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Exploring the Impact of Black-White Residential Segregation on Mental Health: A Cross-Sectional Analysis of the Role of Socioeconomic Resources, Health Resources, and Health Behaviors in U.S. Counties

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ABSTRACT

Background: Racial segregation is a predictor of poor physical health in the United States, as it reflects and reinforces inequality in access to resources that impact well-being. However, fewer studies have examined the relationship between segregation and mental health.

Objectives: This study investigates the relationship between Black-White residential segregation and mental health at the county level, with health resources, socioeconomic factors, and health behaviors considered as potential mediators.

Methods: We use multiple linear regression to analyze data from 1,932 United States counties, sourced from the American Community Survey and County Health Rankings. Black-White residential segregation is measured as a dissimilarity index, and mental health is measured as the average number of poor mental health days reported by county residents. Health resources, socioeconomic factors, and health behaviors are considered as potential mediators, and county-level measures of demographics and social relationships are considered as control variables.

Results: Two distinct patterns emerge by racial context. In counties with a higher-than-average percentage of non-White residents, segregation is associated with worse mental health, and resources and health behaviors partially mediate this effect. Conversely, in counties with a higher-than-average percentage of White residents, segregation is not significantly correlated with mental health; however, resources and health behaviors are still significantly linked to poor mental health days.

Conclusions: Segregation is negatively associated with mental health, particularly in counties where there are fewer White residents, and the availability of health and socioeconomic resources and health behaviors partially explains this relationship. Implications and future directions are discussed.

Keywords: Residential Segregation; Mental Health; Race; Socioeconomic Resources; Health Resources; Health Behaviors; Stress Process Model; Social Determinants of Health; Food Environment; Exercise Opportunities; Education; Home Ownership; Substance Use.

1.0. Introduction

This study seeks to deepen our understanding of the relationship between racial segregation and racial inequality in mental health. Racial residential segregation, or "racial segregation," is the separation and dissimilarity of different racial and ethnic groups across geographical areas (Yang et al., 2020). The current patterns of racial segregation observed in cities reflect structural racism, resulting from a legacy of discriminatory practices in urban planning, real estate, and banking. The persistence of segregation significantly contributes to the persistence of racial inequality in the United States of America (U.S.) (Massey, 2020).

Racial segregation fosters conditions that adversely affect health. Segregated, predominantly Black neighborhoods often have higher poverty and crime rates, and limited access to health-related resources such as medical clinics and fitness facilities (Anderson, 2017; Smith, 2024). These areas are more likely to be classified as food deserts, are less walkable than predominantly White neighborhoods, and typically have less green space (Havewala, 2021; Spoer et al., 2023). Moreover, studies indicate that these neighborhoods are disproportionately affected by environmental

and noise pollution, further elevating health risks (Casey et al., 2017; Woo et al., 2019). Racial segregation is thus considered to be a significant contributor to racial health inequality (Yang et al., 2020). Since the call by Acevedo-Garcia et al. (2011), numerous studies have investigated the role of racial segregation as a determinant of physical health. Segregation is associated with higher rates of obesity, cancer, diabetes, and other diseases, as well as preterm birth and lower birth weights among Black Americans and other minority groups compared to White Americans (Acevedo-Garcia et al., 2011; Allgood et al., 2024; Kisa & Kisa, 2025; Yang et al., 2020). These factors contribute to higher rates of cancer and cardiovascular mortality (Kisa & Kisa 2025; Yang et al., 2020). Studies have also indicated that segregation is linked to reduced healthcare access and lower use of preventative services among minority populations (Mobley et al., 2017; Yang et al., 2020).

Researchers have recognized that mental health is an area that has been both insufficiently studied and inadequately theorized with respect to the effects of segregation (Smith, 2024; Yang et al., 2020). Factors such as poverty and discrimination can lead to poor health by causing stress and distress; thus, the social context of racial segregation also harms mental health (Smith, 2024). Although a limited number of studies have explored the relationship between segregation and mental health (Guo et al., 2023; Lee, 2009; Nobles et al., 2017; Smith, 2024), these investigations focus on specific populations or cities within the United States.

We analyze 1,932 U.S. counties using a nation-wide, compiled dataset to contribute to this growing field of study. The dataset includes details on health, mental health, socioeconomic factors, demographics, measures of residential racial segregation, health behaviors, and access to resources necessary for healthy living. With this comprehensive information, we run regression models to assess the relationship between racial segregation and the average mental health of county residents, while controlling for county demographics and characteristics.

This study contributes to the research literature in three significant ways. First, we use a dataset that includes several thousand counties across the United States, which helps us understand how segregation is associated with well-being. Second, by examining the relationship between racial segregation and mental health, we address the gap in the literature on the role of segregation in racial health inequality (Yang et al., 2020). While there has been work on the role of racial segregation in physical health outcomes, less work has been done on mental health and mental health care. Finally, we identify possible mechanisms linking residential environment and mental health, which remains under-explained in the literature (Smith, 2024). By incorporating measures of health resources, socioeconomic resources, environmental health risks, and health behaviors as mediators, we can better understand how racial segregation is associated with well-being.

1.1. Study Objectives

This study aims to:

1. Examine the relationship between Black-White residential segregation and county-level mental health outcomes in the United States.

2. Determine whether the association between segregation and mental health varies across different racial compositions of counties.

3. Assess the mediating role of health resources in the relationship between residential segregation and mental health.

4. Evaluate the mediating role of socioeconomic resources in the relationship between residential segregation and mental health.

5. Investigate whether health behaviors partially explain the association between residential segregation and poor mental health days.

2.0. Literature

2.1. Segregation and Health

Due to the history of racialized economic inequality in the United States, modern-day patterns of racial residential segregation correspond with the segregation of economic and social resources. These resources include employment opportunities, affordable mortgage and business loan interest rates, high-quality schools, access to green spaces, healthy and affordable food options, health care clinics, and unpolluted air and water. Given that such resources are necessary to maintain and improve health and well-being, segregation also creates health inequalities (Yang et al., 2020).

Racial residential segregation has been linked with various physical health outcomes, such as self-rated health, obesity, diabetes, COVID-19, and multiple types of cancer. Segregation is associated with higher rates of preterm birth and decreased birth weights among Black Americans and other minority groups relative to White Americans (Acevedo-Garcia et al., 2011; Anderson & Simburger, 2022; Kisa & Kisa, 2025; Li & Yuan, 2022; Yang et al., 2020; Zhang et al., 2025). It has also been linked with higher mortality rates due to cancer, higher mortality rates due to cardiovascular illness, and higher all-cause mortality (Gong, 2025; Kisa & Kisa, 2025; Yang et al., 2020).

Fewer studies, however, have examined mental health as an outcome. This is an essential area of study, as mental health is critical to communities' well-being and life chances. Poor mental health can contribute to poor physical health and vice versa. Poor mental health can also limit communities' life satisfaction and economic mobility (Ferenstein, 2021; Lombardo et al., 2018). Studying mental health can also illuminate *how* neighborhood inequality creates health inequality. Sociologists often theorize about the relationship between social and economic conditions and individuals' health using the stress process model (as described by Pearlin et al., 1981). This model argues that social conditions and economic inequality increase stress levels, increasing health risks (Pearlin et al., 1981). If racial residential segregation creates more significant exposure to stressors through economic and social inequality, then we should expect to see disparities in mental health as well as physical health.

A few studies have begun to examine mental health as an outcome. These studies primarily focus on specific ethnic groups, such as Hispanic or Latino Americans (Lee, 2009; Nobles et al., 2017) or Chinese immigrants (Guo et al., 2023). Within the context of Chicago, Lee found that segregation increased depression and anxiety, particularly for Mexican Americans but also for Puerto Ricans, suggesting that segregation worsens well-being. In a nationally representative study of Latino Americans, however, Nobles and colleagues found that residential segregation was associated with *decreased* mental distress, suggesting that predominantly Latino neighborhoods provided a buffer

against distress. The duality of these findings is mirrored by research completed by Guo and colleagues on the psychological well-being of Chinese immigrants and Chinese Americans in ethnic enclaves. They found that while enclaves reduced depressive symptoms, suggesting some positive benefit from social support, those living in enclaves reported reduced quality of life. Social support within segregated networks is beneficial, but it is ultimately constrained by segregation (Guo et al., 2023).

Latino and Asian immigrant groups have different patterns of residential segregation than Black Americans and Black immigrants. For example, research has found that Latino and Asian Americans are more likely to integrate into White neighborhoods than Black Americans (Crowell, 2022; Frey, 2021). Only one article thus far examines the mental health of Black Americans compared to White Americans in segregated cities (Smith, 2024). In this article, Smith found that segregation was a positive factor for the mental health of Black Americans. Smith speculated that this may be due to the "paradox" in that Black Americans report better mental health overall than their White counterparts. Another possible explanation offered by Smith is that living in predominantly Black neighborhoods reduces exposure to racial discrimination and strengthens social support networks, which improves mental health (Smith, 2024).

While these studies find significant associations between segregation and mental health, less is understood about the resources and risks that connect racial segregation with mental health. Thus far, neighborhood resources such as economic opportunities have been theorized but not analyzed in statistical models. These studies do not account for variations in food access, exercise opportunities, employment, healthcare access, and other neighborhood resources that have been prominent in discussions linking segregation with physical health outcomes. Additionally, these studies are limited to only a handful of mental health measures. For example, Smith's article focuses on diagnoses of anxiety and depression, both of which are key indicators of mental health, but do not account for all forms of mental distress (Smith, 2024).

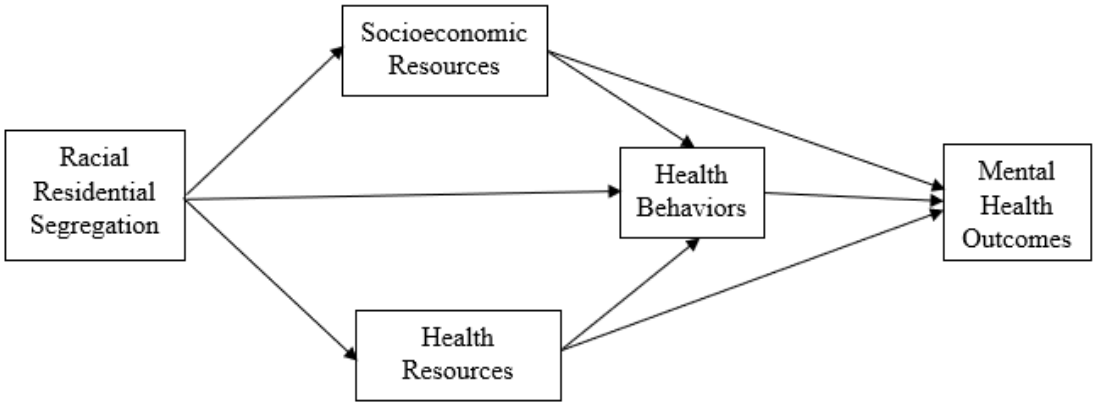


Figure 1. Proposed theoretical model of the relationships between segregation, socioeconomic resources, health resources, health behaviors, and mental health. Racial residential segregation shapes access to resources; segregation and resources shape health behaviors; and these resources and behaviors shape mental health outcomes.

More research is needed to understand the effect of segregation on communities' mental health, to examine more global measures of mental well-being, and to examine the mediating resources contributing to this relationship. We

propose three possible mechanisms through which residential segregation contributes to mental distress: health resources, socioeconomic resources, and health behaviors. We provide a visualization of this relationship in Figure 1. Below, we discuss the literature supporting these mediating factors.

2.2. Stress Process Model

In discussing many of these mediating resources, we rely on the Stress Process Model as a framework for understanding the relationship between segregation and mental health. The Stress Process Model explains the relationship between social factors and health through the lens of stress. When the body experiences a stressful situation, it releases numerous hormones to respond to the perceived threat. Heart rate increases; digestion slows; sugars, fats, and adrenaline flood the system; cortisol heightens alertness; and the body prepares to run or defend itself. While stress is a normal biological response, chronic, unresolved stress can cause wear and tear on the body. Chronic exposure to stress negatively affects sleep and memory, increases the risk of heart disease and hypertension, increases rates of diabetes and obesity, and creates digestive issues and chronic health conditions (Hounkpatin et al., 2024; Mayo Clinic, 2023). Chronic stress exposure also generates higher levels of depression and anxiety and can trigger conditions such as schizophrenia and psychosis (CAMH, 2024). One's experience of stressors is socially determined—for example, socioeconomic stratification creates disparities in exposure to financial stressors (Brown & Homan, 2024; Thomas Tobin et al., 2021).

A stressful situation does not automatically lead to adverse health outcomes. Stress can be managed with social and psychological resources (Brown & Homan, 2024; Pearlin et al., 1981; Thomas Tobin et al., 2021). For example, job loss is a significant stressor linked to health outcomes such as depression, cardiovascular disease, and strokes (Picchio & Ubaldi, 2024). Job loss becomes less stressful when one has close friends to whom one can express disappointment, or friends with connections to new employment opportunities. Conversely, job loss is more stressful when one has low self-esteem, self-deprecating thoughts, and a lack of confidence in the world's ability to provide new opportunities. The effect of stress on health is moderated by social support and psychological coping skills (Brown & Homan, 2024; Picchio & Ubaldi, 2024; Thomas Tobin et al., 2021).

By examining variation in stress exposure and variation in psychosocial resources, sociologists can explain inequality in various health outcomes as a function of the social environment. Such studies link racial stratification and discrimination to health inequities (Brown & Homan, 2024; Thomas Tobin et al., 2021). We use this framework to examine the association between segregation and mental health.

2.3. Health Resources

Health resources are spatially embedded resources that directly support a healthy lifestyle. Examples include grocery stores offering affordable, varied, and nutritious food options; parks, sidewalks, and accessible areas for outdoor exercise; and well-staffed clinics within a reasonable distance that provide quality health care. Neighborhoods without these resources - often referred to as food deserts or medical deserts – have been shown to affect residents' health negatively (Bevel et al., 2023; Flinterman et al., 2023; Kelli et al., 2017).

Whether residents are close to such resources is primarily determined by the availability of homes and home loans,

the urban planning decisions of cities and counties, and incentives and support for new businesses. These factors are shaped by a history of racial stratification in the United States. Redlining, racial covenants, exclusionary zoning, and other racially discriminatory barriers have prevented Black families from integrating into White neighborhoods, which enjoy many more resources (Aaronson et al., 2021; Haupert, 2022; Rouse et al., 2021; Swope et al., 2022). In the past, racial discrimination reduced urban investment in predominantly Black neighborhoods and, in many cases, promoted unsafe or undesirable neighborhood layouts. Today, predominantly Black neighborhoods are more likely to be food deserts (Singleton et al., 2023; Thibodeaux, 2016) and are less likely to have parks and other green spaces (Lu et al., 2021; Rigolon, 2016; Rigolon et al., 2021).

A healthy lifestyle is fundamental to mental and physical well-being. Exercise, a balanced diet, and access to healthcare for illnesses or injuries help individuals cope with stress and manage distress. Food deserts, lack of access to exercise opportunities, and healthcare deserts negatively impact mental health (Flintermanet al., 2023; Park & Berkowitz, 2025; Shim et al., 2018). As racial segregation has directly contributed to disparate access to these health resources, it is expected that racial segregation would be negatively associated with mental well-being.

2.4. Socioeconomic Resources

As racial discrimination limited access to homeownership, education, and employment, residential segregation also reflects inequality in socioeconomic status across neighborhoods. Socioeconomic resources such as employment, income, insurance, and education are spatially embedded and stratified. Income plays a significant role in determining one's health as it directly influences exposure to stressors. The ability to provide for oneself and one's family, and to afford simple pleasures, substantially affects overall health throughout one's life.

One significant benefit of jobs is access to health insurance. Being uninsured is a substantial detriment to one's health, as many cannot afford preventative and curative healthcare without insurance. Though the coverage of mental health care is not as comprehensive as physical health care in the United States, having insurance does make psychiatric medication and other forms of mental health care more accessible (Ortega, 2023). Lack of insurance can also lead to greater stress when health issues arise (Giombe et al., 2025).

Education has a complex relationship with mental health. The college experience is associated with a variety of stressors (Fruehwirth et al., 2023). However, education creates more economic opportunities. Those without a high school diploma have the highest unemployment rate (5.6%, compared to the national average of 3.0%) (*Education Pays: U.S. Bureau of Labor Statistics*, 2023). Education is argued to contribute to better psychosocial resources that benefit one's mental health through repeated problem-solving and social networking with others of higher socioeconomic status. As a result of these factors, those with higher levels of education report lower stress than their less-educated counterparts (Niemeyer et al., 2019; Vable et al., 2024). Racial inequality in access to quality secondary education because of residential segregation can lead to racial disparities in mental distress.

2.5. Health Behaviors

Many adverse effects of stress on the body stem from individuals' efforts to manage the hostile experience of stress or discrimination. Exposure to stress increases rates of substance use, such as smoking and binge-drinking alcohol.

These may provide temporary relief from symptoms of anxiety, depression, or other disorders, but they contribute to worse well-being over time compared with healthier coping mechanisms (Sinha, 2024; Turner et al., 2018). In the absence of resources for healthy coping, such as exercise, individuals are far more likely to turn to substance use (Carlson et al., 2025).

Past research has found that residential segregation limits individuals' health behaviors in the neighborhoods where they live. For example, research has found that segregation is associated with reduced access to healthcare and lower use of preventive services among minority populations (Mobley et al., 2017; Yang et al., 2020). In areas with lower rates of health insurance and where individuals do not have health clinics they can trust to deliver quality healthcare, individuals are more likely to delay preventive care and are far more likely to experience severe health conditions (Doshi et al., 2017; Simon et al., 2017).

2.6. Hypotheses

In line with this literature, we expect to find support for the following hypotheses.

H1: We hypothesize that greater racial residential segregation is associated with worse mental health in counties, after controlling for demographic characteristics, including race/ethnicity, gender, rurality, population size, household size, and marital status.

H2: We hypothesize that health resources partially mediate this relationship (H1) after controlling for other relevant covariates, such that racial residential segregation is associated with decreased access to (a) healthy food environments, (b) exercise opportunities, and (c) primary care doctors. In turn, reduced access to healthy food, exercise opportunities, and primary care doctors is associated with worsened mental health.

H3: We hypothesize that socioeconomic resources partially mediate this relationship (H1) after controlling for other relevant covariates, such that racial residential segregation is negatively associated with (a) employment rates, (b) median income, and (c) percent with health insurance in a county. In turn, decreased employment, income, and insurance are associated with worsened mental health.

H4: We hypothesize that health behaviors partially mediate this relationship (H1) after controlling for other relevant covariates, such that racial residential segregation is associated with higher rates of (a) smoking, (b) excessive drinking, and (c) healthcare avoidance. In turn, smoking, excessive drinking, and healthcare avoidance are associated with worsened mental health.

3.0. Methodology

3.1. Data

Data for this study came from a compiled dataset of county-level measures. Variables came from two sources: the 2022 County Health Rankings and the American Community Survey. The 2022 County Health Rankings is a dataset of over 3,000 U.S. counties compiled by the University of Wisconsin Population Health Institute from several national data sources. The County Health Rankings Data collects information on health behaviors, health outcomes, and health resources, as well as county-level environmental and social indicators that are significant

predictors of health outcomes. This county-level data was merged using FIPS code geographic identifiers with American Community Survey data, which is collected annually by the U.S. Census Bureau and asks questions about social, economic, demographic, and housing characteristics. We used the 2021 five-year estimates to characterize the county characteristics in place when the mental health and segregation data were collected. We described each variable used and its data source below.

The primary dependent variable, mental health, is the age-adjusted average number of poor mental health days reported by county residents over the past month. These two mental health measures were drawn from the 2021 Behavioral Risk Factor Surveillance System and are recorded in the 2022 County Health Rankings dataset.

The primary predictor variable, Black-White residential segregation, came from the 2022 County Health Rankings and is calculated using data from the American Community Survey, 5-year estimates (2017-2021). This measure is a dissimilarity index on a scale from 1 to 100, where higher values indicate greater residential segregation between Black and White residents.

To operationalize health resources, we utilized three measures. The first is food environment index, a summary measure of access to healthy food, ranging from 0 (worst access) to 10 (best access). This is an index of other measures, including the percentage of the population with food insecurity and the rate of the population with limited access to places to buy healthy food. The second is exercise opportunities, which is the percentage of the population with access to places for physical activity, such as parks and gyms. The third, doctor rate, is the number of primary care doctors per 100,000 residents in a county. All three measures came from the 2022 County Health Rankings dataset and represent data collected by various national entities during 2019, 2020, and 2021.

To operationalize socioeconomic resources, we used four measures from the 2021 American Community Survey (5-year estimates): the percent of uninsured residents, the unemployment rate, median income (in dollars), and the percent of the population aged 25 and older who graduated from high school. To operationalize health behaviors, we used three measures: smoking, excessive drinking, and healthcare avoidance. Smoking is measured as the percentage of adults in a county who currently smoke, according to the 2021 Behavioral Risk Factor Surveillance System. Excessive drinking is defined as the percentage of adults who had 5 (for men) or 4 (for women) or more drinks on one occasion in the past 30 days, recorded in 2021 by the Behavioral Risk Factor Surveillance System. Healthcare avoidance is the rate of preventable hospitalizations per 100,000 Medicare enrollees in 2021, collected by the Mapping Medicare Disparities Tool and recorded in the County Health Rankings dataset.

In our analysis, we controlled for several demographic measures. The urbanicity and demographic makeup of cities likely influence access to resources and mental health. Using national census data for each county, we included a measure of population size (logged) and the USDA's rural-urban continuum code. This code ranges from 1 (most urban) to 9 (most rural). We operationalized gender makeup as the ratio of women per 100 men (sex ratio). Race is operationalized as the percentages of the non-Hispanic White-only population, the non-Hispanic Black-only population, the Hispanic population, and all other non-Hispanic racial identities. Both the sex ratio and the percent racial-ethnic makeup come from the 2021 5-year estimates of the American Community Survey.

Social relationships are also expected to affect well-being. To account for this, we include measures of marital

status (percent married, separated, divorced, widowed, and never married) and average household size. These measures were drawn from the 2021 5-year estimates of the American Community Survey.

3.2. Analytic Strategy

In this study, the county is the unit of analysis. Since the dependent variable (average number of poor mental health days) is continuous, we utilized multiple linear regression. Missing data came primarily from 1,000 counties with fewer than 100 Black residents, for which no segregation index could be accurately calculated. Missing data were handled using listwise deletion, and we also included measures of counties' racial/ethnic makeup as control variables in all models. We used Cook's distance and found no values indicating influential outliers. Our final sample contained 1,932 counties.

Since we are testing mediating relationships, we first analyzed the relationships between residential segregation and each mediator (health resources, socioeconomic resources, environmental health risks, and health behaviors) as dependent variables. In the next set of models, we first analyzed the relationship between residential segregation and the number of poor mental health days, then added each potential mediator in subsequent models to assess the effect of their inclusion on the coefficient and significance of the residential segregation coefficient. All models, including the mediator models, included the social and demographic control variables.

An exploration of heteroskedasticity in initial models revealed two distinct patterns across racial contexts—counties with above-average percentages of White residents and those with below-average percentages of White residents. We present two sets of models for the two county types, and Breusch-Pagan tests on both sets revealed no heteroskedasticity.

4.0. Results

First, we present the descriptive statistics of the counties used in our subsequent analysis in Table 1. On average, the counties in our sample reported 4.88 days of poor mental health in the past month, with a range from three to seven days. On a scale from 1 (no segregation) to 100 (complete segregation), the counties had an average score of 50.71, ranging from 2 to 95 (Table 1). Additionally, the average county in our dataset reported that 71.67% of its residents were White, which is the benchmark for distinguishing between the two racial contexts in the following models (Table 1).

Table 2 presents the relationships between the primary predictor variable, Black-White residential segregation, and the proposed mediating variables. Ten linear regression models were used to assess associations between Black-White residential segregation and each mediating variable. Each model included control variables such as rurality, logged population size, racial/ethnic composition, sex ratio, percentage of the population under 18, marital status, and average household size. Table 2 provides coefficients and significance levels for residential segregation, with each row corresponding to a model that uses a specific mediator as the dependent variable. The first column contains models analyzing all counties, the second column focuses on counties with a higher-than-average percentage of White residents (greater than 72%), and the third column examines counties with a lower-than-average percentage of White residents (less than 72%).

Across all counties, Black-White residential segregation was associated with access to health and socioeconomic resources. Notably, greater residential segregation was linked to a higher percentage of the population with access to exercise opportunities and a lower percentage without insurance.

Table 1. Descriptive statistics of segregation, health resources, socioeconomic resources, health behaviors, and average number of poor mental health days across 1,932 United States counties. Source: Compiled Dataset of American Community Survey and County Health Rankings, 2020-2022.

Variables	Mean	SD	Min	Max
Dependent Variable				
# Poor Mental Health Days (Avg)	4.88	0.57	3.07	6.87
Main Predictor				
Segregation	50.27	16.53	2.00	95.00
Health Resources				
Food Environment Index	7.46	1.04	0.00	9.90
% Exercise Opportunities	66.01	21.46	0.00	100
Doctor Rate	56.50	33.44	4.10	296.06
Socioeconomic Resources				
% Uninsured	9.42	4.55	1.60	30.80
Unemployment Rate	5.49	2.18	0.80	26.20
% Homeowner	70.64	8.50	19.80	92.60
% Graduated High School	87.79	5.51	61.60	98.60
Health Behaviors				
% Smoking	19.71	4.04	6.70	33.90
% Excessive Drinking	18.66	2.98	8.19	28.93
Preventable Hosp. Rate	3,079.42	1,100.27	31.76	10,686.00
Demographic Control Variables				
Population Size (logged)	4.75	0.56	3.35	7.00
Rurality Scale	4.16	2.62	1.00	9.00
% Under 18	22.23	3.13	7.2	36.2
Sex Ratio	100.61	10.32	79.6	211.7
% White	71.67	19.46	3.30	97.20
% Black	11.89	15.35	0.00	87.00
% Hispanic	10.42	13.50	0.00	95.50
% Other Race	6.01	6.49	0.10	87.80
Avg. Household Size	2.55	0.23	1.93	4.84

This pattern holds after controlling for population size, rurality, and demographic makeup. Residential segregation was negatively associated with access to quality food and was positively associated with unemployment. Segregation was not significantly related to high school education, homeownership, or primary care doctor rating. Across all counties, Black-White residential segregation was linked to varying access to health and socioeconomic resources. Notably, higher levels of residential segregation was associated with a higher percentage of the population having access to exercise opportunities and fewer individuals without health insurance. These findings hold even after accounting for population size, rurality, and demographic composition. However, residential segregation was negatively associated with access to quality food and was positively associated with unemployment rates. After adjusting for relevant factors, segregation did not significantly correlate with high school education levels, homeownership, or the rate of primary care doctors (see Table 2).

Table 2. Results of Multiple Linear Regressions measuring the relationships between Residential Segregation and each of the mediating health resources, socioeconomic resources, and health behaviors for 1,932 United States counties. Source: Compiled Dataset of American Community Survey and County Health Rankings, 2020-2022.

	Coefficients of Residential Segregation as the Independent Variable		
	All counties (N=1932)	**Fewer % White (N=833)**	**Greater % White (N=1,099)**
Health Resources			
Food Environment Index	-0.006***	-0.011***	-0.004*
Percent with Exercise Opportunities	0.057*	0.139**	0.004
Primary Care Doctor Rate	0.064	0.229**	-0.056
Socioeconomic Resources			
Percent Uninsured	-0.024***	-0.016	-0.009
Unemployment Rate	0.016***	0.015**	0.019***
Percent Homeowner	-0.007	-0.031	0.016
Percent with H.S. Diploma (or eq.)	-0.001	-0.016	0.004
Health Behaviors			
Percent Smoker	0.008	0.016*	-0.001
Percent Excessive Drinker	0.017***	0.013*	0.014*
Preventable Hospitalization Rate	-6.724***	-5.723*	-4.513*

*p<.05 **p<.01 ***p<.001.

Note: The models presented above show results after controlling for population size, rurality, age, sex ratio, racial-ethnic makeup, marital status makeup, and average household size.

Residential segregation was also significantly associated with health behaviors. Higher levels of residential segregation were linked to more frequent reports of excessive drinking, even after controlling for population size, rurality, race, sex, and other demographics. Additionally, findings indicated that segregation was negatively associated with uninsurance and with preventable hospitalizations after controlling for relevant covariates (Table 2).

A comparison of counties with higher-than-average White populations and those with lower-than-average White populations revealed substantial differences. In racially diverse counties, segregation was associated with greater access to exercise opportunities, higher smoking prevalence, and a higher density of primary care physicians. Conversely, these associations were not statistically significant in majority-White counties (Table 2).

Table 3 summarizes four regression models examining the relationship between residential segregation and the average number of poor mental health days in counties with an above-average percentage of White residents. All models controlled for population size, rurality, racial and ethnic composition, sex ratio, percentage under 18 years old, marital status, and average household size. Model 1 examines residential segregation and the number of poor mental health days. Model 2 adds the three health resource measures alongside residential segregation. Model 3 incorporates four socioeconomic resource measures, along with, health resources, and residential segregation. Finally, Model 4 includes three health behavior measures, in addition to all other variables.

In counties where at least 72% of residents are White, residential segregation did not demonstrate a significant association with the average number of reported poor mental health days in any models after adjusting for relevant demographic covariates (Table 3). Several health and socioeconomic resources emerged as significant predictors of mental health. The food environment index was negatively associated with poor mental health days in this subsample. Specifically, counties with greater access to food reported fewer poor mental health days, even after controlling for all variables (Table 3). Access to exercise opportunities was also negatively associated. For every 1% increase in the share of the population with access to exercise opportunities, the number of poor mental health days decreased by 0.003 after controlling for all other variables (Model 4, Table 3). Notably, for every one percent increase in the uninsured population, the average number of poor mental health days decreased by 0.02. As anticipated, higher levels of education were associated with improved mental health. For every one percent increase in the population with a high school education, the number of poor mental health days declined by 0.02. Smoking was associated with poorer mental health - for every one percent increase in adult smoking, the number of poor mental health days increased by 0.08. Although these relationships described above are small, they were statistically significant (Table 3) and may represent meaningful differences, given that the average county reports 4.88 poor mental health days. For example, a county with 10% more adults who smoke than other counties is predicted to have 0.8 more poor mental health days.

Table 4 presents models analogous to those in Table 3 but focuses on counties with a lower proportion of White residents than the average county (less than 72%). Models 5 through 8 display stepwise regressions incorporating various resources and behaviors hypothesized to mediate the relationship between residential segregation and poor mental health days.

Table 3. Results of four multiple OLS regressions demonstrating the relationship between segregation and average number of poor mental health days in counties with more White residents than average (>=71.67%) (1,099 counties). Each model incorporates a new set of mediating resources, to see whether their inclusion changes the association between segregation and mental health days. Source: Compiled Dataset of American Community Survey and County Health Rankings, 2020-2022.

	Model 1		**Model 2**		**Model 3**		**Model 4**	
Variables	**b**	**SE**	**b**	**SE**	**b**	**SE**	**b**	**SE**
Main Predictor								
Segregation	0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.001
Health Resources								
Food Environment Index			-0.323***	0.018	-0.212***	0.021	-0.105***	0.021
% Exercise Opportunities			-0.006***	0.001	-0.004***	0.001	-0.003**	0.001
Doctor Rate			-0.002**	0.001	0.000	0.001	0.001	0.000
Socioeconomic Resources								
% Uninsured					-0.017***	0.005	-0.022***	0.004
Unemployment Rate					0.028**	0.009	0.011	0.008
% Homeowner					0.001	0.002	0.002	0.002
% High School Graduate					-0.057***	0.005	-0.019***	0.005
Health Behaviors								
% Smoking							0.082***	0.006
% Excessive Drinking							-0.009	0.005
Preventable Hosp. Rate							0.000	0.000
Demographic Control Variables								
Population Size (logged)	0.113*	0.001	0.326***	0.050	0.266***	0.047	0.238***	0.043
Rurality Scale	0.052***	0.055	0.012	0.008	-0.008	0.007	-0.005	0.007
% Under 18	-0.047***	0.009	-0.036***	0.006	-0.032***	0.006	-0.052***	0.006
Sex Ratio	-0.015***	0.007	-0.010***	0.002	-0.011***	0.002	-0.013***	0.002
% Black	0.010*	0.003	-0.008*	0.004	-0.016***	0.004	-0.008*	0.003
% Hispanic	-0.025***	0.004	-0.027***	0.004	-0.025***	0.004	0.002	0.004
% Other Race	-0.027***	0.004	-0.019**	0.006	-0.003	0.006	0.011	0.006
Avg. Household Size	1.032***	0.007	0.713***	0.100	0.540	0.097	0.864***	0.096
Constant	4.216***	0.117	6.569***	0.402	11.255***	0.581	5.084***	0.703
Adjusted R-squared	0.150		0.409		0.493		0.569	

*p<.05 **p<.01 ***p<.001.

Note: Percent White omitted to reduce multicollinearity.

Table 4. Results of four multiple OLS regressions demonstrating the relationship between segregation and average number of poor mental health days in counties with fewer White residents than average (<=71.67%) (833 counties). Each model incorporates a new set of mediating resources, to see whether their inclusion changes the association between segregation and mental health days. Source: Compiled Dataset of American Community Survey and County Health Rankings, 2020-2022.

	Model 5		**Model 6**		**Model 7**		**Model 8**	
Variables	**b**	**SE**	**b**	**SE**	**b**	**SE**	**b**	**SE**
Main Predictor								
Segregation	0.005***	0.001	0.004***	0.001	0.004**	0.001	0.002*	0.001
Health Resources								
Food Environment Index			-0.169***	0.017	-0.127***	0.017	-0.056**	0.016
% Exercise Opportunities			-0.002*	0.001	-0.001	0.001	-0.002*	0.001
Doctor Rate			-0.002*	0.001	-0.001	0.001	0.001	0.001
Socioeconomic Resources								
% Uninsured					0.010**	0.004	-0.005	0.004
Unemployment Rate					0.021**	0.008	0.005	0.007
% Homeowner					-0.005*	0.002	-0.006**	0.002
% High School Graduate					-0.036***	0.004	-0.009*	0.004
Health Behaviors								
% Smoking							0.088***	0.007
% Excessive Drinking							0.062***	0.006
Preventable Hosp. Rate							0.000*	0.000
Demographic Control Variables								
Population Size (logged)	-0.195***	0.041	-0.035	0.042	-0.003	0.040	0.053	0.036
Rurality Scale	0.012	0.009	-0.003	0.009	-0.021*	0.008	-0.015*	0.007
% Under 18	0.017*	0.007	0.003	0.007	-0.010	0.006	-0.014*	0.006
Sex Ratio	0.000	0.001	-0.002	0.001	-0.004**	0.001	-0.007***	0.001
% Black	0.000	0.001	-0.006***	0.001	-0.013***	0.001	-0.006***	0.001
% Hispanic	-0.007***	0.001	-0.010***	0.001	-0.018***	0.002	-0.004*	0.002
% Other Race	-0.004	0.002	-0.007**	0.002	-0.009***	0.002	-0.004*	0.002
Avg. Household Size	-0.084	0.092	-0.047	0.088	-0.075	0.087	0.132	0.077
Constant	5.509***	0.344	6.881***	0.341	10.449***	0.562	4.276***	0.637
Adjusted R-squared	0.140		0.264		0.347		0.507	

*p<.05 **p<.01 ***p<.001.

Note: Percent White omitted to reduce multicollinearity.

In counties with a higher proportion of non-White residents than average (28% or more), residential segregation demonstrated a small but statistically significant positive association with the average number of reported poor mental health days after adjusting for demographic covariates. Each unit increase in residential segregation was associated with a 0.01 increase in poor mental health days among this subsample (Model 5, Table 4). The strength of this association diminished with the inclusion of socioeconomic resources in Model 7 and of health behaviors and health resource measures in Model 8.

Counties with a non-White resident population above average, similar to those with a majority of White residents, demonstrated a significant negative association between the food environment index and poor mental health days. A notable negative association was also observed between exercise opportunities and poor mental health days (Model 6, Table 4). These associations persisted in the final, fully model (Model 8, Table 4). Furthermore, the high school graduation rate was negatively associated with poor mental health days (Models 7 & 8, Table 4).

Several differences emerged between counties with fewer White residents and those with a majority-White population. In counties with fewer White residents, the uninsured rate was not significant in the final model that included all covariates. Additionally, percent homeownership was negatively associated with poor mental health days - for every one percent increase in homeownership, the average number of poor mental health days decreased by 0.01 (Model 8, Table 4). In contrast, excessive drinking and preventable hospitalization rates were positively associated with poor mental health days. For every one percent increase in the number of residents reporting excessive drinking, the average number of poor mental health days increased by 0.06.

5.0. Discussion

We identify two distinct patterns of results based on different racial contexts. Residential segregation is not significantly associated with mental health in the majority White counties. However, a significant association exists in counties with a below-average White population. This suggests that segregation may have a less negative association with mental health in majority White counties than in those with more non-White residents. These findings align with previous literature (Lu et al., 2021; Thibodeaux, 2016).

We find that segregation is associated with health resources and behaviors across racial contexts. Segregation correlates with higher smoking rates in racially diverse counties, but not predominantly White counties, reflecting previous findings that segregation contributes to smoking among Black individuals (Landrine et al., 2017). In racially diverse counties, segregation is also positively associated with exercise opportunities and doctor rates, while these associations are not significant in predominantly White counties. Because prior research has found a negative relationship between segregation and individual-level exercise, further study is needed to understand the effects of segregation on exercise opportunities and rates (Mellerson et al., 2010). For other measures, residential segregation appears similarly associated with resources in both county types. Predominantly White areas may have additional resources, such as unmeasured social support, or experience fewer stressors, such as racial discrimination or policing, which are not captured in this analysis. These factors also affect mental health outcomes and may influence our results (Christophe & Stein, 2024). Future research should account for these variables when examining segregation and mental health.

Although our study is limited to the county level, previous research on physical health has demonstrated that White residents are generally less negatively affected by residential segregation than non-White residents (Yang et al., 2020); this pattern may also extend to mental health.

Future research should incorporate individual-level data to investigate this hypothesis further. It is recommended to include the racial makeup of the communities in which individuals reside, as a Black individual might report different mental health outcomes depending on whether they live in a predominantly White or predominantly Black area, even when these areas have similar levels of segregation. This recommendation is supported by studies of minority communities (Allgood et al., 2024; Nobles et al., 2017).

The findings provide partial support for our hypotheses that health resources, socioeconomic resources, and health behaviors are associated with mental health in counties with both higher-than-average White and non-White populations. The food environment, exercise opportunities, smoking, and high school education remained significantly associated with poor mental health days after controlling for other factors. Notably, the specific resources most strongly associated with mental health varied across the two racial contexts.

Health insurance was significant in majority-White areas, whereas homeownership, excessive drinking, and healthcare avoidance were significant in areas with more non-White residents than average. Given the historical context of redlining and housing discrimination in the United States, the positive association between homeownership and mental health in racially diverse counties warrants further investigation. As we cannot explore this using county-level data, future research should examine the meaning and impact of homeownership on stress and mental health by race within the context of racial residential segregation.

In counties with higher proportions of non-White residents, there is evidence that socioeconomic resources and health behaviors partially mediate the relationship between residential segregation and mental health. The results indicate that residential segregation is associated with food deserts, exercise opportunities, unemployment, and excessive drinking, all of which are linked to increased numbers of poor mental health days. These findings contribute to the growing literature on the relationship between residential segregation and well-being. Future research should incorporate measures of these mediating mechanisms when examining the impact of segregation on individual health, particularly regarding mental health.

This study employed the dissimilarity index to measure Black-White residential segregation, restricting the sample to counties with more than 100 Black residents. This sampling criterion may have influenced the findings by excluding many counties with predominantly White populations, where the low numbers of Black residents may result from segregationist views and exclusionary policies. Moreover, the dissimilarity index does not distinguish among African-Americans, African immigrants, and Afro-Caribbeans, who may exhibit distinct patterns of social integration and mental health (Erving & Hills, 2019), nor does it capture segregation among non-Black racial-ethnic groups. Furthermore, social spaces and patterns of segregation may extend beyond county boundaries. Future research should consider geographic proximity to resources and the characteristics of neighboring counties when examining the effect of segregation on well-being.

6.0. Conclusion and Future Recommendations

Our findings support the literature arguing that residential segregation affects both physical and mental health. We build on Smith and Acevedo-Garcia to clarify the relationship between segregation and mental health by examining the association between Black-White residential segregation and the average number of poor mental health days. We find that the relationship between mental health and segregation varies across neighborhood contexts. In predominantly White counties, there is no significant link between residential segregation and poor mental health days at the county level. In contrast, in racially diverse counties, a positive, significant association exists between residential segregation and poor mental health days. This relationship is partially mediated by several county-level factors, including health resources such as the food environment index, availability of exercise opportunities, and the ratio of primary care doctors; socioeconomic resources such as the unemployment rate, the percentage of uninsured individuals, homeownership rates, and the proportion of high school graduates. Additionally, health behaviors, including smoking rates, excessive drinking rates, and the incidence of preventable hospitalizations, also contribute to this association. These findings emphasize the critical importance of these resources in shaping mental health and highlight the need to investigate them as mechanisms linking segregation to health outcomes.

Furthermore, the results underscore the need for policies that address inequalities in these resources resulting from segregation and that aim to enhance community well-being. Our future recommendations based on this analysis are as follows.

1. Researchers should incorporate the mediating factors of health behaviors, health resources, and socio-economic resources into analyses of individual-level mental health.

2. Future research should consider geographic proximity to resources and the characteristics of neighboring counties when examining the effect of segregation on well-being.

3. Researchers should examine the meaning and impact of homeownership on stress and mental health by race within the context of racial residential segregation.

4. Policymakers and public health professionals should consider racial residential segregation as a fundamental cause of health inequality and implement programs and policies that address this issue.

5. Policymakers and public health professionals should implement programs and policies that improve access to exercise opportunities, healthy food environments, home ownership, employment, and educational achievement, especially in highly segregated counties and especially in predominantly Black neighborhoods.

Declarations

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Competing Interests Statement

The authors declare no conflicts of interest.

Consent for Publication

The authors declare that they consented to the publication of this article.

Authors' Contributions

Dr. Meagan Rainock, Dr. Rolande Dorancy Dathis, and Dr. Andrea Stevenson co-authored the article. Aja Coffey, Kyra Edwards, Evonne Downing, Charisma Harris, and Amelia Wright created the dataset and conducted the analysis.

Informed Consent

Not applicable.

Availability of Data and Material

Secondary data analysis used publicly available data from the American Community Survey (US Census Bureau) and the County Health Rankings database (www.countyhealthrankings.org).

Institutional Review Board Statement

Not applicable.

Ethical Approval

Not applicable.

Declaration of Artificial Intelligence

No artificial intelligence tools were used in this research study.

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