

Racial/Ethnic Residential Segregation, Neighborhood Health Care Provision, and Choice of Pediatric Health Care Provider*

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ABSTRACT

Much research has been conducted that demonstrates a link between racial/ethnic residential segregation and health care outcomes. We suggest that minority segregated neighborhoods may have diminished access to organizations, and that this differential access may contribute to differences in health care outcomes across communities. We analyze this specifically using the case of pediatric health provider choice. To examine this association, we estimate a series of multinomial logistic regression models using restricted data with ZIP code level geoidentifiers from the 2011-2012 National Survey of Children's Health (NSCH). We find that racial/ethnic residential segregation is related to a greater reliance on non-ideal forms of health care, clinics and hospital outpatient departments, instead of the pediatric physician's office. This association is at least partially attenuated by the distribution of health care facilities in the local area, physician's offices and health care practitioners in particular. Additionally, families express greater dissatisfaction with these other forms of care compared to physician's offices, demonstrating that the lack of adequate health care provision is meaningful for health care outcomes. This study expands the literature by examining how the siting of health organizations has consequences for individuals residing within these areas.

INTRODUCTION

Recent scholarship has seen an explosion of interest in the relationship between neighborhood patterns and how this relates to health outcomes and healthy environments. Specifically, much of this literature has examined the distribution of food and recreational resources in urban communities (Beaulac, Kristjansson and Cummins 2009; Gordon-Larsen et al. 2006; Walker, Keane and Burke 2010). However, increasing attention has been paid to the spatial distribution of health care resources across communities and how this may differ by segregation status (Anderson 2017b; Dai 2010; Dinwiddie et al. 2013; White, Haas and Williams 2012). Such studies demonstrate that minority segregated communities lack a wide variety of health care establishments compared to their White counterparts, though some of this effect can be accounted for with measures for the socio-economic status of such areas (Anderson 2017b; Gaskin et al. 2012b; Hayanga et al. 2009).

Despite the abundance of research in this field, there are several important gaps in this literature that this study seeks to fill. Primarily, with few exceptions, much of the extant work on the relationship between segregation, the distribution of organizations, and health/health care outcomes fails to connect all of these pieces. There is also relatively little attention to teasing out this association to examine how the unequal distribution of resources across communities shapes and constrains choices and outcomes, especially as it relates to individual-level processes. In particular, the bulk of this literature does not examine where specifically individuals are going for their health needs in light of what is physically proximate to them (Anderson 2020). The assumption is that the lack of such resources in communities limits, constrains, and alters choices for service provision, but this is seldom tested empirically in the literature.

In this analysis, we examine these processes for one such case: how this relates to the choice of pediatric health care provider that families make for their children. Specifically, with this analysis, we have several research questions: Does this organizational context affect where families are able to obtain health care for their children? In particular, how do these patterns relate to racial/ethnic residential segregation? Does having more health and in close proximity relate to if and where families are able to seek health care for their children's health care and dental needs? Does this relate to outcomes for the child—is it related to patient satisfaction with the provider and the overall health of the child? We posit that racial/ethnic residential segregation and the provision of local health care services will shape and constrain where families are able to obtain care for their children. Moreover, we suggest that ultimately this will relate to the level of satisfaction that parents express about their children's providers. First, we review the extant literature and theorizing on the topic.

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Segregation and Health-Related Resources

It has been over two decades since Williams and Collins (2001) first theorized racial residential segregation to be the fundamental cause of racial health disparities. In this seminal article on the topic, they proposed mechanisms by which segregation produces racial health inequity by limiting the educational and employment opportunities, greater exposure to environmental toxins, poorer housing quality, poor health behaviors related to exercise, diet, and tobacco and alcohol use, higher rates of crime, and poor access to medical care (Williams and Collins 2001). Within the context of health care, the scholars argued that residential segregation has resulted in socially vulnerable neighborhoods with high concentrations of low socioeconomic status and racial and ethnic minority individuals, and limited access to quality

health care resources including health clinics, primary care physicians, and pharmacies (Williams and Collins 2001). Since then, a number of empirical studies have demonstrated the disproportionate health consequences of the divisive, institutionalized racism that is residential segregation (Anderson and Fullerton 2014; Berkowitz et al. 2022; Chang 2006; Dai 2010; Do, Frank and Iceland 2017; Ellen, Cutler and Dickens 2000; Hart et al. 1998; Inagami et al. 2006; Planey et al. 2022; Polednak 1997; Subramanian, Acevedo-Garcia and Osypuk 2005). Despite the comprehensive body of literature identifying the association between residential segregation and a diverse set of health outcomes, the social problem persists. Thus, it is clear we must focus on the mechanisms identified by Williams and Collins (2001) to shift the conversation from identifying the social problem to combatting the social problem.

This study will examine in more detail one of their proposed mechanisms, the distribution of health-related organizations across urban space. In recent years, there has been an increase in studies that explore the spatial distribution of health-related resources; however, limited studies have focused on health care resources. Existing literature is predominantly focused on the spatial distribution of health-related resources with respect to promoting a healthy living environment including the distribution of food and recreational resources. Research has demonstrated that segregated neighborhoods with a larger presence of racial and ethnic minority and lower socioeconomic status individuals have less healthy food retail availability and accessibility (Algert, Agrawal and Lewis 2006; Evans et al. 2015; Havewala 2021; Lovasi et al. 2021; Moore and Diez Roux 2006; Morland, Wing and Roux 2002), a greater presence of unhealthy food alternatives such as fast food restaurants (Cooksey-Stowers, Schwartz and Brownell 2017; Ekenga and Tian 2021), and fewer fitness and recreational facilities and parks (Dahmann et al. 2010; Duncan et al. 2012; Estabrooks, Lee and Gyurcsik 2003; Moore et al. 2008; Namin et al.

2020). Health-related resources including healthy food retail, recreational resources, and stable, affordable housing conditions are critical to promoting a healthy living environment for residents of segregated neighborhoods. This study will focus on health care specifically, which is a relatively understudied facet of this work on the distribution of resources.

Segregation, Spatial Inequality, and Health Care Utilization

Existing literature has demonstrated that health care utilization and access is unequal between residents of segregated and non-segregated neighborhoods (Cooper et al. 2012; Gaskin et al. 2009; Mayfield et al. 2022; Thomas-Hawkins et al. 2019). Past studies have found that residents of segregated neighborhoods are more likely than residents of non-segregated neighborhoods to utilize emergency departments (Cooper et al. 2012; Hayanga et al. 2009; Mayfield et al. 2022; Thomas-Hawkins et al. 2019), not have a usual source of care (Caldwell et al. 2017), and to use clinics compared to a physician's office (Anderson 2020). One study found that in a study of the Phoenix area, not having a usual source of care and using an emergency department as a primary source of care is related to whether or not residents have health insurance, rather than the distribution of health care resources (Anderson 2020). Additionally, Black individuals living in segregated neighborhoods are less likely to have health care visits compared to Whites, while Black individuals living in non-segregated neighborhoods are more likely to have health care visits compared to Whites (Gaskin et al. 2009). Thus, the effect of place is clear in the Black-White disparity in health care utilization.

From Williams and Collins (2001) theorizing discussed above, one possible explanation for the disproportionate health care utilization in segregated neighborhoods may be the spatial distribution of health care resources. Findings have demonstrated that health care establishments and resources including physician's offices, health care practitioners, and health care services are

sparser in minority segregated residential areas (Anderson 2017a; Anderson 2017b; Anderson 2018; Archibald and Putnam Rankin 2013; Dai 2010; Dinwiddie et al. 2013; Gaskin et al. 2012a; Gaskin et al. 2012b; Hayanga et al. 2009; Ko and Ponce 2013). Furthermore, research has demonstrated that travel time to health-related resources decreases the likelihood of utilization (Allard, Rosen and Tolman 2003; Allard, Tolman and Rosen 2003; Fortney et al. 1995; Fortney et al. 1999; Goodman et al. 1997). One study demonstrated that Black segregation is positively associated with travel times to the doctor and that this relationship is mediated by the concentration of physicians offices (Anderson 2018). Therefore, if distance to health-related resources decreases utilization and segregated neighborhoods have disproportionate health care facilities, then it is likely that the health disparity in the distribution of health care resources results in worse health outcomes by way of low utilization, compared to non-segregated neighborhoods.

Although these studies have focused on segregation and its relationship to the spatial distribution of health-related resources, the literature is missing research that empirically tests the link between segregation, health-related resource deprivation, and health care utilization. Essentially, while we know that there is an unequal distribution of health care resources across space, it is not clear whether or not it actually leads to poorer health care outcomes. Communities require a diverse network of health-related and health care resources that not only address the promotion of a healthy social environment, but moreover, provide health care resources that provide direct support to residents in segregated communities. The current study aims to address the health disparities in health care access and utilization in a nation-wide spatial analysis of the mechanistic pathway between racial/ethnic residential segregation and health care utilization in children by way of lack of health care resources. We outline our conceptual

approach to this analysis in Figure 1. In the following analysis, we will test these different pathways to examine whether or not local provision of care accounts for the association between residential segregation and poor health care utilization choices. First, we detail our data and methodological considerations.

****Figure 1 about here****

DATA AND METHODS

Data

To examine these relationships, we compiled data from several sources. First, the primary data comes from the restricted use version of the 2011-2012 National Survey of Children's Health (NSCH), which is a large national random telephone (of both landline and cell phone random digit dialing) survey conducted from February 2011 through June 2012 by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC). The survey in 2011-2012 for the first time included both landline and cellphone random digit dialing. The survey is conducted of parents about their children to monitor trends in children's health and to assess need for and gaps in children's health services. For the 2011-2012 survey, a total of 95,677 NSCH interviews were conducted across the U.S., allowing for adequate coverage of patterns across the country by a small geographic unit of analysis. To analyze patterns by area, we submitted a proposal to the NCHS to gain access to the restricted version of the data, which includes the ZIP code as a geographic identifier, and the data was analyzed in the context of a secure federal Research Data Center (RDC).

To examine how these child-level outcomes relate to area-level patterns in service provision and demographics, we combined the ZIP code geotagged version of the data with data from 2008-2012 American Community Survey (ACS) five-year estimates, measured at the zip

code tabulation area (ZCTA) unit of analysis. The data are only released in five-year aggregates as they are not representative for one year at small geographic units of analysis like the ZIP code. This data source will be used provide socio-demographic data on the context in which the NSCH respondent is embedded in order to better understand how local demographics, such as residential segregation and poverty related to health care utilization, satisfaction and health. Furthermore, we also paired this with the 2012 County Business Patterns (CBP) Zip Code Industry Detail file. This data source also comes from the U.S. Census Bureau and uses IRS tax records to provide data on business establishments. Specifically, we use counts of certain kinds of health care establishments at the zip code level to provide an estimate of the local health care context for those families in the NSCH data.

Dependent Variables

In this analysis, we examine two primary dependent variables as noted in the conceptual pathway above. The first is a categorical variable for the type of care that the family usually uses for their children's health care. This item comes from a two part question, specifically worded as "Is there are place that [your child] USUALLY goes when [he/she] is sick or you need advice about [his/her] health?" which is followed up by "What kind of place is it?" with the response options of doctor's office, hospital emergency room, hospital outpatient department, clinic or health center, retail store clinic, school, friend/relative, Mexico or some other location outside of U.S., or some other place. We combined these response options into six total categories for: no usual source of care, doctor's office, hospital emergency room, hospital outpatient department, clinic or health center, and other (to include all other categories). These categories were also included as the main independent variables a set of dummy variables in the second analysis predicting patient satisfaction.

Next, we include a dependent variable for the level of satisfaction that the parent expresses over their choice of care to see if it relates to the type of care used. For this, we created an index of five variables aimed at understanding how satisfied the parent is with their child's provider across several dimensions. These survey items include: "[During the past 12 months / Since [his/her] birth], how often did [S.C.]'s doctors and other health care providers spend enough time with [him/her]?" "[During the past 12 months / Since [his/her] birth], how often did [S.C.]'s doctors and other health care providers listen carefully to you?" "When [S.C.] is seen by doctors or other health care providers, how often are they sensitive to your family's values and customs?" "[During the past 12 months / Since [his/her] birth], how often did you get the specific information you needed from [S.C.]'s doctors and other health care providers?" "[During the past 12 months / Since [his/her] birth], how often did [S.C.]'s doctors or other health care providers help you feel like a partner in [his/her] care?" Each of these items had the response options of: never, sometimes, usually, always. Using confirmatory factor analysis, which produced a one factor solution, these were combined into one factor measuring patient satisfaction, where higher values indicate a more positive evaluation of their child's provider across these five areas.

Independent Variables

For the first analysis, addressing the type of care used, we have two key sets of independent variables. The first are a set of ZIP code level measures for racial/ethnic residential segregation. To capture this, we use a set of clustering scores that take into account the percentage of the different racial/ethnic groups in an area, as well as their geographic neighbors. Typically, segregation scores are measured at a large geographic unit of analysis, such as the county or metropolitan area to provide a summary score of how groups are dispersed or clustered

throughout that area (Massey and Denton 1988). However, in this case, we aim to examine how segregated an area is at the neighborhood level, or a small geographic unit of analysis. To contend with this, we use a set of spatial clustering scores for measured at the level of the ZIP code using the following formula:

$$C_i = x_i \sum_{j=1, j \neq i}^n w_{ij} x_j$$

where x_i is the variable for feature i , x_j is the variable for feature j , and w_{ij} is the spatial weight between features i and j (Anderson 2017b). Essentially, the score reflects product of the percent of a group in a ZIP code and the average percent for row standardized weights in its neighbors, with neighbors defined by a first-order queen contiguity matrix. Thus, theoretically, the measure could range from 0 to 10,000. A score of 10,000 would be possible for a census tract that was composed of 100% of a certain group and all neighboring tracts also had 100% of the same group. Also, to account for differences in the relative sizes of groups across the U.S., these scores are all group mean centered to the mean of the metropolitan area. We calculated these scores for each of the three largest racial/ethnic groups in the U.S. In this analysis, we include three scores: clustering measure for percent Black (non-Latino), for percent Latino (of any race), and for percent Asian (non-Latino). We exclude an analysis of White clustering due to problems with multicollinearity with the inclusion of all four groups in a single model, and focus instead on the clustering of minority groups in neighborhoods.

Moreover, to assess how the local provision of health care services relates to the link between the racial/ethnic clustering scores and health care provider choice, we also include a set of four types of health-related services from the County Business Patterns (CBP) Zip Code Industry Detail file, which are coded by industry using North American Industry Classification

System (NAICS) codes. Here we use four such codes: 621111 Offices of Physicians (except Mental Health Specialists), 6213// Offices of Other Health Practitioners, 622110 General Medical and Surgical Hospitals, and 6241// Individual and Family Services. These are included as counts of the four different types of establishments in a ZIP code: *doctor's offices, other health care practitioners, hospitals, and social services*.¹

We include several sets of covariates in each of the models, measured at three different levels of analysis. The first are child level characteristics as reported by parent/guardian. These include: sex, age, race, health insurance status, and general parent-rated health. *Age* is measured continuously, while *sex* (1=female, 0=male), *insured* (1=has any kind of health insurance, 0=else), and *Medicaid* (1=Medicaid recipient, 0=else) are dichotomized into dummy variables. Race is coded as a set of dummy variables for *White*, *Black*, *Latino*, and *Other* racial groups, with White serving as the reference group. We also include a measure for the general physical health status of the child to control for health need. This is measured ordinally with the response options of excellent, very good, good, fair, and poor, and thus, higher values on this measure indicate *poor health*.

We also include variables from the individual-level survey, but which reflect the household and family circumstances of the child. These include: the highest level of education of either parent/guardian, whether or not the parents are married, whether or not at least one parent/guardian is employed, whether or not the parents/guardians own their home, the percent of the federal poverty line of the household income, whether or not the household receives government cash assistance or Supplemental Nutrition Assistance Program (SNAP) benefits, and

¹ We also tested these associations with several other NAICS codes, including 6214// Outpatient Care Centers, 621493 Freestanding Ambulatory Surgical and Emergency Centers, and 6219// Other Ambulatory Health Care Services. However, these models produced few significant results, especially for the area-level independent variables, and thus, for the sake of parsimony, we limit our analysis to only those four included variables.

whether or not the household is primarily English-speaking. *Percent of the FPL* is treated continuously. *Married parents* (1=married, 0=else), *employed* (1=employed, 0=else), *own home* (1=own home, 0=else), *cash assistance* (1=household received government cash assistance), *SNAP recipients* (1=household receives SNAP benefits), and *no English* (1=language other than English spoken primarily at home, 0=else) are all re-coded as dichotomous variables.

Parent/guardian education level is recoded into a set of dummy variables to indicate the highest level of education of any parent or guardian in the household with the categories of *less than high school*, *high school*, or *more than high school*, with less than high school serving as the reference category.

In addition to the clustering scores, we also include a number of ZIP code level controls to account for the social and economic situation of the neighborhood. These include: *percent foreign born*, *percent in poverty*, *percent of the population with a bachelor's degree or higher*, *percent uninsured*, and *percent with no vehicle*. These are each measured continuously as percentages. Descriptive statistics for all variables used can be found in Table 1. Note that these only include the means and standard deviations (where applicable) as NCHS restricted data use does not allow for the disclosure of variable ranges.

Methods

To examine these associations, we estimate two sets of models for the two parts of this analysis. First, to examine the type of care used, we estimate a series of multinomial logistic regression models for the multi-category outcome. We also set doctor's offices as the baseline comparison category as previous research has established that regular care with a consistent primary care provider to be optimal health care provider, especially for routine and regular (non-specialty) care (Starfield, Shi and Macinko 2005). This is especially the case for children who

have routine well-child visits and immunizations at set intervals throughout childhood. Because data are measured at two different units of analysis, the individual level survey data paired with data on the ZIP code context, we also correct the standard errors using the clustering by ZIP code.

In terms of the modeling strategy, we first estimate a model with all of our child, household, and ZIP code level variables included to get a baseline model how segregation is related to health. These results can be found in Table 2. Then, we add the health care organizations variables to the model to see whether or not the inclusion of the health care counts alters the relationship between the clustering scores and the choice of provider. We add these in one-by-one, though as they are too colinear with each other to include in a single model. Because of the multinomial specification of the dependent variable and the continuous coding of the main independent variables, a formal significance test of their mediation was not possible. Instead, we examine percentage changes in the size of the coefficients to see if the inclusion of the health care provision counts changes the relationship between clustering and the choice of provider. A truncated version of these results can be found in Table 3.

For the second part of the analysis, we estimate a series of two OLS models of the patient satisfaction index to see if the choice of provider relates to opinions about that provider. We present two models here, one without and one with the area-level variables included. These were also corrected with robust standard errors that account for the ZIP code level clustering at level 2. These results can be found in Table 4.

FINDINGS

Part 1: Choice of Health Care Provider

The first part of this analysis focuses on the parent's usual choice of health care provider for their children and whether or not that is related to the constrained set of choices available in segregated areas. For this, we turn to Table 2. For the clustering scores, we see that Black clustering is significantly related to the choice of a hospital outpatient department and a clinic or health center, as compared to a doctor's office. These are both significant and positive, meaning that as Black clustering increases, the use of a hospital outpatient department and clinic, instead of a doctor's office, also increases. These are not negligible effect sizes either. For use of an outpatient department, a one standard deviation increase in Black clustering is related to an increase in the use of an outpatient department, as compared to doctor's office, by a factor of 1.12 or 12%. For clinic use, a one standard deviation increase in Black clustering is related to an increase in the choice of clinic or health center, as compared to a doctor's office, by a factor of 1.072 or 7.2%. There is also a significant and positive relationship for Latino clustering for clinic use where a one standard deviation in Latino clustering is related to an increase in the use of a clinic or health center, instead of doctor's office, by a factor of 1.057 or 5.7%. Thus, for Black and Latino clustering, in these two cases, we see that clustering is related to the use of non-ideal provider types as compared to physician's offices. Asian clustering is not significant for any of the categories, though.

****Table 2 about here****

Interestingly, the clustering scores do not seem to be related to the provider category for not having any care at all and for the use of an emergency room, as compared to the doctor's office. Instead, these seem to be a function of the socio-economic circumstances of the child and household. In particular, the effect of insurance status here is quite large and more pronounced than in the other models. For having no care, being insured relates to an 85% decrease in having

no usual source of care versus a doctor's office, and it related to an 81% decrease using an emergency room versus a doctor's office for the usual source of care.

Of note, several other individual-level variables play an important role here as well. In particular, child race is significantly related to each of the provider categories, such that being Black, Latino, or in another racial category, as compared to White, is related to not having a usual source of care, using an emergency room, using a hospital outpatient department, and a clinic or health center (with the exception of Black for clinics). That is, racial/ethnic minority children are more likely to use all of these types of health care providers instead of physician's offices as compared to their White counterparts, net of their socioeconomic circumstances and insurance status. Similarly, not speaking English in the household is related to a greater likelihood of not having a usual source of care and using a clinic. For example, being in a non-English speaking home relates to an increase in not having a usual source of care, as compared to doctor's office use, by a factor of 3.63, or 263%. This is the single largest effect for speaking English at home, but there are substantively large effects for all types of care as compared to use of a physician's office.

Table 3 presents reduced tables of the models presented in Table 2 but with the addition of different types of health care and service organizations to see if the local provision of care is related to the association between residential segregation and the type of care. The first model includes the results for the clustering scores with the inclusion of the number of physician's offices in a ZIP code. A few findings are notable here. First, we see that the coefficient for the number of physician's offices is significant and negative, meaning that the greater the number of physician's offices in an area, the greater likelihood that a family uses that choice of provider (as physician's offices serve as the reference category). The effect of this is substantively large as

well. Every one standard deviation (23.73) increase in the number of physician's offices in a ZIP code is related to a decrease in the use of an outpatient department by a factor of 0.867 (or 13.3%) and a decrease in the use of a clinic by a factor of 0.850 (or 15%) as compared to the use of physician's office.

****Table 3 about here****

Moreover, when this variable is included, the significant effects of Black and Latino clustering are reduced in their size. For outpatient department use, the Black clustering coefficient is reduced by 10.42% from the previous model presented in Table 2. We find an even larger reduction in the size of the coefficient for use of a clinic versus physician's office. In this case, the Black clustering score is reduced by 20.33%, and the Latino clustering score by 26.83%.

The provision of other types of care providers also produced some results, albeit not as strong as the result for physician's offices. We also included a measure for the number of other types of non-physician health care practitioners. This variable was significant in only one comparison, the use of an outpatient department versus physician's offices. This the coefficient for the number of health care practitioners was significant and negative, meaning that as the number of other health care practitioners in an area increases, the use of hospital outpatient departments decreases relative to physician's offices. This also reduced the size of the coefficient for Black clustering by 17.71%. In the case of the clinics versus physician's offices, the variable is not significant and does not substantially change the size of the clustering scores.

For the number of hospitals in an area, these do not seem to relate to the choice of provider across areas. The coefficient for the number of hospitals is not significant across the model, and it does not reduce the size of the clustering scores that were significant in the original

models. For the number of individual and family services, we see a slightly different pattern. First, for the use of a clinic versus physician's office, the coefficient for the number of services in an area is significant and positive, meaning that the greater provision of social services in an area, the more likely the respondent is to use a clinic or health center for their child's usual provider. Moreover, for both Black and Latino clustering, we see a suppression effect where the effect sizes of both of these are not reduced, but are actually increased slightly.

Part II: Health Care Provider Satisfaction

In the second part of the study, we aim to examine whether or not the choice of provider actually matters for how parents evaluate their choice of provider for their children. For these models, we use the index of provider satisfaction as the dependent variable. These models can be found in Table 3. What we can readily see here is that across the board, parents are less satisfied with all of the other provider choices as compared to the physician's office. These include no usual source of care, emergency rooms, hospital outpatient departments, clinics, and other. These coefficients are each significant and negative meaning, but the magnitude of the effect is different across the different types of care. For instance, having no usual source of care or using the ER leads to the highest dissatisfaction as compared to physician's offices. However, even the effect for clinics is still large. Specifically, from the full adjusted model, using a clinic versus physician's office leads to a 0.155 decrease in the level of satisfaction with the provider.

****Table 4 about here****

DISCUSSION AND CONCLUSIONS

The goal of this study is to examine how the local provision of health care resources relates to racial residential segregation. We examine these relationships in terms of the type of care that people receive, both in terms of where they go for that care and how satisfied they are

with that care when they access it. We find that racial residential segregation is related to the types of care that people use for their children. Specifically, Black clustering is related to greater use of hospital outpatient departments and clinics, as compared to physician's offices, and we find that Latino clustering is related to greater use of clinics. We do not find any significant results for Asian segregation. Moreover, we do not find any significant results for not having a usual source of care and using emergency rooms. None of the clustering scores were related to these two types of care. However, for these a number of the individual-level variables were related to the use of these types of care, especially the insurance status of the child, household English proficiency, and the socio-economic considerations of the family.

Further, when we examine these patterns in light of what is available to people in their neighborhoods, we find that the provision of certain types of care is related to greater use of ideal care by use of physician's offices. Specifically, a greater number of both physician's offices and other health care practitioners are both related to greater use of physician's offices as compared to hospital outpatient departments and clinics. Furthermore, the local provision of both of these sources of care appear to at least partially attenuate or mediate the relationship between Black and Latino clustering and the care type. This suggests that the local provision of care at least partially explains some of the racial/ethnic gap in access to ideal forms of care, at both the individual and neighborhood levels.

These results are in keeping with much of the previous literature, which has demonstrated that neighborhood segregation is related to a lack of a wide variety of health care organizations (Anderson 2017a; Anderson 2017b; Dai 2010; Gaskin et al. 2012b; Gaskin et al. 2009; Ko and Ponce 2013). Moreover, some limited work to date has also shown that the provision of that care is related to health care outcomes for communities, especially that the lack of such facilities

limits and constrains access to care (Dai 2010; Dinwiddie et al. 2013; Gaskin et al. 2012a; Satcher 2022). However, this work adds to this previous literature by showing that the choice of provider is related to residential segregation specifically and that the lack of local provision of care relates to a reliance on less ideal forms of care compared to the physician's office. One previous study in particular found a similar finding to what is presented here for Latino segregated neighborhoods but only in the Phoenix area (Anderson 2020). This study expands that finding to the entirety of the United States, through the use of a restricted national data source and accounts for Black and Asian clustering as well.

Despite these findings, this study is not without limitations. First, the analysis only examines pediatric health care, which may be a fairly conservative version of these associations. Children are more likely to be insured than their adult counterparts through various public programs, which are more sympathetic to children. Second, the study is only cross-sectional in nature, therefore we are unable to make any causal claims about how the local provision of care relates to health care provider choice. Another major limitation is that the study is unable to account for the race of the provider, only whether or not the family had a provider for their child and the type. Previous work has shown that minority physicians are more likely to locate in racial/ethnic minority neighborhoods, and further, that patients report higher levels of satisfaction with those providers (Ma, Sanchez and Ma 2019; Musa et al. 2009; Nazione, Perrault and Keating 2019). For example, one study on pediatric providers found that when Black children see a Black primary care provider, the children and families are more likely to laugh during the encounter (Brown et al. 2007). Similarly, other work has shown that ethnic density is related to greater trust in health care and lower rates of reported discrimination in the health care system, suggesting that the physicians in these neighborhoods, who are more likely to be of the

same race, instill greater feelings of medical trust (Gibbons 2019; Gibbons and Yang 2018). And, other work has shown that people will travel further to see a physician of the same race (Morenoff et al. 2007; Saunders et al. 2014). All of this would suggest that the race of the provider may also play an important role in provider choice as it relates to local provision of care. However, given the constraints of the survey data and our secondary data on the distribution of health care establishments, we cannot account for this in our analysis. This could be an important consideration for future work.

Although these limitations need further exploration, this analysis provides some important contributions to the literature on the distribution of health care resources and access to care. Using a large, national dataset, we demonstrate that the local availability of health care resources in neighborhoods appears to shape or constrain the type of care that families receive for their children. Moreover, this is related to racial/ethnic residential segregation in that families in Black and Latino communities are more likely to use non-ideal forms of health care provision for their children, and that this seems to be partially explained away by the availability of resources within their neighborhoods. However, when it comes to not receiving care at all or using an emergency room, these are much more influenced by socio-economic considerations and the insurance status of the child. This has important implications for public health policy. Much of the political impetus to improve access to care for children is centered on the expansion of medical insurance programs. While this would appear to provide access to some type of care, it does not necessarily mean that they will gain access to ideal forms of care through physician's offices. Previous work has indicated that pediatric care through a regular pediatrician's office provides better health outcomes and better continuity of care (Starfield, Shi and Macinko 2005). That is reflected in our data as well, where parents express higher satisfaction with these

providers across a number of different indicators. These results suggest that we need to be considering not just access to care through health insurance, but rather also providing local primary care options in neighborhoods in a more equitable fashion.

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Table 2. Coefficients, ZIP Code Clustered Robust Standard Errors, and Odds Ratios from Multinomial Regression Models of Usual Place of Care
(Reference group = Doctor's Office)

Variable Name	No Usual Care			Emergency Room			Outpatient Department			Clinic		
	B	SE	OR	B	SE	OR	B	SE	OR	B	SE	OR
Child-Level Variables												
Female	-0.015	.051	.985	-.096	.077	.909	-.120	.067	.887	.039	.031	1.040
Age	0.045***	.005	1.046	.008	.008	1.008	-.000	.007	1.000	.022***	.003	1.022
Race (White=ref.)												
Black	0.548***	.086	1.729	.944***	.122	2.571	.738***	.112	2.092	.109	.064	1.115
Latino	0.492***	.081	1.636	.716***	.137	2.046	.313*	.129	1.367	.531***	.051	1.701
Other	0.476***	.082	1.609	.488**	.151	1.629	.648***	.109	1.911	.225***	.056	1.252
Insured	-1.877***	.090	0.153	-1.660***	.156	0.190	-.552***	.163	0.576	-.780***	.074	0.459
Medicaid	0.193*	.081	1.213	.562***	.134	1.755	.231*	.104	1.260	.206***	.048	1.229
Poor Health	0.012	.031	1.012	.251***	.044	1.285	.315***	.041	1.370	.090***	.019	1.094
Household-Level Variables												
Parent Education												
High School	-0.219**	.075	0.803	-.304**	.106	0.738	-.007	.110	0.993	-.368***	.047	0.692
>High School	-0.371***	.072	0.690	-.432***	.109	0.649	-.071	.107	0.931	-.420***	.047	0.657
Married Parents	-0.167**	.058	0.846	-.457***	.099	0.633	-.225**	.084	0.799	-.032	.038	0.969
Employed	-0.192**	.067	0.825	-.118	.096	0.889	-.039	.103	0.962	.014	.045	1.014
Own Home	-0.474***	.066	0.622	-.380***	.096	0.684	-.514***	.092	0.598	-.302***	.040	0.739
% FPL	-0.094***	.015	0.911	-.122***	.024	0.885	-.070***	.020	0.932	-.098***	.009	0.907
Cash Assistance	0.071	.103	1.074	.145	.116	1.156	-.023	.139	0.977	.030	.065	1.031
SNAP	-0.142	.079	0.868	.062	.112	1.064	-.496***	.113	0.609	-.094	.052	0.910
No English	1.290***	.086	3.633	.656***	.135	1.927	.615***	.126	1.850	.856***	.055	2.353
Zip Code-Level Variables												
Black Clustering _a	0.010	.027	1.011	-.007	.030	0.991	.096**	.031	1.120	.059***	.016	1.072
Latino Clustering _a	0.020	.037	0.987	-.022	.052	0.985	.095	.056	1.066	.082**	.030	1.057
Asian Clustering _a	0.043	.174	1.006	.418	.267	1.056	-.013	.258	0.998	-.132	.162	0.988
% Foreign Born	-0.002	.004	0.998	-.017**	.006	0.983	.005	.005	1.005	-.012***	.003	0.886
% in Poverty	0.004	.005	1.004	.004	.007	1.004	.025***	.006	1.025	.018***	.004	1.018
% Bachelor's	-0.001	.002	0.999	-.006	.004	0.994	.001	.003	1.001	-.003	.002	0.997
% Uninsured	0.015*	.006	1.016	.020*	.009	1.020	-.026**	.009	0.974	-.000	.005	1.000
% No Car	-0.009*	.004	0.991	.014**	.004	1.014	.002	.004	1.002	.001	.003	1.001
Pseudo R ²	0.118											

Note: Level 1 N=43,721. Level 2 N=6735. B=Coefficient, SE=Standard Error, OR=Odd Ratio. FPL=Federal Poverty Line.

a. Coefficient and standard error multiplied by 1,000 for the ease of presentation. Odds ratios for these variable also reflect x-standardized odds ratios.

The models also include an "other" category for place of usual care, but these results are not shown for the sake of parsimony.

Table 3. Coefficients, ZIP Code Clustered Robust Standard Errors, and Odds Ratios from Multinomial Regression Models of Usual Place of Care
(Reference group = Doctor's Office)

Variable Name	No Usual Care			Emergency Room			Outpatient Department			Clinic		
	B	SE	OR	B	SE	OR	B	SE	OR	B	SE	OR
Model with Physician's Offices Included												
Black Clustering _a	0.007	0.027	1.009	-0.010	0.030	0.988	0.086**	0.031	1.107	0.047**	0.016	1.057
Latino Clustering _a	-0.026	0.037	0.983	-0.029	0.052	0.981	0.072	0.057	1.050	0.060*	0.030	1.041
Asian Clustering _a	0.043	0.174	1.006	0.417	0.268	1.056	0.024	0.271	1.003	-0.101	0.163	0.987
Doctor's Offices	-0.001	0.001	0.978	-0.001	0.002	0.973	-0.005**	0.002	0.867	-0.006***	0.001	0.850
Pseudo R ²	0.119											
Models with Other Health Care Practitioners Included												
Black Clustering _a	0.012	0.027	1.014	-0.006	0.030	0.993	0.079*	0.031	1.098	0.061***	0.016	1.074
Latino Clustering _a	-0.017	0.037	0.989	-0.020	0.052	0.987	0.074	0.058	1.051	0.084**	0.031	1.058
Asian Clustering _a	0.039	0.174	1.005	0.410	0.269	1.055	0.034	0.253	1.004	-0.140	0.161	0.982
Practitioners	0.002	0.002	1.026	0.002	0.003	1.024	-0.014***	0.004	0.820	0.002	0.003	1.024
Pseudo R ²	0.118											
Models with Hospitals Included												
Black Clustering _a	0.011	0.027	1.013	-0.005	0.030	0.994	0.099**	0.031	1.124	0.061***	0.016	1.074
Latino Clustering _a	-0.019	0.037	0.987	-0.021	0.052	0.986	0.096	0.056	1.067	0.082**	0.030	1.057
Asian Clustering _a	0.039	0.174	1.005	0.411	0.268	1.055	-0.020	0.256	0.997	-0.137	0.162	0.982
Hospitals	0.031	0.039	1.020	0.044	0.051	1.029	0.060	0.063	1.040	0.040	0.042	1.027
Pseudo R ²	0.118											
Models with Individual and Family Services Included												
Black Clustering _a	0.009	0.026	1.011	-0.006	0.030	0.993	0.097**	0.031	1.121	0.062***	0.016	1.076
Latino Clustering _a	-0.020	0.037	0.987	-0.021	0.052	0.986	0.097	0.056	1.067	0.091**	0.030	1.063
Asian Clustering _a	0.038	0.174	1.005	0.415	0.266	1.055	-0.015	0.258	0.998	-0.136	0.159	0.983
Services	0.001	0.004	1.009	0.005	0.005	1.035	0.004	0.005	1.031	0.014***	0.004	1.109
Pseudo R ²	0.119											

Note: Level 1 N=43,721. Level 2 N=6735. B=Coefficient, SE=Standard Error, OR=Odd Ratio.

a. Coefficient and standard error multiplied by 1,000 for the ease of presentation.

All odds ratios reflect x-standardized odds ratios.

The models also include an "other" category for place of usual care, but these results are not shown for the sake of parsimony.

Table 4. Coefficients and ZIP Code Clustered Robust Standard Errors from OLS Models of Patient Satisfaction Index

Variable Name	β	SE	β	SE
Type of Care				
No Usual Care	-0.575***	0.037	-0.573***	0.037
ER	-0.501***	0.053	-0.505***	0.053
Outpatient Department	-0.170***	0.039	-0.175***	0.040
Clinic	-0.148***	0.017	-0.155***	0.017
Other	-0.462***	0.087	-0.465***	0.087
Child-Level Variables				
Female	0.015	0.009	0.015	0.009
Age	-0.012***	0.001	-0.012***	0.001
Race (ref. = White)				
Black	-0.111***	0.017	-0.110***	0.018
Other	-0.215***	0.017	-0.202***	0.017
Latino	-0.065***	0.016	-0.052**	0.017
Insured	0.515***	0.039	0.511***	0.039
Medicaid	0.019	0.018	0.017	0.018
Poor Health	-0.168***	0.007	-0.168***	0.007
Household-Level Variables				
Parent Education				
High School	0.064**	0.019	0.062**	0.019
>High School	0.067***	0.018	0.069***	0.019
Married Parents	0.016	0.012	0.019	0.012
Employed	0.079***	0.019	0.078***	0.019
Own Home	0.054***	0.014	0.050***	0.014
% FPL	0.024***	0.003	0.025***	0.003
Cash Assistance	-0.036	0.028	-0.042	0.028
SNAP	0.081***	0.023	0.079***	0.023
No English	-0.379***	0.026	-0.358***	0.026
Area-Level Variables				
Black Clustering _a			-0.007	0.005
Latino Clustering _a			0.027**	0.009
Asian Clustering _a			-0.082	0.047
% Foreign Born			-0.002***	0.001
% in Poverty			0.002	0.001
% Bachelor's			0.000	0.000
% Uninsured			-0.003*	0.001
% No Car			0.001	0.001

Note: N=42,046. Level 2 N=6,672. β =Coefficient, SE=ZIP code clustered robust standard errors, FPL=Federal Poverty Line.

a. Coefficient and standard error multiplied by 1,000 for the ease of presentation.

Figure 1. Conceptual Model of Hypothesized Relationships

