



Risk is for the rich? Childhood vaccination resistance and a Culture of Health



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ARTICLE INFO

Article history:

Received 27 August 2015

Received in revised form

28 June 2016

Accepted 11 July 2016

Available online 20 July 2016

Keywords:

Culture

Risk

Childhood vaccination

Solidarity

Inequality

ABSTRACT

Childhood vaccination resistance has given rise to outbreaks of diseases, which had been virtually eliminated in the developed world. A parent's decision to forego vaccination for their child is a private choice that can have collective outcomes. This article takes a two-pronged approach to unraveling the puzzle of perceiving vaccines as dangerous in view of evidence that testifies to their effectiveness and relative safety. First, it draws on fifty-seven years of newspaper articles on vaccines to outline the public narratives. Second, it uses school-level data from New York and California to explore how these public narratives shape a geography of vaccination rates. We have two main findings. First, we find that while risk has always been a feature of vaccine narratives, the perception that the risks of vaccines outweigh the benefits has grown. By the millennium, some began to view medical treatments as sources of risk rather than cure. Second, our geography of childhood vaccination reveals two distinct vaccine worlds. Affluence governs one world. Poverty governs the other. The geographic locales where vaccination rates are low enable us to contrast the difference between imagining risk, the prerogative of the affluent, and being at risk, the fate of the poor. Vaccination resistance speaks directly to a Culture of Health as it poses questions about the collective perception of risk and its relation to social inequality and solidarity.

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1. Childhood vaccination: more than a private choice

During the 2014 holiday season, an outbreak of measles occurred in California that originated at two Disneyland theme parks. Holiday tourist travel, coupled with the appearance of a childhood disease that was generally considered eliminated, drew the attention of the news media. The “Disneyland outbreak” resulted in 125 infected persons and 17 hospitalizations. Of the California residents who contracted measles, forty-five percent were not vaccinated. Of the vaccine-eligible patients, sixty-seven percent were not vaccinated because their parents had invoked “personal beliefs” (CDCa, 2015). This “Disneyland outbreak” is further notable because it followed on the heels of an unprecedented increase in rates of pertussis (whooping cough), which by November 2014 had reached epidemic levels in California (CDPH, 2014).

Vaccination against measles and pertussis are two of thirteen early childhood vaccines that the Center for Disease Control (CDC,

2016) and the American Academy of Pediatrics recommend. The holiday outbreak generated an extensive public discussion on parental resistance to childhood vaccination – a resistance that extends beyond California to the entire United States (Blume, 2006) and is not strictly a contemporary phenomenon. Scholars (Baldwin, 1999; Offit, 2011; Halpern, 2004) have located historical resistance to vaccines in nineteenth century Europe as states began to mandate various vaccinations.

This resistance is puzzling in light of scientific and clinical evidence that continues to confirm the relative safety of childhood vaccines. In the United States, since the late 1970s, the Institute of Medicine (IOM) – an arm of the National Academies, the official scientific advisory board to the United States’ federal government – has conducted over sixty investigations into the safety of vaccinations, a scientific effort that was motivated by emerging public concerns about toxins in vaccines. Using an IOM (2011) report on “adverse effects” of vaccines as their starting point, Maglione et al. (2014) systematically reviewed scientific studies of vaccine safety from 2010 through 2013 and corroborated the medical community’s claim that “adverse effects” were “extremely rare.” The IOM (IOM, 2004) published a landmark study that specifically addressed the issue of vaccines and autism. They argued that parents who

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resisted vaccinating their children did not fully understand the concepts of absolute risk and relative risk as they related to vaccinations and medicine more broadly. The 2004 IOM study recommended that, “Many scientists need to develop a more comprehensive understanding of what a risk-benefit communication entails (IOM, 2004, p.17). In a later study, the IOM reported evidence that reinforced its earlier findings that childhood vaccinations were safe and effective (IOM, 2013). The IOM (2013, p. 135) concluded that “there is no scientific evidence to justify the majority of safety concerns, *perceptions* [emphasis added] dictate parental support and actions.”

Vaccination is a social as well as medical act. Parental decisions about childhood vaccination differ from most other medical decisions in that they are more than private choices. Vaccines work even among those who are not personally vaccinated because the biological phenomenon of herd immunity lowers disease transmission rates in a given population and minimizes the incidence of disease. Given this biological mechanism, an individual's decision to vaccinate becomes a decision that affects the entire community. Thus, parental resistance to childhood vaccination poses sociological questions about the collective perception of risk and its relation to community health and inequality. This article uses the term resistance to incorporate both active and passive non-vaccination (Nichter, 1995). Parental resistance to childhood vaccination is an ideal analytic location for thinking about conditions for and obstacles to developing a mutually enabling and solidaristic approach to health that recognizes its collective and cultural dimensions.

This article takes a diachronic and synchronic approach to unraveling this puzzle of resistance to a relatively safe and effective treatment against disease. First, it traces mainstream print media coverage of childhood vaccines to identify available public narratives, which reflect understandings of childhood vaccination. Until the relatively recent shift to social media, newspapers were a major source of public information regarding science and medical progress. Second, it maps vaccine resistance at the state and local level to show how the interaction of public narratives and private choices affect community-level vaccination rates.

The two data sets constructed for this article explore the public narratives and community-level practices of vaccine perceptions in relation to each other. First, we use computational text data analysis techniques to identify 115 articles about the risks of childhood diseases and vaccines from 1955 to 2012. Second, we use elementary school vaccination rates in California and New York to analyze a geography of vaccine resistance, which permits us to describe the community characteristics of areas where childhood vaccination rates are lower than herd immunity would require.

The combined narrative and demographic data pinpoint temporal and spatial fault lines in the perceptions of vaccines and enable speculation on the broader meanings of the geographic data. Our article aims at an overview of salient issues that inform vaccine non-compliance. Our contribution lies in its broad sweep, which allows us to identify aspects of collective perceptual change and community-level choice outcomes. These identifications are important for understanding the culture of risk perception from which vaccine resistance has emerged and for thinking about future public health and state interventions in the vaccine process. This overview also points to several possible directions for future research on a Culture of Health.

In what follows, we first develop a conceptual link between vaccines and a Culture of Health. Second, we describe how vaccine narratives shift over time, reflecting public knowledge and perceptions. We then analyze a geography of vaccine non-compliance and explore the implications. Lastly, we tie the two strands together and locate the social consequences of vaccine resistance in a broader cultural narrative of risk and society.

2. Conceptualizing a Culture of Health through the lens of vaccine resistance

Meaning is constitutive of culture. Geertz (1973) argues that culture is a “template of and for reality”—suggesting that culture is a recognizable model as well as a guide to action. Shared practices (Bourdieu, 1977) mutually re-enforce this template. A Culture of Health requires developing new health templates based on a community of shared meanings and practices in which members understand and act on the understanding that “we are all in this together” (Plough and Trujillo, 2016). A Culture of Health aspires to a public understanding of health as a collective responsibility rather than an aggregate of individual choices. Mutuality and social solidarity are terms that social scientists use to describe collective sentiments of belonging and reciprocity among members of a group that institutional arrangements hold together. Citizenship, for example, and the institutional arrangements it entails provides a model for action as a member of a national state. This example from political sociology describes how a sense of mutuality can be inscribed in institutions (Somers, 1993). Previous work by social scientists (e.g., essays in Hall and Lamont, 2009) recognizes the role that mutuality plays in developing healthy and successful societies.

Vaccination in particular, as a cultural and institutional practice, is an important component of a healthy society where we might expect this sense of mutuality. Vaccines work on the principle of herd immunity, which is the threshold level in a population where a sufficient number of people are vaccinated so as to reduce the risk of the spread of the disease in the population (Fine et al., 2011). The physical phenomenon of herd immunity is collective and social, as well as biological, because it creates a community of safety from disease. Resistance to vaccination among members of a community, then, is a form of free riding, which is the opposite of mutuality and solidarity. As economists describe the free rider problem, those who do not want to vaccinate can benefit from the protection that their vaccinated neighbors provide. If a population has reached the level of herd immunity, an infected non-vaccinated person could enter the population without risk to themselves or others. A problem occurs when vaccination rates fall below the recommended rates for herd immunity. For example, during the 2014–2015 school year, thirty-eight percent of schools in the state of California fell below herd immunity within their student bodies for pertussis, which requires that ninety-four percent of the population is vaccinated (CDPH IB, 2014).

Parents who do not vaccinate their children formulate their choice in terms of individual risk, not as a rejection of mutuality (Yaqub et al., 2014). Still, mutuality and risk are linked. Anthropologists (e.g. Nichter, 1995; Streefland, 2001) show that local cultures determine how individuals conceive of vaccine risk. Streefland (2001) describes one process by which resistance can develop – scientific discussions of relative risks can trigger doubts, which the media spreads. Our newspaper data analysis (presented below) suggests that even consistently supportive expert discussion can trigger this process. Doubt can surface among parents who make connections on their own between medical episodes and vaccines. Slovic's (1987, 2010) research provides insight into this by documenting the disparity between the feeling of risk and the real risks associated with different medical treatments and life contingencies. In the case of childhood vaccination, perception of risk is disproportionate to the actual risks involved.

The concept of risk is “good to think” with about vaccine resistance, since it enables analysis at both the collective or “population” as well as individual level (Panter-Brick, 2014). For example, sociologists (Beck, 1992; Giddens, 1990) theorize that the burden of risk in contemporary society has shifted from the societal or state level

to the individual. This devolution of risk downwards creates social inequality based on the differential resources that individuals have available to deploy towards their individual security in areas such as housing, food, the environment, and health.

The devolution of risk to the individual requires a way of thinking about decision processes more generally. Coleman's, (1990: 91–108) theory of trust provides a framework for such thinking, which unites risk to temporality. Coleman argues that trust is a “bet on the future” that individuals place with respect to knowledge that they have about the past. Trust is a judgment that individuals make about actions and future outcomes. All actions have a degree of uncertainty built into them. Accident as a concept acknowledges the uncertainty that underlies even routine situations. In Coleman's view, trust and risk are directly proportional to each other. Generalized trust informs actions that individuals and collectivities repeat day after day because they involve low risk. Misplaced trust and increased risk result from the failure to give adequate time to decision making in conditions of novelty (pp. 91–108). Individuals assume that the plane will stay in the air, that the restaurant worker will not poison their lunch. Temporality and past experience intersect in these choices—deciding to take the plane or to eat the food, involves non-conscious weighing of risks and benefits. Individuals trust institutions and social actors to repeat past safe performances.

Following Coleman, it can be argued that different expectations of the future as well as different cultures of risk assessment, characterize the world of vaccine resistance. Decisions about vaccination often reveal individual or group conceptions of future outcomes and generalized social trust. For example, the thinking that “I will not vaccinate my child because I believe that vaccines increase the risk of autism” and the thinking “I will not vaccinate my child because I do not trust ‘big pharma,’ which is subsidized by ‘big government’” are categorically different claims. However, both claims envision a safe future if one avoids vaccination, even if the reasons given for avoidance are different. Parents who do not vaccinate because they lack resources or access to medical providers have a relatively diminished perception of their futures.

Public narratives that encourage individuals to understand the mutuality of health are an essential component of a Culture of Health. Altering public perception is difficult. “New” cultural meanings and practices emerge more easily to the extent that they resonate with practices and beliefs that individuals already hold, and this is no less true for vaccination practices (Kahan, 2013; Nyhan et al., 2014; Streefland, 2001). Public narratives fall on deaf ears if individuals do not recognize the meaning that the story communicates (Kahan, 2013; Nyhan et al., 2014; Polletta and Lee, 2006; Schudson 1989). Experience, the point where personal and collective biography interacts with personal and collective history, is the cultural space where recognition occurs. Childhood vaccination and parental resistance to it expose the challenges and opportunities that confront a Culture of Health. They refract the points where sentiments of mutuality and public vaccine narratives intersect understandings of health as a collective good or individual choice.

3. The public narrative of childhood vaccination

Vaccination narratives located in mainstream media are bellwethers of public perceptions of risk as it relates to health, disease, and science. To measure the content of these narratives and their variation over time, we identified a saturation sample of newspaper articles from 1/1/1955 through 12/31/2012. We selected this time period for substantive and practical reasons. Jonas Salk's polio vaccine became available to the public in 1955 and ushered in a new era in childhood vaccination. Our data source, ProQuest's historical newspaper database, which includes *The Boston Globe*,

Chicago Defender, *Chicago Tribune*, *Los Angeles Times*, *New York Amsterdam News*, *The New York Times*, *Pittsburgh Courier*, *The Wall Street Journal*, and *The Washington Post*, contains only articles published through 2012.

We collected all articles classified by ProQuest as “articles” or “commentary” that contained derivations of the word “vaccine” in the article title, which resulted in 6876 articles. We narrowed the set of articles in two steps; first, by identifying articles that were primarily about childhood vaccination and second by identifying those that discussed “risk.” This resulted in 115 articles, which we manually coded according to eight themes. Most articles contained more than one of the following themes: (1) Risk from vaccines themselves; (2) Risk of vaccines outweighing risk of disease, especially as the risk of disease becomes unfamiliar; (3) Weighing of risks and benefits of vaccines, or the benefits of vaccines; (4) Social risk of non-immunization; (5) Parental resistance/lawsuits; (6); Media/popular culture (7) Expert/state support; (8) Expert/state hesitation. We used computational text analysis methods to automatically narrow in on the relevant set of 115 articles used for analysis. See Supplementary Tables 1A and 1B for details on the computational procedures as well as a summary of the codes and example quotations from articles for an illustration of each theme.

Drawing upon historical (Colgrove, 2006; Conis, 2015) and practitioner (Offit, 2011) accounts, the remainder of this section aims to tease out the salient factors that influenced the public narratives reflected in the newspaper data. In the 1950s, polio was the most visible, disabling, and deadly disease that threatened the post-war baby boom generation (Oshinsky, 2005). When the first mass-marketed polio vaccine became available in 1955, the American public treated Jonas Salk, its developer, as a hero. The public perceived the vaccine as a lifesaver, even though some children likely contracted polio from the vaccine itself. In 1961, the Albert Sabin oral polio vaccine became available. After Salk and Sabin, childhood vaccination became routine in the United States. The success of the polio vaccine opened the door to other new vaccines to combat childhood diseases. Between 1967 and 1971, the MMR (measles, mumps, and rubella) vaccine was developed, followed in 1982 by the vaccine against Hepatitis B. In the 1990s, the Hepatitis B vaccine was combined with the pertussis vaccine. In 1995, a vaccine was developed against varicella (chicken pox) (IOM, 2004, Appendix D). As a result of the success of these vaccines at reducing incidents of disease, the post “baby boom” generations grew up relatively free from traditional childhood diseases (Colgrove, 2006). This allowed for a shift in a focus on the risk of diseases to a focus on the risks of the vaccines. This shift from vaccines being a source of security to a source of risk is reflected in the newspaper data.

Fig. 1 shows the relative prevalence of our eight themes during ten-year time segments (the first and last periods have six and twelve years, respectively). That is, the figure shows the percent of articles in a given time period containing a given theme. Most articles were coded with more than one theme, thus the percentages do not sum to 100.

Panel A of Fig. 1 identifies three themes related to different notions of risk. The shift in focus from the risk of disease to the risk of vaccines is reflected in the shift in relative prevalence of themes 2 and 3. Theme 2 measures discussions of the risk of vaccines outweighing the risk of disease. This theme increasingly becomes more prevalent in later time periods, as experiences with childhood diseases declined. Theme 3 measures discussions of the benefits of vaccines, even despite potential adverse effects. This theme steadily decreases, as the perceived adverse effects of vaccines loom larger in the face of the risks of disease appearing more minimal. This narrative shift is complete in the 1990s, when there is a greater percent of articles discussing the risks of vaccines outweighing the

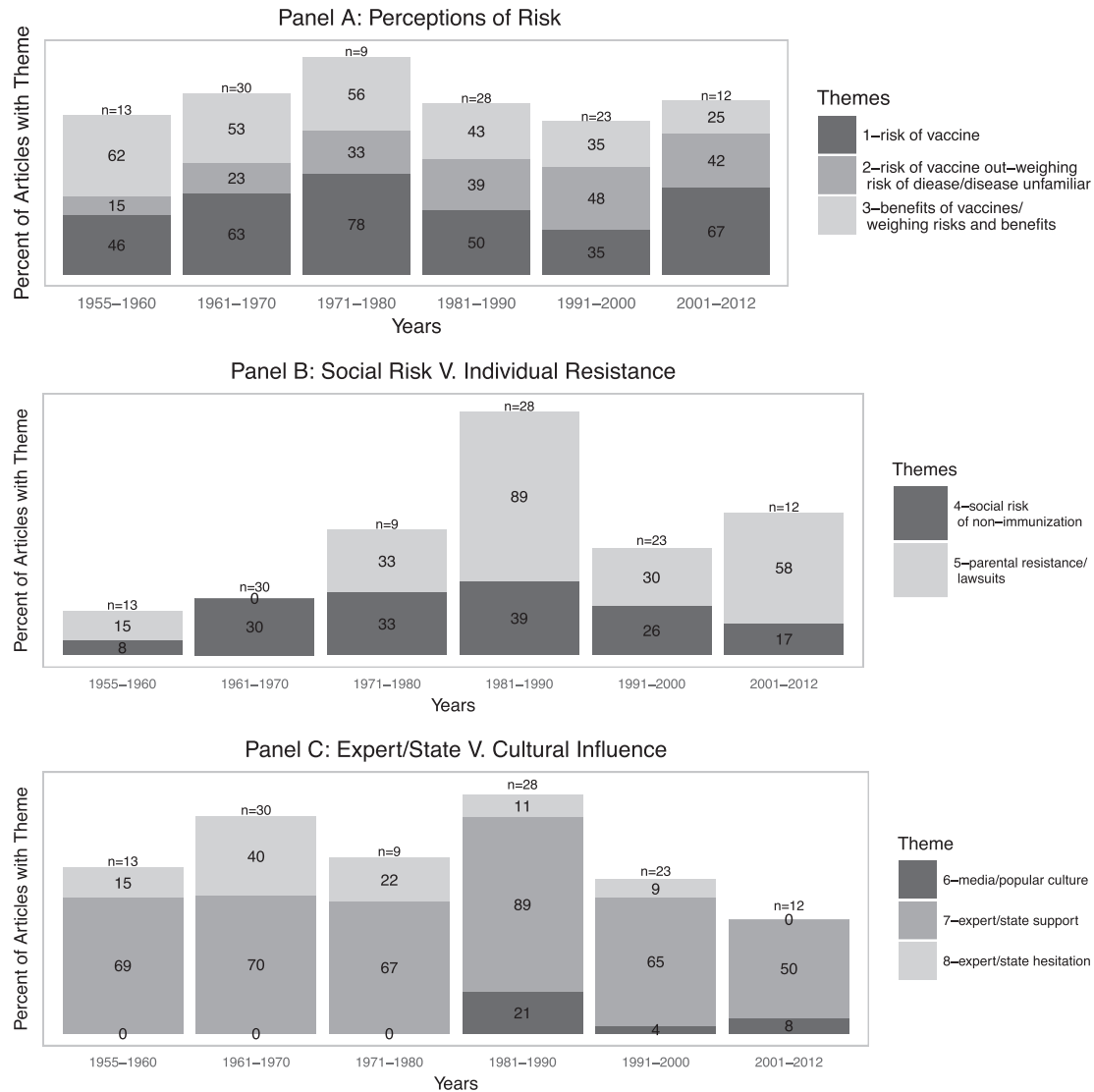


Fig. 1. Relative prevalence of themes over time.

risks of disease (theme 2) compared to discussions of the benefits of vaccines (theme 3). Further, from the beginning of the 2000s, less nuanced discussions of just the risks of vaccines (without reference to the risks of disease) – theme 1—dominates the narrative. However, it is notable that the risks or side effects of vaccines has been a substantial part of the narrative across the entire time period (theme 1). This is balanced by discussions of vaccine benefits (theme 3) only in the earlier time periods.

In addition to shifts in perceptions of risk, there was also a shift in the locus of responsibility and authority. In 1976, the American Congress passed the National Health Information and Health Promotion Act [Public Law 94–317]. Under this law, the Department of Health, Education and Welfare would promote a “federal role in disease prevention,” and provide “consumer health education” and “information programs” (Knowles, 1977, p.76). The 1976 law was intended to instill personal responsibility into health practices and efficiency into medical organization. An unintended consequence of the law, however, was that patients began to demand a voice in what treatments they would receive. A heightened perception of danger began to seep into popular consciousness about medical treatments as the ideology of individual responsibility for health outcomes began to take hold. Indeed, contemporary mothers argue

that vaccinating their children should be their choice and see themselves, rather than doctors, as the experts on their children (Reich, 2014). Millennial parents’ reactions against vaccination often speak to “personal beliefs”—an amorphous term that captures social perceptions of risk, autonomy, and choice (Reich, 2014; Yaqub et al., 2014).

The sense of parental expertise and responsibility became strong in the 1980s. In 1982, *DPT: Vaccine Roulette*, a widely viewed television documentary described horrible dangers associated with the diphtheria, pertussis, and tetanus (DPT) vaccine (Offit, 2011). When Barbara Loe Fisher saw the film, it confirmed her belief that her son had suffered adverse effects from a vaccine and she began a public career advocating against vaccinations. She formed a lobbying group Dissatisfied Parents Together (DPT), which still exists. She also co-founded the National Vaccine Information Center (NVIC), which advocates “Your health. Your family. Your choice.”

Because of the 1980s mobilization against vaccines, drug companies became reluctant to produce vaccines that would expose them to the risk of lawsuits. The tipping point came in 1986 when a jury awarded over a million dollars to a child whose lawyers claimed that he became a paraplegic as a result of a DPT vaccine. Lederle Laboratories refused to continue to produce the vaccine

after the judgment (Offit, 2011). In response, Congress passed the National Childhood Vaccine Injury Act as a kind of no-fault insurance for drug companies that would protect them against lawsuits in order to ensure that they would continue producing vaccines. At the same time, a federal reporting system called Vaccine Adverse Events Reporting System (VAERS) was developed to monitor vaccine injuries and to adjudicate legal issues (Colgrove, 2006).

Three perceptual changes evolved together in the ten years between the 1976 National Health Promotion Act and the 1986 National Childhood Vaccine Injury Act. Baby boomers came of age understanding the danger of polio and the sense of security that vaccines afforded. As a generation, however, baby boomers had no problem questioning the authority of established institutions such as medicine and science. Vaccine resistance in the 1980s was rooted in a growing distrust of science as well as a response to some highly publicized court cases around adverse vaccine reactions (Imber, 2008). A 2015 Pew Research Center study on attitudes towards science reports that forty-one percent of respondents between the ages of eighteen and twenty-nine believe that parents should have the right to choose whether or not to vaccinate their children. The percentage of respondents that oppose mandatory childhood vaccinations decreases in the older age brackets – seventy-nine percent of respondents sixty-five years and older (one of the last generations with living memory of polio) support mandatory childhood vaccination (Pew, 2015).

The above is reflected in shifts in the public narrative, in which the collective value of vaccination recedes before individual pursuit of redress through the legal system. See Panel B of Fig. 1. The social risk of non-immunization (theme 4), in other words the herd immunity argument, recedes before discussions of lawsuits by parents (theme 5) against the drug companies that produce the vaccines that they perceive have injured their children and general parental vaccine resistance.

A final notable shift is the increasing influence of the media and popular culture on perceptions of childhood vaccination. Beginning in the 1990s, the virtual elimination of childhood diseases corresponded to two contradictory but intertwined cultural beliefs: first, the idea that the world is a dangerous place; and second, the widespread perception that risk could be eliminated (Glassner, 1999; Molotch, 2012). In this developing climate of fear, children are seen as particularly at risk and it is not surprising that educated parents would be susceptible to claims that childhood vaccines are dangerous (Omer et al., 2009). In addition, millennial parents have access to the Internet, which experts identify as a major source of misinformation when it comes to vaccines (Dees and Berman, 2013; Kata, 2010). The ideology of choice, coupled with the widespread availability of medical information, has fueled a culture where all parents are potential experts (Eyal, 2013; Reich, 2014).

Panel C of Fig. 1 shows that beginning in the 1980s, a new voice – popular media and culture – more heavily influenced discussions of vaccines (theme 6). We believe that the role of popular culture would have been even more salient if our data had extended to 2015. Entertainers in the U.S. such as Jenny McCarthy and public figures such as Robert Kennedy Jr. have been vocal in their warnings against the dangers that vaccines pose. In addition, mass-market documentaries such as (Gladen, 2015) *Trace Amounts: Autism, Mercury and the Hidden Truths* as well as popular prime time television shows such as *Law and Order SVU* have weighed in on both sides of the vaccine risk issue. Nevertheless, experts remain a prominent and positive voice, as they have consistently been across the entire time period (theme 7). This is true even during a brief period in the 1960s when some experts also expressed some hesitation regarding vaccines (theme 8).

The newspaper data suggest three main highlights. First, risk was always a component of vaccine narratives but the sources of risk have changed. Beginning in the 1980s, the narrative shifts to discussions that reflect a greater concern with the risks of vaccines, which now seem to outweigh the risks of diseases that fewer parents experience. Second, in the same period, public attention focused on vaccination-related lawsuits with only marginal attention to the collective benefit of vaccines. Third, experts have been fairly consistent in supporting vaccine use but the media and popular culture are a new voice.

Contemporary perceptions of vaccination risk point in two directions. The first direction, characteristic of educated parents, is the belief that childhood should be a place without risk. Parents who hold this view tend to practice a parenting style that (Lareau, 2011) describes as “concerted cultivation.” Such parents focus extraordinary energy upon their children to ensure that they develop into “perfect” human specimens—secure and protected from risk (Reich, 2014). The second direction, which reflects a broad distrust of institutions and a simplistic understanding of science, is a refusal to believe the available evidence about vaccine safety. The documentary, *Trace Amounts*, exemplifies this direction by depicting how “big pharma” and the government conspire to endanger children in the name of corporate profit. Popular culture and social media enable both views in ways that were unavailable before the 1980s. The primacy of choice, which began in the 1970s to promote health behaviors, now facilitates distrust in mainstream medical practice. Vaccination risk narratives, combined with beliefs about choice, mutually reinforce each other and provide a favorable environment for vaccine resistance.

4. A geography of childhood vaccination

School vaccination rates are publically accessible data that

Table 1
Demographic and vaccination rate characteristics for the U.S., California, and New York.

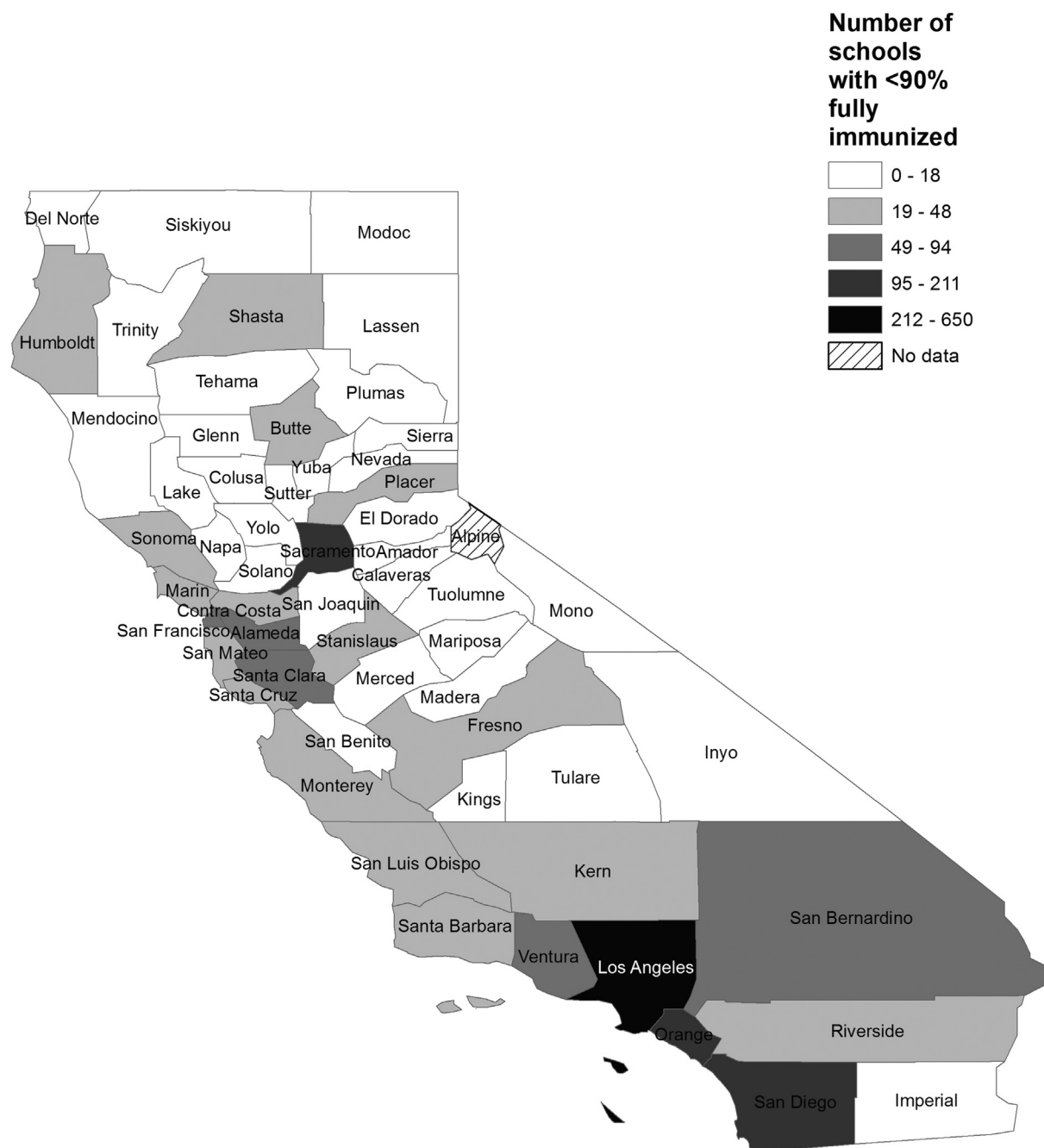
	U.S.	CA.	Los Angeles County	N.Y.	Kings County
Population (in million)	311.5	37.7	9.9	19.5	2.5
Income (in \$1000)	\$53.0	\$61.1	\$56.0	\$58.0	\$46.1
Poverty	11%	12%	14%	12%	20%
Post-Secondary Education	11%	11%	10%	14%	12%
Race					
Black (alone)	12%	6%	8%	14%	32%
White (alone)	63%	40%	28%	58%	36%
Latino (any race)	17%	38%	48%	18%	20%
Vaccination Rates 2013					
DTaP	83%	91%	89%	97%	97%
Polio	93%	91%	90%	96%	97%
MMR	92%	91%	89%	96%	97%

Sources: (ACS, 2009–2013); CA Dept. of Public Health, CA Kindergarten Data (2014–15); NIS (2013); NY Department of Health, School Immunization Survey (2013–14). Note: U.S. vaccination rates are for children 19–35 months; CA and NY rates are for kindergartners.

permit us to geographically locate variations in vaccine practice. Certain factors above the level of individual families also influence these practices. For example, while all states mandate vaccination as a requirement to attend school (Ohri, 2013; Colgrove, 2006), schools differ in the level of enforcement of such mandates (Wood and Brunell, 1995). Further, states allow different types of exemptions. In some states, parents may obtain physician-certified medical and religious exemptions. Additionally, eighteen states permit parents who are opposed to childhood vaccination to seek “personal belief” exemptions (Diekema, 2014). States with “personal belief” exemptions tend toward decreasing rates of vaccination (Wang et al., 2014). Until July 2015, when the State Legislature outlawed it, California permitted a “personal belief” exemption. In contrast, New York State does not allow “personal belief”

exemptions, nevertheless there was a 2013 measles outbreak in Brooklyn (CDC, 2013).

The vaccine geography of California and New York works well as a comparative visualization of parental practice as these states are similar on multiple, culturally relevant dimensions. Both states have large rural areas combined with densely populated urban areas that are global cultural centers with high rates of immigration and diversity. In general, their residents vote reliably Democratic. They have relatively comparable rates of post-secondary education, poverty, and median income. California has a larger Latino population and a smaller African American population than New York State. According to the National Vaccine Information Center, California and New York have more bills on vaccine regulation pending before their state legislatures than other states.



Map 1. State of California. Number of schools within counties with less than 90% of student body fully immunized.

Table 1 outlines state population characteristics and shows how vaccination rates in California and New York compare to aggregate vaccination rates in the United States for three vaccines – DTaP (diphtheria, tetanus, and pertussis), polio, and MMR (measles, mumps, and rubella). At aggregate levels, the vaccination rates are very similar and, for the most part, achieve the ninety percent level that the Department of Health and Human Services (DHHS) recommends (Elam-Evans et al., 2014). However, aggregate vaccination rates obscure considerable diversity among smaller geographic areas (Carrel and Bitterman, 2015).

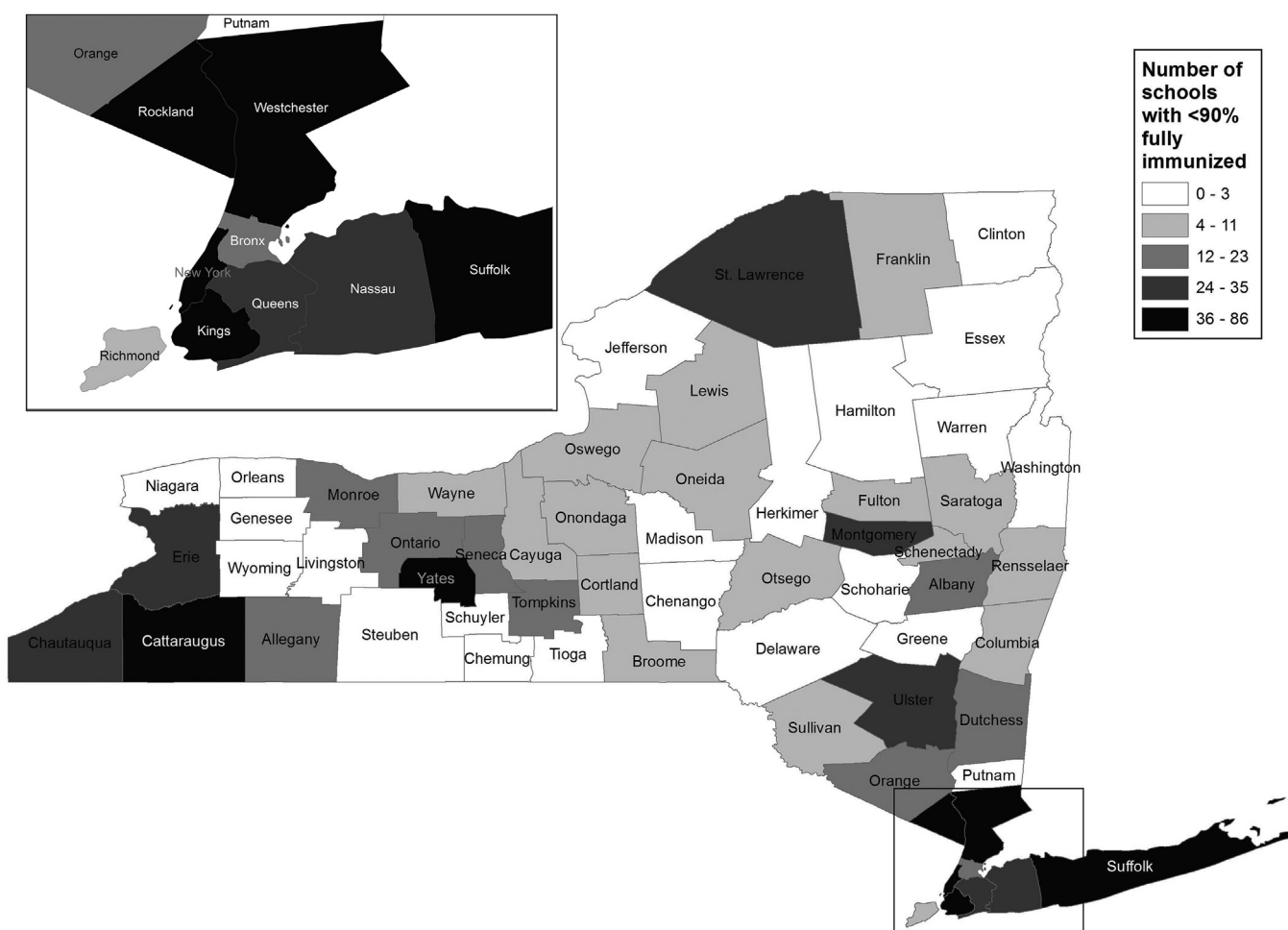
State health departments collect data, which we use to identify the number of schools within counties in California and New York where vaccination rates fell below ninety percent. Maps generated with these data present a suggestive geographic snapshot of parental vaccination practices. **Maps (1, 2)** reveal a distinct split between urban and rural areas. New York State reveals a clearer urban/rural split in vaccination rates than California. Poor, rural New York counties such as Cattaraugus and St. Lawrence have among the lowest vaccination rates. In California, the wealthiest counties such as Marin County and the counties around the San Francisco Bay area have low rates of vaccination, as do Manhattan's five boroughs and surrounding suburban counties.

In California, Los Angeles County has the most low-immunized schools (i.e. schools with less than ninety percent of the student body fully vaccinated). In New York, Kings County has the most low-immunized schools. The high numbers of low-immunized schools in Los Angeles and Kings Counties demand closer

inspection. We analyzed the relationships between two standard demographic measures – percent in poverty and percent holding a graduate or professional degree – and vaccination rates at the zip code level. Using Census data (ACS, 2009–2013) and the state school data together reveals a relationship between these two standard demographic variables—but not in the direction that one would expect. (There are forty-seven zip codes in Kings County and 311 zip codes in Los Angeles County.)

Map 3 shows that in Los Angeles County, most of the schools with less than 90% of their student body fully immunized are located in the southeast and south central areas of the county. Many of the schools with low vaccination rates are in highly educated zip codes, especially along the southeast coastal area and stretching into the lower central area of the county. This pattern coincides with media reports about highly educated parents opting out of vaccinating their children. However, **Map 3** also shows many low-immunized schools in the southern center of the county, which has very low percentages of graduate or professional degree holders. **Map 4** shows that this area is, instead, characterized by high rates of poverty.

Despite differences in the total number of low-immunized schools between the two counties (Los Angeles County has 871 low-immunized schools, while Kings County has 86), similar patterns emerge. **Map 5** shows that many of the low-immunized schools in Kings County are in the south-central, central, and across the northern regions of the county – all areas with high educational attainment. However, there are also low-immunized



Map 2. State of New York. Number of schools within counties with less than 90% of student body fully immunized.

schools in the southeastern and western most zip codes that have very low rates of educational attainment. Map 6 reveals that these are zip codes with high rates of poverty.

5. Imagining risk and being at risk: the two worlds of childhood vaccination

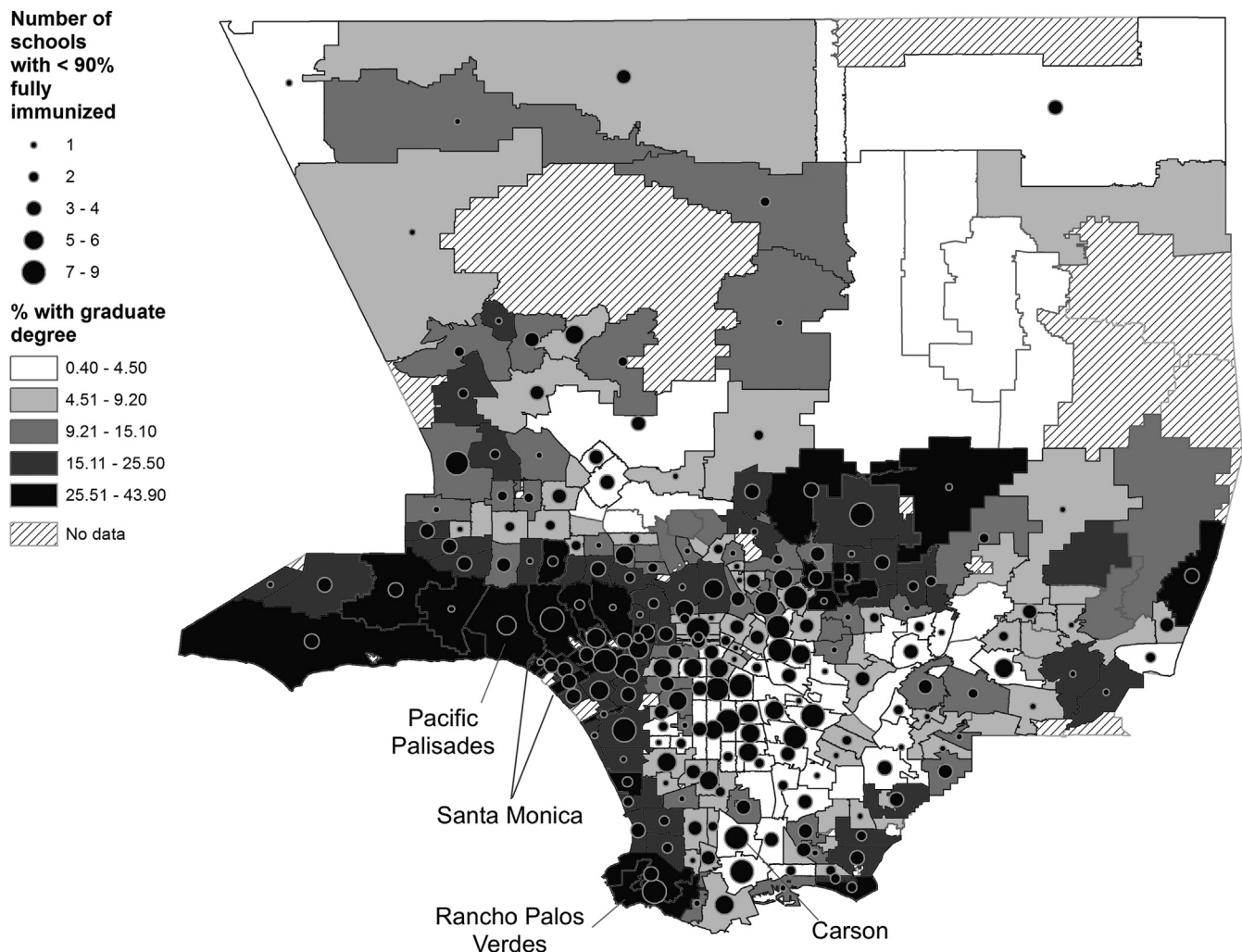
The geographic locales where vaccination rates are low enable us to contrast the difference between imagining risk, the prerogative of the affluent, and being at risk, the fate of the poor. The geographic results in this article are consistent with what others have noted about pockets of resistance to vaccination (Carrel and Bitterman, 2015; Omer et al., 2009). But they present an important difference by offering evidence of two worlds of childhood vaccination that replicate the boundaries of social inequalities in areas that extend beyond health. Previous studies tend to focus on low vaccination resulting from conscious resistance from privileged parents (Carrel and Bitterman, 2015; Reich, 2014). Indeed, we find that some areas of low vaccination tend to be wealthy and high in social, cultural, and economic capital. But other areas tend to be the poorest in their respective counties. For example, in Los Angeles, Santa Monica, which is a high-income area, is a leader in vaccine resistance. Whereas moving southeast, some of the poorest zip codes in Los Angeles County form additional clusters of low

vaccination. Kings County has a similar pattern of low rates of vaccination in the affluent areas of a newly chic Brooklyn existing alongside poor areas.

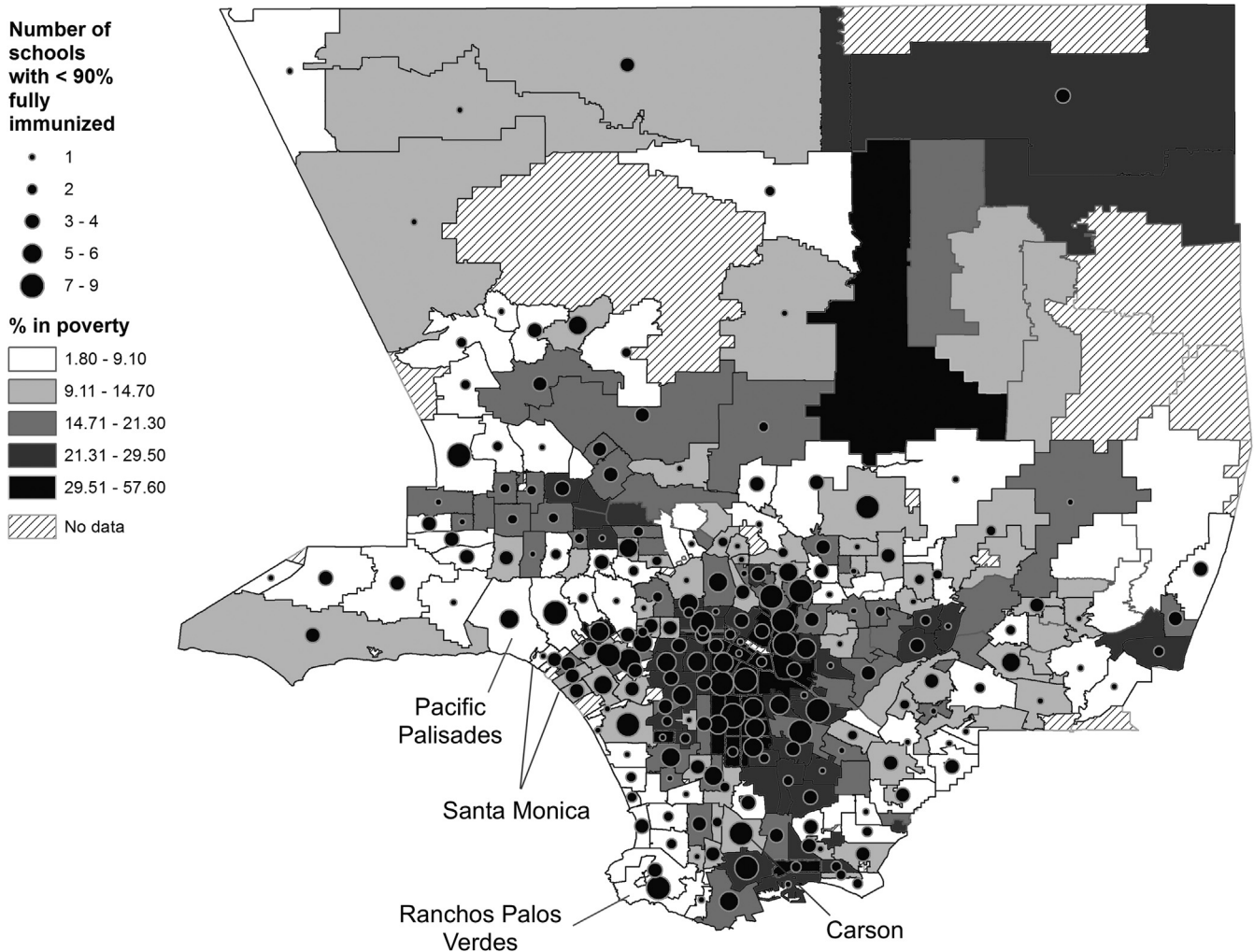
The maps at the state and county levels in California and New York suggest that vaccine resistance is a two-pronged story. In high income and education enclaves, parental choice is the likely determinant of low vaccination rates (Carrel and Bitterman, 2015; Reich, 2014); conversely in low education and low-income areas, barriers to access are more likely the determinants of low vaccine rates (Smith et al., 2004; Wood and Brunell, 1995).

The spatial borders of neighborhoods reinforce cultural and physical boundaries where well educated and affluent parents focus on “cultivating” their children in a risk free environment. The conversations afforded by proximity allow parents living within these neighborhoods to generate a variety of shared meanings around child rearing practices. Proximity has direct effects on health beliefs (King and Bearman, 2011), parental knowledge (Small, 2009), sexual practices (Tavory and Swidler, 2009), and taste cultures (Della Posta et al., 2015).

Boundaries always support exclusion (Lamont and Molnár, 2002). In the case of childhood vaccination, boundaries place others outside the group at risk, and generate unequal forms of public attention. For example, a widely disseminated *Hollywood Reporter* (Baum, 2014) story describes the colorful *patois* about



Map 3. Los Angeles County, CA. Number of schools within zip codes with less than 90% of student body fully immunized and the percent of zip code population with graduate or professional degree.



Map 4. Los Angeles County, CA. Number of schools within zip codes with less than 90% of student body fully immunized and the percent of zip code population in poverty.

well-being and removing toxins from children's bodies that affluent Westside LA parents deploy. But this current focus on the conscious resistance of privileged parents ignores the dynamics among the less privileged. In these areas, it is constraint, not choice that determines a poor parent's relation to childhood vaccination. The media tilt towards the affluent experience mirrors [Bail's \(2012\)](#) study of press releases from Muslim organizations that demonstrates that the media's focus upon violence undercuts the mundane character of everyday Muslim activity. The bounded neighborhood locales where rituals and vocabularies inscribe vaccination beliefs suggests how public space itself is a source of inequality that intensifies the invisibility from which the poor already suffer by siphoning public attention from them. The processes by which this dual interaction occurs requires a more micro level analysis than we can offer within the scope of this article. A fuller analysis would include the perceptions of health among those at the top and the bottom and how they interact and mutually enforce each other ([Lamont et al., 2014](#)).

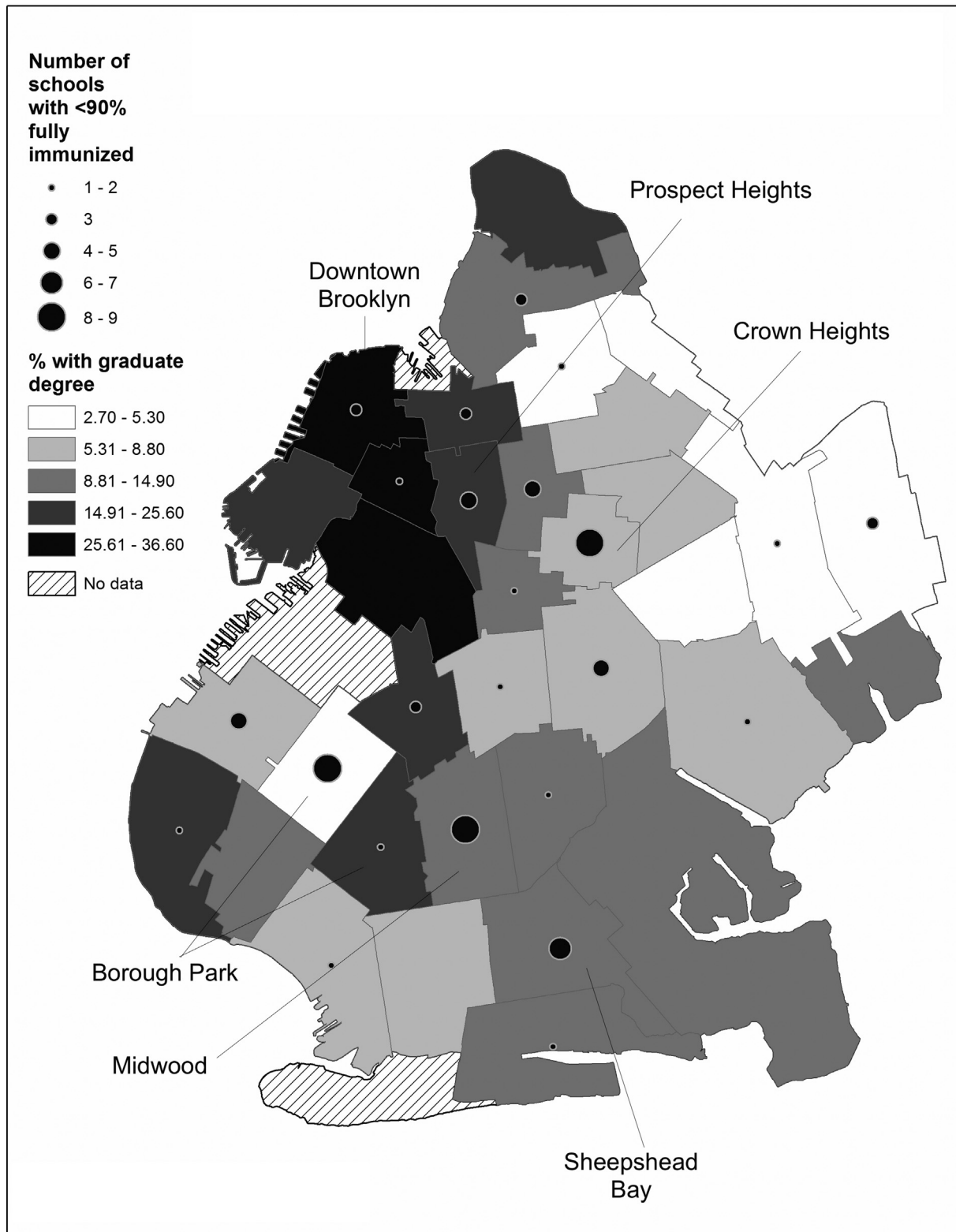
6. Public knowledge and the luxury of risk

This article offers a suggestive synthetic analysis. Childhood vaccination and its surrounding public narratives are bellwethers of broader social trends. Vaccine resistance reflects normative claims that intersect with cultural meanings and sources of social

cohesion. The historical, media, and demographic data presented in this article synthesize these claims that point to changes in the nature of social solidarity and the recalibration of risk among the more affluent and educated segments of society.

In the post-war United States, science was a source of safety and security. In the late 1970s and 1980s, a distinct shift in public attitudes towards expertise in general and science and medicine more particularly began to occur. Ordinary citizens become more willing to challenge the findings of science and to demand compensation for injuries—whether a particular treatment caused those injuries or not. This demand for autonomy and choice corresponded to changes in conceptions of health as a personal responsibility. By the millennium, some health consumers began to view medical treatments as sources of risk rather than cure. Media and popular culture in various forms facilitated a culture of fear where all risks were unacceptable and perfectibility was a desirable personal aspiration.

Vaccination resistance underscores a recalibration of the meaning of risk and its relation to security that has gradually evolved in the last thirty years since the film *DPT: Vaccine Roulette* appeared. As [Beck \(1992\)](#) argues, the recalibration of risk from the institutional to the individual level has occurred in multiple venues. In medicine and public health, the devolution of risk compromised the collective efficacy that was an implicit part of the medical encounter. As individuals began to realize that health was as much

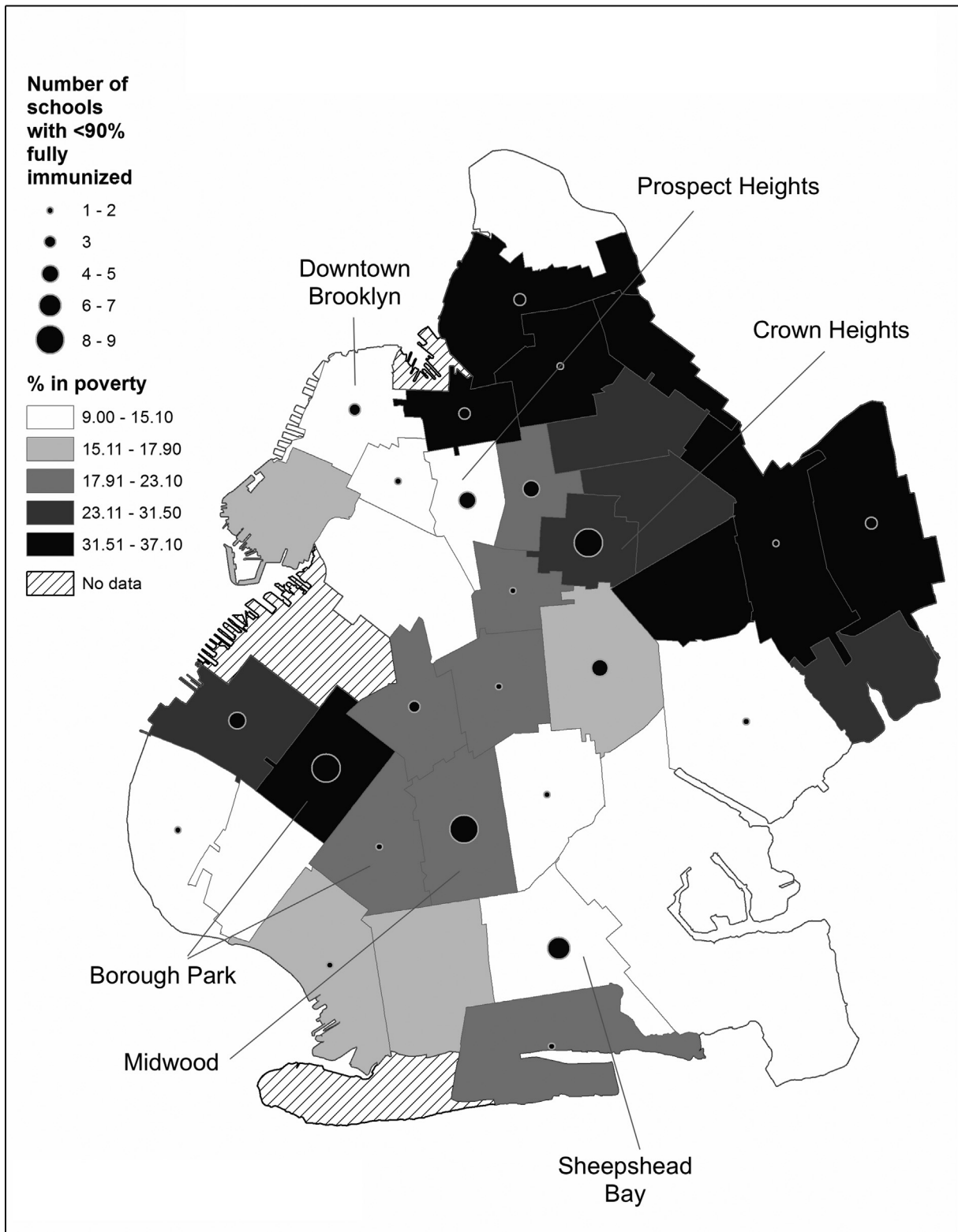


Map 5. Kings County, NY. Number of schools within zip codes with less than 90% of student body fully immunized and the percent of zip code population with graduate or professional degree.

a product of lifestyle as it was of science, they began to view risk as a choice, subject to individual control. The mothers in Reich's (2014) study described their decision not to vaccinate their children in terms of personal knowledge of their child's health, while the Facebook page of the anti-vaccination movement is entitled

"My child, my choice."

As argued in Section 2, risk and trust are related. Individuals and collectivities make multiple choices every day that assess risk. Lack of, or diminished trust in, the institutions and the context in which those choices are made constrains social and individual action. A



Map 6. Kings County, NY. Number of schools within zip codes with less than 90% of student body fully immunized and the percent of zip code population in poverty.

robust feeling of solidarity requires a re-valuation of security, which is a kinship concept to risk and trust. Security stabilizes meanings and allows individuals to feel confident in their individual and collective choices. Without a sense of security, it is difficult individually or collectively to imagine let alone plan for a future. Good

health in particular provides the security to move forward.

The contemporary risk climate underscores the challenge that vaccine resistance poses to social scientists, as well as the medical and public health community, as they seek to develop a positive vaccine message. A commitment to a public discourse around a

Culture of Health that emphasizes the importance of mutuality (i.e., “We are all in this together.”) and shared futures might resonate with educated parents who resist vaccination (Schudson 1989). The audience for this message would consist of educated parents whose own childhood and adolescent socialization included the idea that individual choice and responsibility are paramount when it comes to all features of their environment. Experts acknowledge that messaging is difficult with respect to childhood vaccination because vaccine resistance draws upon many deeply held beliefs (Kreuter and McClure, 2004). Feinberg and Willer (2015) argue that assuming the moral position of the person or group that one wishes to convince is a more effective tool of political persuasion than making rational arguments in favor of one's own position. Using the logic of Feinberg and Willer (2015), a moral argument that links herd immunity to social solidarity might be more persuasive to parents who oppose vaccination than an argument on the basis of scientific evidence that supports vaccine safety.

Residence within a community re-enforces a sense of security or conversely, insecurity, as an individual attribute. A re-invigorated social commitment to solidarity requires messages that valorize and nurture collective security as an aspiration and practice. Vaccination resistance valorizes *precious* children at the expense of *precarious* children. Vaccination resistance narratives and mobilization strategies divert attention from children whose parents lack the time or knowledge to participate in this discussion—parents who may not fully vaccinate their children due to access, not choice issues. Mandatory childhood vaccination is an ideal location to develop a broad public conversation about security and health that includes those who have the luxury of choice and those who do not. Such a discussion would hopefully enhance a public understanding of health as a shared or mutual responsibility and provide a policy relevant step forward towards developing a Culture of Health.

Acknowledgments

The authors wish to acknowledge the support of the Robert Wood Johnson Foundation. We thank Michele Lamont and Paul Lichterman for their careful reading of a first version of the paper and we thank Michele Lamont and Bart Bonikowski, as well as the members of the Culture and Social Analysis Workshop at Harvard University for their helpful feedback. We wish to thank Fedor Dokshin for designing the maps used in the article. We also wish to thank Alexa Yesukevich for her careful editing. In addition, we acknowledge the helpful comments of reviewers.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.socscimed.2016.07.009>.

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