

# SINCE CHILDREN ARE NOT LITTLE ADULTS—SOCIALY—WHAT’S AN ENVIRONMENTAL ECONOMIST TO DO?

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## I. INTRODUCTION

In 1665, Diego Velázquez painted what was to become one of the great works of western art, *Las Meninas*. The large canvas portrays Velasquez painting the Infanta Margarita, daughter of King Phillip IV and Queen Mariana of Spain, along with members of the court. The work was completed at the height of belief in *preformationism*. Preformationism was an early theory of development that saw children as arriving into the world as miniature adults, physically and socially.<sup>1</sup> In the painting, Infanta Margarita, who can be no more than five or six, appears all the miniature queen. Starting with Locke and Rousseau, preformationist conceptions of children’s social, cognitive, and moral development gradually gave way to a more complex understanding of childhood as a sequence of developmental changes.<sup>2</sup>

Preformationism was also a theory of biological development.<sup>3</sup> Well into the 1990s, we could have said that U.S. environmental policy took a preformationist view of children—to the extent that children were considered at all. In fact, the rallying cry of the efforts to bring children’s health concerns into federal environmental policy was “children are *not* just little adults.” The driving concern behind this cry was that environmental standards were set based on the impact of environmental hazards on adult health. And yet, physiologically, children are not little adults. As children pass through complex developmental phases, they are affected by environmental

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1. WILLIAM CRAIN, *THEORIES OF DEVELOPMENT, CONCEPTS AND APPLICATIONS* 1 (5th ed. 2004); PHILLIPE ARIÈS, *CENTURIES OF CHILDHOOD: A SOCIAL HISTORY OF FAMILY LIFE* 33-34 (1962).

2. CRAIN, *supra* note 1 at 4-19.

3. Jane Maienschein, *Epigenesis and Preformationism* (Oct. 11, 2005), in *STANFORD ENCYCLOPEDIA OF PHILOSOPHY* (2005), <http://plato.stanford.edu/entries/epigenesis/>.

conditions quite differently than adults. Often, as with the case of neurotoxin exposure during critical periods of brain development, these differences can be severe and permanent. Several statutes and rules now recognize this explicitly.<sup>4</sup> For the past decade or more, regulatory science has been working out the implications of taking children's physiological differences from adults seriously.<sup>5</sup>

Environmental economics has been going down the same path, but more slowly.<sup>6</sup> Under the 1997 Executive Order 13045, titled "Protection of Children from Environmental Health Risks and Safety Risks", the U.S. Environmental Protection Agency (EPA) is required to conduct economic analysis of economically significant environmental regulations that the agency believes may disproportionately affect children.<sup>7</sup> But to a large extent, it is fair to say that environmental economics is still preformationist in what it can contribute to regulatory analysis.

In this article I explore what it might mean for environmental economics to take the implications of a modern understanding of children's cognitive, social, and moral development seriously. Environmental economists recognize that taking children seriously

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4. See U.S. Environmental Health Protection Agency (EPA), Children's Health Protection: Regulations, <http://yosemite.epa.gov/ochp/ochpweb.nsf/content/regs.htm#> (last visited Feb. 22, 2007) (listing rulemaking activities designed to protect children).

5. See EPA, Children's Health Protection, Scientific Data and Methods, [http://yosemite.epa.gov/ochp/ochpweb.nsf/content/Whatwe\\_scientif.htm](http://yosemite.epa.gov/ochp/ochpweb.nsf/content/Whatwe_scientif.htm) (last visited Feb. 22, 2007) (discussing ongoing efforts at improving the scientific basis for developing standards designed to protect children's health).

6. For a view of EPA funded economic research on valuation of children's health benefits from environmental programs, see EPA, National Center for Environmental Research, Science Topics: Economics and Decision Sciences, <http://es.epa.gov/ncer/science/economics/> (last visited Feb. 22, 2007). For a list of recent EPA-funded workshops on children's health, see EPA, National Center for Environmental Economics, Past Workshops: Valuing Health for Environmental Policy with Special Emphasis on Children's Health Issues, March 24 and March 25, 1999; Valuing Environmental Health Risk Reductions to Children, October 20 and 21, 2003; Morbidity and Mortality: How Do We Value the Risk of Death and Illness? April 10-12, 2006 <http://yosemite.epa.gov/EE/epa/wkshp.nsf/Past+Workshops> (last visited Feb. 22, 2007).

7. Exec. Order No. 13,045, 62 Fed. Reg. 19,885 (April 23, 1997), amended by Exec. Order 13,229, 66 Fed. Reg. 52,013 (Oct. 11, 2001) and Exec. Order 13,296, 68 Fed. Reg. 19,931 (April 23, 2003). See also EPA OFFICE OF POLICY, ECONOMICS, AND INNOVATION (OPEI), EPA'S ACTION DEVELOPMENT PROCESS GUIDE TO CONSIDERING CHILDREN'S HEALTH WHEN DEVELOPING EPA ACTIONS: IMPLEMENTING EXECUTIVE ORDER 13045 AND EPA'S POLICY ON EVALUATING HEALTH RISKS TO CHILDREN 7 (Oct. 2006) available at [http://yosemite.epa.gov/ochp/ochpweb.nsf/content/ADPguide.htm/\\$File/EPA\\_ADG\\_Guide\\_508.pdf](http://yosemite.epa.gov/ochp/ochpweb.nsf/content/ADPguide.htm/$File/EPA_ADG_Guide_508.pdf).

poses significant challenges to standard economic practice.<sup>8</sup> In particular it challenges conventional notions of *consumer sovereignty* that underlie much of economic analysis. Economists' commitment to consumer sovereignty reflects a belief that each individual is the best judge of his or her own preferences and well-being. One of the major themes of the discussion that follows is that focusing on children challenges this assumption and is forcing economists to think about who can best represent the changes in children's welfare created by environmental programs. I will try to show that as economists consider the implications of child development more seriously, they can learn a great deal from law, as well as from their sister social sciences.

EPA has been investing in economic research focused on children's health valuation and has developed preliminary guidance on valuing benefits of reducing risks to children's health.<sup>9</sup> The agency is explicit in noting that this is only interim guidance because so little research has yet been completed on valuation of environmental programs that protect children's health. But the guidance is also clear in that the agency does not expect the value placed on protecting children's health will necessarily be the same as the value placed on protecting adult health.<sup>10</sup> The final word is far from in on what economic research has to say about valuing protection of children's health. But looking at economic theory and examining early empirical results suggests that people may well put a premium on protecting the young, though that premium appears to decrease as children gradually develop into young adults. In other words, it appears that children are not emerging as little adults from an economic perspective either.

I also want to suggest that economics has much to contribute in gaining a clearer picture of how environmental hazards and policies affect children's health. In the risk paradigm that underlies regulatory analysis in U.S. environmental policy, economics is often seen as fulfilling an accounting function on the risk management side of the

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8. See EPA, CHILDREN'S HEALTH VALUATION HANDBOOK at 2-1 (Oct. 2003), available at <http://yosemite.epa.gov/EE/epa/eed.nsf/pages/HandbookChildrensHealthValuation.html> (scroll to bottom of page and follow the pdf hyperlink to the *Handbook*).

9. *Supra* notes 6 and 8.

10. For a related discussion, see Cass Sunstein, *Valuing Life: A Plea for Disaggregation*, 54 DUKE L.J. 385, 386 (2004); Anna Alberini, Maureen Cropper, Alan Krupnick and Nathalie Simon, *Does the Value of Statistical Life Vary with Age and Health Status? Evidence from the U.S. and Canada*, J. OF ENVTL. ECON. AND MGMT. (forthcoming). See also Katharine Q. Seelye & John Tierney, *EPA Drops Age-Based Cost Studies* N.Y. TIMES, May 8, 2003 at A35.

divide between risk assessment and management.<sup>11</sup> Much of the controversy in the legal literature about the role of economics in environmental policy has focused on this accounting function.<sup>12</sup> But economics as a discipline is primarily interested in behavior—especially in how behavior is influenced by financial, technological, time, and knowledge constraints. As a result, there is the potential that economics can make contributions wherever human behavior is relevant to policy analysis. While I will focus primarily on issues that arise in valuation, I also want to examine 'the contributions economics can make to assessing risk and designing and evaluating policy.

In Part II of the following discussion, I look at ways in which a broader integration of economic analysis into regulatory risk analysis could help improve exposure assessment as well as policy design and evaluation. I describe new data collection efforts that could help this effort. Part III turns to a discussion of health valuation. EPA has recommended using parents' willingness to pay (WTP) as a measure of the benefits of environmental policies that reduce risks to children's health. I show that a measure more consistent with economic theory would include a broader range of beneficiaries, but that concerns about double counting individuals' benefits raise questions about the inclusion of benefits to those other than children. Part IV looks at the problem that children's immaturity poses for economists' reliance on the principal of consumer sovereignty. I argue that the law of informed consent and minors and recent research on child development and judgment about risk support EPA's interim recommendation that parents' preferences stand in for children's, but also suggests ways in which children's own voices might enter into valuation of the benefits of environmental programs protecting children's health. Part V briefly reviews the emerging economics literature estimating adults' WTP to protect children's health from environmental hazards. One consistent result emerges – parents appear willing to pay significantly more to protect their children's health as they are their own. Finally Part VI pulls together lessons from this analysis of both law and theoretical and empirical economic research for the role of economic analysis in evaluating children's environmental health policy.

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11. NATIONAL RESEARCH COUNCIL, RISK ASSESSMENT IN THE FEDERAL GOVERNMENT: MANAGING THE PROCESS, (1983).

12. *See, e.g., infra* note 28.

## II. THE *OTHER* SIDE OF ENVIRONMENTAL ECONOMICS: RISK ASSESSMENT AND BEYOND

Federal regulatory agencies are required to conduct risk assessments to evaluate the consequences of exposure to a hazard and to assess the benefits from environmental regulation.<sup>13</sup> Risk assessment is typically viewed as the domain of science, in particular, physical and biological sciences. Despite the fact that environmental health risks are frequently a function of human choice and behavior, potential contributions of economics and other social sciences are often overlooked. Consequently, the “feedback loop” between human behavior and environmental health risk is often ignored in regulatory risk analysis. Senior analysts from agencies with as diverse a set of responsibilities as the Food and Drug Administration and U.S. E.P.A. see this as a problem.<sup>14</sup>

Regulatory risk assessments model health outcomes relying on baseline conditions and alternative intervening decisions, which generally are taken as unchanging givens.<sup>15</sup> In the real world, however, individuals and firms respond to changes in information, prices and other market conditions and these responses can, in turn affect baseline conditions and the actual effects of environmental policy. Behavioral responses can be directly related to environmental hazards, as when parents make sure that their children use inhalers properly to reduce the severity of asthma episodes.

But behavior can also be influenced by factors unrelated to the environmental hazard, as when escalating housing prices push young families to live in areas with poorer air quality or older, ill-maintained housing stock. There is a large body of economics literature that uses the actions that people take to avert exposure or reduce its' health

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13. *See generally*, U.S. Office of Management and Budget, Proposed Risk Assessment Bulletin, [www.whitehouse.gov/omb/infomag/proposed\\_risk\\_assessment\\_bulletin\\_010906.pdf](http://www.whitehouse.gov/omb/infomag/proposed_risk_assessment_bulletin_010906.pdf). Risk assessment focuses on hazard identification, dose-response estimation, exposure assessment, and risk characterization. *See supra* note 11 at 19-20.

14. *See* Richard Williams & Kimberly Thompson, *Combining Risk and Economic Assessments While Preserving the Separation of Powers*, RISK ANALYSIS (Dec. 2004); C.A. Mansfield & C. Poulos, Household Production Function (Sept. 2005) (memorandum prepared for the U.S. Environmental Protection Agency through E.H. Pechan & Associates, with Bryan Hubbell of U.S. E.P.A.); Chris Dockins, Charles Griffiths, Nicole Owens, Nathalie Simon, & Daniel Axelrad, *Linking Economics and Risk Assessment*, 67 J. OF TOXICOLOGY AND ENVIRONMENTAL HEALTH, 611, 611-620; Personal communications with Bryan Hubbell of U.S. EPA Office of Air Quality Planning and Standards, Research Triangle Park (March 23, 2007) and Chris Dockins, National Center for Environmental Economics, U.S. E.P.A., Washington, D.C. (March 7, 2007).

15. Williams & Thompson *supra* note 14 at 1615-17.

impact as a means of measuring how much people value reductions in environmental health risks.<sup>16</sup> This knowledge could be applied in bringing behavioral “feedback loops” into risk assessment.

Risk assessments often model health end points in ways that may be amenable to laboratory analysis, but are difficult to translate into health outcomes that are meaningful to ordinary people and therefore could influence behavior.<sup>17</sup> For example, risk assessments on lead paint hazards model health outcomes as changes in children’s blood lead levels or IQ. In focus groups for a health valuation study, my colleagues and I found that parents had a difficult time relating these physical outcome measures to something meaningful in their children’s lives. These parents wanted to know how blood lead levels and changes in IQ would affect their children’s ability to function in school as children or in the work place as adults.

An example from pesticide regulation can help illustrate what is at stake. EPA already relies on economic estimates of food consumption in assessing exposure to pesticide residues in food, but consumption is usually seen as static, technical parameters that do not change. In contrast, economists generally see consumption as behavior that responds to factors unrelated to environmental policy that can and do change over time. In fact, food consumption in the United States has been changing fairly radically in recent years. For example, studies on obesity show that changes in women’s labor market participation are resulting in noticeable changes in children’s diets.<sup>18</sup> As time constraints are tightening for their mothers, American

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16. See e.g., Carol Mansfield, F. Reed Johnson & George Van Houtven, *The Missing Piece: Valuing Averting Behavior for Children’s Ozone Exposures*, 28 RESOURCE AND ENERGY ECON. 215 (2006); David Archer, Thomas Crocker & Jason Shogren, *Choosing Children’s Environmental Risk*, 33 ENVTL. & RESOURCE ECON. 347 (2006); Mark Dickie, *Parental Behavior and the Value of Children’s Health: A Health Production Approach*, 71 SOUTHERN ECON. J. 855 (2005); Glenn Blomquist, *Self-Protection and Averting Behavior, Values of Statistical Lives, and Benefit Cost Analysis of Environmental Policy*, 2 REV. OF ECON. OF THE HOUSEHOLD 89 (2004); Nil Adote Abrahams, Bryan J. Hubbell & Jeffrey L. Jordon, *Joint Production and Averting Expenditure Measures of Willingness to Pay: Do Water Expenditures Really Measure Avoidance Costs?*, 82 AMER. J. AGR. ECON. 427 (2000); C.W. Abdalla, B.A. Roach & D.J. Epp, *Valuing Environmental Quality Changes Using Averting Expenditures: An Application to Groundwater Contamination*, 68 LAND ECON. 163 (1992); Timothy Bartik, *Evaluating the Benefits of Non-marginal Reductions in Pollution Using Information on Defensive Expenditures*, 15 J. ENVTL. ECON. AND MGMT. 111 (1988); P.N. Courant & R.C. Porter, *Averting Expenditure and the Cost of Pollution*, 8 J. ENVTL. ECON. & MGMT. 321 (1981).

17. Dockins et al., *supra* note 14.

18. Patricia Anderson, Kristin Butcher & Phillip Levin, *Maternal Employment and Overweight Children*, (Nat’l Bureau of Econ. Research, Working Paper No. W7880, 2002); KAY CREPINSEK & NANCY BURNSTEIN, *MATERNAL EMPLOYMENT AND CHILDREN’S NUTRITION*

children are eating more meals outside the home and consuming fewer fruits and vegetables.<sup>19</sup> Changes in the relative cost of land, labor, and transportation—as well as developments in trade law—are resulting in significant changes in the sources of fruits and vegetables consumed in the United States. Between 2000 and 2005, U.S. fruits imports increased twenty-two percent and U.S. vegetable imports increased forty percent.<sup>20</sup> These trends have implications for dietary pesticide exposure assessment. Economists have models and data sources that can help federal agencies track changes in dietary exposure that occur over time as result of changing trade patterns.

In the case of air pollution, a failure to take behavior into account could lead to regulations that provide inadequate protection for children's health.<sup>21</sup> EPA risk assessments look to epidemiological studies for both dose-response relationships between air pollution and health outcomes and baseline health conditions. Epidemiologists use the relationship between daily hospital admissions and ozone levels to estimate these dose-response functions. If these studies do not take into account the extent to which people stay indoors on bad air quality days, they will underestimate the impacts of air pollution on health.<sup>22</sup> If people did not limit their activities, there would be more hospitalizations. Air pollution regulations based on these dose-response functions will be more lax than if the behavior were more accurately represented. Further, the benefits of air quality improvements could also be underestimated because the baseline health estimates do not reflect the health effects of staying indoors.<sup>23</sup> It is conceivable that an improvement in air quality could leave

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19. Wen You, *Parental Time and Children's Obesity Measures: A Theoretical and Empirical Investigation* (2005) (unpublished Ph.D. dissertation, Texas A&M University) (on file with Texas A&M University).

20. Sandra Hoffmann, Remarks at Resources for the Future (RFF) First Wednesday Series: Achieving a Safe Food Supply in Increasingly Global Markets (June 7, 2006), [www.rff.org/rff/Events/Achieving-Food\\_Supply-Global-Market.cfm](http://www.rff.org/rff/Events/Achieving-Food_Supply-Global-Market.cfm).

21. See Carol Mansfield et al., *supra* note 16.

22. Brian W. Bresnahan, Mark Dickie, and Shelby Gerking, *Averting Behavior and Urban Air Pollution*, 73 *LAND ECONOMICS* 34-57 (1997), M. Neidell, *Air Pollution, Health, and Socioeconomic Status: the Effect of Outdoor Air Quality on Childhood Asthma*, 23 *J. OF HEALTH ECONOMICS* 1083-1316 (2004).

23. See also Jane Hall, Victor Brajer, and Frederick Lurmann, *Economic Valuation of Ozone-related School Absences in the South Coast Air Basin of California*, 21 *CONTEMPORARY ECON. POL.* 407 (2003).

asthma-related hospital admissions unchanged, but result in a significant increase in the time children spend in rigorous outdoor activity. In an era when we are facing an epidemic in childhood obesity, these benefits of better air quality could be significant.

The impact of environmental quality on children's health is heavily influenced by choices made by their parents. One of the limitations faced by environmental economists, and therefore agencies, in studying these choices is a lack of data on family decisions that influence children's exposure to environmental hazards. Two promising efforts to include social science questions in national children's health surveys may help to fill this data gap.

First, EPA is currently working to incorporate questions on averting behavior relevant to children's environmental health into future National Health and Nutrition Examination Surveys (NHANES).<sup>24</sup> Second, a new longitudinal study called The National Children's Study is being designed. This study would follow a panel of children and their families through the first 20 years of the children's lives.<sup>25</sup> There are plans to integrate socioeconomic data collection into this study to improve understanding of the way family behavior influences children's exposure to environmental hazards and influences the consequences of that exposure. The National Children's Study has been through a multi-year planning process. Data collection is scheduled to begin in 2008. Continuation of the study through completion is subject to annual Congressional appropriations.<sup>26</sup> A similar economic survey, The Panel Study of Income Dynamics (PSID), has been collecting economic and

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24. EPA is working to incorporate questions on families' efforts to protect asthmatic children from air pollution in the 2007-2008 NHANES survey. Memorandum from the EPA Advisory Comm., Integrating Economics with Existing Health Surveys (Aug. 2003); Interview with Montira Ponsiri, EPA Office of Research and Development (Winter 2006). NHANES are nationwide surveys conducted by the National Center for Health Statistics, Centers for Disease Control (NCHS/CDC). These surveys are designed to assess the health and nutritional status of adults and children in the United States through interviews and direct physical examinations. They are conducted on a periodic basis to allow for assessment of health changes over time. NHANES II and III were carried out from 1976 to 1980 and from 1988 to 1994, respectively. U.S. National Library of Medicine, Communications Engineering Branch, NHANES <http://archive.nlm.nih.gov/proj/dxpnet/nhanes/nhanes.php> (last visited Feb. 22, 2007).

25. The National Children's Study, <http://www.nationalchildrensstudy.gov/> (last visited Feb. 22, 2007).

26. Personal communication with Sarah Keim, National Institutes of Health, March 23, 2007.

sociological data on panels of families since 1968.<sup>27</sup> This data collection effort has been crucial to our understanding of the impact of changing economic conditions on families, particularly poor families.<sup>28</sup>

#### BEYOND RISK ASSESSMENT: IMPLICATIONS OF BEHAVIORAL ANALYSIS FOR POLICY DESIGN AND EVALUATION

A better understanding of behavior is also critical to improving policy design and evaluation. If we can gain a firm grasp on likely behavioral response to policies, we can help avoid unintended consequences of policy initiatives. For example, lead paint disclosure rules are intended to provide parents with information that can prevent them from purchasing homes that contain conditions that might be hazardous to their children's health. However, the rules could also cause home-owning parents not to test for lead, to ignore the problem, or worse, to remove lead paint improperly out of concern that the presence of lead paint or knowledge of its presence could lower their home's resale value. Regulators need to know how households are likely to respond to lead paint rules or abatement assistance in order to effectively structure lead paint policies. Economists have contributions to make here and in designing and evaluating other environmental policies.

### III. *THAT* SIDE OF ENVIRONMENTAL ECONOMICS: BENEFITS VALUATION

Of course, environmental economics also has another, well-known side. The legal literature on valuation of health and ecological benefits of environmental programs is extensive and often acrimonious.<sup>29</sup> Much of this discussion focuses on normative issues about the appropriateness of valuing reductions in health risks and the normative position of welfare economics among the many forms of *consequentialism* and other perspectives on social ethics.<sup>30</sup> My focus

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27. See Panel Study of Income Dynamics, <http://psidonline.isr.umich.edu/> (last visited Jan. 19, 2007) (PSID is a nationally representative longitudinal survey of close to 8,000 U.S. families run by the University of Michigan and funded by multiple federal agencies.).

28. *Id.*

29. See, e.g., Shi-Ling Hsu, *On the Role of Cost-Benefit Analysis in Environmental Law* 35 ENVTL. L. 135, 173 (2005) (reviewing FRANK ACKERMAN AND LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING (2004)).

30. See generally DANIEL M. HAUSMAN & MICHAEL S. MCPHERSON, ECONOMIC ANALYSIS AND MORAL PHILOSOPHY (John Pencavel ed., 1996) (providing an introduction into

is much more limited and practical. Given that agencies are legally charged with valuing the benefits of economically significant rules, what special issues arise for benefits valuation when the rules disproportionately affect children's the health of children?<sup>31</sup>

Theoretically, when economists measure the benefits of any public program, they are trying to capture the aggregate change in the welfare of all members of society attributable to the program. A useful way to think about cataloging the benefits of any environmental policy is to think broadly about who benefits and how.<sup>32</sup> A wider range of people benefit from programs protecting children's health than we might expect on first thought. Obviously children benefit directly, but so do their parents, by, for example, spending less time and fewer resources caring for sick children. They may benefit because a healthy child may be better able to invest in his or her own human capital and, as a result, be in a better position to care for the parents as they grow old. Parents also benefit because they care about their children.<sup>33</sup> Economists distinguish between two types of caring for others, paternalistic and non-paternalistic. Paternalistic altruism is utility derived from another's consumption. Non-paternalistic altruism is utility derived from another's own utility. Parents have paternalistic concern for their children when they care about their children's health or consumption in and of itself, not because of what the child likes. A classic example of paternalistic caring is the parent's admonishment, "Eat your spinach. I don't care if you don't like it. It's good for you." Parents have non-paternalistic

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the relationship between economic theory and moral philosophy); CONSEQUENTIALISM AND ITS CRITICS, (Samuel Scheffler ed. 1988) (describing consequentialism, which is a set of positions in ethics that normative value depends only on consequences). On the issue of valuation specifically, see INCOMMENSURABILITY, INCOMPARABILITY, AND PRACTICAL REASON (Ruth Chang ed., Harvard U. Press 1998); Cass Sunstein, *Incommensurability and Valuation in Law*, 92 MICH. L. REV. 779 (1994).

31. See Sandra Hoffmann et al., *Economic Uncertainties in Valuing Reductions in Children's Environmental Health Risks*, in, ECONOMIC VALUATION OF ENVIRONMENTAL HEALTH RISKS TO CHILDREN 207 (Pascale Scapecchi ed., 2006) (discussing other commonly used health measures and valuing reductions in environmental risks to children's health, in particular cost-of-illness and Quality Adjusted Life Years (QALYs)).

32. Conceptually, a lawyer could think of this in these terms of who has standing to be counted in environmental health benefits assessment and what counts as benefits. The answer from conventional welfare economics is that everyone in society has standing and their own, individual welfare or utility is what counts.

33. Tort law recognizes this direct contribution of children to parents' well-being explicitly when it allows parents to recover damages for the emotional distress of witnessing a child's tortious injury. See, e.g., *Dillon v. Legg*, 441 P.2d 912 (Cal. 1968) (allowing parents to recover damages for the emotional distress of witnessing a child's tortious injury).

concern for their children when they care about the child's consumption or health because it makes the child happy.

Other people, including siblings, extended family members, friends, and even complete strangers, may also benefit from protection of children's health. Like parents, they may benefit directly because fewer resources must be devoted to caring for sick children. They may also have paternalistic and non-paternalistic concern for specific children or for children in general. And in most cases, these other individuals will benefit from increases in the contributions children may be able to make to their family or to society because they are in better health. This spillover of benefits to society-at-large is one of the primary justifications for public expenditures on public health and education for children.

It is likely that the story is even more complex than this. Children may care about the way their health affects others. Children may care because their health may affect their parents' health or the stability of their parents' marriage—a form of paternalistic altruism. Children may even have non-paternalistically altruistic feelings toward their parents!<sup>34</sup> At this point I see my fellow economists throwing up their hands in despair because they know how hard it is simply to get decent measures of the most direct effects of health on children's welfare. But this does suggest that our empirical measures may be conservative in scope.

Economists have long debated the appropriateness of considering altruistically motivated benefits in measures of program benefits.<sup>35</sup> Economists now widely accept that as a general rule, non-paternalistic preferences should be *excluded* because one person's utility gets double counted—once in their own and once in another's utility function.<sup>36</sup> On the other hand, paternalistically altruistic preferences should be *included* because they do not involve this kind of double counting.<sup>37</sup> Instead, they are purely the other person's own

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34. See William Harbaugh & Kate Krause, *Children's Altruism in Public Good and Dictator Experiments*, 38 *ECON. INQUIRY* 95, 107 (2000).

35. See Theodore Bergstrom, *Benefit-Cost in a Benevolent Society*, *AM. ECON. REV.*, Mar. 2006, at 339, 347–48 (providing a recent survey).

36. Theodore Bergstrom, *When Is a Man's Life Worth More than His Human Capital?* 16–18 (Dep't of Econ., Univ. of Cal., Santa Barbara, Paper No. 1982d). *But see supra* note 35 at 348 (noting some qualifications to the conclusion).

37. M.W. Jones-Lee, *Paternalistic Altruism and the Value of Statistical Life*, 102 *ECON. J.* 80, 89 (1992).

direct benefit from the program outcomes.<sup>38</sup> A practical problem is that economists have found it difficult to develop empirical methods for distinguishing between these two types of altruistic preferences.<sup>39</sup> As a result, the tendency has been to exclude both and settle for a potentially more conservative estimate of program 'benefits. EPA interim guidance recommends using parents' WTP to reduce children's health risk as a measure of the benefit of environmental programs that protect children's health. There has been some debate among environmental economists about whether this over-estimates program benefits because it may be motivated in part by non-paternalistic altruism.<sup>40</sup>

The catalog of beneficiaries of programs protecting adult health or ecosystems is no less complex than that for children. In practice, this complexity is typically ignored. Is this complexity more critical in obtaining a decent, first-order approximation of the benefits of children's environmental health programs than it is for other environmental health programs? I maintain that it is because

38. A little formal notation can help give a rough sense of the reason for this distinction. Let  $h_c$  denote a child's health or safety and  $\mathbf{x}_c$  denote the child's consumption of all goods and services. The utility the child derives from consumption and health and safety can be denoted  $u_c(\mathbf{x}_c, h_c)$ ; i.e., the child's utility depends on the child's health ( $h_c$ ) and consumption of other goods ( $\mathbf{x}_c$ ). Parents benefit directly from increased protection of children's health because they can spend less time and fewer resources caring for the sick child and more on other things they want. Let  $\mathbf{x}_p$  denote a parent's total consumption of goods and leisure. The fact that this depends on the child's health is denoted  $\mathbf{x}_p(h_c)$ . The parent's direct benefit (or utility) from an environmental health program that targets children is then denoted  $u_p(\mathbf{x}_p(h_c))$ . Their benefits that accrue from paternalistic and nonpaternalistic altruism related to their children's health can be denoted  $u_p(h_c)$  and  $u_p(u_c(h_c))$ , respectively. A parent's total benefit from the program therefore depends on how the parent's own direct consumption changes as well as the utility the parent gets from knowing that the child is healthier and happier; i.e.,  $U_p = u_p(\mathbf{x}_p(h_c), h_c, u_c(\mathbf{x}_c, h_c))$ . Total welfare for a parent and a child could be denoted as some function  $W$  that depends on the utility of the parent and child; i.e.,  $W = W(u_c(\mathbf{x}_c, h_c), u_p(\mathbf{x}_p(h_c), h_c, u_c(\mathbf{x}_c, h_c)))$ . This function illustrates in a highly simplified way why economists believe non-paternalistic preferences should not be included in measuring the benefits of a policy—in this case, the child's utility is double counted—once on his or her own and once in the non-paternalistically altruistic parent's utility (italics are added to highlight this repetition). Note that the paternalistic preference over their children's health,  $u_p(\mathbf{x}_c, h_c)$ , is *not* repeated in this welfare function.

Once strategic behavior between spouses or divorce is taken into account, the story becomes even more complex. See generally Theodore Bergstrom, *Benefit Cost Analysis and the Entanglements of Love* (Nov. 1, 2003)(unpublished manuscript, on file with the University of Cal., Santa Barbara, Dep't of Econ.)(providing a nice summary of the implications of alternative family arrangements and alternative roles for extended family and strangers for benefit-cost analysis in societies where people care about one another's consumption, health, or happiness).

39. *Supra* note 8 at 2-7, 2-8.

40. Discussion at the O.E.C.D. Workshop on the Valuation of Environmental Health Risks for Children (Sept. 11-12, 2003).

children are not little adults, either socially or developmentally. And as a result, the obligations and concerns of others in society toward children are different than those toward other adults or possibly even nature.

#### IV. WHAT'S LAW GOT TO DO WITH IT? LESSONS FOR ECONOMISTS FROM INFORMED CONSENT

Economics is based on a commitment to consumer sovereignty, and so economists prefer to base estimates of the value of reducing health risks on individuals' own WTP to reduce risk to themselves. The normative appeal of consumer sovereignty rests on individuals' ability to make informed, rational judgments about the choices they confront. But childhood is defined by the process of gaining the experience, cognitive ability, and judgment needed to make such choices, as well as the judgment and experience to make decisions about managing financial resources. The problem facing economists is similar to that faced by the legal system: at what point and for what purposes should a child's judgment be taken seriously, or when should a minor be bound by his or her decisions or held responsible for his or her actions? A close analogy for the problem faced in environmental health valuation is the place of children's wishes in informed consent for medical treatment and participation in research.

The requirement of informed consent to medical procedures was first established in the 1957 case of *Salgo v. Leland Stanford, Jr. University Board of Trustees*.<sup>41</sup> The patient in *Salgo* was not informed of the risks associated with a contrast medium used in an aortogram. The California Appeals Court held that a patient's consent was not legally effective if it was not "informed." In surveying the legal, philosophical, regulatory, medical, and psychological literatures, Ruth Faden and Tom Beauchamp identify the central elements of informed consent as (1) disclosure, (2) comprehension, (3) voluntariness, (4) competence, and (5) consent.<sup>42</sup> A long line of cases has resulted in a fairly settled body of law about the kind of information that must be disclosed to have legally effective consent. The required information includes "the nature and purpose of the proposed treatment; the risks and consequences of the proposed treatment; reasonably feasible

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41. *Salgo v. Leland Stanford Jr. University Board of Trustees*, 317 P.2d, 170, 181 (Cal. Ct. App. 1957).

42. RUTH FADEN & TOM BEAUCHAMP, *A HISTORY AND THEORY OF INFORMED CONSENT* 274 (1986).

alternatives; and the prognosis if the recommended treatment is not provided.”<sup>43</sup>

Not surprisingly, the information required for adequate disclosure closely resemble the kinds of information that are usually considered in risk analysis. Typically, a rational decision about uncertain outcomes should consider the nature of likely alternative outcomes, their consequences, the likelihood of alternative outcomes, and the benefits or costs of the consequences to the decision maker. A diverse and growing literature on child development, adolescent psychology, and decision-making under uncertainty is exploring children’s development of competence to make these assessments.

The developmental psychology literature offers a mixed picture of children’s ability to assess expected outcomes. Schlottmann (2001) found that children as young as five or six have a functional understanding of probability and expected value.<sup>44</sup> Schlottmann and Anderson (1994) show that children as young as five use information on both likelihood and “size of prize” in assessing gambles.<sup>45</sup> Yet in other studies, children as old as eleven were found to have difficulties comprehending the standard gamble used to develop QALYs.<sup>46</sup> Harbaugh and coauthors (2002) conducted an interesting set of experiments to test whether age influences the choices individuals make under uncertainty.<sup>47</sup> They asked participants from the ages of five to sixty-four to make choices between a simple gamble and a certain outcome. They found strong evidence that children use probability weights in assessing uncertain outcomes, but they use them very differently from adults. Consistent with most other experimental research on adults, they find that adults tend to overweight low-probability events and underweight high-probability ones. In contrast, children underweighted low-probability events and overweighted high-probability ones. Children were found to take more risks than adults when facing low probabilities of large losses.

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43. AMERICAN COLLEGE OF LEGAL MEDICINE TEXTBOOK COMMITTEE, LEGAL MEDICINE 344 (S. Sandy Sanbar et al. eds., 6th ed. 2004).

44. Anne Schlottmann, *Children’s Probability Intuitions: Understanding the Expected Value of Complex Gambles*, 72 CHILD DEV. 103, 103 (2001).

45. Anne Schlottman & Norman Anderson, *Children’s Judgments of Expected Value*, 30 DEVELOPMENTAL PSYCHOLOGY 56, 65 (1994).

46. E.F. Juniper et al., *Minimum Skills Required by Children to Complete Health-Related Quality of Life Instruments for Asthma: Comparison of Measurement Properties*, 10 EUROPEAN RESPIRATORY J. 2285, 2292-93 (1997).

47. William Harbaugh et al., *Risk Attitudes of Children and Adults: Choices over Small and Large Probability Gains and Losses*, 5 EXPERIMENTAL ECON. 53, 60–69 (2002).

Yet children also used large, subjective probability weights, which decreased with age. This finding is consistent with a finding by Fischhoff and coauthors (2000) that adolescents tend to overestimate their chances of premature death.<sup>48</sup> On the whole, the evidence on children's use of probabilities suggests that children have some of the same cognitive biases as adults, but also that these biases decrease as the child matures.

The abilities of individuals to identify outcomes associated with risks and their understanding of these outcomes should influence their judgments about risk taking. A recent review of research shows that young adolescents are able to identify negative consequences associated with medical procedures and risky behavior, and that this ability increases with age. Overall, the levels of competence in identifying risks among adolescents are not high relative to adults.<sup>49</sup> The meaning a child or adolescent attaches to a negative outcome may also change with age. One illustration of this is the well-studied area of how children and adolescents conceive of death. Carey (1985), reviewing literature on children's conceptual understanding of death, finds that children under five typically view death to be similar to sleep; elementary school children understand the finality of death, but not its inevitability. By the age of nine or ten, children seem to understand death as both terminal and inevitable.<sup>50</sup> In contrast, children seem as competent as adults at conveying the severity of symptoms they are currently experiencing.<sup>51</sup>

Finally, judgments about risks and risk taking require an ability to integrate and draw inferences from information on likelihoods, outcomes, and severity. A National Academy of Science Workshop, which was convened to synthesize recent research on adolescent health and development, noted recent research showing that "children's capacities for logic, reasoning, and planning continue to grow throughout adolescence, as do their problem-solving skills and capacity to understand the long-term consequences of their

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48. Baruch Fischhoff et al., *Teen Expectations for Significant Life Events*, 64 PUB. OPINION Q. 189, 196–98 (2000).

49. Susan Millstein & Bonnie Halpern-Felsher, *Perceptions of Risk and Vulnerability*, 31 J. OF ADOLESCENT HEALTH 10, 22–24 (2002)

50. SUSAN CAREY, CONCEPTUAL CHANGE IN CHILDHOOD 60–65 (1985). See also Brenda L. Kenyon, *Current Research in Children's Conceptions of Death: A Critical Review*, 43 J. OF DEATH AND DYING 69 (2001).

51. Stavros Petrou, *Methodological Issues Raised by Preference-Based Approaches to Measuring the Health Status of Children*, 12 HEALTH ECON. 697 (2003).

behavior.”<sup>52</sup> New research is showing that the malleability of the neural system during puberty manifests itself in commonly observed “affective changes—ranging from increased sexual interest and emotional intensity to risk-taking and sensation seeking.”<sup>53</sup> Earlier onset of puberty coupled with incomplete cognitive development “make adolescents particularly vulnerable to emotional and behavioral difficulties (e.g., depression, social anxiety), regulation of appetite and reward motivation (e.g., substance abuse, eating disorders), and impulsivity (e.g., antisocial behavior, excessive risk taking).<sup>54</sup> Effectively, there is a biological disjunction between novelty and sensation seeking and the development of self-regulatory competence.<sup>55</sup>

From an economist’s perspective, these results from the psychology literature suggest that adolescents and children probably discount future outcomes more highly than adults. A person has a high discount rate if they prefer consumption today to consumption tomorrow. A high discount rate could be explained by belief in a high chance of premature death.<sup>56</sup> It could also be explained by impatience or a low level of self-regulatory competence.<sup>57</sup> The few studies that directly compare the discount rates of adults and children find that children and adolescents do have higher discount rates than adults.<sup>58</sup> Some studies find that teenagers and young adults who engage in risky behavior also have higher discount rates than those who do not.<sup>59</sup>

In the 1970s and 1980s, a number of theoretical economic studies examined the efficiency properties of Arrow-Debreau contingent claims markets (a theoretical representation of insurance or futures markets). These studies established that when risk perceptions change or better risk information is revealed over time, insurance and

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52. NATIONAL RESEARCH COUNCIL, A STUDY OF INTERACTIONS: EMERGING ISSUES IN THE SCIENCE OF ADOLESCENCE WORKSHOP SUMMARY 6 (2006).

53. *Id.* at 8.

54. *Id.* at 8–9.

55. Laurence Steinberg, *Risk Taking in Adolescence: What Changes, and Why?*, 1021 ANN. N.Y. ACAD. SCI. 51, 54 (2004). *But see* NATIONAL RESEARCH COUNCIL, ADOLESCENT RISK AND VULNERABILITY: CONCEPTS AND MEASUREMENT 1–2 (2001).

56. *See supra* note 48.

57. *See* Steinberg, *supra* note 55.

58. *See* Kate Krause & William Harbaugh, *Economic Experiments that You Can Perform at Home on Your Children* 14 (Univ. of Or. Dep’t of Econ., Working Paper No. 1999-1, 1999).

59. *See, e.g.,* Harrell Chesson et al., *Discount Rates and Risky Sexual Behaviors among Teenagers and Young Adults*, 32 J. OF RISK AND UNCERTAINTY 217, 227–28 (2006).

futures markets produce intertemporally inefficient allocations.<sup>60</sup> Harbaugh (1999) argues that the pervasive transformation of children's immature appreciation of risk of illness and death into future adult risk aversion effectively creates a form of failure in intertemporal markets, with children demanding too little safety relative to their mature selves.<sup>61</sup> Restrictions on children's range of choice, or rules that allow contracts entered by children to be voided, are ways of correcting this market failure and are in line with the core principles underlying the law of children and informed consent.<sup>62</sup>

The law of informed consent is being influenced by developments in child psychology as well as wider cultural views about the autonomy of children. In general, both convention and the weight of evidence from the psychology literature suggests that most children lack the capacity to give informed consent, although this capacity develops through adolescence into young adulthood. In almost all states, children under 18 are viewed as minors who are incompetent to give informed consent to medical procedures or participation in research, although exceptions are increasing.<sup>63</sup>

In the case of a patient's incompetence, the goals of informed consent are pursued by engaging a proxy decision maker who acts for the patient.<sup>64</sup> Parents generally have the authority to make medical

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60. Ross Starr, *Optimal Production and Allocation under Uncertainty*, 87 QUARTERLY J. OF ECON. 81 (1973); Richard Harris, *Ex-Post Efficiency and Resource Allocation Under Uncertainty*, 45 REV. OF ECON. STUD. 427 (1978); Richard Harris and Nancy Olewiler, *The Welfare Economics of Ex-Post Optimality*, 46 ECONOMICA 137 (1979); Peter Hammond, *Ex-Ante and Ex-Post Optimality under Uncertainty*, 48 ECONOMICA 235 (1981); Peter Hammond, *Changing Tastes and Coherent Dynamic Choice*, 43 REV. OF ECON. STUD. 159 (1976).

61. William Harbaugh, *Valuing Children's Health and Life: What Does Economic Theory Say about Including Parental and Societal Willingness to Pay?* 4–5 (Univ. of Or. Dep't of Econ., Working Paper No. 2001-13, 2001).

62. For example, most states ban sale of tobacco products to minors. See Julie A. Fishman et al., *State Laws on Tobacco Control—United States, 1998*, 48 MORBIDITY AND MORTALITY WEEKLY REP. 21, 26–27 (1999). In measuring WTP, economists are also interested in the ability of the consumer to make rational choices about financial management. In most states, contracts entered by minors are generally voidable at the insistence of the minor. See E. ALLAN FARNSWORTH, *CONTRACTS* 214–24 (1982).

63. There is a significant body of literature arguing that the view of majority at 18 being a bright line with a few exceptions is erroneous and providing a thorough discussion of the rights and legal obligations of teenagers and informed consent. See JESSICA BERG ET AL., *INFORMED CONSENT: LEGAL THEORY AND CLINICAL PRACTICE* 97–98 (2d ed. 2001); JAMES MORRISSEY ET AL., *CONSENT AND CONFIDENTIALITY IN THE HEALTH CARE OF CHILDREN AND ADOLESCENTS: A LEGAL GUIDE* 30–32 (1986); *CHILDREN'S COMPETENCE TO CONSENT* (Gary Melton et al. eds., 1983).

64. JESSICA BERG ET AL., *INFORMED CONSENT: LEGAL THEORY AND CLINICAL PRACTICE* 95 (2d ed. 2001).

decisions for minor children as a matter of U.S. constitutional law and state law.<sup>65</sup> This authority is based in the nature of the family and reflects an interest both in the rights of the parents and the welfare of the child. Parents are generally presumed to be most likely to know the interests and values of the child and to act in the child's best interest.<sup>66</sup> But in cases of neglect or abuse by parents, the state has a duty to step into the parent's shoes to act in its role as *parens patriae*.<sup>67</sup>

The past 40 years have seen significant shifts in views on the Constitutional status of children generally and as related to informed consent specifically. In a 1969 case recognizing the rights of schoolchildren to free speech under the First Amendment, *Tinker v. Des Moines Independent Community School District*, the Supreme Court declared for the first time that children are "persons under our Constitution. They are possessed of fundamental rights which the State must respect."<sup>68</sup> In other cases during the 1960s and 1970s, the Court upheld children's constitutional rights to privacy in abortion

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65. BARRY FURROW ET AL., HEALTH LAW §4.3-4.5 (1995). See also WHO SPEAKS FOR THE CHILD: THE PROBLEMS OF PROXY CONSENT (Willard Gaylin & Ruth Macklin eds., 1982).

66. *Prince v. Massachusetts*, 321 U.S. 158, 164-66 (1944), *rehearing denied*, 321 U.S. 804 (1944); *Wisconsin v. Yoder*, 406 U.S. 205, 232 (1972). See BARRY FURROW ET AL., HEALTH LAW 725-26 (1995). See JAMES MORRISSEY ET AL., CONSENT AND CONFIDENTIALITY IN THE HEALTH CARE OF CHILDREN AND ADOLESCENTS (1986) for the historical perspective on the development of law pertaining to minors in the United States. The position of the child in colonial law was less child-centered than contemporary cases might indicate. Early colonial law viewed the parent as sovereign. "Children had no constitutional or protective rights of their own, and parents had almost absolute autonomy in respect to their minor offspring and hence almost complete control." *Id.* at 2. The philosophic view was that children owed their parents obedient respect to repay their physical and emotional nurturance. "The emphasis was on the future and on molding the child to grow up—for the good of the community—into a God-fearing, self-supporting citizen." *Id.* at 3. In the 19th and early 20th century, parental sovereignty gave way to a view of the child as dependent and immature with age-specific developmental needs. A view that drew on new theories of child development. Emotional nurturance in early years gained as much importance as preparation for work and *spiritual* care. Overtly objectionable conditions for child labor in early industrial settings and technological advances that reduced the need for unskilled labor all contributed to emergence of the "child welfare" perspective in American law pertaining to minors. State-imposed boundaries on parental prerogatives toward children gradually emerged, including compulsory education and restrictions on child labor. "For the first time, the state recognized the child's needs as separate from family needs and interests. Indeed, the state replaced parents as the final arbiter of child welfare parameters." *Id.* at 4.

67. Literally, "parent of the country." This is a common law concept inherited from pre-colonial law. Clear and convincing evidence of abuse or neglect is generally needed for the state to take custody and is required under the U.S. Constitution to terminate parental rights permanently. *Santosky v. Kramer*, 455 U.S. 745, 766-69 (1982). See also, BARRY FURROW ET AL., HEALTH LAW § 17-34 (1995)(explaining application of the *parens patriae* concept when parents deny their children adequate medical care).

68. 393 U.S. 503, 511 (1969).

decisions and to due process in juvenile-detention decisions.<sup>69</sup> Many states also allow “mature” minors (defined as those old enough and having enough discretion to be able to understand the proposed treatment and the consequences of the treatment decision) to make urgent treatment decisions when parents are unavailable.<sup>70</sup> During the 1980s and 1990s, the U.S. Supreme Court appears to have retreated from pursuing the path of “child as autonomous person” into what has been characterized as a “child under permanent custody” view.<sup>71</sup> An important innovation that could stand between the child as autonomous person view of *Tinker*<sup>72</sup> and Supreme Court cases of the 1970s and the child under permanent custody view of more recent cases is the notion that even though a child, particularly an adolescent, may not have the competence to authorize treatment or participation in research, the law of informed consent could require that *their views be heard*.<sup>73</sup> Federal regulation governing informed consent from children acting as research subjects takes this position, requiring both the parents’ or guardians’ authorization *and* the child’s assent.<sup>74</sup>

What lessons can be drawn from this discussion of children and the modern law of informed consent? As a broad rule, the legal system looks to parents to speak for their children. However, there is growing recognition of the right of children, particularly older children, to at least be heard, and in some cases, of their right to autonomous decision-making. We should not overlook, though, the role of the state as the final arbiter for children’s welfare. This speaks

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69. See *Planned Parenthood of Central Mo. v. Danforth*, 428 U.S. 52, 74-75 (1976) (finding a Missouri statute requiring a minor female to acquire parental consent for an abortion to violate her right to privacy under the U.S. Constitution); see also *In re Gault* 387 U.S. 1, 13 (1967) (finding that the Fourteenth Amendment Due Process Clause applies to juvenile proceedings because such proceedings could result in loss of liberty to the child). There is a substantial body of literature in social sciences and the law on the “rights of the child.” For an overview, see JOSEPH HAWES, *THE CHILDREN’S RIGHTS MOVEMENT: A HISTORY OF ADVOCACY AND PROTECTION* (1991), and MARTIN GUGGENHEIM, *WHAT’S WRONG WITH CHILDREN’S RIGHTS* (2005). For an insightful analysis of the history of late-20th-century children’s rights cases, see LAURENCE HOULGATE, *CHILDREN’S RIGHTS, STATE INTERVENTION, CUSTODY AND DIVORCE: CONTRADICTIONS IN ETHICS AND FAMILY LAW* (2005).

70. *Supra* note 46 at 347.

71. HOULGATE, *supra* note 69.

72. *Tinker v. Des Moines Indep. Cmty. Sch. Dist.*, 393 U.S. 503 (1969)

73. See, e.g., *In re Green*, 92 A.2d 387, 392 (Pa. 1972). See also *Wisconsin v. Yoder* 406 U.S. 205, 242 (1972) (Douglas, J., dissenting).

74. 45 C.F.R. § 46.408. See also BARRY FURROW ET AL., *HEALTH LAW* § 23-7 (1995).

of the importance of children to society as a whole, and points to the significant investments strangers make in children.

#### V. BACK TO ECONOMICS: WHAT DO WE KNOW EMPIRICALLY ABOUT PARENTS' AND OTHERS' WILLINGNESS TO PAY TO PROTECT CHILDREN'S HEALTH?

Empirical studies estimating WTP to protect children from environmental health hazards have almost exclusively looked at the question from a parent's perspective. Scapecchi (2006) recently reviewed the small literature on valuation of parental WTP to protect children's health.<sup>75</sup> These studies span the three classes of risk generally addressed in environmental health valuation: reduction in mortality risk, in risk of acute illness, and in risk of chronic illness.<sup>76</sup> All the studies show that parents are willing to pay more to protect their children's health and survival than they are to protect their own.<sup>77</sup> Three studies, all examining precautionary purchases to estimate WTP to reduce mortality risks, find parents willing to pay more to protect their children's health than the typical adult is to protect his or her own.<sup>78</sup> Bolmquist and coauthors (1996) found that the actions of parents of children age five and under imply that they were willing to pay significantly more to keep their children from being in a fatal or nonfatal motor vehicle accident than was the typical adult.<sup>79</sup> Mount and coauthors (2000) estimate the values of statistical life (VSLs) for children, adults, and the elderly based on family automobile purchases. These investigators find that the VSL of a child is only slightly higher than that of an adult, but significantly greater than that of the elderly.<sup>80</sup> Three studies, using both stated

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75. Pascale Scapecchi, *Valuation Differences between Adults and Children*, in ECONOMIC VALUATION OF ENVIRONMENTAL HEALTH RISKS TO CHILDREN 79 (Pascale Scapecchi ed., 2006).

76. *Id.* at 82.

77. *Id.* at 101.

78. *Id.*

79. Glenn Blomquist et al., *Values of Risk Reduction Implied by Motorist Use of Protection Equipment*, 30 J. TRANSP. ECON. & POL'Y. 55, 63 (1996) (finding that adults still value children more than themselves, even when controlling for different life spans).

80. Timothy Mount, et al., *Automobile Safety and the Value of Statistical Life in the Family: Valuing Reduced Risks for Children, Adults and the Elderly* 1, 24 (paper presented at the 2001 Assoc. of Env'tl. and Resource Econ. Workshop, Bar Harbor, Maine, June 13-15, 2001)(using family automobile purchase data to estimate WTP for reduction in mortality risk for different age groups, they find a VSL of \$7.3 million for children, \$7.2 million for adults, and \$5.2 million for the elderly). *But see* Robin R. Jenkins et al., *Valuing Reduced Risks to Children: The Cause of Bicycle Safety Helmets*, 19 CONTEMP. ECON. POL'Y. 397 (2001) (estimating that the VSL for

preference and market behavior, find that parents are willing to pay about twice as much to prevent an episode of acute illness for their children as they are for themselves.<sup>81</sup> Two contingent valuation studies also find evidence that parents are willing to pay more to reduce risk of chronic illness for their children than for themselves. Viscusi and coauthors (1987) find that parents of young children are willing to pay more than adults without children to reduce risk of injury from household pesticides. Dickie and Gerkin (2001) find that parents are willing to pay twice as much to reduce the risk of non-melanoma skin cancer from solar radiation exposure for their children as for themselves.

Research comparing valuation of children's health to adults is a relatively young literature. One regularity is that parents seem willing to pay significantly more to protect their children's health than their own. More research is needed to determine why this is the case. It may be simply that parents are counting the health of the two people, but more likely, this result reflects a sense of protectiveness towards children, or what economists study as altruism.'

## VI. PUTTING IT ALL TOGETHER: A LAW AND ECONOMICS VIEW ON A REASONABLE MEASURE OF CHILDREN'S ENVIRONMENTAL HEALTH BENEFITS

What then do we want to capture in a measure of change in society's welfare that comes from reducing environmental risks to children's health? Looking back to our model of social welfare and the way society's various members benefit from protecting children's health, I have said nothing in this article to suggest that we do not

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younger children is higher than for older, but concluding that adult VSL is higher than either children's category).

81. Jin-Tan Lieu *et al.* *Mother's Willingness to Pay for Her Own and Her Child's Health: A Contingent Valuation Study In Taiwan*, 9 *Health Econ.* 319, 325 (2000) (finding a Taiwanese mother's WTP to prevent a cold in her child is approximately twice as large as her WTP to prevent a cold in herself); Mark Agee & Thomas Crocker, *Smoking Parents' Valuations of Own and Children's Health* (paper presented at the Assoc. of Env't. and Resource Econ. 2001 Workshop, Assessing and Managing Environmental and Public Health Risks) (estimating parents' annual WTP for an increase in health services for themselves and their children, as well as parents' WTP to reduce their child's daily exposure to second hand tobacco smoke). They found that parents value reduction in risks to their own child's health twice as much as their own. *Id.* See also M. Dickie & V.L. Ulery, *Valuing Health in the Household: Are Kids Worth More than Parents?* (paper presented at the Assoc. of Env't. and Resource Econ. 2001 Workshop, Assessing and Managing Environmental and Public Health Risks) (finding parents' WTP to be about twice as much to have their children avoid an episode of acute illness than to avoid it themselves).

care about the benefits to children, parents, other family members, or even strangers. The issue, somewhat similar to the issue in informed consent, is *who* speaks for these members of society. The answer I propose gives weight to the legal and ethical concerns evidenced in the law of minors and informed consent. And it also gives weight to the practical and technical concerns of economists who are trying to determine how to measure something that is very difficult to quantify.

First, the law of informed consent supports the position of EPA's *Children's Health Valuation Handbook*, that parents, not children, should speak for the child.<sup>82</sup> The law, however, supports the position in a way that is contrary to the standard results in the economics literature. Rather than the non-paternalistic preferences of parents serving to double count the preferences of children, as would be the case in a standard environmental valuation problem, here they actually reflect the legal duty of parents to represent their children's interests and preferences. Parents are expected to speak for the child because they are emotionally impelled and legally required to act in the child's best interest. In other words, they are expected to, and in all likelihood generally do, reflect paternalistic altruism toward their children in their choices. But they are *also* expected to speak for the child because they are in the best position to understand and care about the decision's impact on the child's happiness. Here they are expected to, and generally do, reflect non-paternalistic altruism toward their children in their choices. Because the preferences of children are not independently measured, they are not double counted in the parent's WTP.

Second, the more recent cases on children's rights and the law of informed consent suggest some potential innovations for studies that value reductions in risk to children's health. Parental choices are not transparent reflections of children's preferences, but they do take the preferences into account. The courts and federal agencies have suggested that in important decisions about children's health, particularly older children's health, explicit processes should be in place to allow the child's perspective to be heard. Consideration might be given to doing this in valuation studies. One possibility could draw on the finding that children have been found capable of accurately reflecting their current level of comfort or discomfort on QALY indices.<sup>83</sup> Perhaps QALY indices could be used to help inform

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82. *Supra* note 8.

83. *See* Petrou, *supra* note 51.

parents about the generic comfort level of children in much the same way they are used to inform treatment decisions. One difficulty in implementing this suggestion is that it would likely need to be done in the context of a stated-preference or stated-choice study. A methodological challenge in this, as in many social science surveys, is to encourage respondents to accurately reflect their true position rather than giving socially acceptable responses. Use of children's preferences to inform parents could reinforce the socially acceptable response—"I'd do anything for my kids"—when in reality, all parents face constraints of time and material resources.

Third, informed consent is not the same as assessing the changes in social welfare resulting from a new public policy. The role the state plays as a final defense for children where parents fail to protect them indicates that children are important to members of society other than parents. The work of Nancy Folbre and other feminist economists restates a long-recognized fact in economics.<sup>84</sup> Significant external benefits (and sometimes costs), which are shared by all members of society, accrue from investing in children. Individuals who do not have children regularly vote to burden themselves with higher tax bills through school bond issues and general taxes that pay for public programs that invest in children's health, safety, and education. As with measurement of the value of other public goods, there *does* appear to be a danger that including the WTP of non-parents may result in double counting of children's own utility. After all, parents are likely already reflecting children's feelings in *their* decisions and statements. One solution is to view the WTP of parents as a conservative measure of societal WTP to reduce environmental risks to children's health. A measure that includes the WTP of others in addition to parents might be seen as an upper bound, perhaps an unrealistically high upper bound.

One empirical regularity already appears to be emerging from the empirical valuation literature. Even if we count *only* parental WTP, the societal benefits of reducing risks to children's health, in

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84. Nancy Folbre, *Children as Public Goods*, 84 AMER. ECON. REV. 86 (May 1994); SYLVIA HEWLETT, WHEN THE BOUGH BREAKS: THE COST OF NEGLECTING OUR CHILDREN (1991). Economic research on the value of social investments in children has a long history and certainly is not the sole domain of feminist economics. See, e.g., Dale Jorgenson & Barbara Fraumeni, *The Accumulation of Human and Nonhuman Capital, 1948-84*, in THE MEASUREMENT OF SAVING, INVESTMENT AND WEALTH (Robert Lipsey & Helen Stone eds., 1989). For a recent discussion of the same issue from a social ethics perspective, see Anne Alstott, *Property, Taxation and Distributive Justice: What Does a Fair Society Owe Children—and Their Parents?*, 72 FORDHAM L. REV. 1941 (2003-04).

particular that of young children, appear to be at least double that of reducing risks to adults. One concern among economists working on this issue has been that these estimates of parental WTP are overestimating benefits to children by double counting children's utility. The analysis of law in this article as well as recent work in theoretical welfare theory supports EPA's practical guidance on valuing reductions in environmental risks to children's health. Even if parental choices and statements are reflecting nonpaternalistic altruism toward children, those children's preferences are not double counted because parents, not children, are speaking for children. And parents must reflect both their own benefits *and* those of the children for whom they care.

Fourth, I would like to return to a theme I raised at the beginning of this article. The law of informed consent illustrates just one situation in which parents make decisions that affect the health of their children. Because parents face competing demands for their time, attention, and financial and physical resources, they make different choices in the face of changing conditions. Some of these choices affect children's exposure to environmental hazards or the consequences of those exposures. Economists are trained to study this kind of behavioral choice and can make contributions to exposure assessments that have not been fully exploited. More accurate exposure assessment may well lead to better policy decisions and greater improvements in children's health.

#### A FINAL WORD

On October 31, 2005, a new Infanta of Spain, Leonor de Todos los Santos de Borbon y Ortiz, was born. The many images of the Infanta with clearly doting and delighted parents and grandparents show that beliefs about child development have changed significantly since Velasquez painted the portrait of her ancestress more than three centuries ago.<sup>85</sup> In these new portraits, Infanta Leonor is what she is—a little princess. But she is *not* a little adult. Hopefully, as we begin focusing on the fact that she and other children are children, both physically *and* socially, we will be able to do a better job of providing *all* children with physical environments that allow them to develop into healthy adults.

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85. Hola.com, <http://www.hola.com/galeria-de-imagenes.html?imagen=/casasreales/2006/01/05/leonor-galeria/imgs/pleo3a.jpg&publi=&nactual=27&nnumeroactual=28&nfotos=46&seccion=casasreales&publicacion> (last visited March 6, 2007).