohorts*, 32 INT'L J. OBESITY 550, 550 (2008).

[75] Mengying Li et al., *The Association of Maternal Obesity and Diabetes with Autism and Other Developmental Disabilities*, PEDIATRICS, Feb. 2016, at 1.

[76] A.A. Adane et al., *Maternal Pre-pregnancy Obesity and Childhood Physical and Cognitive Development of Children: A Systematic Review*, 40 INT'L J. OBESITY 1608 (2016); Rajesh Kumar et al., *Maternal Pre-pregnancy Obesity and Recurrent Wheezing in Early Childhood*, 23 PEDIATRIC ALLERGY IMMUNOLOGY & PULMONOLOGY 183 (2010); Swatee P. Patel et al., *Associations Between Pre-pregnancy Obesity and Asthma Symptoms in Adolescents*, 66 J. EPIDEMIOLOGY & COMMUNITY HEALTH 809 (2012); Rika Tanda et al., *The Impact of Prepregnancy Obesity on Children's Cognitive Test Scores*, 17 MATERNAL & CHILD HEALTH J. 222 (2013).

that of Claudia Buss et al. that suggest "[h]igh pregnancy anxiety during mid-gestation is associated with decreased gray matter density in 6–9-year-old children"?[77] The authors of that study state that "[a]ltered gray matter volume in brain regions affected by prenatal maternal anxiety may render the developing individual more vulnerable to neurodevelopmental and psychiatric disorders as well as cognitive and intellectual impairment."[78] The authors of the study suggest that addressing anxiety should therefore be a major focus of public health initiatives. What might the moral response be and, coextensively, how might law respond?. Do we as individuals make a choice to put ourselves in position where stress is going to affect the outcome of our pregnancies? If I know I am a particularly anxious person, should I make a different choice?

Rather than being drawn into this neoliberal account of responsibility, we should try to challenge the social circumstances in which harmful stress is pervasive for women.

As I have noted elsewhere, government health advisory bodies and professional organizations advise women who are pregnant or contemplating pregnancy to take vitamin supplements, remain fit, refrain from drinking alcohol and taking drugs, and, rather extraordinarily, to avoid stress.[79] Not only are stresses experienced by pregnant women (and women contemplating becoming pregnant) likely to have a negative impact on the health outcomes of their children but, in all likelihood, one of the manifestations of that psychosocial harm may well be an overly anxious child.[80] In other words, stress of this kind may result in "anxiety lineages" just as prepregnancy obesity research has led to what Warin et al. evocatively described as "obesity lineages."[81] In addition to depression and anxiety, the research has also found that ASD and ADHD, schizophrenia, and psychopathology, among other conditions, are associated with maternal stress. Research by Meriem Hamza et al. titled *Epigenetics and ADHD: Toward an Integrative Approach of the Disorder Pathogenesis* claims that "[b]esides the genetic component of ADHD, epidemiological studies have highlighted several pre and perinatal environmental risk factors predisposing to

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[77] Claudia Buss et al., *High Pregnancy Anxiety During Mid-Gestation Is Associated with Decreased Gray Matter Density in 6–9-Year-Old-Children*, 35 PSYCHONEUROENDOCRINOLOGY 141, 141 (2010).

[78] *Id.*

[79] *See* Isabel Karpin, *Taking Care of the "Health" of Preconceived Human Embryos or Constructing Legal Harms*, *in* THE "HEALTHY" EMBRYO: SOCIAL, BIOMEDICAL, LEGAL AND PHILOSOPHICAL PERSPECTIVES 136 (Jeff Nisker et al. eds., 2010); Karpin, *supra* note 36, at 140.

[80] Buss et al., supra note 77, at 147–48.

[81] *Supra* note 69 and accompanying text.

the disorder including toxic exposure, maternal stress during pregnancy, low birth-weight, and psychosocial adversities."[82] Notably there is also some discussion of paternal genetic transmission of ADHD and environmental factors such as paternal chronic alcohol consumption, but the maternal psychosocial factors were cited as leading to "long-lasting changes in epigenetic marks and thus modulate gene expression."[83] "Maternal stress during pregnancy especially in the third trimester was associated to an increased risk of ADHD and has been correlated with the symptoms severity."[84]

Kinga Polanska et al. conducted a study of "[m]aternal stress during pregnancy and neurodevelopmental outcomes of children during the first 2 years of life."[85] In this study, the researchers concluded that "prenatal exposure to maternal stress is significantly associated with decreased child cognitive functions."[86] Rebecca Slykerman et al. linked depression in early adolescence with stress during pregnancy[87] and Nadja Reissland linked hand preference to maternal stress.[88] Finally, Olena Babenko et al. explored whether stressful experiences during pregnancy exert long-term consequences on the future well-being of the mother and the baby.[89] Concerned with the transgenerational effects of stress and possible links to ADHD, anxiety, ASD, and schizophrenia, they proposed that the fetal brain is highly susceptible to an "adverse maternal environment" and potentially mediated by epigenetic regulation.[90] Stress in this context ranges from non-pregnancy-specific mildly stressful events like moving house to chemical experiences in utero.[91] The conclusion of this study is that prenatal stress is one of the most powerful influences on mental health.[92]

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[82] Meriem Hamza et al., *Epigenetics and ADHD: Toward an Integrative Approach of the Disorder Pathogenesis*, J. ATTENTION DISORDERS, Mar. 9, 2017, at 1, 1.

[83] *Id.* at 4.

[84] *Id.* (citation omitted). The authors do concede that it is hard to control for some factors, such as air pollution, which might lead to the same modifications in DNA methylation. *See id.* at 5.

[85] Kinga Polanska et al., *Maternal Stress During Pregnancy and Neurodevelopmental Outcomes of Children During the First 2 Years of Life*, 53 J. PAEDIATRICS & CHILD HEALTH 263, 263 (2017).

[86] *Id.*

[87] Rebecca F. Slykerman et al., *Maternal Stress During Pregnancy Is Associated with Moderate to Severe Depression in 11-Year-Old Children*, 104 ACTA PAEDIATRICA 68 (2015).

[88] Nadja Reissland et al., *Laterality of Foetal Self-Touch in Relation to Maternal Stress*, 20 LATERALITY 82 (2015).

[89] Babenko et al., *supra* note 43.

[90] *See id.* at 83, 85

[91] *See id.* at 85.

[92] *See id.*

How we respond to the fact that women who are stressed are not just being harmed in and of themselves but as mothers will be crucial as the law moves forward in a postgenomic era.

## V. WHAT DOES THE VULNERABILITY THEORY HAVE TO OFFER AS A WAY OF DEALING WITH THESE STUDIES?

Fineman argues that the "theoretical task of reconceptualizing the role of the state requires that we imagine responsive structures whereby state involvement actually empowers a vulnerable subject by addressing existing inequalities of circumstances that result from undue privilege or institutional advantage,"[93] and I think we can do that here.

On the one hand, the identification of maternal stress and psychosocial harm as a cause of negative outcomes in children may burden women with an impossible responsibility to avoid such harms. Yet it is also possible that science describing the harmful intergenerational effects of a stressful, hostile, or discriminatory environment on both women and their future progeny will lend support to the argument for shifting the burden away from the individual (specifically the maternal figure) toward a societal responsibility for systemic inequalities and discrimination and violence.

Epigenetics blurs the distinction between the physical and the psychological by revealing a physical register for psychological harm through changes to methylation and the epigenome. Thus, we might feel that here, at last, is a way of proving what we already suspected about the physical consequences of an unequal society—not just for the people most immediately affected but also for the multiple generations that are born out of such environments. This is the kind of evidentiary trail that is particularly appealing to law. Therefore, if epigenetics can lend support to this, it may give rise to initiatives that shift the burden away from the individual in favor of state or societal responsibility for inequalities and gender-based discrimination and violence.

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[93] Fineman, *The Responsive State*, *supra* note 3, at 274.

## CONCLUSION: USING VULNERABILITY THEORY TO RESPOND TO THE LEGAL SCIENTIFIC SUBJECT

Fineman argues that vulnerability is universal for all humans and that "[d]ependency and vulnerability are not deviant, but natural and inevitable."[94] She replaces the liberal subject—as the central figure around which social institutions are organized—with the vulnerable subject that is both embodied and embedded. Once vulnerability is accepted as inevitable, she argues, this impels a responsive state, namely, one which recognizes that both it and its institutions are the means by which individuals gain access to resilience and resources that they require to navigate the practical implications of our shared vulnerability.[95]

This Essay is a provocation to rethink the logics of law along epigenetic lines to incorporate an inevitable bio-intergenerational sociality that emphasizes our embedded and interconnected vulnerability. It argues that by using Fineman's vulnerability thesis it might be possible to craft a legal remedy for psychosocial harm to future people that does not place the central burden on women. Indeed, the intention would be to shift the burden away from individuals by recognizing that the harm is systemic, cumulative, continuous, and somatic.

Without a direct intervention into the scientific literature—and this is where vulnerability theory is vital—it seems clear that the argument for the socialization of that responsibility could be lost and this body of scientific literature co-opted to the interests of a neoliberal individualism. My concern is that responsibility would be situated in the individual maternal figure constituting her as the hostile environment—Babenko's "adverse maternal environment." Our very difficult task then, as legal thinkers, is to find a way to deploy this new research to socialize responsibility rather than to individualize it, and vulnerability theory offers us a pathway there.

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[94] Martha Albertson Fineman, *Equality, Autonomy, and the Vulnerable Subject in Law and Politics*, *in* VULNERABILITY: REFLECTIONS ON A NEW ETHICAL FOUNDATION FOR LAW AND POLITICS, *supra* note 3, at 13, 17.

[95] *See* Fineman, *The Responsive State*, *supra* note 3, at 260–61.