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Opting Out: Individualism and Vaccine Refusal in Pockets of Socioeconomic Homogeneity

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Kevin Estep[a] **and Pierce Greenberg**[a]

Abstract

Cases of measles and other highly contagious diseases are rising in the United States. Public health experts blame the rise partly on the spatial concentration of parents declining to vaccinate their children, but researchers have given little attention to theorizing why this clustering occurs in particular communities. We argue that residential and school selection processes create "pockets of homogeneity" attracting parents inclined to opt out of vaccines. Structural features of these enclaves reduce the likelihood of harsh criticism for vaccine refusal and foster a false sense of protection from disease, making the choice to opt out seem both safe and socially acceptable. Examination of quantitative data on personal belief exemptions (PBEs) from school-based vaccination requirements in California schools and districts, as well as findings from parent interviews, provide empirical support for the theory. We discuss substantive implications for lawmakers and public health officials, as well as broader sociological contributions concerning neighborhood effects and residential sorting.

Keywords

public health, vaccination, income segregation, individualism, neighborhood effects

In 2019, the United States experienced the highest number of measles cases in 25 years—a problem many scientists attribute to the growing proportion of parents who choose not to vaccinate their children (Aloe, Kulldorff, and Bloom 2017; Omer et al. 2008; Sundaram, Guterman, and Omer 2019). Although schools require children to receive certain vaccines before entering kindergarten, many states allow parents to opt out of this requirement by filing "personal belief exemptions" (PBEs). These exemptions increased substantially in recent years. Between 2000 and 2013, the proportion of parents opting out in California increased four-fold—from just .73 percent to 3.09 percent of incoming kindergarteners (Delamater, Leslie, and Yang 2018).

From a public health perspective, the most concerning issue is that vaccine exemptions cluster in particular communities and schools (Brennan et al. 2017; Carrel and Bitterman 2015; Delamater et al. 2018; Lieu et al. 2015; Omer et al. 2008). Recent research indicates these clusters persist even when states minimize access to exemptions through stricter vaccination policies (Gromis and Liu 2020). Epidemiologists warn that these pockets of low vaccination are like holes in the protective wall of community health, which weaken herd immunity to infectious diseases and put non-vaccinated individuals and entire

[a]Creighton University

Corresponding Author:
Kevin Estep, 2500 California Plaza, Creighton Hall, Omaha, NE 68178
Email: kevinestep@creighton.edu

communities at risk (Feiken et al. 2000; Omer et al. 2008; Omer et al. 2009).

Although there is abundant evidence regarding the existence and health risks of PBE clustering, we know much less about the specific contexts where PBEs are concentrated and why this clustering occurs. White, relatively affluent parents are most likely to opt out and, therefore, racially homogeneous and affluent schools and school districts have higher rates of PBEs (Carrel and Bitterman 2015; Smith, Chu, and Barker 2004; Sugerman et al. 2010; Yang et al. 2016). The limitation of this individual-demographics explanation, though, is that most parents who match that profile *do* vaccinate their kids. Moreover, schools that are similar in socioeconomic composition often have very different vaccine exemption rates. These facts suggest that a more compelling explanation of vaccine refusal must consider why affluent parents *in certain contexts* choose to opt out. In short, what is missing is a sociological theory about places: Which kinds of places support opting out of vaccines, and which do not?

Sociologists have long noted that a "spatial logic" organizes the distribution of health, crime, and other socioeconomic outcomes across geographic areas (Gieryn 2000; Park 1915; Sampson 2012; Zorbaugh 1929). In particular, the "neighborhood effects" literature demonstrates how individual choices are influenced not only by individuals' characteristics, but also by features of the social context in which people live (Sampson 2012; Sampson, Morenoff, and Gannon-Rowley 2002). Our approach to PBE clustering follows Sampson's (2012) call for researchers to develop place-based theories that identify the social-interactional mechanisms by which neighborhoods influence individual and aggregate outcomes, while simultaneously treating individual selection as a social process to be embedded in our theories.

In this article, we argue that higher percentages of PBEs occur within a specific geographic context we call "pockets of homogeneity"[1]—that is, schools and school districts of high affluence, surrounded by areas of low affluence. Our theoretical justification for this prediction is based, first, on Reich's (2016) finding that vaccine refusal stems from an individualist parenting ideology that emphasizes personalization of risks and benefits for children, rather than accepting generic recommendations of medical and public health officials. Second, pockets of socioeconomic homogeneity surrounded by diversity are conducive to this strand of individualism and, therefore, could attract higher proportions of those parents. Third, the enclave-like features of these pockets could reinforce the tendency to opt out by reducing the social stigma of "free-riding" and by giving a false sense of protection from disease. Consequently, vaccine refusal may be viewed as both a safe and socially acceptable decision in these unique settings.

We evaluate this theory using a "complementary" mixed-methods design (Small 2011), in which the strengths of one type of data compensate for weaknesses in another. In this case, we use quantitative data on schools and school districts as the primary test of our hypotheses about the association between PBEs and pockets of homogeneity, and qualitative data from interviews with Santa Monica parents illustrate the mechanisms informing our hypotheses. We find that PBEs are, in fact, disproportionately high in advantaged schools and districts that are near to, but separate from, less-prosperous ones. In addition to the substantive implications for public health, this analysis also contributes to sociological research on neighborhood effects, lifestyle enclaves, and residential sorting.

SPATIAL DIMENSIONS OF VACCINE REFUSAL

The CDC reported 1,282 new cases of measles in 31 states in 2019—nearly 20 years after the organization declared measles eradicated from the United States (CDC 2019). Significant outbreaks recently occurred in New York and Washington State, but our study focuses on California, where warning signs appeared in 2015. There, a measles outbreak began at

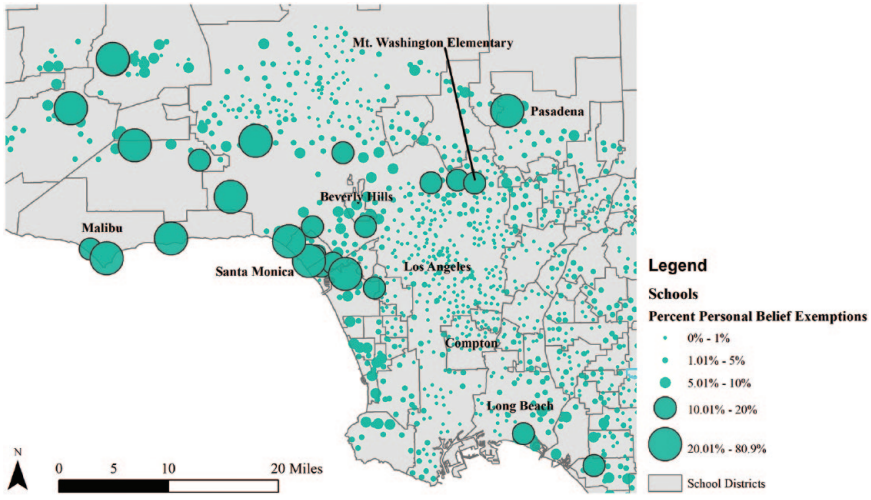

Figure 1. School-Level Personal Belief Exemptions across Kindergartens in the Los Angeles Metropolitan Area

the Disneyland theme park in Anaheim, spread to 147 individuals in seven states, and prompted the state to eliminate PBEs.[2] Several studies have found that vaccine exemptions were concentrated in particular California communities and schools (Brennan et al. 2017; Carrel and Bitterman 2015; Lieu et al. 2015), and this clustering intensified in the years before the Disneyland measles outbreak (Delamater et al. 2018). Delamater and colleagues (2018) also find evidence of spatial diffusion, as areas with an increase in PBEs were near areas that initially had high PBEs.

We do not rule out the possibility that schools or districts with high PBEs cluster together, but we think an overemphasis on diffusion might overlook other detailed community contexts where PBEs are disproportionately high. For instance, as Figure 1 shows, one kind of clustering involves *districts* where multiple schools have very high exemption rates. In 2013, 12 percent of students in the Beverly Hills district obtained vaccine exemptions, compared to 1.5 percent in the surrounding Los Angeles Unified district. In nearby Santa Monica, more than half of the elementary schools had PBE rates higher than 10 percent, and several were above 20 percent. Both areas are known as enclaves for affluent residents on the outskirts of more racially and economically diverse parts of Los Angeles. Mount Washington Elementary, a high-achieving *school* in the Los Angeles Unified district, illustrates a second kind of high-PBE setting. The Mount Washington neighborhood attracts highly educated residents who enjoy its eclectic homes and easy access to downtown Los Angeles (Garner 2016). Over 13 percent of students here obtained PBEs in 2013, despite very low rates in the rest of the district.

These cases suggest a compelling explanation must account for why PBE clustering often occurs amid or on the margins of low-PBE areas. We consider the possibility that this pattern is connected to a classic sociological observation about "lifestyle enclaves"—the tendency of like-minded people to cluster in places where their individual preferences are reinforced, rather than challenged (Bellah et al. 1985; Fischer and Mattson 2009; Lamont et al. 1996; Park 1915). In their study of American individualism, Bellah and colleagues (1985:74) write that "the lifestyle enclave [is] the realm, par excellence, of expressive individualism." For instance, in recent decades, certain cities have become beacons for "the creative class" (Florida

2002), people sort into local communities that appeal to either conservative or progressive sensibilities (Bishop 2008), and neighborhoods can be identified based on very specific consumer preferences (Michman, Mazze, and Greco 2003; Weiss 2000). Such trends suggest places attract people with particular lifestyles, tastes, values, and perhaps even parenting orientations. Or, as Sampson (2012) claims, neighborhoods "select" individuals. In the following sections, we build on this insight as we lay out a rationale for our theory about pockets of homogeneity, including a discussion of "opt-out individualism" and the types of places that might attract and reinforce that parenting orientation.

OPT-OUT INDIVIDUALISM

Individual motivations are key to understanding the development of ideological enclaves that support parents opting their children out of vaccines, and they play an important role in place-based theories. Some medical providers, public health officials, and concerned citizens vilify parents who refuse vaccines for their children, but scholars suggest these parents make choices that are consistent with their understanding of risks and benefits. Based on in-depth interviews with parents, Reich (2016) concludes that the choice to opt out of vaccines is rooted in an individualist parenting ideology that prioritizes parents' right to choose a personalized healthcare plan for their children, rather than accepting the generic obligations of public health.

To illustrate Reich's important claim, it is helpful to draw attention to two common reasons parents give for opting out. First, some parents are hesitant to accept generalized medical findings about the safety of vaccines because they believe each child is unique and *they* are the experts on their own children (Benin et al. 2006; Motta, Callaghan, and Sylvester 2018; Reich 2016). These parents are not necessarily anti-science, but their own intuitions about family health decisions carry more weight than medical recommendations by authorities (Motta et al. 2018).

Second, when faced with uncertainty about the risks of vaccines, some parents opt out because they believe the risk of exposure to disease is low, and thus they can control their children's risk of disease in other ways (Reich 2016; Salmon et al. 2005). Some parents embrace healthy lifestyles—including breastfeeding, natural or organic diet, and reduced exposure to chemicals—to boost "natural" immunity to disease (Bean 2011; Duffell 2001; Gellin, Maibach, and Marcuse 2000). Reich (2016) also suggests parents' decisions are sometimes based on racialized narratives of disease that depict certain social groups as more threatening (Epstein 1996; Reagan 2010) and on their perception that parents with lower education are less likely to be vigilant in terms of protecting their children from disease. Thus, preventing exposure is equated with restricting social interactions to other families that occupy a similar social position. In summary, by making personalized choices to live "naturally" and avoid potentially harmful social interactions, some parents perceive vaccines to be unnecessary.

As Reich (2016) observes, these justifications for vaccine refusal stem from a particular kind of individualism—one that values a personalized "have-it-your-own-way" approach to medicine over the "one-size-fits-all" health policies designed to promote population health (Hedgecoe 2004; Tutton 2012). Some parents reason that if there is risk associated with vaccination and the benefits of immunization can be achieved in other ways, then they should be given the freedom to opt out of those requirements to craft a plan that is personalized to the unique features of their children and their context. We refer to this parenting orientation as "opt-out individualism."

Identifying this strand of individualism as the root of vaccine refusal is important but it cannot, on its own, explain why vaccine exemptions are especially high in certain settings. Parents personalize choices about medical interventions based on unique features of their childrearing context (Reich 2020), which suggests opt-out individualism could manifest in specific geographic and spatial

contexts. We argue that pockets of socioeconomic homogeneity amid diversity could both *attract* parents with this opt-out orientation and *reinforce* that mindset.

HOW POCKETS OF HOMOGENEITY ATTRACT OPT-OUT INDIVIDUALISM

Neighborhood Sorting

People with sufficient resources often self-select into communities that allow them to avoid contact with others who do not share their social class, ethnicity, political views, or cultural tastes (Bishop 2008; Fischer and Mattson 2009; Putnam 2015). This may be especially true for families. Previous research demonstrates that middle- and upper-middle-class parents are increasingly concerned about helping their children get ahead from a young age (Lareau 2003; Ramey and Ramey 2010) and are willing to leverage resources to do so (Kornrich and Furstenberg 2013; Owens 2016). If exposure to socioeconomic diversity is seen as a detriment to their children's educational, economic, or social prospects, parents may have incentives to select homogeneous social contexts that protect them from those influences.

Different kinds of homogeneity exist, giving parents the opportunity to select contexts that align with their broader childrearing values and goals. For instance, private schools, charter schools, and home-school co-ops offer distinct forms of homogeneity that appeal to some parents (Renzulli and Evans 2005; Stevens 2001). Likewise, when choosing where to live, families with sufficient resources often seek out a school district, neighborhood, or suburban community where they are surrounded by households with similar values and resources (Owens 2016; Reardon and Bischoff 2011). In short, many environments could insulate children of advantaged families from perceived sources of downward mobility.

For decades, the majority of middle-class families have opted for suburbs that offer "good" schools and "safe" neighborhoods away from under-resourced inner cities (Baldassare 1992; Hobbs and Stoops 2002). But other families perceive suburban lifestyles as generic or monotonous and instead choose homogeneous spaces within more-diverse areas offering proximity to employment, eclectic neighborhoods, or access to arts, culture, and entertainment (Butler and Robson 2003; Ley 1996; Zukin 1987). These are not merely idiosyncratic preferences. Rather, lifestyle preferences point to underlying cultural repertoires and ideologies (DellaPosta, Shi, and Macy 2015; Lamont el al. 1996). This suggests that where parents ultimately land on questions of school and neighborhood context may be a reflection of deeper values or ideologies about parenting.

Pockets of Homogeneity

To develop a placed-based theory of vaccine refusal, we consider a particular geographic context—what we call "pockets of homogeneity"—that might attract a higher proportion of parents who exemplify characteristics of opt-out individualism. In contrast to affluent settings that neighbor other affluent areas, pockets of homogeneity are affluent settings bordering less-prosperous ones. This might be a school serving a gentrified or "trendy" neighborhood in a mixed-income area (e.g., Mount Washington Elementary), or an affluent district neighboring poorer ones (e.g., municipalities like Santa Monica or Beverly Hills that run their own school districts). Unlike large suburbs, these enclaves allow families to opt out of contact with poor and working-class households in their broader surroundings, while still maintaining proximity to diverse opportunities—an attractive feature for families that might value diversity but prefer to keep it at arm's length.

The homogeneous pockets we have in mind are facilitated by rising income segregation among families with children (Owens 2016). Sociologists have drawn attention to the crucial segregating role of school attendance boundaries (Fiel 2013; Owens, Reardon, and Jencks

2014; Stroub and Richards 2013). Lower-income families tend to evaluate housing choices based on safety or proximity to child-care or employment, whereas affluent parents are much more likely to decide based on school characteristics, such as the test scores or demographic composition of schools in their target area (Owens 2016). Moreover, school quality is increasingly capitalized into housing prices, as the demand for living in high-performing districts exceeds the supply of available housing (Nguyen-Hoang and Yinger 2011). These factors drive up housing costs around desirable schools, leaving families with fewer resources to settle for more affordable options. In contrast, affluent families—typically those with at least one college-educated parent—are able to opt out of mixed-income neighborhoods as they pursue desirable educational opportunities for their children.

These residential sorting processes help produce homogeneous pockets at the level of both schools and districts. At the district level, we could imagine a family relocating for a high-paying job on the north side of Los Angeles. They survey housing options that fall within an acceptable commuting distance, which could include neighborhoods in Los Angeles Unified, Culver City, Santa Monica-Malibu, or Beverly Hills districts (see Figure 1). Due to reputational and performance differences between Los Angeles and Santa Monica districts, families that can afford it are more likely to purchase homes on the Santa Monica side of that boundary. Over time, these individual decisions to improve opportunities for one's children tend to form sharp lines of income segregation. The result is a homogeneous district of affluent, highly educated families adjacent to one or more lower-income districts.

District boundaries are an increasingly salient source of income segregation (Owens 2016), but residential segregation can also produce pockets of socioeconomic advantage *within* school districts (Owens, Reardon, and Jencks 2016), as both wealthy and poor neighborhoods exist within the boundaries of a single district. Returning to our example, only 20 percent of Los Angeles Unified elementary students have a college-educated parent. But some schools are much better off. There are 30 schools in the district (including Mount Washington) where over 70 percent of parents have college degrees. These homogeneous schools enroll high proportions of well-off students, whereas students of various class backgrounds rub shoulders in the hallways of other public schools in the district.[3]

Managing Opportunity and Risk

Gentrification has created new opportunities for affluent families to satisfy their neighborhood and schooling preferences (Hyra 2015; Ley 1996; Zukin 1987). Indeed, we suspect that gentrified neighborhoods with high-performing schools and highly educated residents—who may have displaced racial minorities and lower-income residents—are an important instance of the kinds of settings that might appeal to parents who exhibit key characteristics of opt-out individualism. In their study of gentrified neighborhoods in London, Butler and Robson (2003:157–8) find that "[m]iddle class incomers have managed the classic maneuver of gentrification: coupling a necessary spatial proximity to other urban groups while strategically maintaining and protecting their material and cultural distance from them." Although our conceptualization of "pockets of homogeneity" includes more than just gentrified neighborhoods, our point is similar. Homogeneous pockets allow families with sufficient resources to enjoy the benefits of living near diversity, while opting out of the perceived difficulties of sharing educational resources with poor or working-class children.

Our argument is not that these enclaves are especially numerous, but rather that they are a distinct form of homogeneity that is likely to appeal to parents looking for ways to individualize opportunities and risks for their children. Like the gentrifiers Butler and Robson (2003) studied, these parents expend a great deal of effort to carefully select a setting that offers proximity to desirable opportunities

and, at the same time, provides a sense of protection from the features of city life they would prefer to avoid. This effort to personalize is a key feature of the individualist orientation that motivates vaccine refusal (Reich 2016). Whereas most parents rely on general medical recommendations in their pursuit of well-being for their children, those who opt out of vaccines expend a great deal of effort to craft a plan that personalizes risks and benefits. This suggests that the choice to settle in a homogeneous pocket and the choice to opt out of vaccines could be two manifestations of the same individualist parenting ideology.

To be clear, our argument makes no deterministic assumptions about the link between opt-out individualism and the residential choices of individuals. Not all parents who display opt-out tendencies will select pockets. Rather, we make the much more plausible and sociological claim that there are *affinities* between ideological orientations and features of places that are likely to influence the distribution of particular ideologies across space. In this case, we expect pockets of homogeneity to *disproportionately* attract vaccine-hesitant parents who, as Reich (2016) described, are seeking ways to personalize their children's lives by maximizing exposure to opportunities while opting out of risks.

HOW POCKETS OF HOMOGENEITY REINFORCE THE OPT-OUT MINDSET

To understand why vaccine exemptions may be higher in pockets of homogeneity, we consider not only the kinds of places that attract opt-out individualists, but also how features of those places reinforce that mindset. In the case of vaccines, parents who are inclined to opt out may be more likely to do so if they feel confident their children are protected from exposure to disease (Salmon et al. 2005) and if they can avoid harsh social consequences for that choice (Carpiano and Fitz 2017; Leach and Fairhead 2012). The pockets of homogeneity we examine have two distinctive features that could lower the social stigma associated with opting out and give a false sense of protection from disease.

Overlapping Social Circles and Avoiding the Free-Rider Stigma

Like so many aspects of human behavior, choices about vaccines are shaped by the pressure to conform to social norms (Carpiano and Fitz 2017; Leach and Fairhead 2012; Silverman and Wiley 2017). Individuals who deviate from those norms face social consequences (Durkheim 1915 [2008]). Most critics accuse non-vaccinating parents of free-riding—accepting the benefits of collective immunity without shouldering any of the costs of providing it. This stigma can affect children as well as parents, as intentionally unvaccinated children could be excluded from social gatherings and play groups (Carpiano and Fitz 2017). Parents who would prefer not to vaccinate may be more likely to act on their preference if they can avoid this free-rider stigma by appealing to a shared ideological commitment that prioritizes a parent's right to choose. Homogeneous enclaves that disproportionately attract parents with individualistic tendencies could provide the necessary normative protection.

The districts and schools described earlier feature what sociologists sometimes call overlapping social circles. In most settings, dimensions of social life like race, occupation, and education are imperfectly correlated. Blau (1977; Blau and Schwartz 1984) referred to this as cross-cutting social circles. When combined with the basic idea that people prefer associations with similar others, Blau developed the important insight that cross-cutting social circles foster intergroup contact: homophilous in-group preferences in one dimension, such as race, ensure people will have intergroup relations in other dimensions, such as occupational status or education. Enclaves, however, are characterized by *overlapping* social circles—for instance, a person's race, education, and occupation would be highly correlated. This, according to Blau,

discourages intergroup contact, because homophilous choices in one dimension do not necessarily lead to intergroup relations on other dimensions. The effect of the social distance between in-groups and out-groups on rates of intergroup contact, which results from overlapping social circles, is multiplied by physical distance between groups (Blau and Schwartz 1984; Hipp and Perrin 2009). Thus, when overlapping social circles occur in a spatially bounded area—as they do in pockets of socioeconomic homogeneity—in-group preferences can be realized without having to seek relationships outside the enclave.

For residents of an enclave, most relations occur among other residents of the enclave. Thus, a high proportion of the meaningful interactions of individualist parents in homogeneous pockets will be with others who share their "have it your way" approach to parenting and are, therefore, less likely to criticize parents who opt out, even if they disagree with that choice. In their view, parents should have the freedom to choose what is best for their children.

In fact, rather than inviting criticism, opting out could provide a status boost in certain settings. Reich (2014) argues that a mother's choice to refuse certain vaccines could signal to others that she has expended intense effort to develop an individualized plan for her child's health. In homogeneous pockets of upper-middle-class families, where expectations for intensive parenting are high (Hays 1998; Lareau 2003), moving into a neighborhood with desirable schools or delaying vaccinations become evidence of elite parenting, which can then be exchanged for social esteem. Sobo (2015) makes a similar argument in her study of Waldorf schools, where PBEs are unusually high. Because the educational philosophy behind these "alternative" schools emphasizes independence of mind, parents feel pressure to affirm their status as good "Waldorfian citizens" by rejecting mainstream medicine in favor of alternative vaccine schedules. Attwell, Meyer, and Ward (2018) use a social capital-based framework to suggest parents feel pressure in their social networks to adopt "appropriate" vaccine behaviors. They link vaccine refusal to other forms of social capital, such as school selection, food choice, and methods of giving birth. In short, the normal pressures to conform to the recommended vaccine schedule are reduced (and potentially even reversed) in settings where opting out is seen as evidence of intensive parenting.

Boundaries and a False Sense of Protection

In addition to reducing social costs, pockets of homogeneity may also foster a false sense of protection from contagious diseases. Scholars have pointed out that members of dominant social groups are especially likely to perceive communicable disease as something that happens to "other" groups (Brandt 1987; Epstein 1996). This kind of thinking is common among parents who believe they can control exposure to the carriers of disease without the use of vaccines. They envision themselves as part of what Reich (2014) calls an "imagined gated community" in which they are able to protect their children by managing their social interactions. This suggests boundaries that reinforce notions of "us" and "them" foster a false sense of security. They allow parents to imagine their children are protected from exposure to diseases like measles because infection occurs only among members of other social groups who are, presumably, less vigilant in terms of protecting their children from harm.

Intergroup boundaries are real and palpable to people, but contagious diseases tend to ignore them. The sharper the boundaries, the more likely parents will have a false sense of protection. Sociologists note that group boundaries are strengthened both by the sense of in-group solidarity that comes from living in a homogeneous setting (Berger 1967; Blau 1977; Simmel 1955) and by the sense of threat that exposure to diversity often evokes (Coser 1956; Fischer 1975; McVeigh 2009; Olzak 1992). To resolve this apparent tension, some scholars argue that especially salient boundaries and active boundary maintenance

occur when group members enjoy frequent in-group interactions in their immediate environment but also perceive members of out-groups in their broader surroundings (Andrews and Seguin 2015; McVeigh, Crubaugh, and Estep 2017; McVeigh and Sikkink 2005; Wilson and Portes 1980).

For example, McVeigh and Sikkink (2005) find that white supremacist framing—which constructs sharp racial boundaries to perpetuate stereotypes and make conspiracy theories appear plausible—is most successful in settings where minorities are present but segregated from white people. They find that "proximity is required to generate a sense of threat, while a certain degree of distance is required to prevent members of the dominant group from seeing out-group members as unique individuals" in a way that might disconfirm stereotypes and outrageous conspiracy narratives (McVeigh and Sikkink 2005:501). The combination of proximity and distance intensifies in-group and out-group distinctions in ways that can distort evaluations of reality.

Although there is much that distinguishes vaccine refusal from racist activism, the comparison helps us understand how pockets of homogeneity might alter how parents perceive risk. Out-groups may be near enough to reinforce class-based or racialized narratives of disease (Brandt 1987; Epstein 1996) but not close enough to refute the faulty reasoning upon which those narratives are based. Separation from poor and working-class families could allow members of these enclaves to feel a sense of protection, while the awareness of class diversity just outside the enclave provides frequent reminders that they are, in their estimation, succeeding in their project of creating a protected space for their family. In this way, pockets of homogeneity might give parents a sense of empowerment, or perhaps even invulnerability, in terms of shielding their children from disease. This could then shift the cost-benefit analysis by making vaccination seem less important. Not surprisingly, parents who believe vaccinations are unnecessary are much more likely to opt out (Salmon et al. 2005).

SUMMARY AND HYPOTHESES

To summarize our argument, we first note that well-documented dynamics of school and residential selection can create homogeneous pockets of advantaged families in close proximity to diversity. These settings may be more likely to disproportionately attract parents who expend great effort to take advantage of the benefits of diverse environments while opting out of the perceived costs of contributing to that diverse community. Because vaccine refusal stems from this same parenting orientation, parents who are inclined to opt out of vaccines should be overrepresented in these homogeneous contexts.

Moreover, parents who would prefer not to vaccinate their children are more likely to act on that preference if they feel their children are protected from exposure to disease and if they feel they (and their children) will not face social exclusion or stigmatization because of that decision. We argue that the high frequency of interaction with other individualist parents in these homogeneous pockets may reduce the likelihood of harsh criticism for opting out, and the salient social boundaries of these enclaves foster a false sense of security from the presumed carriers of disease. As a result, the choice to opt out in these settings could be seen as both safe and socially acceptable.

These place-based mechanisms of attraction and social reinforcement, operating at the level of both school districts and schools, pose three primary hypotheses that we test in this article. At the district level, we expect the following:

> *Hypothesis 1:* The relationship between district-level socioeconomic status (SES) and PBEs varies based on the average SES of neighboring school districts. Specifically, we expect *high-SES districts that border low-SES districts* will have particularly high PBEs.

The logic of the theory yields a very similar prediction concerning school-level PBEs:

> *Hypothesis 2:* The relationship between school-level SES and PBEs varies based on the SES

of the school district in which the school resides. Specifically, we expect *high-SES schools located in low-SES districts* will have particularly high PBEs.

We argue that homogeneous pockets could attract individualist parents with sufficient resources who wish to avoid contact with poor or working-class families. In economically integrated districts, families may have more incentives to locate a protected space for their children. Thus, in addition to the overall affluence of the district in which a school is located, we also consider the degree to which affluent families are either segregated from or exposed to poor and working-class households:

Hypothesis 3: The relationship between school-level SES and PBEs varies based on the level of income segregation in the district. Specifically, we expect *high-SES schools located in economically integrated districts* will have particularly high PBEs.

DATA AND METHODS

We evaluate our argument using quantitative data on schools and school districts, as well as qualitative data from parent interviews. Our strategy aligns with Small's (2011) "complementarity" category of mixed-methods research, in which the strengths of one type of data compensate for the weaknesses of the other (Brewer and Hunter 2006; Scrimshaw 1990). Quantitative school/district data are well-suited for identifying spatial patterns in PBE occurrence, but not for explaining why those patterns emerge; interview data reveal underlying parental motivations that drive choices about housing, schools, and vaccines, but they cannot speak to the distribution of those motivations across populations or space. Thus, we use quantitative data to test our hypotheses about the relationship between PBEs and pockets of homogeneity, then shift to qualitative analysis to provide evidence that our proposed theoretical mechanisms are reflected in the experiences of parents living in these unique places.

Case Setting

Our quantitative analysis examines variation in the percentage of kindergarteners in California schools and school districts who obtained PBEs in the academic years just prior to the Disneyland measles outbreak. We operationalize the concept of "pockets of homogeneity" at two levels of analysis and run separate models for each. The first uses ordinary least squares regression of districts while considering the characteristics of neighboring districts; the second is a multilevel regression analysis of schools nested in school districts. We focus on California for several reasons. First, it was the focal point of a highly publicized measles outbreak in 2015 and has, therefore, become an important state in the ongoing battle over compulsory vaccines. Understanding this case should shed light on the dynamics of vaccine refusal in other states. Second, the state keeps accessible government records, including data on the percentage of elementary school students who receive vaccine exemptions and the educational attainment of students' parents (a key predictor in our analysis). Third, in the years leading up to the measles outbreak, California had one of the highest PBE rates of all 50 states, with documented spatial clustering of PBEs (Carrel and Bitterman 2015; Delamater et al. 2018). Fourth, due to its size, its large and varied economy, and its demographic diversity, there is a significant amount of variation in terms of the composition of communities in which schools are located.

Outcome Variables

We collected data on PBEs at the district and school level from the California Department of Public Health (CDPH) website.[4] The CDPH kept detailed records of the percentage of kindergarteners in each elementary school who were granted PBEs in each year (prior to the elimination of PBEs in 2016). Given our interest in schooling choices that occur within and between districts, we limited our analysis to *public* schools that reported vaccination

data, because private-school enrollment is not constrained by district boundaries (key predictor variables are also unavailable for private schools).

To calculate PBEs for the district-level analysis (Hypothesis 1), we aggregated the total number of kindergarteners receiving PBEs in each district and divided this by the total number of kindergarteners in the district (multiplied by 100). We calculated the mean PBE rate in districts for the academic years that began in 2011, 2012, and 2013—the peak of PBEs before the state implemented more-restrictive laws in 2014 and 2016. PBEs fluctuate substantially, especially in smaller schools and districts, so the three-year average is a better measure of the rate of vaccine refusal in the district. We eliminated districts governed by state and county boards of education rather than by elementary or unified school districts ($n = 33$), as well as six other districts that could not be matched to district-level variables derived from American Community Survey data. As described below, 13 districts were dropped due to low response for our key predictor variable related to parents' education. The final district-level dataset included 747 elementary and unified school districts with at least one school reporting PBE data in each of the three academic years. Districts ranged from 0 to 48 percent PBEs, with a mean of 4.0 percent; 70 districts had over 10 percent opting out, and 72 districts had no PBEs during these years. Following other research on PBEs in California (see McNutt et al. 2016; Walker and Rea 2016; Yang et al. 2016), we used the natural log of this variable in our regression models to account for skewness.[5]

For the school-level analyses (Hypotheses 2 and 3), we calculated the mean PBE rate for 2011, 2012, and 2013 and used the natural log of this variable. Given our theoretical interest in interaction and social influence, we eliminated schools where instruction is delivered primarily online ($n = 13$) or via independent study ($n = 33$). We also dropped 64 schools that are governed by state or county boards of education; 188 schools were dropped due to low response for parents' education and three for missing income segregation data. The final school-level dataset included 5,025 public schools that reported PBEs in each of these three academic years, ranging from 0 to 75 percent, with a mean of 2.6 percent; 221 schools had rates higher than 10 percent, and 1,132 schools had no PBEs at all during the three-year period.

Measuring Pockets of Homogeneity

Pockets of homogeneity exist in settings where *local homogeneity* occurs within the midst of *broader diversity*. The pockets that interest us involve a high concentration of socioeconomically advantaged families that are close to, but separate from, families in less advantaged areas. We created three interaction terms to operationalize pockets of homogeneity at two levels of analysis: *districts* with high proportions of parents with college degrees that border low-income districts (Hypothesis 1); and *schools* with high proportions of parents with college degrees that are located in low-income (Hypothesis 2) or economically integrated (Hypothesis 3) districts.

We use parents' education to measure "local homogeneity" because of our focus on parenting orientation. Previous research shows a general association between education and childrearing practices (Lareau 2003), and the intensive, individualistic parenting practices that characterize vaccine-hesitant parents (Reich 2016) are more closely related to education than to income. Thus, the pockets we have in mind involve a high concentration of highly educated parents. High-quality data on parents' education are not available in every state. Fortunately, the California Department of Education collected information on parents' educational attainment through one component of their previous statewide accountability system, the Academic Performance Index (API) (California Department of Education 2018). We calculated the *percentage of students in each school and district with one or more parents who have a bachelor's degree or higher*.[6]

Operationalizing pockets of homogeneity also requires a measure of socioeconomic

diversity in the surrounding area. We obtained a measure of *median household income for school districts* from American Community Survey (ACS) five-year estimates for 2009 to 2013 (U.S. Census Bureau 2014). In addition, we created another district-level variable that captures the *income of neighboring districts* for use in testing Hypothesis 1. We identified all the neighbor relationships for each district using the Polygon Neighbors tool in ArcGIS. We operationalized "neighbor" relationship using a Queen's contiguity scheme—if any part of the polygon bordered on any other polygon, they were categorized as neighbors. Districts had an average of 5.8 neighbors. For both conceptual and methodological reasons, we prefer these income variables over education measures for operationalizing our "broader diversity" concept. Conceptually, our theory involves parental choices to avoid contact with low-SES families, and we think differences in income are more perceptible to parents making residential choices than are differences in educational credentials. Methodologically, income is less correlated with our local homogeneity measure (percent college-educated parents), which reduces the potential for multicollinearity.

To measure *income segregation* (Hypothesis 3), we used ACS household income data to calculate a "rank-order information theory index" or *H* (Reardon et al. 2008).[7] Theoretically, *H* can vary from 0 (no segregation) to 1 (complete segregation). A value of 0 would indicate the distribution of incomes is the same in each block group in the district.[8] Thus, low values correspond to economically integrated districts, where we would expect high contact between different income groups.[9]

Using the variables described above, we created three interaction terms to test our hypotheses.[10] Variables were centered before generating interaction terms, such that the main effect for each term in the interaction represents the effect of that variable at the mean of the other variable in the interaction. The first corresponds to our district-level analysis, and the second and third to the school-level analyses: *percent parents with college degree (district)* × *median income of neighboring districts* (Hypothesis 1); *percent parents with college degree (school)* × *median income (district)* (Hypothesis 2); and *percent parents with college degree (school)* × *income segregation (district)* (Hypothesis 3).

Additional Predictors

We included several school- and district-level variables from National Center for Educational Statistics (NCES) data for the 2011–12 academic year (U.S. Department of Education 2016). We used a dichotomous indicator for *charter school* in the school-level analysis, as previous studies show PBEs are higher in these settings (Birnbaum et al. 2013; Brennan et al. 2017). Our theory helps explain this relationship. The goal of charter schools is to give parents freedom to personalize educational opportunities for their children (Nathan 1997). Charters are also more racially and economically homogeneous than surrounding public schools, especially when they are situated within less-advantaged districts or communities (Renzulli and Evans 2005). In short, we expect to find that charter schools have especially high PBEs because they are ideologically and structurally similar to our pockets of homogeneity.

Because race tends to be a strong predictor of PBEs (Smith et al. 2004; Sugerman et al. 2010; Yang et al. 2016), we included a measure for *percent white students* in both the school- and district-level analyses. Additionally, larger schools and districts are likely to be different from smaller ones in meaningful ways, so we included a measure of *total school enrollment* and *total district enrollment*. We used the natural log of both variables to adjust for skewness.

Previous studies have also found that PBEs tend to be lower in densely populated areas (Atwell et al. 2010; Estep 2018; Richards et al. 2013). We divided the total population based on U.S. Census Data (U.S. Census Bureau 2014) by the district area derived from district shapefiles to calculate *population density* in each district (1,000 residents/

Table 1. Descriptive Statistics for Variables in District-Level Analysis

Variable	*N*	Mean	Std. Dev.	Min.	Max.
% PBEs	747	4.01	5.48	0	48.17
% PBEs (log)	747	1.23	.84	0	3.90
% Parents with College Degrees	747	33.38	22.94	0	98
% White Students	747	38.86	25.95	0	95
Total District Enrollment	747	7,240	26,051	84	653,826
Total District Enrollment (log)	747	7.69	1.59	4.44	13.39
Population Density	747	1,081	1,869	.08	13,404
Population Density (log)	747	5.22	2.22	.08	9.50
% Republican	747	45.12	17.40	4.21	81.52
% Third Party	747	2.64	1.30	0	13.26
Income of Neighboring Districts ($1,000s)	747	61.41	19.62	23.18	137.95

square mile, logged). We included this district-level predictor in both school- and district-level analyses to account for differences between urban areas and portions of the state that are more sparsely populated.

A recent study of PBEs in California found an increasingly positive association between PBEs and the proportion of Republicans in census tracts (Estep 2018). We obtained precinct-level results for the 2012 presidential election from California's Statewide Database (Statewide Database 2013). To create a *school-level measure of percent Republican*, we used ArcGIS to match school coordinates to electoral precincts, then calculated the proportion of votes in that precinct cast for Mitt Romney in the 2012 presidential election. Fifty-five schools were located in precincts where no votes were cast; to avoid losing these cases, we matched these schools to the nearest precinct with available voting data. For the *district-level measure of percent Republican*, we created centroid points for all voting precincts in the state, then spatially joined them to school districts based on whether those districts "contained" the centroid of the precinct. We then calculated the percentage of all votes cast in those precincts that went to Romney in 2012.

Finally, we used the same approach to measure district- and school-level *percent third-party* vote in the 2012 presidential election (e.g., Libertarian, Green Party). PBEs could be associated with the tendency to reject traditional left-right political categories in favor of parties that reflect a more personalized set of issue positions (Baldassarri and Goldberg 2014). Third-party voting is, to some extent, a political expression of opt-out individualism. Thus, in addition to adjusting for this in our statistical analysis, we also use these variables descriptively to evaluate whether this expression of individualism is more common in pockets of homogeneity.

Summary statistics for all district- and school-level variables are presented in Tables 1 and 2. Tables 3 and 4 provide bivariate Pearson correlation coefficients for variables used in both analyses.[11]

Statistical Analyses

We estimate district-level models using an OLS regression. We also tested the data with negative binomial regression models and zero-inflated models to address excessive zeroes in the outcome variable and relax the assumption of normally distributed residuals. The statistical significance of the key variables of interest did not differ between models. Furthermore, the two alternative modeling approaches have important limitations related to the conceptualization of "pockets of homogeneity." Therefore, we present the OLS coefficients and resulting margins for ease of interpretation.[12]

Table 2. Descriptive Statistics for Variables in School-Level Analysis

Variable	*N*	Mean	Std. Dev.	Min.	Max.
School-Level Variables					
% PBE	5,025	2.61	4.57	0	75.00
% PBE (log)	5,025	.92	.78	0	4.33
% Parents with College Degree	5,025	32.49	25.58	0	100
Charter School	5,025	.06	.23	0	1
Total School Enrollment	5,025	561	215	31	2,266
Total School Enrollment (log)	5,025	6.24	.45	3.47	7.73
% White Students	5,025	27.00	24.96	0	96.69
% Republican	5,025	35.85	18.41	0	100
% Third Party	5,025	2.41	1.22	0	28.57
District-Level Variables					
Median Household Income ($1,000s)	5,025	62.77	21.72	22.38	236.53
Population Density	5,025	2,296	2325	.13	13,404
Population Density (log)	5,025	6.94	1.66	.12	9.50
Total District Enrollment	5,025	80,498	184,903	87	659,132
Total District Enrollment (log)	5,025	9.73	1.73	4.48	13.40
Income Segregation	5,025	.11	.04	–.03	.99

Table 3. Bivariate Correlation Matrix for Variables in District-Level Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) % PBE (log)	1.00							
(2) % Parents with College Degree	.50							
(3) % White Students	.76	.55						
(4) Total District Enrollment (log)	–.23	.04	–.41					
(5) Population Density (log)	–.12	.28	–.29	.69				
(6) % Republican	.13	–.05	.36	–.32	–.49			
(7) % Third Party	.45	.06	.38	–.23	–.18	–.21		
(8) Income of Neighboring Districts	.15	.61	.10	.27	.50	–.34	–.08	1.00

Our school-level analysis includes characteristics of schools nested within districts, which violates OLS assumptions concerning the independence of observations. Attributes of schools within the same district are likely to share more similarities, on average, than schools in separate districts. To relax this assumption, we estimated mixed-effects linear regression models, treating school attributes as level-one and district attributes as level-two covariates. Models include a random intercept at the district level, and we added a random coefficient to allow our school-level measure of percent of parents with a college degree to vary across districts. A key feature of these multilevel models is that they permit cross-level interactions. This allows us to estimate how the effect of parents' education (a school-level variable) changes depending on the median income and income segregation of the district.[13]

Qualitative Data

The first author conducted 11 semi-structured interviews with parents of elementary school children in Santa Monica ($n = 7$) and Orange County ($n = 4$) in June 2016.[14] Demographically, these settings are quite similar—predominantly white, high incomes, and high

Table 4. Bivariate Correlation Matrix for Variables in School-Level Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
School-Level Variables											
(1) % PBE (log)	1.00										
(2) % Parents with College Degree	.54										
(3) Charter School	.14	.08									
(4) Total School Enrollment (log)	−.21	−.03	−.20								
(5) % White Students	.73	.67	.07	−.23							
(6) % Republican	.42	.31	−.08	−.05	.58						
(7) % Third Party	.21	.01	.03	−.23	.19	−.03					
District-Level Variables											
(8) Median Household Income ($1,000s)	.25	.65	−.06	.01	.35	.16	−.04				
(9) Population Density (log)	−.23	.07	.02	.26	−.33	−.44	−.12	.12			
(10) Total District Enrollment (log)	−.24	−.11	.06	.28	−.35	−.37	−.12	−.16	.61		
(11) Income Segregation	−.11	.01	.03	.17	−.14	−.20	.05	.04	.37	.56	1.00

proportions of college-educated parents. Santa Monica, however, is bordered on all sides by the much more diverse LA Unified school district, and it is therefore an ideal setting for evaluating whether parents experience pockets of homogeneity in the ways we have described.[15]

We recruited parents using a mixture of purposive and snowball sampling. In Santa Monica, the Parent Teacher Association president for one of the district's elementary schools facilitated introductions with other parents during morning drop-off. Initial interviewees were then asked to recommend other parents who might have a valuable or different perspective on the topic of childhood vaccinations. To identify parents in Orange County, we distributed flyers door-to-door in neighborhoods surrounding an elementary school in Mission Viejo and another in Newport Beach. In addition, one flyer recipient agreed to post a recruitment message on an online message board for vaccine-hesitant parents. The full sample included nine mothers and two fathers. Vaccine-hesitant parents were intentionally over-sampled, but the final sample still represents a variety of views and choices related to childhood immunizations (see Appendix Table A1 for participant characteristics). Participants were asked a variety of questions related to residential and school choices, parental fears/concerns, decision-making about vaccinations, perceptions of risks, and reactions to the recent measles outbreak.

Interviews took place in 2016, several years later than the timeframe for the quantitative data. However, many parents recounted vaccination decisions made during the years of our quantitative study. Additionally, our conversations with parents occurred 18 months after the beginning of the Disneyland measles outbreak, one year following the passage of SB277 (in June 2015) that eliminated PBEs, and just prior to the actual implementation of SB277 for the 2016–17 school year. We acknowledge that those events could have altered participants' current views or their recollections of past ones (e.g., about risks and benefits). Although, as we will discuss, parents at the center of our theoretical argument were surprisingly unaware of the outbreak and the subsequent political conflict over eliminating PBEs.

Interviews were recorded and later transcribed. Initial analysis involved open coding to identify repeated themes and important concepts. We later re-analyzed all transcripts looking specifically for codes suggested by our pockets-of-homogeneity argument (many of which overlapped with codes identified previously). We then selected examples and quotations to illustrate broader themes in the data and to corroborate the mechanisms described earlier.

QUANTITATIVE FINDINGS

Descriptive Analysis

We begin by examining cross-tabulations that illustrate relationships between our key variables of interest. We operationalized "pockets of homogeneity" as the combination of (1) a high proportion of college-educated parents in a local setting and (2) low-income households in the surrounding area. To capture this idea, we created categories for percent college-educated parents (less than 25 percent, 25 to 50 percent, and over 50 percent), as well as district income and neighboring district income (above and below \$60k[16]). We identify districts and schools with 10 percent or more PBEs as "hotspots" where vulnerability to the spread of disease is especially high.

Table 5 shows the percentage of hotspot districts for various combinations of parents' education and income of neighboring districts, and we note several important observations. First, as we would expect based on the geographic principle that places close to one another are more alike than those farther away, districts tend to be similar to their neighbors: most highly educated districts have wealthy neighbors (n = 139), and most districts with low education have poorer neighbors (n = 254). But this is not always the case, as many districts fall into other categories. Second, highly educated districts are more likely than less-educated districts to be hotspots. Third, and most important for our argument, the

Table 5. Percentage of California School Districts with Over 10 Percent Personal Belief Exemptions, by Parents' Education and Income of Neighboring Districts

		Income of Neighboring Districts	
		Less than $60,000	*More than $60,000*
Percent of Students in District with College-Educated Parents	*Less than 25%*	4% (254)	0% (79)
	25 to 50%	14% (117)	8% (132)
	Over 50%	**27% (26)**	19% (139)

Note: Parentheses indicate the number of districts in each category. Bold indicates "pocket of homogeneity."

Table 6. Percentage of California Schools with Over 10 Percent Personal Belief Exemptions, by Parents' Education and District Income

		Median Income of District	
		Less than $60,000	*More than $60,000*
Percent of Students in School with College-Educated Parents	*Less than 25%*	<1% (2,018)	<1% (507)
	25 to 50%	6% (625)	3% (651)
	Over 50%	**17% (252)**	10% (972)

Note: Parentheses indicate the number of schools in each category. Bold indicates "pocket of homogeneity."

highest frequency of hotspots (27 percent) occurs in highly educated districts with low-income neighbors—that is, in pockets of homogeneity. We might expect having high-SES neighbors would reinforce the positive association between education and PBEs, but the opposite relationship emerges.

Table 6 reveals a similar pattern when examining schools. Once again, hotspots are more common in highly educated schools. And, importantly, the positive relationship between education and PBEs *increases* as the median income of the school's district *decreases*. Highly educated schools in poor districts are nearly 70 percent more likely to be hotspots than are similar schools situated in affluent districts (17 percent versus 10 percent). To help visualize where pockets of homogeneity occur, we created two statewide maps that identify districts and schools that fall into the lower-left cell of Tables 5 and 6 (see online supplemental materials).

Regression Analysis

The findings in the previous section provide descriptive evidence that there are higher levels of PBEs in pockets of homogeneity, but we now test whether this relationship holds up after adjusting for other relevant confounding factors. We first examine pockets of homogeneity in our district-level dataset (Hypothesis 1). Before estimating OLS regression models, we checked for multicollinearity that might result from the correlation of several district-level predictors (see Table 3). Specifically, percent parents with college degree is positively correlated with percent white students ($r = .55$) and neighboring district income ($r = .61$). We checked VIF statistics, and all variables are well within the acceptable range (highest VIF is 3.1 for parents' education) (O'Brien 2007).

Table 7 presents coefficient estimates from the OLS regression models. Looking at the

Table 7. Coefficients from OLS Regression Models Predicting Percent Personal Belief Exemptions at the District Level

Variables	Model 1	Model 2
% Parents with College Degree	.004**	.006***
	(.001)	(.001)
% White Students	.021***	.021***
	(.001)	(.001)
Total District Enrollment (log)	.038*	.032
	(.017)	(.017)
Population Density (log)	.004	–.005
	(.014)	(.014)
% Republican	–.001	–.002
	(.001)	(.001)
% Third Party	.134***	.132***
	(.019)	(.019)
Neighboring Districts' Median Household Income	–.0004	.001
	(.001)	(.001)
% Parents with College Degree × Neighboring Districts' Income		–.0002***
		(.00004)
Constant	–.208	–.321
	(.158)	(.161)
R-squared	.635	.644
Observations	747	747

Note: Standard errors are in parentheses.
*$p < .05$; **$p < .01$; ***$p < .001$ (two-tailed test).

additional predictors in Model 1, as expected, percent white students is a strong, positive predictor of PBEs. The statistically significant coefficient estimate for percent third-party suggests PBEs are higher in districts that attract residents who vote for a political party other than Democrat or Republican. As we show in our supplemental analysis, we suspect this association is because third-party support taps into the same individualistic root as vaccine refusal.

Turning to our key predictor variables, the coefficient for parents' education is positive and statistically significant, indicating PBEs are higher in districts where more parents have college degrees. Our measure of household income in neighboring districts does not help predict a district's PBEs, net of other variables. Our main interest is the interaction of parents' education and neighbor income, which is added in Model 2. As predicted, the coefficient is negative and statistically significant, indicating that the influence of having college-educated parents in a district is stronger when surrounded by low-income districts. To help visualize the direction and substantive significance of this interaction, we used the margins command in Stata to generate predicted values for the outcome at various values of the two terms in the interaction, while holding all other covariates at their mean values. We then plotted these values, as shown in Figure 2. In less-educated districts, we see a potential "spillover" effect where PBEs are higher when they are surrounded by affluent districts. However, in highly educated districts, PBEs increase as neighbor income decreases. As Hypothesis 1 suggests, districts with the highest PBEs have higher proportions of college-educated parents and border poorer districts.

Next, we test Hypotheses 2 and 3 using our dataset of schools nested within school districts. We again check for multicollinearity. Table 4 shows that percent parents with college degree is positively correlated with percent white students ($r = .67$) and median household income ($r = .65$). VIF statistics for all variables are well within the acceptable range (highest VIF is 3.27 for parents' education).

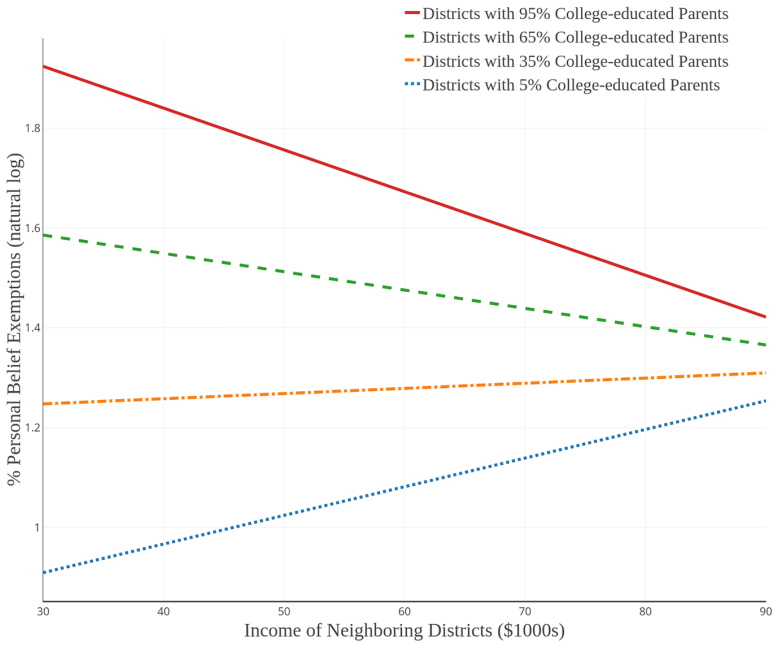

Figure 2. Predicted Percent Personal Belief Exemptions in California School Districts at Varying Levels of Parents' Education and Income of Neighboring Districts

Table 8 shows results of mixed-effects regression for our school-level measure of PBEs. As expected, PBEs are higher in charter schools and schools with a higher percentage of white students. The negative coefficient for school enrollment suggests smaller schools tend to have higher PBE rates. Once again, third-party voting is positively associated with PBEs. Looking at the effect of our main predictors, the school-level measure of parents' education is positive and statistically significant, indicating that vaccine exemptions are higher in settings where more parents hold college degrees. Furthermore, median household income of the district is not a statistically significant predictor of PBEs, net of other variables in the model. As we argued, the aggregation of affluent households does not necessarily mean a high rate of vaccine refusal.

Model 2 in Table 8 provides a test of Hypothesis 2. We added an interaction term that captures the combination of parents' education and district income. The negative, statistically significant coefficient indicates that the effect of the parents' education variable changes depending on whether a school is in a poor or prosperous district. Predicted values for this interaction are plotted in Figure 3. Results are similar to those obtained in our district-level analysis. Most importantly, PBEs in highly educated schools tend to be higher when the school is in a poorer district. The highest PBEs occur in advantaged schools within disadvantaged districts.

In Model 3 of Table 8, we test our prediction that PBEs cluster in highly educated schools located in economically integrated districts (Hypothesis 3). The coefficient for the interaction of percent college-educated parents and our measure of income segregation is also negative and statistically significant, indicating parents' education has a stronger positive effect on PBEs in less segregated districts—that is, districts where households with different income levels tend to share neighborhoods. As before, we calculated predicted margins based on Model 3 and plotted them in Figure 4. The right side of the plot represents districts where income segregation is high and, therefore, students of various class backgrounds are unlikely to go to the

Table 8. Coefficients from Mixed-Effects Regression Models Predicting Percent Personal Belief Exemptions at the School Level

	Model 1	Model 2	Model 3
School-Level Variables			
% Parents with College Degree	.005***	.006***	.004***
	(.001)	(.001)	(.001)
Charter School	.246***	.216***	.232***
	(.032)	(.032)	(.032)
Total School Enrollment (log)	–.125***	–.111***	–.119***
	(.019)	(.019)	(.019)
% White Students	.017***	.017***	.017***
	(.001)	(.001)	(.001)
% Republican	.0003	–.001	.0001
	(.001)	(.001)	(.001)
% Third Party	.043***	.039***	.040***
	(.006)	(.006)	(.006)
District-Level Variables			
Median Household Income ($1000s)	–.0007	.003***	–.0003
	(.001)	(.001)	(.001)
Population Density (log)	–.003	–.011	–.003
	(.011)	(.011)	(.011)
Total District Enrollment (log)	.012	–.006	–.004
	(.016)	(.016)	(.017)
Income Segregation	–.563	.046	.485
	(.345)	(.363)	(.485)
Interaction Terms			
School-Level Percent Parents with College Degree × District-Level Median Household Income		–.0001***	
		(.00001)	
School-Level Percent Parents with College Degree × District-Level Income Segregation			–.030***
			(.009)
Constant	.968***	1.262***	1.163***
	(.153)	(.157)	(.166)
Observations	5,025	5,025	5,025
Number of Groups	738	738	738
Log Likelihood	–3582.075	–3532.551	–3557.644

Note: Standard errors are in parentheses.
*$p < .05$; **$p < .01$; ***$p < .001$ (two-tailed test).

same public schools. In such settings, there is very little difference in PBEs, regardless of whether the school has a majority of college-educated parents or hardly any at all. The story is quite different in integrated districts (left side of Figure 4). Here, highly educated schools represent a homogeneous pocket of advantaged families in a district where other schools tend to be much more diverse. PBEs are higher, on average, in these settings.

Taken together, results of descriptive and multivariable regression analyses offer consistent support for our hypothesis that PBEs tend to cluster in a very particular kind of setting—what we call pockets of homogeneity.

Do Pockets Attract Particular Ideologies?

We argued that parents who exhibit characteristics of opt-out individualism are not uniformly distributed across space, but rather cluster in places that cater to that unique strand of individualism. An empirical test of this claim would require data on the parenting ideology of a substantial proportion of residents in every community in California. Such data do not

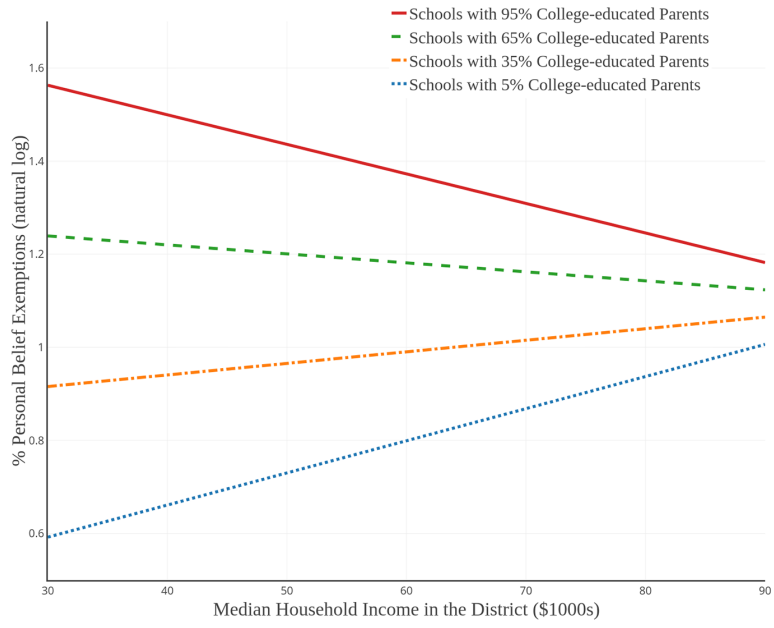

Figure 3. Predicted Percent Personal Belief Exemptions in California Schools at Varying Levels of School-Level Parents' Education and District-Level Median Income

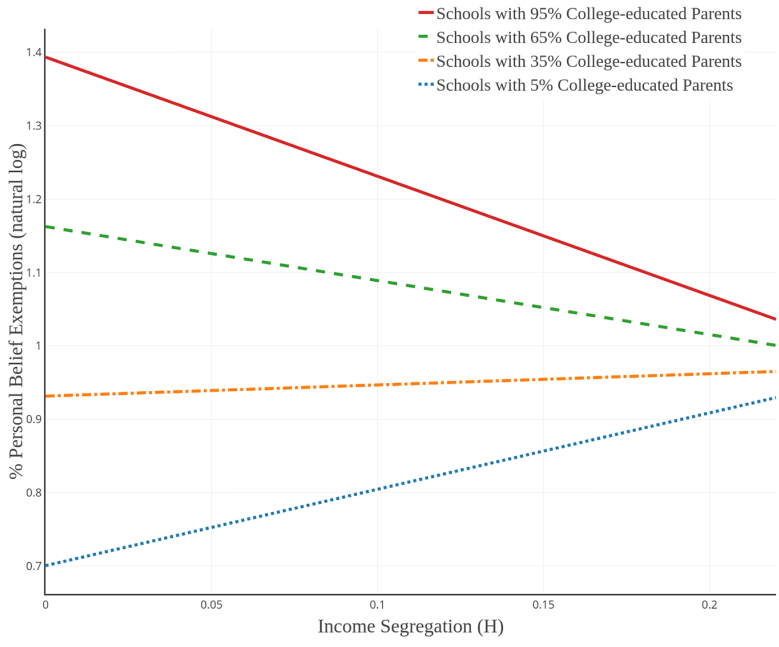

Figure 4. Predicted Percent Personal Belief Exemptions in California Schools at Varying Levels of School-Level Parents' Education and District-Level Income Segregation

exist. However, we do have access to voting records in California (Statewide Database 2013), which is an imperfect but reliable indicator of political ideology (Bafumi and Shapiro 2009), and therefore could provide indirect evidence that pockets of homogeneity disproportionately attract certain ideologies. Our interest here is not so much in the left-right

political spectrum, but rather in the proportion of people who opt out of those categories in favor of a third party that reflects their unique set of issue preferences (e.g., Libertarian Party, Green Party, Peace and Freedom Party).

Like vaccine refusal, the overall proportion who opt out of the two-party system is relatively low (only 2.6 percent). Using precinct-level data, we created a dummy variable to indicate districts in which 5 percent or more voted for third parties, and a similar variable to identify schools located in precincts where 5 percent or more voted third-party. Using the same cross-tabulation strategy as our descriptive analysis, we found that schools and districts located in pockets of homogeneity were more likely to be "hot-spots" of third-party votes (see Appendix Tables A2 and A3). For instance, a high-SES school in a low-SES district is more than three times as likely to be above the 5 percent third-party threshold than is a high-SES school in a high-SES district (7 percent versus 2 percent). We are not suggesting these are the same people as those who refuse vaccinations, or that political ideology is a direct measurement of opt-out individualism. But this does suggest pockets of homogeneity disproportionately attract residents who prefer to opt out of traditional or predetermined categories.

QUALITATIVE ANALYSIS

We now turn to the voices of parents in Southern California to evaluate our arguments about how selection and social reinforcement mechanisms contribute to the PBE clustering identified in our quantitative findings. Specifically, we look for evidence to support three central claims: that pockets of homogeneity appeal to parents who exhibit opt-out individualism, that opting out is less stigmatized in these settings, and that sharp social boundaries give parents a false sense of protection.

Opt-Out Individualism and Residential Choices

As we noted, Reich (2016) identified an individualist parenting orientation as the common thread uniting various motivations parents give for refusing or delaying immunizations. These parents believe each child is unique and that parental intuitions, not general medical advice, should guide healthcare decisions. Jack,[17] a father we spoke with in Santa Monica, said,

> I don't want to hear the dogma you studied 20 years ago. Do you know [my son]? Have you talked to him for a minute? Oh, I don't need to. Ha! Because I've known him for a long time. . . . So, I will not abandon my own judgment, which is essentially what experts in institutions suggest you to do.

Other interviewees were less cynical but still prioritized their own feelings over expert advice. When asked about her alternative vaccine schedule, Jennifer, a stay-at-home mother of four in Santa Monica, responded, "So we didn't have any real medical knowledge background about it, it was just sort of a feeling."

Relying on their intuition, the vaccine-hesitant parents we interviewed expended a great deal of effort to personalize healthcare by adopting or opting out of medical recommendations based on what they believed suited their children's unique needs. Jennifer vaccinated her twins on a slower schedule, but she decided to reject the Hepatitis B vaccine completely:

> The only thing we didn't do was I think the Hepatitis B which was—my husband was a biologist, not working as one now, but he was very against the Hep B because there's just—Through blood transfusions, drug use, I don't really see why our 4-year-old needs Hep B. To this day the school is still pushing that we get it, and we haven't really talked about it or done anything about it. They haven't had it.

We argued that pockets of homogeneity might appeal to this kind of parent because the choice to settle in a place like Santa Monica involves a similar kind of personalization of risks and opportunities. Leah, an

Ivy-League-educated attorney who now stays at home with her two young children, engaged in vigorous research to determine which vaccines to give her children, and when. That same effort to personalize opportunities and risks—the core of opt-out individualism—is also evident in Leah's description of how she and her family settled in Santa Monica:

> We decided to live in Santa Monica because it has a good school district and we were looking in a few different areas within public schools. Specifically, we ended up in Santa Monica because the house we found was in Santa Monica and we had certain parameters where we wanted to go.

When asked to elaborate on the specific "parameters" she had in mind, she explained:

> L.A. is a really big place and when it came down to it, the things we were looking for were really good public schools, quote good neighborhoods, meaning relatively safe. And well located for a commute for work purposes, so places like Orange County would be too far. . . . We didn't want to live too close to the freeway for health reasons, we didn't want to be within a mile of the freeways. So that knocked out a lot of areas. That's why we ended up in Santa Monica.

Like many families with children, their home search began with concerns about school quality (Holme 2002; Owens 2016). Areas without "really good" public schools were crossed off the list. Other risks and opportunities were delicately balanced as well. In the end, school and neighborhood quality, exposure to freeways or other perceived health risks, and commuting distance to Los Angeles served as a checklist, winnowing the list of options by eliminating communities that met some, but not all, of the family's personalized set of criteria (e.g., "Orange County would be too far").

Pockets of homogeneity check a lot of boxes. Santa Monica residents enjoy the "good" schools and "safe" neighborhoods that accompany concentrated wealth, without giving up the advantages of living near a large and diverse metropolitan area. As Margaret, a Santa Monica mother and small-business owner, stated, "I think that there's just a lot of opportunities here. When you're in a big city there's museums and there's access to things and culture." Desirable features of Los Angeles are within easy reach, even as the poor and working-class households that contribute to the "culture" of the city are kept at arm's length.

In Leah's earlier quote, she seemed to acknowledge her own privilege when she used scare quotes for "good neighborhoods." Other parents in Santa Monica did not explicitly articulate their choices in terms of protecting class advantages, but they certainly expressed an understanding of the social boundaries that insulate their community from others. When asked why her family settled in Santa Monica, Jennifer explained,

> I mean, *it feels like a little Los Angeles pocket*. It's calm. It's easy going. I feel supported, especially within the [elementary school] community. It's a great public school that sort of has the feel of a private school. It's just an easy city to get around, and it is an easy city to be with your kids in. [emphasis added]

For Jennifer, Santa Monica is a peaceful haven within the greater Los Angeles area. Importantly, she interprets her preference for this setting in terms of providing advantages for her children, especially the "feel" of local schooling options. Similar to the gentrifiers in Butler and Robson's (2003) study, parents we interviewed appreciated the strategic location of Santa Monica: close to diverse opportunities in Los Angeles, yet buffered from less-desirable people and places by a supportive, homogeneous local community that facilitates their childrearing priorities.

These interviews provide some evidence that the choice to opt out of vaccines and the choice to live in a homogeneous pocket are two manifestations of the strand of individualism we have described in this article. This suggests the spatial patterns of PBEs identified in our quantitative results could be due,

in part, to the selection of individualist parents into these pockets of homogeneity. Next, we consider evidence for our claim that pockets not only select parents who are inclined toward opting out, but they also make it easier to do so.

Avoiding Social Criticism

Gretta is a mother of two elementary school children in Orange County, about an hour drive south of downtown Los Angeles. She is highly suspicious of government vaccination mandates and has decided to opt her children out of all immunizations. She described the stigma that some vaccine-refusing families experience:

> I did have some experience in his preschool where I did mention to a couple people that we weren't vaccinating, and [my son] was shunned in a couple instances. After that I opted not to bring it up because I want to protect him, I want him to be included in parties and social gathering and play dates. . . . Moms on the playground would say "shhh shh shh" as I walked by, and say, "she's the one not vaccinating." It felt very isolating and very lonely.

Some parents are confident enough in their decision that even the harshest criticism would not alter their behavior.[18] Others could be more pliable. Although they might prefer to personalize vaccination schedules or opt out entirely, the prospect of being shunned—or worse yet, their children being shunned—could tip the scales toward vaccination. Research shows this kind of stigma is common (Carpiano and Fitz 2017).

Two mothers we interviewed illustrate different degrees of perceived stigma. Leah, the Santa Monica mother quoted earlier, described herself as "pro-vaccine" but used a delayed vaccination schedule for her children; Tammy lives in an affluent district in Orange County and did not vaccinate her kids. Both chose to delay or refuse vaccinations. But Tammy described her fear of discrimination and the effort required to keep her decision from others in her school community:

> It could be a hot topic for some people so unless someone is likeminded, I just wouldn't really get into it and I definitely don't want my kids to be discriminated against. . . . I definitely don't speak to the parents of my kids' friends, you know in the school, because I don't want to have, say, sort of, I don't want people to have a different view point on me or the rest of my family, so I don't get into it.

In contrast, Leah seemed almost unaware of any social consequences associated with her choice to delay vaccinations. To find a pediatrician for her second child, she said, "I just crowd sourced. . . . I said I want someone in Santa Monica who has a separate waiting room, who accepts insurance, who would do a modified vaccination schedule." When asked who she "crowd sourced," she replied, "I think our class list," illustrating that Leah felt less social stigma for opting out of the recommended vaccine schedule.

We argued earlier that the likelihood of criticism is lower in settings where there is a shared commitment to individualist parenting, because even parents who strongly disagree are unlikely to speak up. For instance, Charlotte, a leader in the Santa Monica parent community, was adamantly in favor of vaccines, and she called parents who do not vaccinate "selfish and narcissistic." But when asked about her interactions with those parents, she said she would never challenge another parent's choice. She simply avoids the conversation if another parent brings it up. Margaret, a physician's daughter and a self-proclaimed pro-vaccine mother in Santa Monica, said, "If other people aren't vaccinating their kids, it scares the heck out of me." Yet, despite that fear, she said, "I tend to stay quiet. . . . I just keep my mouth shut about it." Both Charlotte and Margaret believe vaccine-refusing parents have the right to choose what they feel is best for their children, even though they strongly disagree with those decisions.

Jennifer, who adopted a slower vaccination schedule but does not feel strong hesitations about vaccines generally, explained how she approaches this topic:

> *Jennifer:* I don't want to feel judged for what I've done. You know what I mean. Um, I don't want them to feel judged about what they've done, so it is personal, but it is interesting, and I think both sides could learn a lot from each other.
>
> *Interviewer:* Do you remember any experiences personally, or things you've heard about second-hand, where there was real criticism from someone?
>
> *Jennifer:* I can't think of any. No, I know, you know, reading stories in the newspaper and things like that, but I can't think of any situations where I've known anybody personally, or even known anybody who has known anybody, that they've had to deal with that.

This exchange typifies the perspective we found among Santa Monica parents. They are aware of non-vaccinating parents who have become targets of social criticism—an awareness gleaned from external news sources—but they cannot remember that ever occurring in their community. It is a "personal" decision for which people should not feel "judged."

Imagined Protection

Just over a year prior to our interviews with parents in Santa Monica and Orange County, the Disneyland measles outbreak began in the Los Angeles area and quickly became an international news story. According to a Nexis Uni database search, 4,573 news-related publications that contained the terms "Disneyland" and "measles" were released in 2015. Although living at the epicenter of this highly publicized outbreak, Santa Monica parents we spoke with could recount very few details about the outbreak, and others were unaware or dismissive of any risk this may have posed to their children. When asked to list health-related concerns for their children, parents were anxious about sugar intake and overscheduling, but no one mentioned infectious disease.

The outbreak did come up in our interview with Charlotte, who offered an insightful analysis of why parents were not more concerned:

> I think people are just not—people don't personalize anything much anymore unless it is personal to them. I think it's very easy to ignore the reasons for vaccinating if you feel like it would never happen to you. . . . You can see how easily people get taken into a false sense of security where they just believe it won't happen to them. Won't happen to their families, won't happen to them.

Charlotte is suggesting that, even if the threat is nearby, the danger is easily dismissed as something unlikely to affect one's own family. This "it won't happen to us" attitude is likely common among middle-class Americans. Deadly diseases are, in fact, rare. But we argue that the social structure of homogeneous pockets could make parents especially likely to misjudge their actual risk, as they see themselves inhabiting "imagined gated communities" (Reich 2014) where the risk of disease lies outside their circle of homophilous relationships.

This way of thinking appeared in our interview with Leah. She repeatedly emphasized that she was "risk averse" and made choices based on her perception of the likelihood of exposure to particular diseases. Yet her interview revealed how her views about the nature of risk are connected to her perception of living in a "pocket." She acknowledged that her child's school had very low rates of vaccination, and was then asked if that made her more likely to vaccinate on schedule. She replied, "No. It slightly concerned me because I may have been pregnant with my second child at the time, but there was nothing I could do. This is where we lived. This was our pocket of people." Sending her kids to a school with low vaccination rates did not seem risky enough to warrant a faster vaccination schedule, because this was her "pocket of people." This suggests her calculation of risks was influenced by the perceived

boundaries between the people in her pocket and those outside of it.

It is important to note that non-vaccinating parents in other contexts still feel the need to protect their children. However, the social boundaries that define their "safe haven" are drawn closer in—perhaps around their household, rather than their homogeneous neighborhood or school community. Tammy, the Orange County mother quoted earlier, stated:

> If you're keeping your baby at home, which we were, we had like someone coming in or whatever else, you know, you can delay these vaccinations. It's not, you're not going to have as much exposure to things, and the situation may not need all these vaccinations.

We found that boundary maintenance is a common strategy among vaccine-hesitant parents. Santa Monica residents, however, exhibited an unusual flippancy about infectious diseases, even in the immediate aftermath of a measles outbreak. The imagined protection associated with living in this homogeneous space seems to provide parents with one more justification for opting out of vaccines.

DISCUSSION

Outbreaks of vaccine-preventable diseases have increased in recent years. One reason for this increase is the growing proportion of parents who opt out of routine childhood vaccinations (Aloe et al. 2017; Omer et al. 2008; Sundaram et al. 2019). Rather than focusing on individuals, we sought to identify a particular spatial context that is likely to harbor high levels of PBEs. Consistent with our hypotheses, we found that PBEs are higher, on average, in "pockets of homogeneity"—affluent schools and districts that border less-prosperous areas. We explain this pattern based on the unique attributes of these places—specifically, their appeal to a particular kind of individualist parent, and their enclave-like features that make vaccine refusal seem like a safe and acceptable choice.

Our place-based argument is consistent with Sampson's (2012) robust definition of "contextual causality," because it treats places as important causal actors, in their own right, while also incorporating neighborhood selection and social influence into the theory. In particular, we highlighted the usefulness of theorizing how places can sometimes attract people with particular ideological leanings and then reinforce those tendencies through various social-interactional mechanisms. In the following section, we discuss study limitations, practical implications for addressing spatial concentrations of PBEs and other public health concerns, and the broader sociological implications of pockets of homogeneity and place-based ideologies.

Limitations and Suggestions for Future Research

Our place-based approach has several limitations. First, in seeking to identify patterns of PBE clustering among schools and school districts, we do not directly observe the micro-level processes that produce these patterns. We proposed several causal mechanisms based on secondary literature and found supporting evidence in our own interviews with parents, but our data cannot provide a definitive test of these mechanisms. For instance, third-party voting data suggest pockets disproportionately attract people who exemplify opt-out ideology, but we cannot directly measure the distribution of opt-out individualism across various contexts. We must concede the possibility that rates of opt-out individualism do not covary with pockets, and that some alternative explanation exists for why PBEs are higher in pockets than in other high-SES communities. However, our proposed mechanisms of attraction and reinforcement should open doors for future studies to further investigate the link between parental ideology and residential choice, and for work on risk perceptions, social stigma, and other micro-level processes that might contribute to PBE clustering. Such research would require individual-level data on parental ideology, perceptions, and choices, which can be linked to relevant geographic units.

Second, the cross-sectional nature of our data does not allow us to evaluate the

independent effect of residential selection and social influence. We agree with Sampson (2012) that contextual causality involves both. However, we acknowledge that this is an empirical claim that is open to further inquiry using data that measure changes in the distribution of parental orientations across settings over time.

Third, our goal has been to identify a setting where PBE hotspots are especially likely to occur, but our theory does not explain PBE concentrations outside of homogeneous pockets (see non-bold cells in Tables 5 and 6). Additional theoretical and empirical work—such as Delamater and colleagues' (2018) study of spatial spillover effects—is needed to understand other high-PBE settings.

Finally, we do not include a longitudinal analysis that considers the historical legacies of these pockets of homogeneity and whether these legacies affect PBEs. Pockets of homogeneity could result from the displacement of racial minorities and low-income families through gentrification (Smith 1996), from the secession of affluent districts (Frankenberg, Siegel-Hawley, and Diem 2017), from marginalization of service laborers in amenity-driven destinations (Park and Pellow 2011), or from "place-making" activities of the urban growth machine (Logan and Molotch 1987). We see this as a fruitful avenue for future research. In particular, we believe there is an opportunity to incorporate more of the work on new urban political economy to understand how local elites—such as chambers of commerce and real estate agents—make pockets of homogeneity attractive to people with opt-out ideologies.

Implications for Public Health

We argued that the spatial distribution of PBEs could be tied to broader, and largely inexorable, social forces associated with rising expectations for personalized consumption among middle- and upper-middle-class families (Reich 2016, 2020). Although critics have identified the negative consequences of the school choice movement (Buckley and Schneider 2009; Lubienski 2003), housing developments tailored to cultural tastes and political views (Bishop 2008), and personalized medicine (Dickenson 2013), these trends are largely beyond the control of the agencies charged with protecting community health. Increasing expectations for personalized choices, coupled with the growing income gap between college-educated and working-class families, makes it easier for affluent families to segregate themselves from others (Owens 2016). As a result, the homogeneous enclaves that foster high PBEs could become more common.

Some states, including California, have responded to this problem by eliminating PBEs. However, even such drastic changes in state policy are a limited solution at best, because policy proposals that limit parental rights have proved politically impossible in many states experiencing rapid growth in PBEs (Rabin 2019). Moreover, even in states that do restrict or eliminate PBEs, parents who are resolved to opt out seem to find ways of doing so. A recent study of vaccine exemptions in California revealed that SB277 did eliminate clusters of PBEs, but permanent *medical* exemptions (PMEs) rose precipitously after the law went into effect, and PME clusters quickly emerged in the same settings where PBEs were previously high (Gromis and Liu 2020). Other solutions are needed.

By focusing on places instead of individuals, our study opens the possibility of designing targeted interventions for "at risk" communities, rather than having to reach a dispersed population of parents who share a particular demographic trait. These place-based strategies should be based on an understanding of the structural features of places that attract vaccine-hesitant parents, and the social mechanisms that distort parents' estimation of the risks and benefits of vaccination in those settings. For instance, if opting out is less likely to be stigmatized in settings with high proportions of individualist parents, and might even be a sign of intentional parenting, then enforcement and educational strategies that "denormalize" vaccine refusal and associate on-time vaccination with "good parenting"

could help realign social incentives. Silverman and Wiley (2017) suggest that social marketing campaigns, public disclosure of vaccination rates by schools, and exclusion of unvaccinated children from schools during outbreaks are effective and permissible means of shaping social norms. Similarly, educational and media campaigns—by schools, healthcare providers, or local health departments—could be used to undermine the perception that the risk of exposure to a disease as contagious as measles can be managed by sheltering children from the perceived carriers of disease. As more outbreaks occur in these under-vaccinated areas, there may be more concrete evidence and statistics to use in those campaigns.

The conflict over compulsory vaccination is one of many instances in which the *collective* demands of public health run counter to the *individual* preferences of some. The very nature of public health requires that individuals give up some degree of freedom to protect the community—especially its most vulnerable members. Thus, our argument about pockets of homogeneity might help officials address other situations where noncompliance with public health recommendations or directives in certain spatial contexts could be problematic. For example, the COVID-19 pandemic has spurred government-recommended actions such as social distancing and mask wearing, and long-term containment of the viral illness may depend on widespread vaccination. Our theory suggests people in pockets of homogeneity may be more likely than others to resist those recommendations—their neighborhoods or surroundings might feel like a protected space, and neighbors may be more likely to excuse such resistance.

Broader Sociological Contributions

Our work also makes several contributions to the sociology of place. First, our analysis demonstrates the importance of measuring not only community composition—a staple in studies of "neighborhood effects"—but also relevant features of the *surrounding area*. We are not the first to note this important interaction of local and extra-local. Wilson (1987) showed that the plight of poor urban black families was exacerbated by the erosion of surrounding black middle-class neighborhoods, and Sampson (2012:239) offers a compelling case that "a neighborhood's neighbors matter" when it comes to explaining the spatial distribution of crime.

In the case of PBEs, it is misguided to assume all white, affluent communities are places for concern. We are much better off considering the composition of a local community *and* its neighbors. Beyond providing more accurate explanations, this approach also facilitates connections between neighborhood-effects research and other branches of sociological theory. For instance, our identification of pockets of homogeneity brought our theory into natural conversation with macro-structural network theory (Blau 1977) as well as literature on cultural and social boundaries (Lamont and Molnár 2002).

Second, we add to research on "lifestyle enclaves" by considering the causes and consequences of place-based ideologies. On one hand, the enclaves of individualism we described could promote individual expression, tolerance, and resistance to restrictive forms of normativity. However, Bellah and colleagues (1985:72) warn about the "narcissism of similarity" in lifestyle enclaves. Whereas ethnic enclaves and other communities blend public and private concerns, residents of lifestyle enclaves have difficulty with this balance. For instance, parents' efforts to personalize opportunities for their children are not intended to undermine the health or success of others, but they do reveal a narrow view of "good parenting" that obscures obligations to care for children outside one's immediate family (Reich 2016). In the end, our focus on place-based ideology illustrates that many uncoordinated, well-intentioned *individual* choices can produce *collective* outcomes that run counter to the public good, especially in places that cater to individualistic ideologies.

Finally, our discussion of pockets of homogeneity could help explain why group-based

inequalities persist even when macro-level patterns of segregation break down. Much of the literature on what is "dividing" contemporary U.S. society is focused on macro-level patterns of segregation (Bishop 2008; DellaPosta et al. 2015; Fischer and Mattson 2009; Florida 2002; Putnam 2015). These forms of segregation are clearly important. But overemphasis on affluent suburbs and under-resourced urban neighborhoods, or declining versus creative cities, obscures other forms of place-based segregation that may also be consequential.

We identified a different kind of homogeneity, which occurs when advantaged groups carve out a homogeneous pocket within a larger diverse population. This occurs in many settings. For instance, highly educated, predominantly white cosmopolitans return to the urban core, but they congregate in "gentrified" neighborhoods geographically close to poor or minority neighborhoods that are separated by strong social or physical boundaries (Lees, Slater, and Wyly 2013). Similarly, colleges expend resources to recruit diverse student bodies but then allow students to self-select into themed dormitories that tend to be segregated by race and class (Jordan 1994; Yanni 2019).

Homogeneous pockets in various settings—fostered by rising income inequality and expanding opportunities for personalized consumption—could allow individuals with advantages to continue monopolizing resources and opportunities, while feeling justified in doing so. They might perceive that the less-advantaged people around them have equal access to opportunities and, therefore, believe their advantages are the result of effort rather than structural inequalities that favor them over others (McVeigh et al. 2014). In the case of vaccines, the proximity of pockets of homogeneity near diverse populations may illustrate a particular kind of inequality—where people who opt out of vaccines put the less fortunate at risk.

APPENDIX

Table A1. Characteristics of Parent Interviewees

Pseudonym	Location	# Children	Vaccination Position	Interview Time (minutes)
Leah	Santa Monica	2	Delayed vaccination schedule	71
Jack	Santa Monica	2	Delay some vaccines, opt out of others	76
Charlotte	Santa Monica	3	Vaccinated on schedule	66
Anne	Santa Monica	1	Delayed vaccination schedule	70
Jeff	Santa Monica	2	Opt out of all vaccines	63
Jennifer	Santa Monica	4	Delay some vaccines, opt out of one	45
Margaret	Santa Monica	2	Vaccinated on schedule	60
Julie	Orange County (Mission Viejo)	3	Opt out of nearly all vaccines	65
Tammy	Orange County (Newport Beach)	2	Opt out of all vaccines	70
Gretta	Orange County (Mission Viejo)	2	Opt out of all vaccines	58
Natalie	Orange County (Newport Beach)	1	Delay some vaccines, opt out of others	25

Table A2. Percentage of California School Districts with 5 Percent or More Third-Party Voters in 2012, by Parents' Education and Income of Neighboring Districts

		Income of Neighboring Districts	
		Less than $60,000	*More than $60,000*
Percent of Students in District with College-Educated Parents	*Less than 25%*	6% (254)	0% (79)
	25 to 50%	7% (117)	2% (132)
	Over 50%	**15% (26)**	6% (139)

Note: Parentheses indicate the number of districts in each category. Bold indicates "pocket of homogeneity."

Table A3. Percentage of California Schools Located in Voting Precincts with 5 Percent or More Third-Party Voters in 2012, by Parents' Education and District Income

		Median Income of District	
		Less than $60,000	*More than $60,000*
Percent of Students in School with College-Educated Parents	*Less than 25%*	3% (2,018)	2% (507)
	25 to 50%	3% (625)	1% (651)
	Over 50%	**7% (252)**	2% (972)

Note: Parentheses indicate the number of schools in each category. Bold indicates "pocket of homogeneity."

Editors' Note

To avoid any possible conflict of interest, Rory McVeigh was not involved in the handling and review process for this article. The final decision was made by Omar Lizardo in consultation with an *ASR* Deputy Editor with no Notre Dame affiliation.

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ORCID iDs

Kevin Estep https://orcid.org/0000-0001-8495-4036
Pierce Greenberg https://orcid.org/0000-0002-5624-6646

Notes

1. We use the term "pocket" to reflect language used by multiple parents interviewed for this research.
2. SB277 was passed in 2015 and took effect in 2016. Although California no longer accepts PBEs, analyses of data prior to passage of SB277 could inform efforts to combat *medical* exemptions in California (Gromis and Liu 2020) and should be helpful to the dozens of other states currently debating vaccine policy.
3. We focus our discussion of pockets of homogeneity on large, urban contexts, but these same dynamics may play out in rural settings. For example, rural areas with natural amenities (e.g., coastal communities or areas near mountains and lakes) may attract well-off residents who wish to send their children to school districts separate from a low-income rural school district, or to a well-off school within an otherwise socioeconomically diverse rural district. This form of residential segregation has been noted in amenity-driven rural communities that rely on service-industry or immigrant labor but that attract wealthy residents (Park and Pellow 2011).

4. We obtained data in 2015 from https://www.cdph.ca.gov/programs/immunize/Pages/ImmunizationLevels.aspx. After the passage of SB 277, the California Department of Public Health changed this webpage and no longer provides historical data on PBEs on their webpage.
5. For all log transformations in this article, we add 1 to the original variable before calculating the natural log so that cases with zero values for the original variable also have zero values for the logged variable (rather than missing values).
6. The API also provides the percentage of parents who reported their educational attainment. Some schools/districts had low response rates in certain years. To address this challenge, we assembled API data for the academic years beginning in 2011, 2012, and 2013 and used parents' education data from the year the school/district had the highest response rate. Cases that had lower than 50 percent response rate in each of these three years were dropped from the analysis (13 districts, 188 schools). The mean response rate for the remaining cases was 93 percent for districts and 92 percent for schools. We also checked for systematic differences between dropped and included cases, and we found that excluded schools had fewer white students and tended to be in larger districts. As an additional check, we reran analyses with these cases included and obtained similar results.
7. In contrast to nominal characteristics like race, income is measured continuously (although typically reported in an ordinal scale in census data), which presents challenges for calculating segregation. The rank-order information theory index, however, overcomes many of these challenges. Rather than using information about only two categories (e.g., those who make above a certain income threshold and those who earn below it), it uses the entire distribution of income categories. It also does not confound income segregation and income inequality.
8. We used U.S. Census block groups for the calculation of *H*. Block groups are larger than census blocks but smaller than census tracts. Some rural districts in California have very few tracts, which can lead to extreme values for *H*. By using block groups (instead of tracts) as the smaller geographic unit in the calculation, we are able to avoid this problem. Segregation variables based on block groups and those based on tracts are very highly correlated.
9. As an additional robustness check, we estimated models using two other measures of segregation: an exposure index measuring the percentage of households that make less than 30K in a block group where a typical household makes 100K, and an index of dissimilarity based on percent free lunch data. Results were consistent with those presented here.
10. We conducted robustness checks using various combinations of school, district, and district-neighbor SES measures (percent free lunch, percent college-educated parents, median income) for these interactions and obtained consistent results.
11. The dataset used for quantitative analyses, as well as coding syntax for regression models, can be found with the online supplements for this article.
12. We also estimated spatial regression models, and we found that adjusting for spatial dependence did not meaningfully alter results (detailed methodological appendix available upon request).
13. Our school-level analysis represents schools in 738 districts; the district-level analysis includes 747 districts. The nine districts absent in the school-level analysis were due to missing school-level data related to income segregation (three districts) and low response rates for the parent's education data (six districts). These dropped schools were the only schools in their district—leading to the districts being absent from the school-level analysis. We keep the nine districts in the district analysis because we have all data used in those analyses.
14. Qualitative data collection methods were reviewed and approved by the Institutional Review Board at The University of Notre Dame, Protocol ID: 16-04-3120.
15. The Santa Monica-Malibu district is very unusual in that it consists of two spatially separate pieces. Our comment refers to the Santa Monica piece, where our interviews were conducted.
16. $60k approximates the median for both variables.
17. All parent names are pseudonyms.
18. Gretta did not succumb to such criticism. Instead, she enrolled her children in a Waldorf school, where parents and students are encouraged to think independently, including about vaccinations (Carpiano and Fitz 2017; Sobo 2015). Her effort to move her kids into this setting indicates her desire to find an insulated community of parents who would support, or even affirm, her resistance to medical recommendations.

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Kevin Estep is Assistant Professor of Health Administration and Policy in the Department of Cultural and Social Studies at Creighton University, and is also Assistant Professor of Medical Humanities in the School of Medicine. His research examines the consequences of residential sorting on politics and public health. Kevin is coauthor, with Rory McVeigh, of *The Politics of Losing: Trump, the Klan, and the Mainstreamig of Resentment.*

Pierce Greenberg is an Assistant Professor of Sociology in the Department of Cultural and Social Studies at Creighton University. His research interests include spatial inequality, environmental sociology, rural sociology, and quantitative methods. His primary project focuses on the creation and maintenance of environmental inequality in the rural United States. He received his PhD in Sociology from Washington State University in 2018.