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Laws and Social Norms: Unintended Consequences of Obesity Laws

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LAWS AND SOCIAL NORMS: UNINTENDED CONSEQUENCES OF OBESITY LAWS

*Susan Yeh**

Traditional law and economic analysis considers how laws directly incentivize socially optimal behaviors. Meanwhile, a growing theoretical literature posits that beyond deterrence or incentives, laws also communicate normative judgments that can have effects unanticipated by classical predictions. This Article presents empirical evidence supporting the broader legal theory that laws can express social values, leading to shifts in social norms. Using data on adolescent peer networks in the United States, I find that where anti-obesity policies are stricter, social stigma increases for obese girls, though obesity rates do not necessarily decrease. These results are robust and consistent with a model in which the obese, in an anti-obesity policy environment, are negatively perceived as exerting less effort in their health than their non-obese peers. I explore implications of this stigma.

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I. INTRODUCTION

Classical law and economic theory analyzes legal rules by focusing on their deterrence or direct incentive effects and by evaluating whether or not such legal incentives would produce socially optimal outcomes. At the same time, a burgeoning body of scholarship argues that laws, from public health policies to criminalization statutes to consumption taxes, can tacitly express powerful normative statements in addition to imposing direct incentives.[1] Such laws are theorized to interact with people's preferences and to induce a shift in social norms. The concern, then, is that these legal statements motivate unanticipated responses that may enhance or impede policymakers' original goals, depending on the social network in question. While existing literature is rich in theory, there is a dearth of empirical studies on the law and economics of social norms.

This Article contributes empirical evidence addressing the broader legal theory that laws express values and shift social norms by studying the case of obesity-related laws and their relationship with peer group norms. Like many public health laws, anti-obesity policies typically have goals of incentivizing healthy behaviors to reduce health risks among the aggregate population. But do such obesity-related laws communicate values that also lead to social stigma of obese or

1. Examples include mandatory sex education revealing an acceptance of teen sex as a norm, or priority flu vaccinations of children as revealing how the state values children's lives above adults' lives. *See, e.g.*, Robin Pierce, *The Expressive Function of Public Health Policy: The Case of Pandemic Planning*, 4 PUB. HEALTH ETHICS 53 (2011); Kerry Taylor & Roxanne Mykitiuk, *Genetics, Normalcy and Disability*, 2 ISUMA: CANADIAN J. POL'Y RES. 65 (2001).

overweight persons? Indeed, especially among female adolescents, social pressures to conform to norms in body weight can be significant in U.S. schools, and obese youth experience higher likelihoods of being bullied compared to normal weight youth.[2] Beyond bullying, obesity stigma has been documented to translate to further disadvantages in society. Relative to non-obese persons, obese persons are susceptible to discrimination and are worse off in education, employment, the marriage market, happiness, and health care, among other areas.[3]

In policy terms, such consequences warrant greater attention as the obesity epidemic has emerged as a significant public health threat in recent decades. The rise in obesity rates since the 1980s, particularly among youth,[4] has spurred alarm not only about the health status of a growing population but also about the financial costs associated with obesity amid an increasingly expensive health care system.[5] In response, lawmakers have proposed a number of interventions in society,[6] such as levying taxes, requiring nutrition education, and revamping school lunches. Previous studies have evaluated the laws' effects on reducing body weight, though little is known about the stigma consequences.

To formalize my analysis, I present a simple economic model that explores one mechanism of obesity stigma amid variation in health laws. A hypothesis is that anti-obesity policies that encourage taking responsibility of one's own weight-related behaviors can further stigmatize obese persons.[7] Namely, the model suggests that obese persons, in an anti-obesity policy environment expressing values of

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2. *See, e.g.*, Richard S. Strauss & Harold A. Pollack, *Social Marginalization of Overweight Children*, 157 ARCHIVES PEDIATRIC & ADOLESCENT MED. 746 (2003).

3. *See* Rebecca M. Puhl & Chelsea A. Heuer, *The Stigma of Obesity: A Review and Update*, 17 OBESITY 941, 943–47 (2009).

4. Among youths ages six to nineteen, the prevalence of obesity has more than tripled since 1980, with 16.5 percent classified as obese in 2002. Combating youth obesity has emerged as a theme, most recently publicized by Michelle Obama's "Let's Move" campaign to promote healthy eating and physical activity. *Learn the Facts*, LET'S MOVE, http://www.letsmove.gov/learn-facts/epidemic-childhood-obesity (last visited Jan. 29, 2013). Heeding the advice of public health experts, Obama's initiative emphasizes strategies to reduce cost barriers to healthy lifestyles. Sheryl Gay Stolberg, *Childhood Obesity Battle Taken up by First Lady*, N.Y. TIMES, Feb. 10, 2010, at A16.

5. The health consequences of obesity are costly, reaching $147 billion in 2008, or almost 10 percent of all U.S. medical expenditures. Eric A. Finkelstein, Justin G. Trogdon, Joel W. Cohen, & William Dietz, *Annual Medical Spending Attributable to Obesity: Payer- and Service-specific Estimates*, 28 HEALTH AFF. W822 (2009).

6. Anti-obesity interventions may include educational campaigns on diet and nutrition; regulation of physical activity of schoolchildren, nutritional labeling requirements, and the so-called "fat tax" on soft drinks and junk foods.

7. *See* Taryn Parker-Pope, *Fat Stigma Spreads around the Globe*, N.Y. TIMES: WELL BLOG (Mar. 30, 2011, 7:00 AM), http://well.blogs.nytimes.com/2011/03/30/spreading-fat-stigma-around-the-globe/.

personal responsibility, are negatively perceived as exerting less effort in their health than their non-obese peers. Though this model of effort is not the only explanation of why obesity stigma arises, it characterizes a plausible mechanism describing how expressive health laws might motivate to real changes in behavior.

Next, I empirically document the relationship between health laws with obesity norms. Taking advantage of a nationally representative dataset of adolescent peer networks across U.S. schools,[8] I analyze social stigma and academic outcomes of obese girls amid policies that are hypothesized to affect obesity. For anti-obesity policies, I use state dietary and nutrition education mandates, which are among a broader class of programs directly aimed at reducing obesity among youth. To be clear, this focus on mandates does not deny the powerful roles of the media and culture in stigmatizing persons who deviate from the "ideal" body weight. Media effects are likely to be national in scope, though cultural standards may vary. To minimize such biases from cultural or media influences, the regression analysis controls for demographic, school-level, and neighborhood variables.

This analysis offers original evidence that links stricter anti-obesity laws to more obesity stigma. To further develop the analysis, I consider how the law's expressive effects vary by pre-existing norms, since underlying weight norms may differ by culture or by whether one is obese relative to one's peers. To implement this analysis, I employ the demographic composition that varies idiosyncratically across peer groups (cohorts) in schools.

My results are consistent with the predictions of legal theory. I find that obese adolescent women experience harsher social stigma amid well-intentioned policies that aim to reduce obesity in the larger population. Where anti-obesity dietary education laws are stricter, social stigma increases for obese girls. On the other hand, the education penalty that obese women experience is mitigated under anti-obesity laws. I also find that efforts to engage in healthier behaviors are slightly higher under more demanding dietary education mandates, though obesity does not decrease. Finally, pre-existing norms could matter; being surrounded by more white peers as well as being surrounded by more obese peers correspond to less social stigma from anti-obesity law. Taken together, these results are consistent with the model in which the obese, in an anti-obesity policy environment favoring personal responsibility over one's own health, are negatively perceived as exerting less effort in their health than their non-obese peers. While

8. In evaluating the social norms of health laws, school-based, peer network data are especially useful, since the lives of adolescents often center on school, where there is heightened awareness of social norms. Robert Crosnoe, *Gender, Obesity, and Education*, 80 SOC. EDUC. 241, 244 (2007).

these estimates should not be viewed as definitive of a causal relationship, they do shed light on the law's role in shaping norms and preferences, an area where thus far, data work has been scarce and costly to pursue.

The implications extend beyond health laws. The upshot is that the predictions of expressive legal theory warrant practical attention. That is, policymakers should more seriously consider the social norm outcomes of laws, especially those that may vary by pre-existing norms. In the case of obesity, a shift in weight norms can manifest in educational or employment differentials, which lie outside of the law's formally incentivized outcomes. Thus, it may be more effective to calibrate a law by taking into account stigma effects that vary by subgroups.

Part II gives background on the law and economics of social norms. Part III explains the application of the theory to obesity and presents a simple model of expressive obesity law and stigma. Part IV tests this question empirically, describing the data and econometric estimation, and discussing the results in stigma outcomes. It also considers educational and policy implications of obesity stigma and the social norm outcomes of laws generally. Part V concludes.

II. THE LAW AND ECONOMICS OF SOCIAL NORMS

A. Review of Legal Theory

Recall that positive law and economics theory is grounded in analyzing the direct incentive effects of the law. To be more specific, this refers to the idea that the law can motivate an outcome by imposing costs or payoffs that make particular behaviors more attractive than others. This idea is traditionally applied in the analysis of criminal and tort laws. For example in criminal law, statutes that impose mandatory fines for driving over the speed limit are thought to deter reckless speeding by increasing the expected costs of driving too fast.[9] In tort law, rationales for large punitive damage awards, such as in medical malpractice, state that such precedents would incentivize greater levels of precaution and deter future accidents.

Since the mid-1990s, however, a substantial movement in legal scholarship has generated theories that recognize that laws can have effects beyond those expected from their "carrot and stick" approaches. Incorporating analyses of social norms, legal scholars such as Cass

9. *See, e.g.*, Orley Ashenfelter & Michael Greenstone, *Using Mandated Speed Limits to Measure the Value of a Statistical Life*, 112 J. POL. ECON. S226 (2004).

Sunstein,[10] Richard McAdams,[11] and Dan Kahan[12] have categorized such non-incentive roles as the "expressive" function of law. The most simplified version of the theory holds that such non-incentive effects arise when laws express what the government values or what it believes should be the social norm.[13] For example, laws that criminalize marijuana possession can be construed as expressing the view that marijuana use is morally wrong. The law's role in conveying this message would be independent of its direct deterrent function in increasing private costs of marijuana possession via criminal sentencing.

In terms of norms, the theory holds that the law can communicate what the social norm is, and in doing so, the law shapes individual preferences and behaviors. Because people prefer not to deviate too much from existing social norms, they will adjust their behaviors to conform to the norm (or to come closer to a position that they prefer relative to the norm).[14] This leads to compliance with the law, regardless of the actual or expected private costs of breaking the law.[15] Thus, criminalizing marijuana would convey the norm that marijuana is "bad." According to the theory, since most people do not want to be "bad," they will refrain from smoking pot, even though the expected

10. Cass R. Sunstein, *On the Expressive Function of Law*, 144 U. PA. L. REV. 2021, 2024–25 (1996) (characterizing this as "the function of law in 'making statements' as opposed to controlling behavior directly", and focusing on how policymakers might apply this function in changing social norms).

11. *See* Richard H. McAdams, *An Attitudinal Theory of Expressive Law*, 79 OR. L. REV. 339, 340 (2000).

12. Dan M. Kahan, *What Do Alternative Sanctions Mean?* 63 U. CHI. L. REV. 591 (1996). *See also* Dan M. Kahan, Donald Braman, Geoffrey L. Cohen, John Gastil & Paul Slovic, *Who Fears the HPV Vaccine, Who Doesn't, and Why? An Experimental Study of the Mechanisms of Cultural Cognition*, 34 LAW HUM. BEHAV. 501, 502 (2009) (surmising that the controversy over HPV vaccination may arise from concerns that the policy would be "an expression of moral or political values unrelated to the efficacy of the vaccine").

13. *See, e.g.*, Lawrence Lessig, *The Regulation of Social Meaning*, 62 U. CHI. L. REV. 943 (1995).

14. Sunstein writes that norms themselves are powerful in influencing risky behaviors such as drug use, cigarette smoking, and diet and exercise. Sunstein, *supra* note 10, at 2033–34.

15. While most models predict compliance, it is also possible for expressive functions to have the opposite effect, such as inducing backlash against the law. *See, e.g.*, Daniel L. Chen, Vardges Levonyan, & Susan Yeh, Do Policies Affect Preferences? Evidence from Random Variation in Abortion Jurisprudence (2012) (manuscript), *available at* http://nber.org/~dlchen/papers/Abortion.pdf. Or, there may be no genuinely expressive effects. *See* Matthew D. Adler, *Expressive Theories of Law: A Skeptical Overview*, 148 U. PA. L. REV. 1363, 1375–76 (2000) (asserting that the existing expressive theories of law, which rely on law's linguistic meaning, fail to prove that the law is truly expressive according to moral theories); Robert E. Scott, *The Limits of Behavioral Theories of Law and Social Norms*, 86 VA. L. REV. 1603 (2000). Moreover, expressive functions or social norms can be inefficient. *See* Eric Posner, *Law, Economics, and Inefficient Norms*, 144 U. PA. L. REV. 1697, 1722 (1996) (arguing that social norms can produce negative externalities that hurt third parties); Alex Geisinger, *Are Norms Efficient? Pluralistic Ignorance, Heuristics, and the Use of Norms as Private Regulation*, 57 ALA. L. REV. 1 (2005) (applying social and cognitive psychology to analyze when norms may be inefficient).

sanctions may not be harsh enough to deter smoking if a person does not care about being "bad."[16]

Further models and extensions more precisely explain mechanisms of the law's expressive effects and the role of social norms. McAdams's attitudinal theory highlights the role of information and beliefs; it proposes that the law signals public attitudes about what behaviors are appropriate, that people will update their beliefs about these attitudes, and that they will comply with the law to avoid public disapproval.[17] Similarly, Dharmapala and McAdams write that laws reveal information about the riskiness of a behavior (such as a smoking ban revealing that the government estimates smoking to be more dangerous than the public thinks), and people will update their beliefs to incorporate that new information.[18] Benabou and Tirole present formal microeconomic models that explain how laws may shift preferences as people update beliefs with the law; they propose that individuals will change their actions as the law informs them whether their prior preferences relative to the norm make them more likely to experience honor (or stigma).[19] Notably, game theory[20] has also been applied to explain expressive effects.[21] Both Cooter and McAdams, for example, highlight the idea that law reveals a "focal point" about the coordination strategy that may

16. Social scientists who study crime have also considered the "broken windows theory," which argues that disorder in urban environments foster norms that result in urban crimes. *See generally*, GEORGE L. KELLING & CATHERINE M. COLES, FIXING BROKEN WINDOWS: RESTORING ORDER AND REDUCING CRIME IN OUR COMMUNITIES 16–27 (1996).

17. According to Richard H. McAdams:

> [P]eople care about attitudes of approval and disapproval, but make mistakes about such matters; legislation is correlated with public attitudes so that the enactment of legislation provides a signal of public attitudes; and those who observe the signal will update their prior beliefs about public attitudes in the direction of expecting more disapproval for behavior the law condemns. Expecting disapproval for the behavior provides an incentive, independent of legal sanctions, to comply with the law.

McAdams, *supra* note 11, at 372.

18. *See* Dhammika Dharmapala & Richard H. McAdams, *The Condorcet Jury Theorem and the Expressive Function of Law: A Theory of Informative Law*, 5 AM. L. ECON. REV. 1 (2003).

19. *See* Roland Benabou & Jean Tirole, *Law and Norms*, (Nat'l Bureau of Econ. Research, Working Paper No. 17579 2011).

20. In a game theoretic model, individuals choose the best strategies to optimize their payoffs given the other players' best strategies; depending on the payoff structures, this may mean that a player is better off not cooperating with others lest he be hurt even more by other players who do not cooperate. But under certain conditions, such as in a repeated game over a longer time horizon, the optimal strategy may be to cooperate with others. *See generally* ROBERT GIBBONS, GAME THEORY FOR APPLIED ECONOMISTS (1992) (introduces basic concepts of game theory and their extensions); MARTIN J. OSBORNE & ARIEL RUBINSTEIN, A COURSE IN GAME THEORY (1994) (provides mathematical proofs of strategic and cooperative games).

21. *See, e.g.*, CRISTINA BICCHIERI, THE GRAMMAR OF SOCIETY: THE NATURE AND DYNAMICS OF SOCIAL NORMS (2006); Richard H. McAdams, *A Focal Point Theory of Expressive Law*, 86 VA. L. REV. 1649 (2000); Robert Cooter, *Expressive Law and Economics*, 27 J. LEGAL STUD. 585 (1998).

exist among individuals in society.[22] Thus, when people become aware of the law, they adjust their preferences accordingly in order to uphold the equilibrium coordination strategy and continue to maximize their payoffs overall.[23]

B. Empirical Literature

Despite this wave of scholarship, there exist only a handful of empirical studies that test the expressivist theories with real-world laws and data. The following studies test the theories directly. First, a key study by Funk analyzes mandatory voting laws over time and across cantons in Switzerland, where fines for noncompliance were so small as to render the laws "symbolic."[24] Observing that cantons that removed the voting laws saw lower voter turnout compared to others, Funk concludes that the laws had an expressive function independent of deterrence.[25] Second, Fox and Griffin argue that the Americans with Disabilities Act (ADA) expressed negative messages about persons with disabilities by linking its enactment with a reduction in the birthrate of babies with Down syndrome.[26] Third, Kotsadam and Jacobssen find no changes in attitudes about prostitution following the enactment of a Norwegian law criminalizing buying sex.[27] Finally, Chen, Levonyan, and Yeh model changes in political preferences following exogenous changes in abortion policy across appellate jurisdictions and find causal, empirical evidence of political backlash, contrary to the standard predictions of expressivist theories.[28] None of these studies, however, makes the case that they are directly characterizing norms shared across a population with a common network. By directly analyzing the relationship between law and social norms using peer networks, this Article contributes original evidence where theory is rich but data work is scarce.

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22. Cooter, *supra* note 21, at 586, 593–96; McAdams, *supra* note 21, at 1651–52.

23. Cooter, *supra* note 21, at 595. *But see* Posner, *supra* note 15, at 1713–19 (suggesting conditions where strategic behavior can undermine coordination and render norms inefficient).

24. Patricia Funk, *Is There an Expressive Function of Law? An Empirical Analysis of Voting Laws with Symbolic Fines*, 9 AM L. & ECON. REV. 135, 139 (2007).

25. *Id.* at 138.

26. *See* Dov Fox & Christopher L. Griffin, Jr., *Disability-Selective Abortion and the Americans with Disabilities Act*, 2009 UTAH L. REV. 845 (2009).

27. *See* Andreas Kotsadam & Niklas Jakobsson, *Do Laws Affect Attitudes? An Assessment of the Norwegian Prostitution Law Using Longitudinal Data*, 31 INT'L REV. L. & ECON. 103 (2011).

28. *See* Chen, Levonyan, & Yeh, *supra* note 15.

III. OBESITY APPLICATION

Social norms regarding body weight can be a very visible fact of life in the United States, with abundant media images favoring slimmer body figures and an extensive industry surrounding diet and weight loss. Yet recent years have witnessed growing alarm over an "obesity epidemic" in the United States, which is one of the heaviest nations in the world, in terms of average body weight.[29] By now, the average American is overweight, and over one-third of Americans are classified as clinically obese[30] and are at heightened risk of serious health-threatening conditions such as diabetes and heart failure.[31]

In view of these problems, policymakers at the national, state, and local levels have called for a "war on obesity." Recent initiatives have explicitly targeted childhood obesity, sometimes quite aggressively.[32] Georgia, for example, posted billboards announcing, "Chubby kids may not outlive their parents" and "Big bones didn't make me this way. Big meals did."[33] Most prominent has been First Lady Michelle Obama's "Let's Move" campaign, which was launched in tandem with President Barack Obama's creation of a Task Force on Childhood Obesity. Calling childhood obesity a "national health crisis,"[34] this campaign proposed to reduce obesity in a generation by encouraging healthy eating and exercise, as well as by monitoring the body mass index (BMI) of children.[35]

Could such anti-obesity initiatives shift norms and preferences in body weight? Critics have been vocal in arguing that official policies emphasizing the harms of obesity could further stigmatize obese

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29. *Obesity and Economics of Prevention: Fit not Fat—United States Key Facts*, ORG. FOR ECON. CO-OPERATION AND DEV., http://www.oecd.org/document/57/0,3746,en_2649_33929_46038969_1_1_1_1,00.html (last visited Jan. 29, 2013).

30. *Overweight and Obesity: Adult Obesity Facts*, CENTERS FOR DISEASE CONTROL AND PREVENTION, http://www.cdc.gov/obesity/data/trends.html (last visited Jan. 29, 2013); Cynthia J. Stein & Graham A. Colditz, *The Epidemic of Obesity*, 89 J. CLINICAL ENDOCRINOLOGY & METABOLISM 2522, 2522 (2004).

31. *See* Aviva Must, Jennifer Spadano, Eugenie H. Coakley, Alison E. Field, Graham Colditz & William H. Dietz, *The Disease Burden Associated with Overweight and Obesity*, 282 J. AM. MED. ASS'N 1523 (1999); Ali H. Mokdad, Earl S. Ford, Barbara A. Bowman, William H. Dietz, Frank Vinicor, Virginia S. Bales & James S. Marks, *Prevalence Of Obesity, Diabetes, and Obesity-Related Health Risk Factors, 2001*, 289 J. AM. MED. ASS'N 76 (2003).

32. *See, e.g.*, David Crary, *Amid "War on Obesity," Skeptics Warn of Stigma,* ASSOCIATED PRESS, May 2, 2011, http://www.msnbc.msn.com/id/42770308/ns/health-diet_and_nutrition/t/amid-war-obesity-skeptics-warn-stigma/.

33. *Id.*

34. *See* THE CHALLENGE WE FACE, LET'S MOVE!, *available at* http://www.letsmove.gov/sites/letsmove.gov/files/TFCO_Challenge_We_Face.pdf.

35. *See Learn the Facts*, *supra* note 4.

persons.[36] "Fat Acceptance" advocates maintain that initiatives like "Let's Move" that put negative attention on obese children are likely to worsen their encounters with discrimination and bullying in schools, and later, at work and in society.[37] In fact, one law professor blogged that the program essentially was communicating that "the way to stop the bullying of fat kids is to get rid of fat kids."[38] Despite the original intentions to improve health in the aggregate, "the claim can be made that it is in fact supporting childhood bullying, suggesting the 'otherness' (e.g., size, shape, and/or weight) that children's peers display or perform is not passable in terms of embodiment or by way of the implications of Michelle Obama's initiative."[39]

These critiques highlight a real-world application of the law and economics of social norms to the timely public health issue of obesity. Certainly, observers have noted the role of social norms in public health interventions in general and that stigma surrounding some diseases can make public health policies a challenge to implement effectively.[40] A legitimate worry is that persons infected with HIV may be reluctant to reveal their disease status and that the epidemic may then go underground.[41] Skeptics of HIV disclosure laws argue that imposing criminal penalties for hiding one's disease status might further increase the stigma of infected persons,[42] while not necessarily reducing risky health behaviors as the laws were intended to do.[43] These comments

36. *See, e.g.*, Parker-Pope, *supra* note 7 (surmising that the emergence of fat stigma around the world may also result from public health efforts to promote obesity as a disease and a worrisome threat to a nation's health); Jenny A. Armentrout, *Sugar, Salt, and Fat: Michelle Obama's Rhetoric Concerning the* Let's Move! *Initiative: Binary Opposition, Weight Obsession, and the Obesity Paradox* 128-9 (Aug. 2011) (Ph.D. dissertation), *available at* http://etd.ohiolink.edu/send-pdf.cgi/Armentrout%20Jenny%20A.pdf?bgsu1307554274&dl=y; Crary, *supra* note 32.

37. Crary, *supra* note 32.

38. Paul Campos, *Michelle Obama's Let's Move Campaign is Helping Bullies*, THE DAILY BEAST, MAR. 15, 2011, http://www.thedailybeast.com/articles/2011/03/16/michelle-obamas-childhood-obesity-lets-move-campaign-helps-bullies.html.

39. Armentrout, *supra* note 36, at 129.

40. *See, e.g.*, Scott Burris, *Disease Stigma in U.S. Public Health Law*, 30 J.L. MED. & ETHICS 179 (2002); Rebecca M. Puhl & Chelsea A. Heuer, *Obesity Stigma: Important Considerations for Public Health*, 100 AM J. PUB. HEALTH 1019, 1019–20 (2010) (giving historical examples of disease stigma surrounding persons with cholera or tuberculosis).

41. Burris, *supra* note 40, at 179.

42. Catherine Dodds & Peter Keogh, *Criminal Prosecutions for HIV Transmission: People Living with HIV Respond*, 17 INT'L J. STD & AIDS 315, 317 (2006) (finding that HIV-infected persons perceive more stigma under HIV disclosure laws). *Cf.* Gregory M. Herek, John P. Capitanio & Keith F. Widaman, *Stigma, Social Risk, and Health Policy: Public Attitudes Toward HIV Surveillance Policies and the Social Construction of Illness*, 22 HEALTH PSYCHOL. 533, 533, 535 (2003) (finding that perceptions of stigma could affect people's decisions to be tested for HIV).

43. Scott Burris et al., *Do Criminal Laws Influence HIV Risk Behavior? An Empirical Trial*, 39 ARIZ. ST. L. J. 467, 468 (2007) (concluding that HIV disclosure laws fail to "influence people's normative beliefs about risky sex" upon finding no differences in risky sexual behaviors between people

suggest that understanding the expressive functions of laws is essential for improving health policy.[44] By investigating whether normative messages of health laws could further disfavor obese persons in society, this Article addresses the need for empirical evidence on expressive functions of public health laws. Below provides a background on obesity and explains the application of expressive law and economics to obesity.

A. Laws Relevant to Obesity

While a national campaign like "Let's Move" has inspired public awareness, it is merely one of many anti-obesity interventions that policymakers have implemented or proposed in the past two decades. Certainly, consumption taxes and direct regulations on unhealthy behaviors have emerged, with variation across local and state jurisdictions. Taxes on high-calorie soft drinks and snack foods, as well as taxes levied on people merely for being obese,[45] have generated many debates, not only about their effectiveness in reducing weight, but also about the government's appropriate role in influencing individuals' food choices. In light of anxiety about obesity rates, direct government interventions have included overhauls of unhealthy school lunch programs, mandates for dietary and nutrition education, mandates for more physical education, moratoriums on opening fast food restaurants in neighborhoods,[46] and requirements to monitor individuals' BMI.[47]

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in a state with an HIV disclosure law and in a state without an HIV disclosure law).

44. *See, e.g.*, Robin Pierce, *The Expressive Function of Public Health Policy: The Case of Pandemic Planning*, 4 PUB. HEALTH ETHICS 53 (2011).

45. *See* Matt Sloane, *Alabama to Link Premium Costs to Workers' Health*, CNN, Sept. 19, 2008, http://articles.cnn.com/2008-09-19/health/alabama.obesity.insurance_1_unhealthy-employees-screening-plan (reporting about Alabama imposing a health insurance surcharge on state employees who are obese or have high blood pressure starting in 2010); STATE OF ALABAMA, WELLNESS PREMIUM DISCOUNT PROGRAM, *available at* http://www.alseib.org/PDF/SEHIP/SEHIPWellnessPremiumDiscount.pdf; Crary, *supra* note 32 (reporting about "Arizona Gov. Jan Brewer's recent proposal to levy a $50 fee on state Medicaid recipients who are obese and don't follow a doctor-supervised slimming regimen"). Since 2008, Japan has also levied similar fines on health insurance providers who failed to adequately screen their participants' waistlines or who failed to reduce them among patients whose waistlines exceeded the government guidelines. *See* Norimitsu Onishi, *Japan, Seeking Trim Waists, Decides to Measures Millions*, N.Y. TIMES, June 13, 2008, at A1.

46. Molly Hennessy-Fiske, *Panel OKs Fast-Food Curbs*, L.A. TIMES, July 23, 2008, *available at* http://articles.latimes.com/2008/jul/23/local/me-fastfood23.

47. Researchers have identified factors contributing to obesity rates that could justify such policy interventions. *See generally* Diane Whitmore Schanzenbach, *Do School Lunches Contribute to Childhood Obesity?*, 44 J. HUM. RESOURCES 684 (2009) (evaluating the National School Lunch Program's effects on childhood obesity, with policy implications for reforming school lunch offerings). In practice, many programs' actual impacts on obesity or improving health outcomes are open to further study.

1. Direct Incentive Effects

Many weight and food-related laws are designed to discourage obesity by increasing the costs of unhealthy habits or decreasing the costs of healthy habits. But unlike the most recent anti-obesity publicity campaigns, the majority of these taxes and regulations do not so explicitly promote negative images of the obese. In that way, such laws may be more appropriate for testing expressivist theories because they allow us to differentiate more clearly between a law's incentive function (e.g., raising dollar costs of unhealthy habits or lowering information costs of healthy habits) and its expressive function (shifting social norms or unexpectedly affecting social stigma).

With the high health care costs of treating conditions associated with obesity, it is reasonable that the deterrence or incentive effects of obesity-related laws have been of interest to health economists and policymakers ex post, even if the laws did not explicitly target obesity. For instance, because they would raise the cost of high-calorie drinks to consumers, soda taxes are often considered as an anti-obesity strategy, even though at first, some of the taxes were "applied primarily for revenue generation."[48] Typically, when evaluating the policy incentives, the outcomes of interest are related to body weight. In this vein and drawing from previous analyses of sin taxes on cigarette and alcohol consumption, studies have documented that state-level soda taxes[49] decrease soda consumption by children and adolescents while increasing their consumption of other high-calorie products;[50] the links with obesity rates are unclear.[51]

Likewise, states, school districts, and schools vary in their health policies governing, among others, school breakfast and lunch choices, healthy food preparation, junk food advertising, physical education, and nutrition education.[52] Each of these policies would shift incentives,

48. Lisa M. Powell et al., *Associations Between State-level Soda Taxes and Adolescent Body Mass Index*, 45 J. ADOLESCENT HEALTH S57, S58 (2009).

49. Soda tax rates range from zero to seven percent, with a mean tax rate of 3.43% in grocery stores and 4.02% through vending machines. Soda tax rates vary by state, with the majority of states levying a tax on soda sold in grocery stores or through vending machines. *Id.*

50. Jason M. Fletcher, David E. Frisvold & Nathan Tefft, *The Effect of Soft Drink Taxes on Child and Adolescent Consumption and Weight Outcomes*, 94 J. PUB. ECON. 967, 973 (2010).

51. *See* Daniel Kim & Ichiro Kawachi, *Food Taxation and Pricing Strategies to "Thin Out" the Obesity Epidemic*, 30 AM J. PREVENTATIVE MED. 430, 432–33 (2006) (finding a link between repealing a soda or snack food tax and higher obesity prevalence but no statistically significant relationship between state soda tax rates and adult obesity rates); Powell et al., *supra* note 48, at S57 (finding statistically insignificant relationships between soda tax rates and adolescent BMI and only a weakly significant relationship with the "BMI among teens at risk for overweight").

52. *See* DEPARTMENT OF HEALTH AND HUMAN SERVICES, SCHOOL HEALTH POLICIES AND PROGRAMS STUDY 2006 (2006); *available at* http://www.cdc.gov/healthyyouth/shpps/2006/factsheets/pdf/FS_Overview_SHPPS2006.pdf.

often through higher or lower economic costs. For example, requiring that reduced-price school lunch programs offer skim milk in addition to whole milk[53] would lower the costs of a healthier diet because the person could more easily obtain the skim milk at the reduced lunch rate rather than paying a higher price at a supermarket, as well as paying for gasoline and time. How exactly is providing cheaper skim milk serving a "deterrent function"? Quite simply, this policy makes it easier to comply with healthy eating goals and discourages unhealthy eating by increasing the *relative cost* of choosing whole milk when skim milk is now just as inexpensive. An analogous reasoning applies to state regulations on dietary and nutrition education in schools, which Part III(B) discusses.

2. Obesity Stigma and the Expressive Function of Laws

The critiques of the anti-obesity campaigns suggest that such laws might express messages about acceptable behaviors or physical appearances independently of their direct incentives or penalties. In assessing whether or not obesity-related laws shift social norms, this Article focuses on the social acceptance and stigma that obese persons experience amid such laws.

It is no secret that for some time, obese persons have been regarded with disdain in American society, facing stereotypes such as being lazy, lacking self-control, and lacking intelligence.[54] In schools, anecdotes of obese children being the victims of taunts and bullying based on their weight are common.[55] Obese students also mention feeling dissatisfaction about their body sizes compared to societal ideals.[56] At work, obese persons often experience bias based on their weight and appearance in the form of more severe wage penalties and employment

53. For example, as of 2006, 6 states and the District of Columbia require that schools to offer three or more different types of milk for lunch, and 12 states recommend it. CTR. FOR DISEASE CONTROL AND PREVENTION, STATE-LEVEL SCHOOL HEALTH POLICIES AND PRACTICES: A STATE-BY-STATE SUMMARY FROM THE SCHOOL HEALTH POLICIES AND PROGRAMS STUDY 2006, *available at* http://www.cdc.gov/healthyyouth/shpps/2006/summaries/pdf/State_Level_Summaries_SHPPS2006.pdf

54. Puhl & Heuer, *supra* note 40, at 1019.

55. Studies have documented students' tendencies to bully their overweight peers. *See* Julie C. Lumeng et al., *Weight Status as a Predictor of Being Bullied in Third Through Sixth Grades*, 125 PEDIATRICS e1301 (2010); Ian Janssen, Wendy M. Craig, William F. Boyce & William Pickett, *Associations Between Overweight and Obesity with Bullying Behaviors in School-Aged Children*, 113 PEDIATRICS 1187 (2004); Richard S. Strauss & Harold A. Pollack, *Social Marginalization of Overweight Children*, 157 ARCHIVES PEDIATRIC & ADOLESCENT MED. 746 (2003).

56. *See, e.g.*, Kristen Harrison, *Ourselves, Our Bodies: Thin-Ideal Media, Self-Discrepancies, and Eating Disorder Symptomatology in Adolescents*, 20 J. SOC. & CLINICAL PSYCHOL. 289 (2001); Janet D. Latner et al, *Stigmatized Students: Age, Sex, and Ethnicity Effects in the Stigmatization of Obesity*, 13 OBESITY RESEARCH 1226 (2005).

barriers on average;[57] the wage penalties are especially pronounced among white women who are obese.[58] Obese patients are also more likely to face derogatory comments and negative attitudes from doctors, nurses, and other medical workers in health care settings.[59]

In view of the stereotypes about obese people, it is plausible that an anti-obesity policy could adversely affect their positions relative to the government's desired norms. Indeed, psychologists have conducted smaller experimental studies to determine the causes of bias against obesity, which could inform anti-obesity policies and their consequences. Other researchers have found that cues emphasizing the internal, controllable causes of obesity worsened negative attitudes about obesity,[60] while cues emphasizing external factors such as genetics improved attitudes.[61] In fact, the framing of cost-equivalent incentives can matter to health policymakers looking to navigate stigma. An online experiment indicated that increasing health care premiums for overweight persons signaled negative messages about being overweight, while providing a credit of the same dollar amount for non-overweight persons did not signal such messages to participants in the experiment.[62] As such, these findings could help justify critics' arguments that the aggressive anti-obesity educational campaigns would worsen obesity stigma, with their cues blaming obese people for being unable to control their behaviors. However, the small-scale experimental results have been mixed,[63] and the expressive roles of actual laws on norms remain untested in larger populations.

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57. *See, e.g.*, Rebecca M. Puhl & Kelly D. Brownell, *Confronting and Coping with Weight Stigma: An Investigation of Overweight and Obese Adults*, 14 OBESITY 1802 (2006); John Cawley, *The Impact of Obesity on Wages*, 39 J. HUM. RESOURCES 451 (2004).

58. *See* Cawley, *supra* note 57, at 457; S. Averett & S. Korenman, *Black-White Differences in Social and Economic Consequences of Obesity*, 23 INT'L J. OBESITY 166, 166 (1999).

59. *See* Puhl & Heuer, *supra* note 3, at 943–47 (2009).

60. Rebecca M. Puhl, Marlene B. Schwartz & Kelly D. Brownell, *Impact of Perceived Consensus on Stereotypes About Obese People: A New Approach for Reducing Bias*, 24 HEALTH PSYCHOL. 517, 523 (2005).

61. Christian S. Crandall, *Prejudice Against Fat People: Ideology and Self-Interest*, 66 J. PERSONALITY & SOC. PSYCHOL. 882 (1994).

62. *See* David Tannenbaum, Chad L. Valasek, Eric D. Knowles & Peter H. Ditto, Work Wellness Programs: Sticks Send Stigmatizing Signals 12–13 (manuscript), *available at* https://webfiles.uci.edu/dtannenb/www/documents/Stick%20paper.pdf.

63. *See, e.g.*, Stephen K. Bell & Sam B. Morgan, *Children's Attitudes and Behavioral Intentions Toward a Peer Presented as Obese: Does a Medical Explanation for the Obesity Make a Difference?*, 25 J. PEDIATRIC PSYCHOL. 137 (2000) (finding that information explaining obesity had mixed effects on children's attitudes towards obese peers); Bethany A. Teachman, Kathrine D. Gapinski, Kelly D. Brownell, Melissa Rawlins & Subathra Jeyaram, *Demonstrations of Implicit Anti-Fat Bias: The Impact of Providing Causal Information and Evoking Empathy*, 22 HEALTH PSYCHOL. 68, 68 (2003) (finding higher bias when subjects were told that obesity was mainly caused by overeating and lack of exercise, but not lower bias when subjects were told that obesity was mainly due to genetic factors).

B. Dietary Behaviors & Nutrition Education Laws

To test the law and economic theories of social norms, this Article analyzes dietary behaviors and nutrition education policies, which vary across states. By 1994, 69% of states required high schools to offer instruction on dietary behaviors and nutrition as part of their health education curricula.[64] According to a survey of high school health teachers, this most likely includes teaching about "nutrients and the foods where they are found (72.7%), choosing healthy meals and snacks (72.6%)," as well as teaching about "social pressures to be thin (66.8%)" and "healthy weight management (63.2%)."[65] Appendix Table 9 summarizes the laws by state.

There are several reasons to focus on nutrition education laws when testing legal theories of social norms. First, incentives to eat healthily are embedded in the laws. All other things equal, nutrition education in schools would reduce the time spent on seeking information and lower the overall cost of information and, at least at the margin, make it easier to make healthier decisions and achieve a healthy weight. Put another way, they make unhealthy diets relatively less attractive and in theory could "deter" obesity.[66] Next, as with the recent anti-obesity awareness campaigns, the nutrition education laws can potentially have expressive effects, making implicit statements about body weight that can stigmatize obese people.[67]

Third, the laws apply specifically to adolescents in schools, where

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64. Janet L. Collins, Robert S. Gold, Laura Kann, Lloyd J. Kolbe, Beth Collins Patemen & Meg Leavy Small, *School Health Education*, 65 J. SCH. HEALTH 302 (1995). The state policies do not prescribe specific materials that a class must cover, nor do any require a separate, self-contained class devoted solely to diet and nutrition, though individual districts and schools have discretion to devise additional guidelines. *See* CTR. FOR DISEASE CONTROL AND PREVENTION, SCHOOL HEALTH POLICIES AND PROGRAMS STUDY, *available at* http://www.cdc.gov/healthyyouth/shpps/1994/pdf/main.pdf (reporting that 80% of districts require nutrition be taught, and 84% of schools include education on dietary behaviors and nutrition in their curricula).

65. *Id.* at 309.

66. Studies have linked nutrition education with dietary behaviors and knowledge, physical activity, attitudes, or physical health indicators such as BMI. *See, e.g.*, Alicia Raby Powers, Barbara J. Struempler, Anthony Guarino & Sondra M. Parmer, *Effects of a Nutrition Education Program on the Dietary Behaviors and Nutrition Knowledge of Second-Grade and Third-Grade Students*, 75 J. SCH. HEALTH 129 (2005); Carmen Pérez-Rodrigo & Javier Aranceta, *School-Based Nutrition Education: Lessons Learned and New Perspectives*, 4 PUB. HEALTH NUTRITION 131, 136 (2001); Yannis Manios, Joanna Moschandreas, Christos Hatzis & Anthony Kafatos, *Evaluation of a Health and Nutrition Education Program in Primary School Children of Crete over a Three-Year Period*, 28 PREVENTATIVE MED. 149 (1999); F. Angelico, M. Del Ben, L. Fabiani, P. Lentini, F. Pannozzo, G.C. Urbinati & G. Ricci, *Management of Childhood Obesity Through a School-Based Programme of General Health and Nutrition Education*, 105 PUB. HEALTH 393 (1991).

67. My own tabulations of student-level data merged with the state-level data on nutrition laws show a strong positive correlation between states that require nutrition education and students reporting that they learned about the health problems of obesity in school.

social norms are prominent and networks in schools can be very influential. As sociologist Robert Crosnoe argues, "[T]he valence and intensity of cultural messages vary considerably across specific pockets of this mass culture. As a bounded, identifiable setting of adolescent life, the school is an appropriate unit for considering local contexts of youth culture."[68] Furthermore, researchers have linked peer influence and social norms to eating behaviors.[69] Others have also documented differences in perceived norms about healthy eating habits in some nutrition education interventions, concluding that these programs encourage young people's acceptance of healthy food choices.[70] Still, whether or how actual norms about obesity (and the social acceptability of obese persons themselves) shift in the wake of laws presents a ripe empirical question and a highly relevant application in testing legal theory.

How exactly could nutrition education laws have expressive effects? First, consider the analogous example of sex education laws and their controversy. A rationale for mandating sex education in public schools is to lower the costs of safe sex by providing information. At the same time, according to the information-updating model proposed by McAdams, as well as Benabou and Tirole, the laws might communicate that teen sex is (or should be) the norm, which critics worry would encourage students to have more sex (protected or not), independently of the effect of more information about contraceptives.[71] Following this information-updating framework, nutrition education laws would lower the costs of achieving a healthy weight by providing information. At the same time, the law itself communicates to students that being overweight or obese should not be the norm, independently of its effect in lowering the information costs of losing weight.

C. Summary of Predictions

To spell out the analytical framework more concisely, an anti-obesity law should have direct incentive effects for obese or overweight persons to lose weight. Healthier diets, more exercise, lower obesity rates, or

68. Crosnoe, *supra* note 8, at 244.

69. *See, e.g.*, Marla E. Eisenberg et al., *The Role of Social Norms and Friends' Influences on Unhealthy Weight-Control Behaviors Among Adolescent Girls*, 60 SOC. SCI. & MED. 1165 (2005); Patricia Pliner & Nikki Mann, *Influence of Social Norms and Palatability on Amount Consumed and Food Choice*, 42 APPETITE 227 (2004); J.G. Maeland & L.E. Aaro, *The Theoretical Basis for Health Education in Medical Practice*, 113 TIDSKRIFT FOR DEN NORSKE LAEGEFORENING 51 (1993).

70. *See, e.g.*, Tom Baranowski et al., *Gimme 5 Fruit, Juice, and Vegetables for Fun and Health: Outcome Evaluation*, 27 HEALTH EDUC. & BEHAV. 96, 96–97 (2000).

71. Indeed, Lessig notes that beyond conveying information, "education can alter social meaning[]." Lessig, *supra* note 13, at 1022.

lower average BMIs could serve as evidence of incentives at work in an anti-obesity, nutrition education policy. A "pro-obesity" or "obesity-friendly" law should have the opposite incentives regarding weight-related behaviors.

Obesity laws can have expressive functions that shift social norms regarding obesity. This can be represented by an increase in the social stigma of obese persons under anti-obesity law. Applying the belief-updating model,[72] an anti-obesity law such as a dietary education mandate reveals information that the norm is a lower body weight than what individuals previously believed it to be. On average, people then update their beliefs and adjust their dietary or weight-related behaviors to conform to the norm. People who remain obese, however, are now even further away from the norm of lower body weight and experience greater stigma.[73]

D. Mechanism: Personal Responsibility

Several mechanisms might explain how laws could shift norms regarding obesity. The most obvious is that policymakers intentionally make anti-obesity policy to generate social stigma against the obese as a shaming device to discourage unhealthy behaviors. The billboards in Georgia come to mind in proclaiming that obesity is undesirable. In this way, social stigma is used as a direct deterrent, since it adds to the psychic costs of being obese. But most policies, including nutrition education requirements as well as the White House's "Let's Move" campaign do not so blatantly vilify the population.

A second and more plausible mechanism specific to obesity is related to a tacit (or not so tacit) emphasis on individual choices as a major cause of obesity. While many factors can contribute to obesity, public health communications cite individual behaviors leading to energy imbalance—consuming too many calories while not expending enough physical activity—as "the bottom line."[74] And with escalating health care costs, obesity is commonly approached as an economic problem where weight gain stems from individual choices.[75] Strong popular

72. *See* McAdams, *supra* note 11; Benabou & Tirole, *supra* note 19.

73. A finding that anti-obesity laws do not decrease obesity rates would not dispel the validity of the laws' expressive effects. Diet and exercise behaviors may be more reasonable measures of anti-obesity effort rather than changes in body weight. If laws express more focus on weight loss through dietary effort, then weight norms could become lower despite no visible changes in obesity rates.

74. *Defining Overweight and Obesity*, CTRS. FOR DISEASE CONTROL AND PREVENTION (Sept. 8, 2012, 5:55 PM), http://www.cdc.gov/obesity/causes/index.html; *What are Overweight and Obesity?*, NAT'L HEART LUNG AND BLOOD INST. (Sept. 8, 2012, 5:59 PM),http://www.nhlbi.nih.gov/health/dci/Diseases/obe/obe_causes.html.

75. Tomas Philipson & Richard Posner, *Is the Obesity Epidemic a Public Health Problem? A*

sentiments attributing obesity to poor personal choices were especially prominent amid the controversy over fast food class action litigation, which charged fast food companies with inflicting obesity-related harms in connection with people's consumption of their products.[76] The "American Personal Responsibility in Food Consumption Act," the House's response to the fast food litigation in 2004, barred lawsuits against restaurants claiming that their food made people fat and undeniably voiced the idea that people were overweight due to their own choices.[77] These attitudes are consistent with conclusions from some researchers that "[s]ociety regularly regards obese persons not as innocent victims, but as architects of their own ill health, personally responsible for their weight problems because of laziness and overeating."[78]

In light of the sentiments above, anti-obesity policies could further influence how society associates individual choices with obesity. Promoting personal responsibility in managing body weight, then, is a reasonable mechanism for a law's expressive effects on obesity stigma. Anti-obesity laws such as nutrition education mandates and soda taxes target choices in diet and physical activity by directly incentivizing healthier behaviors or deterring unhealthy ones. Recall the belief-updating framework, which predicts that obesity stigma arises when (1) the law expresses that the norm should be a lower body weight, (2)

Decade of Research on the Economics of Obesity (NBER, Working Paper No. 14010, 2008) (stating that obesity is not only a public health issue but also an economic problem, where caloric intake and expenditure are functions of individual choice).

76. For discussions comparing fast food obesity claims with tobacco litigation, *see* Richard A. Daynard, *Food Litigation: Lessons from the Tobacco Wars*, 288 J. AM. MED. ASS'N 2179 (2002); Joseph P. McMenamin & Andrea D. Tiglio, *Not the Next Tobacco: Defenses to Obesity Claims*, 61 FOOD & DRUG L.J. 445 (2006); Richard A. Epstein, *What (Not) to Do About Obesity: A Moderate Aristotelian Answer*, 93 GEO. L.J. 1361 (2005); Michelle M. Mello, David M. Studdert & Troyen A. Brennan, *Obesity—The New Frontier of Public Health Law*, 354 NEW ENG. J. MED. 2601 (2006); Kelly D. Brownell & Kenneth Warner, *The Perils of Ignoring History: Big Tobacco Played Dirty and Millions Died. How Similar Is Big Food?*, 87 MILBANK Q. 259 (2009).

77. Chairman of the Judiciary Committee Rep. F. James Sensenbrenner Jr. (R-WI) declared, "This bill says, Don't run off and file a lawsuit if you are fat . . . It says, Look in the mirror because you're the one to blame." Carl Hulse, *Vote in House Offers a Shield in Obesity Suits*, N.Y. TIMES, Mar. 11, 2004, at A1.

78. Puhl & Heuer, *supra* note 40, at 1020. The following Internet post is an example of this sentiment:

> Even when most people are made aware of the health dangers of foods, *they keep on eating the garbage foods anyway!* People must certainly know that ice cream and soft drinks promote obesity, and yet you see it time and time again at the supermarket: loads of ice cream tubs and 12-packs of soft drinks in the shopping carts of 300-pound people who can barely squeeze into the checkout lanes. Clearly, this is a personal responsibility problem: these people need to stop making excuses and start making better choices about foods and groceries.

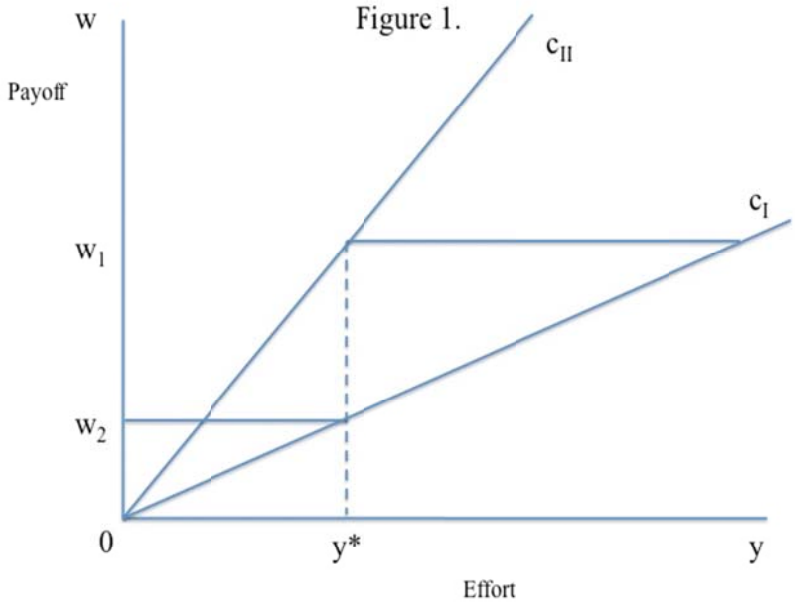
Mike Adams, *Is Obesity a Choice or a Disease*?, NATURALNEWS.COM, July 19, 2004, http://www.naturalnews.com/001416.html.

people update their beliefs and behaviors to adjust to the lower weight norm, and (3) people who remain obese experience more stigma as they are now further from the norm. Under a policy expressing that the norm should be a lower weight via making healthier and more responsible *choices*, obese persons become negatively perceived as lazier, or exerting less effort in maintaining a lower weight than their non-obese peers. Thus, society accepts or stigmatizes a person based on weight, at least partly because anti-obesity law implies that heavier weight is due to the person's own bad choices.

A very basic separating equilibrium model with information asymmetry can illustrate views about personal responsibility in obesity stigma.[79] Because of obesity laws (i.e., dietary behaviors and nutrition education policy), society values people who follow the lower weight norms as making more responsible choices. In this simplified model, people who are closer to the low weight norm will minimize their stigma. Becoming thinner; however, requires a costlier investment of effort in diet, exercise, and time. Here, there are two types of people: "Type I" and "Type II." For various genetic, economic, or environmental reasons, the costs of losing weight are lower for Type I and higher for Type II.

Figure 1 depicts the cost curves for Type I and Type II, as well as the payoffs that they would receive in society from minimizing stigma given the effort they invest in losing weight. Type II faces cost curve c_{II}, which is steeper than the cost curve c_I of Type I. The equilibrium effort, y^*, is the social norm's amount of health effort that is more likely to translate into some visible weight loss for Type I than for Type II. For both, when society observes effort $y < y^*$, the gross benefit of avoiding stigma is w_2.

79. This framework adapts Nobel economist Michael Spence's groundbreaking signaling model, which characterizes education as a costly credential that only high ability workers will invest in, to convey information to employers that they are intrinsically more productive than low ability workers. *See generally* Michael Spence, *Job Market Signaling*, 87 Q. J. ECON. 355 (1973).



When society observes effort $y \geq y^*$, one's gross benefit in avoiding stigma is w_1, which is greater than w_2. For Type II, the costs outweigh the benefits of exerting the equilibrium effort y^*, while exerting zero effort would yield a net payoff of w_2. For Type I, the benefits outweigh the costs of exerting effort y^*, so that exerting y^* would yield a net payoff of $w_1 - c_I(y^*)$, which is greater than w_2. Therefore, it is rational for Type I to choose to invest effort in losing weight ($y = y^*$) and for Type II to choose not to invest effort ($y = 0$). In equilibrium, society will observe two body types, thin and obese, where thin people are Type I's who had dieted and exercised, while obese people are Type II's who could not afford to do so. Society interprets the obesity of Type II's as physical indicators that they not only are deviants from the norm, but also make irresponsible choices in failing to invest enough effort in their health.[80]

This model of effort is not the only mechanism explaining how obesity stigma might arise from anti-obesity laws.[81] In view of popular

80. A key point in Spence's job market signaling model is that education itself has no intrinsic effect on improving a worker's productivity. Similarly in this model, obesity does not in itself affect how responsibly or productively a person behaves.

81. An alternate explanation is that the law would directly reduce obesity rates, and the mere salience of the fewer obese persons remaining would increase their stigmatization. *Cf.* Patricia Funk, *Governmental Action, Social Norms and Criminal Behavior*, 161 J. INST'L & THEORETICAL ECON. 522

prejudices against obese persons, I propose this as a plausible model for policies that express messages about body weight norms while targeting individual choices.

E. Heterogeneity of Expressive Effects: Pre-Existing Social Norms

The expressive effects of laws can vary depending on pre-existing norms, whether determined by culture, genetics, or other factors. To illustrate this, consider again the simple model from before. Here, I show examples of how the initial distribution of Type I's and Type II's (whose costs differ due to genetics, culture, and socioeconomic circumstances) can make a difference in the stigma effects of the law. I argue that being saliently obese, or being one of the few obese persons among most people who are not obese, worsens stigma. Meanwhile, being relatively less obese, or being obese among many others who are also obese, lessens stigma.

Consider a society with more Type I's than Type II's. An anti-obesity law directly changes the incentives or costs of losing weight. Because the majority of people are Type I, they will internalize the costs and lose weight, resulting in a lower weight norm. With fewer Type II's, it becomes easier to spot the remaining obese persons and attribute their status to poor personal choices. Here, the law has shifted the weight norm downward, so to remain obese is more salient amid a population that is generally thinner. Due to the law's expressive effects, obese persons experience more stigma because they are further from the norm.

But now consider a society with many more Type II's than Type I's. Since it is far costlier for Type II's to lose weight (due to genetics, economic circumstance, etc.), many more people in this society will remain obese despite an anti-obesity law. Hence, it appears that the law does not shift the weight norms as much. As a result, being obese would be less stigmatizing because obese persons are closer to the heavier weight norm than if the law had shifted the norm to a lower body weight.

In concluding this Part, by providing an additional means to separate the population based on traits that were previously unobservable, a law that gives more benefits to potentially thinner people than heavier people would induce a further separation among the population and associations of perceptions of their unobserved qualities (such as "laziness") based on weight. Those persons who remain obese are

(2005). This explanation is consistent with the model that I have described, which posits that those fewer persons who remain obese after a law is enacted might experience worse stigma because they are viewed as exerting less effort.

viewed as "lazy," which worsens their stigma. In this way, the law expresses the value that obese persons should be less worthy.

IV. EMPIRICAL ANALYSIS

This Part empirically analyzes the relationship between norms and obesity-related laws, using state dietary behaviors and nutrition education requirements as anti-obesity law. The inquiry focuses on adolescent female students attending schools across the United States in the mid-1990s. I note that social networks are especially influential among this age and gender group,[82] and deviating from weight norms can have more acute effects on adolescent girls. I use the National Longitudinal Survey of Adolescent Health, whose data on high school friendship networks and self-reported feelings of social acceptance are good for measuring social stigma, and whose data on educational outcomes allow me to assess how obesity stigma matters to economic well-being in the long run. Using this data, I estimate differences in stigma and educational outcomes experienced by obese versus non-obese female students corresponding to the obesity-related laws.

The main purpose of this analysis is to produce empirical estimates that can confirm or challenge the social norm hypotheses of expressive law and economics. The basic empirical strategy relies on cross-sectional ordinary least squares (OLS) regressions to estimate differences in individual outcomes across states with varying obesity laws. To minimize biases from variables that can correspond to location, school, or family background, the regressions control for demographic, school-level, and neighborhood characteristics. This regression is a standard technique used in empirical law and social sciences.[83] In implementing this, my analysis offers original evidence that links stricter anti-obesity laws with more obesity stigma.

In developing the empirics, I also consider the "personal responsibility" mechanism to explain obesity stigma that follows from anti-obesity laws. I find that dietary education laws correspond with some increased health efforts and little to no decrease in obesity. These patterns are consistent with anti-obesity laws that emphasize healthy personal choices, highlighting the role of "personal responsibility" in one's weight. Furthermore, higher cigarette taxes correspond with higher rates of obesity in general, suggesting that cigarette taxes might be interpreted as a de facto "obesity-friendly" law. Finally, to understand whether or how obesity laws shift norms, I consider pre-

82. *See* Peggy C. Giordano, *Relationships in Adolescence*, 29 ANN. REV. SOCIOL. 257 (2003).

83. *See, e.g.*, JEFFREY M. WOOLDRIDGE, INTRODUCTORY ECONOMETRICS: A MODERN APPROACH 861 (3d ed. 2006).

existing norms and find that the law's expressive effects vary by peer groups with different underlying norms.

Some caveats should be noted when interpreting the results. First, the goal of the analysis is to determine whether a relationship between obesity-related laws and obesity stigma exists as predicted by theory. As such, the reader's focus should be on signs and statistical significance; the magnitudes of stigma or exactly how much norms shift are not the main concern of this study. Second, the estimates from the basic cross-sectional regression model are merely suggestive of the social norm influences of obesity laws. A true experiment in varying laws across identical groups of people would be preferred in establishing causation. As is typical in many empirical studies, short of conducting a randomized controlled experiment, regression estimates can be susceptible to biases from reverse causality or omitted variables. With obesity laws, reverse causality (endogeneity) should not be a problem under the common assumption that state-varying laws are enacted exogenously, and therefore, provide a "natural experiment" for evaluating the effects of policy on individual behaviors.[84] While the assumption that laws are exogenous is controversial,[85] it is highly plausible that reverse causality is not an issue here—current social stigma outcomes of obese youth are not motivating past changes in state anti-obesity policies during this time period. However, omitted variable bias, or failing to account for unobserved characteristics or underlying time trends, can make it more difficult to infer causality from cross-sectional models.[86] I employ some techniques and robustness checks to address this, which I describe in the next subparts.

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84. It is reasonable that obesity stigma is unlikely to be directly motivating policymakers to enact dietary education laws, and even less likely to be motivating changes in state cigarette tax rates. State variation in laws is generally accepted among empirical law and economics scholars as a sufficient "natural experiment" for identifying causal effects on people's behaviors. *See, e.g.*, Jonathan Klick & Thomas Stratmann, *The Effect of Abortion Legalization on Sexual Behavior: Evidence from Sexually Transmitted Diseases*, 32 J. LEGAL STUD. 407, 411 (2003) (observing that state variation in "[a]bortion legalization provides a natural quasi experiment to determine the effect of abortion availability on STD incidence"); Jonathan Gruber & Michael Frakes, *Does Falling Smoking Lead to Rising Obesity?*, 25 J. HEALTH ECON. 183 (2006).

85. It is important to point out that assumptions that state laws vary exogenously may be inaccurate. Through the political process, people lobby for policy changes to satisfy their preferences, such that an economic or social trend may instead be driving a change in the law. *See, e.g.*, Timothy Besley & Anne Case, *Unnatural experiments? Estimating the incidence of endogenous policies*, 110 ECON. J. F672 (2000). Thus, an increasing trend in crime may inspire policymakers to enact laws with tougher criminal sanctions. Indeed, preexisting norms can predict legal precedent and can therefore determine how states may regulate in areas such as obscenity or property law. *See* Daniel L. Chen & Susan Yeh, *Distinguishing Between Custom and Law: Empirical Examples in Property and First Amendment Precedents*, 21 WM & MARY BILL RTS J. (forthcoming 2013).

86. *See, e.g.*, WOOLDRIDGE, *supra* note 83, at 13–14.

A. Data

1. The National Longitudinal Study of Adolescent Health

This analysis uses the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative survey that asks detailed questions on health, peer networks, and education.[87] Clustered sampling occurred first at the school level, in which 80 high schools and their 54 feeder middle schools were selected following a stratified sampling scheme designed to be representative of U.S. schools according to region, urbanicity, school type, size, and ethnicity. The schools range in size from twenty-five to 2,559 students. In 1994–1995, all students in these schools received an in-school questionnaire, which asked basic questions about their race, parental education, and other demographic traits. Next, under a scheme of stratified sampling by race, age, and sex within each school, seventeen female and seventeen male students per grade per school were randomly selected for the longitudinal study, which consist of very detailed in-home and parental interviews. In 16 schools, *all* enrolled students were followed longitudinally as part of Add Health's "saturated sample." Respondents were enrolled in grades 7–12 at the first longitudinal survey in 1994–1995 (Wave 1). Follow-ups occurred in 1996 (Wave 2), and 2001–2002 (Wave 3). In addition to standard data on demographic and socioeconomic background, these longitudinal surveys include sensitive data on friendship networks, health outcomes, and school transcript grades, among others. About 15,000 sample individuals were followed from Wave 1 through Wave 3. Of these, about 3,700 students are in Add Health's saturated sample, which spans 16 representative states.

The variables for my analysis are drawn from the In-Home interviews, since both obesity and stigma variables are available only in this component of Add Health. To measure obesity, I create an obesity indicator variable using the Centers for Disease Control's definitions, which relies on computing a BMI from height and weight.[88] To measure

87. *The National Longitudinal Study of Adolescent Health*, CAROLINA POPULATION CENTER: ADD HEALTH (Sept. 8, 2012 7:06 PM), http://www.cpc.unc.edu/projects/addhealth (machine-readable data file and documentation). Add Health is a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website. *Id.* No direct support was received from grant P01-HD31921 for this analysis.

88. Doctors routinely screen for obesity by measuring one's body mass index (BMI), which is the ratio of weight in kilograms to squared height in meters. Individuals over age 20 are classified as obese (BMI $\geq$ 30), overweight (30 > BMI $\geq$ 25), normal (25 > BMI $\geq$ 18.5) and underweight (BMI <

social stigma, I use friendship network data and self-reported social acceptance.[89] In the friendship network data, I focus on three different variables: (1) the number of students whom the respondent names as a friend (out-degree friends); (2) the number of students who name the respondent as their friend (in-degree friends); and (3) an index of popularity that is commonly used in social network analysis (proximity prestige).[90] Additionally, I create socioeconomic controls for family income, parent's marital status, and parental education from the parental In-Home interview in Wave 1.[91]

Because my analysis considers pre-existing norms or peer effects, I need to create cohort-level variables based on characteristics of students in each grade at the sample schools, to control for otherwise unobserved

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18.5)). CENTER FOR DISEASE CONTROL AND PREVENTION, http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html (last visited Jan. 29, 2013). Because BMI and body fat increase dramatically with age among youth, I follow the Centers for Disease Control's procedure of using age–sex growth charts of a reference population in the 1970s to compute BMI percentiles for youth ages 7 to 20. CENTER FOR DISEASE CONTROL AND PREVENTION, http://www.cdc.gov/nchs/data/nhsr/nhsr025.pdf (last visited Jan. 29, 2013). Using these BMI percentiles, the CDC defines youth individuals as "obese" (BMI percentile ≥ 95), "overweight" (95 > BMI percentile ≥ 85), "healthy weight" (85 > BMI percentile ≥ 5), or "underweight" (BMI percentile < 5). I use the obese indicator in my main specifications. I also check specifications that use the continuous BMI variable.

89. I re-code "social acceptance" as a variable with values ranging from 1 to 5, where 1 corresponds to feeling the least socially accepted, and 5 corresponds with feeling most socially accepted. In the In-Home survey, respondents were asked to rate their agreement with the statement, "You feel socially accepted," with 1 = strongly agree; 2 = agree; 3 = neither agree nor disagree; 4 = disagree; 5 = strongly disagree. I flip the original variable's coding.

90. "Prestige" identifies important actors within a social network, meaning that the actor is named by many others as a friend (popular), but she initiates few relations herself. "Proximity" refers to how closely other people in the network can reach the actor directly and indirectly. "Proximity prestige" measures the prestige of the actor relative to the number of people who can reach her:

$$prxprest_i = \frac{\frac{I_i}{(g-1)}}{\sum_j \frac{d(n_j, n_i)}{I_i}}$$

where I_i = influence domain of i, which is equal to the number of other people who can reach i;
g = number of nodes in X;
$d(n_j, n_i)$ = distance between actor j to actor i.

91. Parental education is constructed as the higher of the mother's or father's years of education. In the parental interview module, an interviewer administered a written questionnaire to the youth's mother or other parent/guardian if the mother was unavailable. I impute missing values using those available for another youth in the same family, replace the remaining missing values with the mean values by the birth years of the sample adolescents, and flag the imputed observations with indicators; flagged observations range from 14.8 percent (married indicator) to 25.7 percent (family income) of the youth in the original survey. Missing values for race and academic outcomes were not imputed. Estimates are robust whether simply omitting the observations with missing values from the analysis or including them with imputed values and flags.

differences across peer groups. For the cohort-level measures in my main specifications, I rely on Add Health's saturated sample, where obesity measures (among others) are available for all students in the schools.[92] Most of the social norm outcome variables are available in Wave 1, but educational attainment is measured in Wave 3.[93] To maintain a consistent analysis sample, I restrict the analysis to saturated sample observations with non-missing values for BMI, non-missing race, and non-missing longitudinal sample weights for analysis across waves of the survey.

2. Obesity Laws

I use the state-level dietary behaviors and nutrition education requirements as a measure for anti-obesity law. These state policy variables come from the 1994 School Health Policies and Programs Study.[94] The state law variable is coded as an indicator for whether the state requires its schools to offer "dietary behaviors and nutrition education." Appendix Table 1 shows that thirty-one states had these requirements; of the sixteen states represented in my analysis sample, ten states had these requirements. Parts of the analysis use state cigarette taxes to check for the robustness of the main results. State excise taxes on cigarettes per pack (in cents) as of 1995 come from the CDC State Tobacco Activities Tracking and Evaluation (STATE) System. State cigarette tax rates range from 3 cents to 56 cents in the analysis sample.

3. Summary Statistics

Table 1 shows the summary statistics for the analysis sample of female respondents in Add Health. The main analysis sample includes

92. Obesity variables are not available in the in-school survey given to all students in the 134 schools. To include more schools, constructing cohort-level measures using the non-saturated longitudinal sample is an alternative, but these would be based on small samples within the school and are susceptible to measurement error and attenuation bias. *See* WILLIAM H. GREENE, ECONOMETRIC ANALYSIS 84–86 (5th ed. 2003). I also check my regressions using the non-saturated sample but get very noisy estimates, as expected.

93. The years of education variable was constructed from responses to a Wave 3 question that asked for the "highest grade or year of regular school" completed. I re-code years of education to account for type of degree earned and/or institution attended using the typical value for years of education corresponding to the highest degree earned as recommended by Park (1996). This re-coding affects 13 percent of the sample. *See generally* Jin Heum Park, *Measuring Education Over Time: A Comparison of Old and New Measures of Educ[a]tion from the Current Population Survey*, 50 ECON. LETTERS 425 (1996).

94. *See* Michael T. Errecart et al., *Methodology*, 65 J. SCH. HEALTH 295 (1995).

1,131 observations from sixteen schools.[95] Of the female students, 9.9% were obese, 15.7% were overweight, 69.9% were normal weight, and 4.5% were underweight according to Wave 1 (1994–1995) measures of height and weight.[96] School sizes range from thirty to 1,744. The average student attended a school with 532 students. Of the sample, 75% attended a school in an urban area, and 24.5% attended a private school. Nationally representative longitudinal probability weights and corrections for clustered sampling by school and stratification by region were applied to all estimates.

B. Econometric Model

To start, consider equation (1), the basic econometric model:

$$(1)\quad y_{ijs} = \beta_1 Law_s{*}Obese_{ijs} + \beta_2 Law_s + \beta_3 Obese_{ijs} + \beta_4 X_{ijs} + \varepsilon_{ijs}$$

where the subscripts denote individual *i*, school *j*, and state *s*. Here, y_{ijs} is the outcome variable for social stigma or educational attainment. Law_s is the state obesity law variable, i.e., dietary behaviors and nutrition requirements. $Obese_{ijs}$ is a dummy variable indicating whether the individual is obese. X_{ijs} is a vector of individual demographic and socioeconomic characteristics, including the student's race, age, family income, parental education, parent's marital status. The main coefficient of interest is on the interaction term $Law_s{*}Obese_{ijs}$, which captures the differential stigma effect that the law has on obese students, after controlling for the general shift in social norms among all students due to the law (using Law_s) and the stigma that obese students already feel without the law (using $Obese_{ijs}$). This model is a cross-sectional OLS regression that controls for a number of individual, family, and school characteristics that could otherwise bias estimates of the law's role in shifting social norms.[97]

95. The longitudinal sample, which I use in a robustness check but lacks the variables for social network analysis, includes 10,227 observations from 132 schools.

96. The youth obesity prevalence in this sample is somewhat lower than the commonly cited statistics and trends based on national data from the Centers for Disease Control. *See* Cynthia L. Ogden, Katherine M. Flegal, Margaret D. Carroll & Clifford L. Johnson, *Prevalence and Trends in Overweight among U.S. Children and Adolescents, 1999-2000*, 288 J. AM. MED. ASS'N 1728 (2002) (reporting obesity prevalence rates based on the National Health and Nutrition Examination Survey).

97. Despite this, I acknowledge that the OLS model can be susceptible to omitted variable biases that can understate or overstate a law's effect. Unobserved background traits of individuals may be correlated with whether or not they experience a particular law. For example, families that are very health conscious and disdainful of body fat might prefer to live in states with more stringent dietary education requirements. A greater concentration of families with lower weight norms could be a major explanation for observing greater obesity stigma in states with anti-obesity laws. Failing to account for such family traits can lead a researcher to over- or under-attribute stigma or other outcomes to the law.

A model of how laws shift social norms should consider pre-existing norms. Thus, the next step is to test for whether the law's expressive effects on obesity stigma vary by different underlying norms. However, a challenge is that students and their families might tend to self-select their peers and underlying norms, which could bias any estimates of peer effects. To alleviate this bias, I adapt the cohort-differences model that labor economists have previously implemented using Add Health to estimate peer effects on academic outcomes.[98] This technique uses variation in pre-existing peer norms based on how many students of a particular culture (e.g., white students or obese students) randomly appear above or below their expected numbers in a particular grade in a school. In other words, this method maintains that while students' characteristics may determine where they live or which schools they attend, exactly how many white (or obese) students are present across different grades within the same school is exogenous.[99]

To adapt this method,[100] I observe that weight norms differ by peer groups—having more white students in one's grade within the school worsens stigma, while having more obese students lessens it—and I use the variation across cohorts' demographic composition to assess how stigma from the law varies by different pre-existing norms. In defining underlying norms, I use white peers as one proxy for culture, based on published findings that weight standards may differ between whites and racial minorities.[101] I use obese peers as another proxy for culture because the number of one's peers who are obese may signal a higher pre-existing weight norm, as I explained in Part IV.[102] Being obese

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A common solution is to use panel data, or data from the same individuals collected at multiple periods over time, and then control for individual fixed effects, or all time-invariant unobserved characteristics that are specific to an individual. Then one would infer that changes in outcomes are due to changes in the laws over the years. I try implementing this individual fixed effects model, but there is not enough power for estimation in Add Health, because the state obesity laws change for only a handful of the individuals during the survey years. Also for this reason, I do not implement the differences-in-differences estimator to evaluate the effects of laws that vary across states and over time, which is another standard technique in empirical law and economics.

98. *See* Robert Bifulco, Jason M. Fletcher, & Stephen L. Ross, *The Effect of Classmate Characteristics on Post-Secondary Outcomes: Evidence from the Add Health*, 3 AM. ECON. J: ECON. POL'Y 25 (2011); *see also* Victor Lavy, M. Daniele Paserman & Analia Schlosser, *Inside the Black Box of Ability Peer Effects: Evidence from Variation in the Proportion of Low Achievers in the Classroom* (Nat'l Bureau of Econ. Research, Working Paper No. 14415, 2008); Caroline Hoxby, *Peer Effects in the Classroom: Learning from Gender and Race Variation* (Nat'l Bureau of Econ. Research, Working Paper No. 7867, 2000).

99. Bifulco et al., *supra* note 98.

100. I do not control for the within-school fixed effects exactly according to the Hoxby or Bifulco et al. method (which focus on peer effects and not law effects). Doing so in my case would cause collinearity problems with the state law variables.

101. *See, e.g.*, Latner et al., *supra* note 56; Christian S. Crandall, *Prejudice Against Fat People: Ideology and Self-Interest*, 66 J. PERSONALITY & SOC. PSYCHOL. 882 (1994).

102. *Cf.* Nicholas A. Christakis & James H. Fowler, *The Spread of Obesity in a Large Social*

while surrounded by more peers who are obese may lessen stigma that may arise from being saliently heavier than others.

Equation (2) is the main specification in estimating whether obesity laws influence obesity stigma, taking into account pre-existing norms:

$$(2)\quad y_{ijs} = \gamma_1 Law_s{*}Obese_{icjs}{*}PeerNorm_{cjs} + \gamma_2 Law_s{*}Obese_{icjs} + \gamma_3 Obese_{icjs}{*}PeerNorm_{cjs} + \gamma_4 Law_s{*}PeerNorm_{cjs} + \gamma_5 Law_s + \gamma_6 Obese_{icjs} + \gamma_7 PeerNorm_{cjs} + \gamma_8 X_{icjs} + \gamma_9 School_j + \gamma_{10} Cohort_c + \varepsilon_{ijs}$$

where $PeerNorm_{cjs}$ is the vector of variables denoting the percentage of students in cohort c at school j who are white or who are obese, and $School_j$ is a vector of school characteristics including school size, public or private status, urbanicity, and region. The coefficient γ_3 on the interaction between $Obese_{icjs}$ and $PeerNorm_{cjs}$ measures how obese students fare as the percentage of white peers (or obese peers) increases; I define this the pre-existing obesity norm. The main coefficient of interest is γ_1 on $Law_s{*}Obese_{icjs}{*}PeerNorm_{cjs}$, which reveals how the law's influence on obesity stigma varies by pre-existing obesity norms as defined by peer groups.

C. Results

Tables 2 through 8 display the results of my regression analyses. The primary goal is to empirically establish whether or not a relationship exists between obesity laws and obesity norms that would be consistent with predictions of expressive law and economic theories. As such, the signs and statistical significance of the estimates are the focal points in these tables.

1. Main Estimates of the Relationship Between Laws and Stigma

Table 2 shows the relationship between state dietary behaviors and nutrition education laws and obesity stigma, applying OLS estimation to equation (1). In this table, an indicator for whether the respondent is obese during the first wave of the survey (1994–1995) serves as the obesity measure. Each column shows results for one of four different outcome variables that can proxy for social stigma: self-reported feelings of social acceptance in school; number of students naming the respondent as their friend, number of students the respondent names as her friend, and proximity prestige, all of which proxy for one's status

Network Over 32 Years, 357 NEW ENG. J. MED. 370 (2007) (finding that being surrounded by obese peers corresponds to higher obesity probabilities).

within the school's social network. First, note that holding all other variables equal, obese girls have fewer friends than non-obese girls, with 2.969 fewer schoolmates naming an obese respondent as their friend (column 2), where the mean respondent in the sample has 5.647 friends (see Table 1). An obese adolescent girl having fewer friends would be consistent with the negative social perceptions of obese persons in the United States, as documented by Puhl and Heuer (2009).[103] Interpreting the coefficient on the *Obese* indicator variable, in states with no dietary education requirements, the social acceptance of obese girls does not statistically differ from that of non-obese girls.

The expressive influence of anti-obesity law on obesity stigma corresponds to the coefficient on the interaction term between the dietary education law variable and the obesity indicator. The -0.467 coefficient on the interaction, which is statistically significant at the 5% level, means that in states with dietary education requirements, obese girls are less socially accepted than non-obese girls. In other words, the level of social stigma (in terms of social acceptance) from obesity is worse under an anti-obesity law. There is no statistically significant difference in the number of friends or proximity prestige.

The results in Table 2 support theories that obesity-related laws could shift obesity norms on average (not taking into account pre-existing norms). I acknowledge that although the specifications attempt to control for individual, family, and school characteristics, the coefficients may still be over or underestimated due to omitted variable biases. For example, there may be unobservable factors that drive obese students with social outlier personalities to begin with to sort into states with dietary education requirements, lower cigarette tax rates, or both. In this example, not controlling for the unobserved factors may lead me to over-attribute stigma effects to obesity law.

2. Robustness Checks

Table 3 examines how the estimated relationship between obesity laws and obesity stigma changes when removing and adding a variety of controls, or measuring body weight with BMI instead of an obesity indicator. This exercise can be informative of the results' sensitivity to omitted variable bias. Column 1 shows the estimates of the influence of dietary behaviors and nutrition education laws when excluding school-level characteristics and cohort dummies. In column 2, these controls are added back and the estimates here are identical to the first coefficient in column 1 of Table 2. The estimates for the laws are robust whether

103. *See generally* Puhl & Heuer, *supra* note 3.

including or removing school characteristics, which are plausibly correlated with individual preferences for location or school type. I also compare results using BMI instead of an obese indicator variable. Dietary education laws continue to have stronger, negative impacts on weight stigma (column 5 of Table 3).

Column 3 of Table 3 shows how sensitive the estimates are when including both the dietary education laws and the cigarette tax rates in the regression. There are two reasons for checking this. First, if the omitted variables correlated with dietary education laws are also correlated with state-specific health policy climates as reflected in cigarette taxes, including cigarette taxes would help minimize bias on the estimates for dietary education laws. Second, dietary education requirements as anti-obesity law and cigarette taxes as obesity-related laws[104] may have some competing effects on obesity norms. It can be cleaner to estimate the effect of an anti-obesity law, holding the relatively obesity-friendly cigarette tax constant. When including both laws, dietary education laws continue to worsen obesity stigma; the coefficient of -0.533 is similar and slightly larger in magnitude than if tax rates were excluded.

A policy goal of anti-obesity laws is to directly reduce obesity rates. If nutrition education laws reduce the number of obese people, then the fewer students who remain obese become more salient, as they are now heavier relative to their peers. Thus, changes in the number of people engaging in a behavior discouraged by the law may increase stigma for people who persist in that behavior.[105] Still, Column 4 of Table 3 verifies that the main findings of obesity stigma are robust when including a control for the percentage of students who are obese per school.

3. Robustness Checks Using an Obesity-Friendly Policy

To further establish that obesity stigma outcomes arise from anti-obesity expressions of anti-obesity law, I compare results using state cigarette tax rates.[106] It is possible that the mere fact that an obesity-related law was enacted will be linked to behaviors in a particular direction, regardless of which side the law favors.[107] Analyzing a health

104. *See infra* Part IV(C)(3).

105. *Cf.* Funk, *supra* note 81.

106. Appendix Table 9 lists state cigarette excise tax rates as of 1995.

107. *See, e.g.*, Daniel L. Chen & Susan Yeh, Growth Under the Shadow of Expropriation? The Economic Impacts of Eminent Domain 50 (May 2012) (unpublished manuscript), *available at* http://www.duke.edu/~dlc28/papers/EminentDomain.pdf at 50 (finding that regardless of the case's resolution, the appearance of an appellate regulatory takings case leads to higher property values in the locality of the original regulation in the long run, and the reason may be due to [u]nobserved factors that

law that is a placebo or that has tacitly obesity-friendly incentives can help verify that stigma outcomes arise from the anti-obesity values expressed by nutrition education laws rather than from the mere presence of having any law with incentives related to body weight.[108] Cigarette taxes are useful, as they represent health-related consumption laws that are not immediately associated with raising obesity awareness but, as discussed below, have been linked with obesity rates.

Columns 2 and 4 of Table 6 show that higher cigarette tax rates are correlated with a higher likelihood of being obese. This result aligns with existing studies. On the margin, higher cigarette tax rates can increase the costs of losing weight (or maintaining a lower weight) by smoking.[109] Popular belief holds that smoking can help one lose weight and that quitting smoking would lead to weight gain; these views follow from findings that smoking increases metabolism and suppresses appetite.[110] Further, the link between cigarette policy and obesity has been of interest to health economists, with studies finding evidence that higher cigarette taxes (or higher cigarette prices) lead to higher obesity rates.[111] In theory then, the higher costs that consumers must pay to purchase cigarettes can be a deterrent to losing weight or maintaining a lower weight via smoking, so that state cigarette excise taxes might even be considered to be a rough proxy for "obesity-friendly" laws in their

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correlate with the land being worth litigating over).

108. *Cf. id. See also* Chen, Levonyan, & Yeh, *supra* note 15, at 16 (estimating the effects of pro-choice appellate decisions on political preferences and estimating the effects of pro-life or conservative decisions as a robustness check).

109. According to the 1986 Adult Use Tobacco Survey, 27% of smokers who had tried to quit "reported that 'actual weight gain' was a 'very important' or 'somewhat important' reason why they resumed smoking" and "[f]orty-seven percent of current smokers and 48 percent of former smokers agreed with the statement that 'smoking helps control weight.'" U.S. DEP'T OF HEALTH & HUMAN SERVICES., THE HEALTH BENEFITS OF SMOKING CESSATION: A REPORT OF THE SURGEON GENERAL ix (1990), *available at* http://profiles.nlm.nih.gov/ps/access/NNBBCV.pdf.

110. Indeed, in 1990 the U.S. Surgeon General concluded from a review of fifteen studies that that "four-fifths of smokers who quit gained weight after cessation," and the people who quit smoking gained about 4 pounds more on average than non-quitters. *Id.* at ix. The quitters' increased weight persists for up to 6 years or more before decreasing to the weight level of those people who never smoked before. Paul. Froom et al., *Smoking Cessation and Body Mass Index of Occupationally Active Men: The Israeli CORDIS Study*, 89 AM. J. PUB. HEALTH 718, 720–21 (1999); Tetsuya Mizouea et al., *Body Mass Decrease After Initial Gain Following Smoking Cessation*, 27 INT'L J. EPIDEMIOLOGY 984 (1998).

111. *See* Shin-Yi Chou, Michael Grossman, & Henry Saffer, *An Economic Analysis of Adult Obesity: Results from the Behavioral Risk Factor Surveillance System*, 23 J. HEALTH. ECON. 565, 568–69 (2004); Inas Rashad & Michael Grossman, *The Economics of Obesity*, 156 PUB. INTEREST 104, 108–09 (2004); Charles L. Baum, *The Effects of Cigarette Costs on BMI and Obesity*, 18 HEALTH ECON. 3 (2009). *But see* Gruber & Frakes, *supra* note 84, at 183 (finding a negative relationship between cigarette taxes and body weight); Charles Courtemanche, *Rising Cigarette Prices and Rising Obesity: Coincidence or Unintended Consequence?*, 28 J. HEALTH ECON. 781 (2009) (arguing that over time, higher cigarette prices corresponds with lower BMI, which is partly due to effects on exercise and food consumption).

deterrent roles. Observing higher obesity rates amid higher tax rates would be consistent with the tax's deterrent effect on weight loss.[112]

It is reasonable to predict that a law that makes it costlier to lose weight would either have no effect on or lessen the stigma of obese persons. On the margin, weakly "obesity-friendly" tax rates should leave weight norms unchanged if being overweight were already the norm or should shift weight norms towards being heavier.[113] Table 4 is similar to Table 2 and shows the relationship between state cigarette tax rates and weight stigma, using BMI to measure body weight.[114] The takeaway here is that obesity-friendly taxes weakly correspond with heavier weight norms, which supports the idea that obesity stigma outcomes arise from anti-obesity expressions of anti-obesity law rather than from the mere presence of any health-related consumption law. Higher cigarette taxes correspond with a marginally greater social acceptance of girls who have higher BMIs, compared to their social acceptance amid lower cigarette tax rates. In column 1 of Table 4, the coefficient on the interaction of cigarette tax rates and BMI is positive though weakly significant at the 10% level. Amid higher tax rates, each unit of increase in BMI corresponds with an improvement in social acceptance (by 0.000582 points) over the baseline penalty (of -0.0258) in social acceptance that the same person would experience amid lower tax rates.

This weak decrease in obesity stigma contrasts with the greater obesity stigma under dietary behaviors and nutrition education policy. That an increase in tax rates corresponds to little or no reduction in weight stigma is consistent with the predictions that anti-obesity law shift weight norms downward, while a law with some obesity-friendly price incentives but no obvious announcement about body weight should not.

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112. It would also be consistent with increases in efforts to quit smoking or decreases in smoking, all of which have been linked to weight gain (or at least not weight loss).

113. It is plausible that higher cigarette taxes, which discourage smoking by making it more expensive, could also affirm heavier weight norms. The confluence of popular perceptions, advertising, and research linking smoking with weight, as well as simply increasing the cost of a weight loss method, suggest that cigarette taxes could express a normative statement about the body weight, even though it may not intentionally speak about obesity as do dietary education mandates or a "fat" tax. Here, the popular perception that smoking helps one lose weight or stay thin could be at work. Note also that tobacco companies have a long history of advertising cigarettes with sleek imagery and associating smoking with slender figures. *See, e.g.*, F. Senaida Fernandez et al., *Cigarette Advertising in Magazines For Latinas, White Women, and Men, 1998–2002: A Preliminary Investigation*, 30 J. COMMUNITY HEALTH 141, 141–42 (2005); Alyssa N. Zucker et al., *Smoking in College Women: The Role of Thinness Pressures, Media Exposure, and Critical Consciousness*, 25 PSYCHOLOGY OF WOMEN QUARTERLY 233, 234–35 (2001).

114. Here, instead of an obesity indicator variable, I use BMI as a measure for body weight, because cigarette taxes are indirect obesity-friendly laws that may affect behaviors at a different margin than laws that explicitly address body weight.

4. Direct Incentives and Health Effort

Recall that the incentive effects of dietary behaviors and nutrition education requirements predict that more people would adopt healthier habits and obesity rates would decline if people previously were at unhealthy weights. Table 5 sheds light on the incentive effect by showing estimates for the relationship between obesity laws and health effort. Columns 1 and 3 show that students in states with dietary behaviors and nutrition education requirements eat breakfast more frequently, an average of 2 more days than students in states without the requirements. However, the policy has no statistically significant correlation with the students' physical fitness (columns 4 and 6). Table 6 shows linear probability estimates of the relationship between the policies and the likelihood of being obese. Dietary education requirements and higher cigarette taxes correspond with a higher likelihood of obesity in 1994–1995, but the relationship weakens in 1996. Columns 2 and 4 show that higher cigarette tax rates correspond to higher obesity probability, which supports the predicted incentive effects of obesity-friendly policies and is also consistent with published findings by Chou, Grossman, and Saffer (2004) and Baum (2009).[115] However, the results for dietary education policies do not support policymakers' intentions that the anti-obesity law would incentivize a decrease in obesity.

The effort model where obesity is perceived as a signal of bad individual choices does not require obesity rates to change. The increased frequency of eating breakfast reflects greater efforts to improve one's health (though additional calories from breakfast do not necessarily result in weight loss). Therefore, under dietary education policies, health effort increases and obesity rates are unchanged, but social stigma worsens for obese girls. This pattern of results is still consistent with the predictions of the personal responsibility mechanism in obesity stigma, where the anti-obesity law promotes making better choices in health effort, but in doing so encourages society to further stigmatize obese people who are seen as making bad choices.

5. Heterogeneity and Pre-Existing Social Norms

I next analyze how obesity stigma arising from laws would vary by pre-existing social norms, or the composition of one's peers. Here, I address the hypothesis that the composition of one's peer group can affect how much a law may increase one's stigmatization. Suppose the

115. Chou et al., *supra* note 111; Baum, *supra* note 111.

law shifts the weight norm downward. Amid a population that is generally thinner, being obese becomes a more salient feature. As a result of the law's expressive effects, obese persons in a group of thinner peers may experience more stigma because the law causes them to appear even further away from the norm.

To address the role of one's peers in the data, I apply equation (2) and show coefficients on anti-obesity law, obesity, and cohort (peer) composition variables in Table 7. The main coefficients of interest in Tables 7 are on the three-way interactions of the law, obesity measure, and the cohort composition variables. But first, observe that the other displayed coefficients are themselves informative of the expressive theory. In Table 7, the coefficients on Law*Obese reveal that under that anti-obesity law, obese girls have fewer friends in school (columns 2–3). To control for the pre-existing norms in the regressions, I include both the percentage of a cohort that is white and the percentage that is obese within each school (*%White* and *%Obese*, respectively). The coefficient on *Obese*%White* is negative and statistically significant for the number of friends and proximity prestige (columns 2–4 of Table 7). In other words, at the baseline, obese girls experience more social stigma as the percentage of their classmates who are white increases. This pattern is consistent with anecdotal and published assertions that pressures to be thin are greater among white people, compared to other races.[116] In contrast, the coefficient on *Obese*%Obese* is positive for the number of friends and proximity prestige, meaning that at the baseline, obese girls experience less social stigma as they are surrounded by more obese classmates.

I find that obesity stigma arising from dietary behaviors and nutrition education policies lessens as obese peers increase. To interpret the coefficients, for every percentage point increase in obese classmates, obese girls under the policy have 73.4 more friends, which cancels out the loss of 20.28 friends at the baseline where there are fewer obese peers (column 3). Admittedly, these are extreme magnitudes. But the pattern of signs and statistical significance support the theoretical prediction that obesity stigma will be mitigated when the underlying population norm is dominated by obese persons who have difficulty losing weight (despite the law making it less costly to do so).[117] Surprisingly, as white peers increase, obese girls have more friends

116. *See, e.g.*, Andrea D. Powell & Arnold S. Kahn, *Racial Differences in Women's Desire to be Thin*, 17 INT'L J. EATING DISORDERS 191 (1995); Marisol Perez & Thomas E. Joiner, Jr., *Body Image Dissatisfaction and Disordered Eating in Black and White Women*, 33 INT'L J. EATING DISORDERS 342 (2003); Linda J. Neff et al., *Black—White Differences In Body Size Perceptions And Weight Management Practices Among Adolescent Females*, 20 J. ADOLESCENT HEALTH 459 (1997).

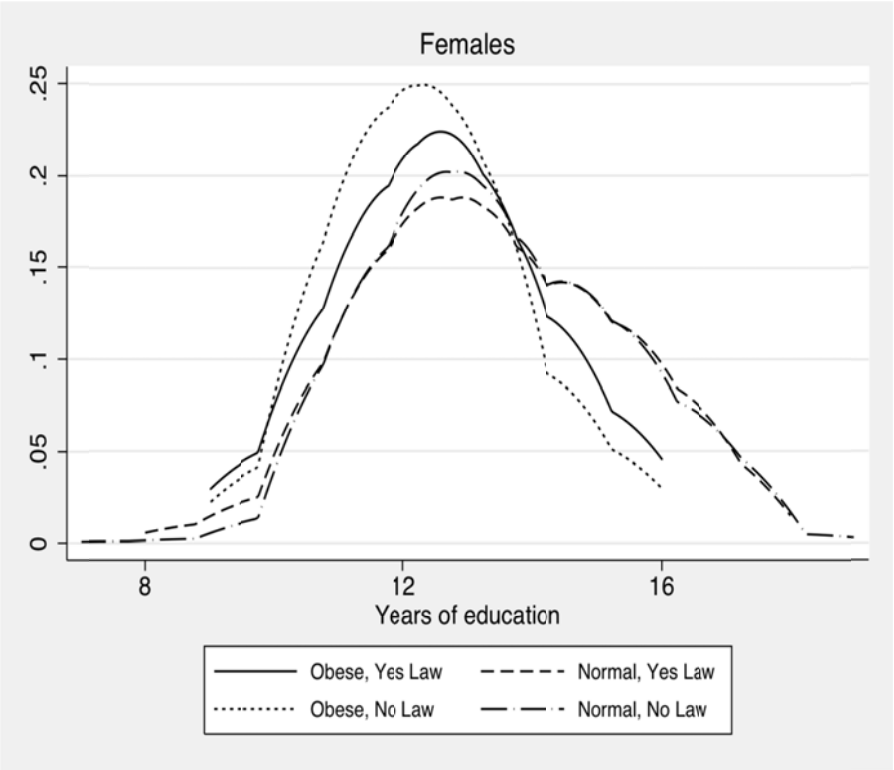
117. These persons would be the "Type IIs" in the separating equilibrium model. *See infra* Part III(E).

under dietary behaviors and nutrition education law. This implies that some pre-existing norm represented by more white peers counteracts the law's average stigma effects.

6. Educational Consequences and Policy Implications

On average, obesity stigma worsens under anti-obesity laws. A natural question to ask is, so what? Can these stigma effects in high school translate to welfare losses or worse socioeconomic outcomes in the long run? To briefly mull possible longer-term implications of these social norm consequences, I analyze educational attainment as an exercise. Figure 2 plots the raw distribution (kernel density) of years of education separately in four groups, by obese or normal weight classification and by dietary behaviors and nutrition education policy. The spike at twelve years of education, which most closely corresponds to a high school diploma, is highest for obese females. At higher years of education, the kernel densities for obese females are markedly lower than for normal weight females.

Figure 2
Distribution of Years of Education, by Obesity and Law



"Yes Law" denotes states with dietary behaviors & nutrition education requirements.

"No Law" denotes states without.

I estimate equation (2) with education outcomes as the dependent variables. The coefficients in Table 8 show how the educational attainment of women who were obese adolescents varies by dietary behaviors and nutrition education policy, controlling for pre-existing norms using cohort composition within schools. Obesity incurs an education penalty. On average, women who were obese adolescents get -0.443 fewer years of education and are 9.77 percentage points less likely to attend college than women who were not obese (columns 1 and 4); these results resemble those in previous studies.[118] However, being in a state with dietary education requirements increases an obese girl's likelihood of earning a high school diploma and attending college, completing an average of one more year of education (columns 1, 4, and 7). Therefore, the education penalty associated with obesity is mitigated

118. Crosnoe, *supra* note 8, at 256 ("Obese girls were less likely to enter college after high school than were their nonobese peers.").

by this anti-obesity law.

Curiously, education decreases as exposure to white classmates increases. While anti-obesity law's relationship with educational attainment of obese students seems counterintuitive given its opposite relationship with social stigma, it is not unreasonable that more social stigma might prompt a positive academic response, and more social acceptance might prompt a negative academic response.[119] For example, a higher level of stigma could mean fewer social activities and instead, more time to devote to academics.

Though these findings have mixed policy implications, they remain important dimensions when evaluating optimal legal rules. First, the data show that an anti-obesity law can shift norms and further stigmatize obese girls in school, in terms of poorer social acceptance, fewer friends, or worse social status. However, the social stigma does not necessarily translate to worse educational outcomes. In the data, stigma may be inversely related with educational attainment. If an initial goal of anti-obesity law was to promote healthier behaviors for economic purposes, then the law could also be beneficial if educational attainment improves, given that more education improves wage outcomes[120] as well as health outcomes.[121] On the other hand, other mechanisms may be at play so that social stigma at school could be less relevant to college attendance.

This does not rule out the idea that obesity stigma in adolescence could affect one's future well-being in ways unrelated to college attendance. Psychological stress and bullying, including those associated with weight stigma, might leave lasting impressions into adulthood.[122] Moreover, laws expressing values against obesity could also encourage negative perceptions that persist over time, which would do little to lessen the discrimination that obese people already face in society and the stress that accompanies it.[123] In these cases, implementing anti-bullying legislation to acknowledge weight-based harassment of children, or anti-discrimination laws that discourage

119. *See, e.g.*, Robert Crosnoe & Chandra Muller, *Body Mass Index, Academic Achievement, and School Context: Examining the Educational Experiences of Adolescent at Risk of Obesity*, 45 J. HEALTH & SOC. BEHAV. 393 (2004); King-To Yeung & John Levi Martin, *The Looking Glass Self: An Empirical Test and Elaboration*, 81 SOC. FORCES 843 (2003).

120. *See generally* David Card, *The Causal Effect of Education on Earnings*, *in* 3 HANDBOOK OF LABOR ECONOMICS 1801–63 (Orley Ashenfelter & David Card eds. 1999).

121. *See* David M. Cutler & Adriana Lleras-Muney, *Education and Health: Evaluating Theories and Evidence* (Nat'l Bureau of Econs. Research, Working Paper No.12352, 2006).

122. *See, e.g.*, Stephen Allison et al., *Does School Bullying Affect Adult Health? Population Survey of Health-Related Quality of Life and Past Victimization*, 43 AUSTL. & N.Z. J. PSYCHIATRY 1163 (2009); Gemma L. Gladstone et al., *Do Bullied Children Become Anxious and Depressed Adults?: A Cross-Sectional Investigation of the Correlates of Bullying and Anxious Depression*, 194 J. NERVOUS & MENTAL DISEASE 201 (2006).

123. *Cf.* Puhl & Heuer, *supra* note 3.

weight-based discrimination may be appropriate policy responses to temper the unintended social norm effects of anti-obesity laws intended to improve public health. Still, whether or not the law's social norm effects translate into wage inequalities and long-term health problems and what to do about it remain open questions that deserve full investigation beyond the scope of this Article. Further work is needed to better understand the long-term consequences of obesity laws and stigma.

V. CONCLUSION

This Article applies an expressive law and economic framework to analyze timely concerns about the consequences of obesity laws on obesity stigma. I find empirical evidence linking stricter anti-obesity laws with worse obesity stigma, supporting the legal theory that laws shift social norms and generate stigma by expressing values beyond their original incentive effects. These analyses and results contribute much-needed evidence to an area where legal theory is rich but few empirical studies exist.

Using a unique dataset of social networks in schools, I find that where dietary education laws are stricter, social stigma increases for the remaining obese girls, though obesity rates do not decrease. Moreover, pre-existing norms are important; I find that the law's expressive role in obesity stigma can vary by pre-existing peer norms, where being surrounded by more white or being surrounded by more obese peers can lessen the social stigma from anti-obesity law. I also find that efforts to engage in healthier behaviors are slightly greater under more demanding dietary education mandates, though obesity itself does not decrease. Together, these results are consistent with a basic economic model of obesity stigma in which the obese, under anti-obesity laws that emphasize responsible individual health choices, are negatively perceived as exerting less effort in their health.

Several insights from this analysis would benefit from further discussion. This Article has focused on adolescent obesity stigma associated with state dietary behaviors and nutrition education mandates, which are useful in testing for expressive effects of the law generally. There is much room for research on the long-term consequences of this stigma, as well as developing and testing additional theories of how social norms might shift, beyond those discussed in this Article. While this Article has explored the relationship and pathways between stigma and laws in detail, obtaining rigorous causal estimates, ideally through randomized experiments or natural experiments, would be the next step for evidence-based policymaking.

Importantly, a basic lesson from these results is that a law's social norm interactions with vulnerable subgroups, such as obese women, can be very real and warrant further examination by policymakers. That a law's stigma consequences might vary by peer types or pre-existing norms suggests how complex the interactions can be between laws and pre-existing norms, cultural or otherwise. Policymakers should more seriously consider the expressive function of public health laws, the populations at stake, and the unintended outcomes that such laws may produce.

APPENDIX

Table 1
Summary Statistics

Variable	Mean	St. Dev.	Min.	Max.	N
BMI	22.202	4.712	13.332	46.934	1131
Obese	0.099	0.299	0	1	1131
Overweight	0.157	0.364	0	1	1131
Normal weight	0.699	0.459	0	1	1131
Underweight	0.045	0.208	0	1	1131
White	0.774	0.418	0	1	1131
Black	0.075	0.263	0	1	1131
Hispanic	0.084	0.278	0	1	1131
Asian	0.051	0.22	0	1	1131
Other race	0.016	0.124	0	1	1131
Age	14.672	1.72	11	21	1131
Parent's years of education	13.96	2.293	8	18	1131
Family income (thousands)	47.534	28.222	0	230	1131
Parent married	0.787	0.388	0	1	1131
Northeast	0.125	0.33	0	1	1131
West	0.243	0.429	0	1	1131
Midwest	0.467	0.499	0	1	1131
South	0.165	0.371	0	1	1131
Urban school	0.755	0.431	0	1	1131
Private school	0.245	0.431	0	1	1131

Large school	0.416	0.493	0	1	1131
School size	532.437	546.114	30	1744	805
% white in school	0.701	0.307	0	0.952	1131
% white in cohort in school	0.708	0.321	0	1	1123
% obese in cohort in school	0.099	0.07	0	0.5	1131
Number of students whom respondent named as her friend	5.229	2.702	0	10	805
Number of students naming respondent as friend	5.647	3.821	0	23	805
Proximity prestige	0.225	0.126	0.001	0.774	755
Feel socially accepted	4.007	0.802	1	5	1128
Years of education (Wave 3)	13.109	1.719	7	19	1130
Attended college (Wave 3)	0.615	0.487	0	1	1130
Earned high school diploma (Wave 3)	0.821	0.384	0	1	1130

Table 2.
Relationship between Obesity Law and Stigma of Obese Adolescent Girls

Dependent Variable	Social Acceptance	Number of friends (in)	Number of friends (out)	Proximity Prestige
	(1)	(2)	(3)	(4)
Dietary Behaviors & Nutrition Education Law* Obese	-0.467*	1.160	-0.217	0.131
	(0.194)	(1.436)	(1.344)	(0.0790)
Dietary Behaviors & Nutrition Education Law	-0.0225	-1.536	-1.185	-0.132
	(0.198)	(1.409)	(0.792)	(0.106)
Obese	0.00947	-2.969*	0.589	-0.136+
	(0.178)	(1.446)	(1.265)	(0.0788)
Black	0.306**	1.006**	-0.510	0.0806*
	(0.0961)	(0.329)	(0.377)	(0.0328)
Hispanic	-0.0718	3.681**	0.313	0.107**
	(0.167)	(0.814)	(0.594)	(0.0322)
Asian	0.178	2.861**	-0.104	0.0841**
	(0.110)	(0.507)	(0.456)	(0.0262)
Other Race	0.408**	5.253**	0.831**	0.0248**
	(0.122)	(0.756)	(0.254)	(0.00745)
Age	-0.0381	-0.494**	-0.247	0.00264
	(0.0655)	(0.177)	(0.230)	(0.00568)
Parental Education	-0.0453*	0.377**	0.0435	0.00564*
	(0.0183)	(0.0942)	(0.0289)	(0.00240)
Family Income	0.00179	-0.00482	0.0108*	0.000120
	(0.00116)	(0.00552)	(0.00437)	(0.000207)
Parents are Married	0.0263	-0.661	-0.105	0.00252
	(0.103)	(0.499)	(0.421)	(0.0191)
Cohort 1	0	5.767**	-1.309	0
	(.)	(2.134)	(1.303)	(.)
Cohort 2	-0.239	0	0	-0.0676
	(0.336)	(.)	(.)	(0.0836)
Cohort 3	-0.401	1.336**	0.0403	-0.0231
	(0.243)	(0.438)	(0.660)	(0.0910)
Cohort 4	-0.302	2.222*	-0.459	-0.105
	(0.254)	(0.927)	(1.122)	(0.0712)
Cohort 5	-0.391+	1.892+	-0.410	-0.108
	(0.214)	(1.056)	(1.371)	(0.0700)
Cohort 6	-0.227	2.724**	-0.742	-0.106
	(0.260)	(0.989)	(1.190)	(0.0652)
Cohort 7	-0.335	2.887*	-0.454	-0.102
	(0.335)	(1.288)	(1.703)	(0.0630)
West	0.0224	-7.773**	-4.203**	-0.334**
	(0.270)	(1.506)	(1.109)	(0.116)
Midwest	0.282+	-1.174**	-1.255**	-0.0230
	(0.152)	(0.217)	(0.223)	(0.0257)
South	-0.0840	-0.356+	-2.343**	0.00816
	(0.123)	(0.197)	(0.218)	(0.0214)
Urban School	-0.521**	2.328**	0.682*	0.126**
	(0.177)	(0.358)	(0.265)	(0.0334)
Large school	-0.00341	0.728	0.853	-0.0748+
	(0.221)	(0.749)	(0.819)	(0.0396)
Constant	5.621**	7.001**	9.540**	0.273

	(1.105)	(2.000)	(2.981)	(0.227)
R-squared	0.107	0.264	0.187	0.570
Observations	999	692	692	646

**1%; *5%; +10% significance. Robust standard errors are clustered by school and are shown in parentheses. All estimates use longitudinal survey weights and adjust for stratified sampling according to region.

Table 3
Robustness Checks for the Influence of Obesity Laws on Obesity Stigma: The Influence of Dietary Behaviors & Nutrition Education Laws on Social Acceptance

	Dependent variable: Social Acceptance				
	(1)	(2)	(3)	(4)	(5)
Dietary Behaviors & Nutrition Education Law*Obesity	-0.449** (0.102)	-0.467* (0.194)	-0.533* (0.236)	-0.452* (0.197)	-0.0549** (0.0180)
Obesity measure	Dummy	Dummy	Dummy	Dummy	BMI
Include school covariates and cohorts?	No	Yes	Yes	Yes	Yes
Control for Tax?	No	No	Yes	No	No
Control for % Obese in School?	No	No	No	Yes	No
R-squared	0.056	0.107	0.112	0.108	0.111
N	999	999	999	999	999

**1%; *5%; +10% significance. Coefficients shown are on state laws interacted with obesity during Wave 1 (1994–1995). Robust standard errors are clustered by school and are in parentheses. Regressions include controls for race, age, parental years of education, family income, marital status of parental respondent, and flags for imputed values of the latter three. "Tax" refers to the state cigarette tax rate as of 1995. School covariates include school size, public or private status, urbanicity, region, and cohort indicators.

Table 4
Relationship between Cigarette Taxes and Stigma of Obese Adolescent Girls

Dependent variable	Social Acceptance	Number of friends (in)	Number of friends (out)	Proximity Prestige
	(1)	(2)	(3)	(4)
Cigarette Tax*BMI	0.000582+	0.000756	0.00162	-0.0000247
	(0.000319)	(0.00214)	(0.00158)	(0.0000350)
Cigarette Tax	-0.0153*	-0.0885	-0.0803+	-0.00346
	(0.00756)	(0.0604)	(0.0468)	(0.00276)
BMI	-0.0258+	-0.147*	-0.0441	-0.00121
	(0.0143)	(0.0658)	(0.0416)	(0.00115)
Black	0.208+	-0.521	-0.604	0.0343
	(0.124)	(0.491)	(0.396)	(0.0396)
Hispanic	0.0524	0.980	0.432	0.0415
	(0.178)	(1.207)	(0.366)	(0.0363)
Asian	0.207+	0.543	-0.173	0.0330
	(0.112)	(1.200)	(0.423)	(0.0557)
Other Race	0.428**	5.273**	0.726**	0.0273**
	(0.127)	(0.602)	(0.265)	(0.00561)
Age	-0.0468	-0.491**	-0.308*	-0.00382
	(0.0616)	(0.168)	(0.152)	(0.00387)
Parental Education	-0.0195	0.122	-0.0157	-0.00281
	(0.0257)	(0.149)	(0.0535)	(0.00532)
Family Income	0.00147+	0.00728	0.00754	0.000444+
	(0.000837)	(0.00800)	(0.00513)	(0.000242)
Parents are Married	-0.0362	-1.085*	-0.153	-0.0190
	(0.0894)	(0.501)	(0.323)	(0.0124)
Cohort 1	0	0	0	0.0426
	(.)	(.)	(.)	(0.0359)
Cohort 2	-0.0571	-4.293**	0.0984	-0.0211
	(0.359)	(1.238)	(0.986)	(0.0302)
Cohort 3	-0.199	-2.666*	0.417	0.0296
	(0.295)	(1.079)	(1.017)	(0.0305)
Cohort 4	-0.140	-1.680	0.751	-0.0199
	(0.250)	(1.102)	(0.690)	(0.0142)
Cohort 5	-0.185	-2.324*	0.828	-0.0271*
	(0.224)	(1.053)	(0.738)	(0.0106)
Cohort 6	-0.0535	-1.786	0.483	-0.0204*
	(0.228)	(1.152)	(0.672)	(0.00954)
Cohort 7	-0.122	-1.274	0.754	0
	(0.266)	(1.202)	(1.027)	(.)

West	-0.126	-1.157	-1.372**	0.00445
	(0.142)	(1.127)	(0.510)	(0.0558)
Midwest	0.106	0.257	-0.293	0.0739
	(0.0944)	(0.921)	(0.676)	(0.0653)
South	0.119	-2.108*	-2.165**	-0.146+
	(0.120)	(0.966)	(0.716)	(0.0849)
Urban School	0	2.340**	1.876**	0.153*
	(.)	(0.689)	(0.502)	(0.0643)
Private School	0.208			
	(0.127)			
Large school	-0.0871	-1.581+	-1.359**	-0.234**
	(0.179)	(0.857)	(0.496)	(0.0762)
Constant	5.591**	18.49**	11.29**	0.426*
	(1.485)	(3.613)	(2.625)	(0.167)
R-squared	0.067	0.202	0.149	0.487
Observations	1127	805	805	755

**1%; *5%; +10% significance. Robust standard errors are clustered by school and are shown in parentheses. All estimates use longitudinal survey weights and adjust for stratified sampling according to region.

Table 5
Relationship between Obesity Laws and Effort

	Number of Days Last Week Ate Breakfast		Physically fit	
	(1)	(2)	(3)	(4)
Dietary Behaviors & Nutrition Education Law	1.920**	2.135**	0.0128	-0.0536
	(0.477)	(0.392)	(0.0725)	(0.0344)
Control for Cigarette Tax?	N	Y	N	Y
R-squared	0.122	0.124	0.072	0.076
N	1023	1023	1021	1021

Table 6
Relationship between Obesity Laws and Obesity Probability

	Obese, 1994-1995		Obese, 1996	
	(1)	(2)	(3)	(4)
Dietary Behaviors & Nutrition Education Law	0.0633	0.126*	0.0268	0.103
	(0.106)	(0.0530)	(0.133)	(0.0756)
Cigarette Tax		0.00377*		0.00449*
		(0.00166)		(0.00212)
R-squared	0.038	0.048	0.050	0.061
N	1983	1983	1020	1020

**1%; *5%; +10% significance. Coefficients shown are on state dietary behaviors and nutrition education policies and state cigarette tax rates. Robust standard errors are clustered by school and are shown in parentheses. All regressions include controls for race, age, parental years of education, family income, marital status of parental respondent, and flags for imputed values of the latter three. School covariates include school size, public or private status, urbanicity, and region. Data are from the Add Health saturated sample and are restricted to women. All estimates use longitudinal survey weights and adjust for stratified sampling according to region.

Table 7
Do Influences of Dietary Behaviors & Nutrition Education Law on Obesity Stigma Vary by Pre-Existing Norms?

	(1) Socially Accepted	(2) Number of Friends (in)	(3) Number of Friends (out)	(4) Proximity Prestige
Law*Obese	0.667	-10.91*	-20.28*	-0.239
	(0.484)	(5.249)	(9.761)	(0.182)
Law*Obese*%White	-1.352	16.19**	15.21+	0.580**
	(0.956)	(4.493)	(8.467)	(0.111)
Obese*%White	0.166	-3.315**	-3.646**	-0.194**
	(0.480)	(1.130)	(0.434)	(0.0147)
Law*Obese*%Obese	-0.164	-18.07	73.40*	-0.711
	(3.937)	(14.94)	(30.53)	(0.865)
Obese*%Obese	2.193	11.26	6.395+	1.535**
	(1.996)	(7.463)	(3.792)	(0.143)
Obese	-0.322	-1.976*	1.952**	-0.206**
	(0.290)	(0.897)	(0.442)	(0.0188)
Law	-1.402**	0.779	-0.183	0.0499
	(0.462)	(5.224)	(3.540)	(0.219)
% White	-0.925*	1.142	0.895	0.0203
	(0.407)	(4.116)	(3.567)	(0.124)
Law*%White	1.559**	-2.575	-2.143	-0.286
	(0.501)	(5.398)	(3.861)	(0.191)
%Obese	-1.742	-20.89**	-12.78**	-1.728**
	(1.766)	(2.622)	(2.427)	(0.159)
Law*%Obese	1.970	7.091	10.50**	1.674**
	(2.051)	(6.322)	(3.120)	(0.280)
R-squared	0.130	0.301	0.226	0.697
N	994	691	691	645

**1%; *5%; +10% significance. "Law" is a dummy variable for whether the state requires dietary behaviors & nutrition education.

Table 8
Obesity Law's stigma roles in educational attainment

Dependent variable	Years of Education		Attended College		High School Diploma	
	(1)	(2)	(4)	(5)	(7)	(8)
Cohort Measure	% white	% obese	% white	% obese	% white	% obese
Law*Obese*Cohort	-0.881	9.362	-1.010*	-2.222+	-0.725*	1.462
	(0.652)	(6.076)	(0.399)	(1.244)	(0.326)	(1.327)
Law*Obese	1.054*	-0.815	0.554*	0.216	0.523*	-0.184
	(0.464)	(0.796)	(0.245)	(0.140)	(0.225)	(0.191)
Obese*Cohort	-0.209	-2.065	0.385**	1.185**	0.140	-0.612
	(0.352)	(3.808)	(0.107)	(0.346)	(0.129)	(0.419)
Law*Cohort	1.272	-2.802	0.673**	-0.193	1.258**	-0.118
	(1.010)	(3.226)	(0.250)	(0.741)	(0.292)	(0.441)
Law	-1.529+	-0.607	-0.515*	-0.0274	-1.377**	-0.372*
	(0.922)	(0.597)	(0.214)	(0.194)	(0.257)	(0.170)
Obese	-0.443**	-0.305	-0.0977+	-0.189*	-0.100	0.0180
	(0.130)	(0.520)	(0.0535)	(0.0735)	(0.0618)	(0.0677)
Cohort	-1.887*	1.546	-0.529**	0.331	-0.616**	0.531**
	(0.872)	(2.449)	(0.196)	(0.227)	(0.164)	(0.202)
R-squared	0.247	0.239	0.230	0.224	0.342	0.311
N	996	1001	996	1001	996	1001

Table 9
State Anti-Obesity Laws and Cigarette Excise Tax Rates

State	Tax (cents per pack)	Dietary Behaviors & Nutrition Education Required?
Alabama	16.5	Yes
Alaska	29	
Arizona	58	
Arkansas	31.5	Yes
California	37	
Colorado	20	
Connecticut	50	
Delaware	24	Yes
District of Columbia	65	
Florida	33.9	Yes
Georgia	12	Yes
Hawaii	60	Yes
Idaho	28	
Illinois	44	Yes
Indiana	15.5	Yes
Iowa	36	Yes
Kansas	24	Yes
Kentucky	3	
Louisiana	20	
Maine	37	
Maryland	36	Yes
Massachusetts	51	
Michigan	75	
Minnesota	48	Yes
Mississippi	18	Yes
Missouri	17	Yes
Montana	18	Yes
Nebraska	34	
Nevada	35	Yes
New Hampshire	25	Yes
New Jersey	40	
New Mexico	21	
New York	56	Yes

North Carolina	5	Yes
North Dakota	44	
Ohio	24	Yes
Oklahoma	23	
Oregon	38	
Pennsylvania	31	Yes
Rhode Island	61	Yes
South Carolina	7	Yes
South Dakota	33	
Tennessee	13	Yes
Texas	41	Yes
Utah	26.5	
Vermont	44	Yes
Virginia	2.5	Yes
Washington	81.5	
West Virginia	17	Yes
Wisconsin	44	Yes
Wyoming	12	Yes
State average	32.7	
Federal excise tax	24	
Combined federal and state average	56.7	