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Historical Redlining and Contemporary Violent Victimization Over the Life Course

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Abstract

Introduction: This study assesses the relationship between living in historically redlined communities and the incidence of violent victimization and examines differences in this relationship across race and ethnicity.

Methods: Data are from the US National Longitudinal Study of Adolescent to Adult Health (Add Health) from Waves I (1994–1995; ages 12–17), III (2001; ages 18–26), IV (2008–2009; ages 24–32), and V (2016–2018; ages 34–44). Multi-level, within-between regression models were used to assess the relationship between residence in historically redlined areas and violent victimization from adolescence to adulthood. The study includes 8,266 participants, and data analysis was conducted in 2024.

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Results: Respondents who lived in redlined areas throughout adolescence and adulthood reported a 4.8% higher average probability of violent victimization relative to those who never lived in redlined areas. Respondents who moved from a non-redlined to a redlined area across waves also reported a 2.2% higher probability of victimization, on average. Although Black and Hispanic respondents were significantly more likely than their White peers to live in a redlined area and report violent victimization at each stage of the life course, the probability of experiencing victimization while living in a redlined area was similar between racial and ethnic groups.

Conclusions: These findings underscore the profound and enduring consequences of New Deal-era redlining policies for present-day safety, emphasizing the urgent need to confront and rectify historical injustices to enhance contemporary safety and well-being.

INTRODUCTION

Violent victimization is a traumatic event that has significant repercussions for well-being.[1–5] In 2021 alone, approximately 4.5 million violent victimizations of persons aged 12 and older occurred in the United States (US)[6] and the total cost of interpersonal violence in the US is estimated to be over $2 trillion annually.[7] The risk of violent victimization is disproportionately endured by minoritized populations and those living in communities characterized by concentrated disadvantage.[8–12] While research examines the impact of contemporary neighborhood characteristics on the risk of violent victimization,[12–14] there is a lack of knowledge on how historical factors rooted in structural racism contribute to contemporary violent victimization.

One noteworthy historical factor that may shape the risk of violent victimization is residence in a historically redlined community. Redlining policies are typically traced to the 1930s when the Home Owners' Loan Corporation (HOLC) was established to promote homeownership in the US following the Great Depression.[15] The HOLC—and, later, the Federal Housing Administration and other private lenders—implemented a color-coded neighborhood mapping system in over 200 major metropolitan areas across the US. Neighborhoods were assigned hierarchical letter and color grades based on their perceived risk of lending. The grading system labeled areas as "A" (green; "most desirable"), "B" (blue; "still desirable but not rising"), "C" (yellow; "definitely declining"), and "D" (red; "hazardous"). Yellow and red grades were largely determined by racial-ethnic compositions, especially the presence of Black, Hispanic, and other working-class immigrant residents.[16–18] Despite the Fair Housing Act of 1968 outlawing redlining,[19,20] historical redlining policies are among the most consequential and widespread manifestations of structural racism in modern US history, with lingering repercussions for urban communities today.[21,22]

The current study conceptualizes historical redlining as a formalized policy that altered the trajectories of urban communities, creating conditions in historically redlined communities that make the risk of contemporary violent victimization greater for the inhabitants of these areas. By deliberately segregating neighborhoods along racial lines, redlining practices dictated the flow of investment and resources, creating a bifurcated urban landscape characterized by stark contrasts in wealth, stability, and access to opportunities.[23–25] By

tracing these pathways, it becomes evident that historical redlining did more than shape neighborhoods' physical and economic landscape; it also laid the groundwork for ongoing social and health disparities that manifest as increased risks of violent victimization into the twenty-first century.[26–30]

Although research finds higher rates of salient yet relatively rare forms of violence in historically redlined areas (e.g., fatal firearm violence[31–38]; fatal encounters with police[28]), this work overlooks more common forms of violence, such as assault, injury from a weapon, and threats with a weapon.[6] Moreover, prior research on redlining and violence primarily uses aggregated macro-level data,[28,31–38] which cannot capture individual-level patterns of mobility into and out of redlined communities over the lifespan and how such patterns might shape an individual's exposure to violence. This limitation underscores the need for more granular, multi-level analyses of individuals nested within historically redlined communities over the life course.[39–42]

The current study leverages nationally representative longitudinal data collected over 25 years from the National Study of Adolescent to Adult Health (Add Health) to evaluate the relationship between residence in a historically redlined area and individual experiences of violent victimization over the life course. Given the profoundly racist underpinnings of historical redlining policies, this study also considered whether living in a formerly redlined area still poses unique risks of violence for different racial-ethnic groups in the contemporary US.

METHODS

Study Sample

Data are from the Add Health study, a nationally representative cohort of US adolescents who were enrolled in grades 7–12 during the 1994–1995 school year and have been followed for five waves to early midlife.[43] The primary sampling frame of the Add Health study was derived from the Quality Education Database, which was comprised of 26,666 US high schools. From this frame, 70 high schools were selected with a probability selection proportional to school size, and from each high school selected, one of its feeder schools—typically a middle school—was identified and recruited, with a total of 52 feeder schools selected. According to the rural-urban commuting area codes for respondents' Wave I census tracts, most respondents lived in major metropolitan areas during adolescence (79%), followed by micropolitan/small town areas (15%) and rural areas (6%).

Our analyses include data from Wave I (1994–95; ages 12–19), Wave III (2001–02; ages 18–26), Wave IV (2008; ages 24–32), and Wave V (2016–19; ages 33–43). The analytic sample includes respondents who participated in all waves and have valid measures of historical redlining and race-ethnicity, and identify as non-Hispanic Black, Hispanic, and non-Hispanic White ($N = 8,266$). The use of the Add Health data received approval from Duke University and the University of Texas Health Science Center at Houston institutional review boards.

Measures

The dependent variable measures a respondent's exposure to violent victimization. At each wave, respondents report how often in the past 12 months someone: (1) pulled a knife or gun on them; (2) shot them; (3) cut or stabbed them; or (4) they were jumped. The measure compares respondents who answer "once" or "more than once" on any of these items (=1) to those who answer "never" on all four items (=0).[2,3]

The focal independent variable is historical redlining status. The measure originates from geospatial data provided by the Mapping Inequality Project,[44], which recently digitized original 1930s HOLC redlining maps. The geospatial dataset consists of polygons or HOLC "areas" for all cities where redlining maps exist. At each wave, respondents' geocoded residential addresses are spatially linked to the HOLC area maps, resulting in two separate variables: (1) proximity to the nearest HOLC area and (2) grade of the nearest HOLC area.[45] Proximity scores are ordinal and range from residence inside the HOLC area, residence outside by less than one mile, outside by 1 to 4.99 miles, outside by 5–10 miles, and outside by further than ten miles. HOLC grades are also ordinal and range in letter/color grades from A/green ("best" and on the rise), B/blue ("still desirable" but not rising), C/yellow ("definitely declining"), and D/red ("hazardous"). From these two variables, a dichotomous measure was created comparing respondents who live inside a yellow or red urban HOLC area ("redlined") to everyone else who lives outside these areas. Yellow/red areas were combined to maximize cell counts and because research indicates these areas have experienced similar trajectories into the twenty-first century.[21,22,24] Further information on the linkage of HOLC maps to the Add Health data can be found in DeAngelis et al.[45]

Respondents are asked at Wave V, "What is your race or ethnic origin?" Respondents are then given the option to choose multiple identifications from a list that includes Black/African American, Hispanic, and White, among others. Respondents who choose more than one race are asked, "Of the race/ethnicity categories you selected, please pick the one with which you most strongly identify." From these questions, categories for non-Hispanic Black, Hispanic, and non-Hispanic White were created. Respondents with missing data on Wave V race-ethnicity were assigned their Wave I racial-ethnic identity (n = 79).

Multivariable estimates account for respondent's Wave I biological sex at birth (1=female, 0=male) and family socioeconomic status (SES). Family SES reflects a standardized factor score from the first principal component of respondents' parental education, parental occupation, household income, and household receipt of public assistance.[46] Analyses accounted for time-varying measures of age (in years), and educational attainment (0=less than high school, 5=postgraduate). Finally, neighborhood-level covariates from the US Census Population and Housing (Waves I and III) and American Community Survey (Waves IV and V) were included. These included the proportion of Black residents in the respondent's census tract, the proportion of impoverished residents in the census tract, and the population density of the census tract (in thousands of persons per square kilometer).

Statistical Analysis

A within-between linear regression estimator, with multiple observations nested within respondents was used to test associations between living in a historically redlined area and the probability of violent victimization over the life course.[47,48] The multi-level model decomposes the associations between violent victimization and living in a redlined area into separate between-person (β_1) and within-person (β_2) components. The between-person component reflects the average difference in probabilities of reporting violent victimization over the life course between respondents who never lived in a redlined area (=0) versus those who lived in a redlined area throughout adolescence and adulthood (=1). The within-person component reflects the average difference in probabilities of reporting violent victimization after moving from a non-redlined (=0) to a redlined (=1) area across waves. The model also includes time-invariant (β') and time-varying (β'') covariates, a respondent-specific residual at each wave (e_{it}), and a respondent-specific intercept or average probability of violent victimization across all waves (u_i).

$$\text{Victimization}_{it} = \beta_0 + \beta_1(\overline{\text{Redlined}_i}) + \beta_2(\text{Redlined}_{it} - \overline{\text{Redlined}_i}) + \beta'(\text{Covariates}_i) + \beta''(\text{Covariates}_{it}) + e_{it} + u_i$$

Clogg tests were used to test racial-ethnic heterogeneity in the associations between violent victimization and living in a redlined area over the life course to identify significant differences in coefficients across race-stratified models.[49] The Clogg statistic tests whether coefficients across independent samples in stratified models significantly differ from each other in magnitude by estimating z-scores based on the ratio of (a) the difference in regression coefficients divided by (b) the square root of the difference in squared standard errors.

The following variables had missing values: Wave I family SES (n=423), Wave III education (n=5), Wave IV education (n=3), Wave V education (n=15), Wave I victimization (n=39), Wave III victimization (n=34), Wave IV victimization (n=754), and Wave V victimization (n=251). These missing observations were imputed with 10 iterations of multiple imputation by chained equations, where each variable with missing data is regressed on respondents' race-ethnicity, sex, survey weight, and redlining status at each wave. Imputation models used linear regression for Wave I family SES, ordinal logistic regression for education, and binary logistic regression for victimization to impute missing observations. Estimates are weighted with level-1 respondent weights and level-2 school weights, both recorded at Wave I original sampling frame, and standard errors are adjusted for clustering by Wave I schools.[50] Further robustness analyses determined that the results are similar with logit and probit models and without weights or multiple imputation (not shown).

RESULTS

The analytic sample includes 8,266 respondents. Table 1 reports descriptive statistics of study variables for non-Hispanic Black ($n = 1,774$), Hispanic ($n = 1,043$), and non-Hispanic White ($n = 5449$) respondents. Compared to non-Hispanic Whites, nearly twice as many non-Hispanic Black and Hispanic respondents experience violent victimization at each

wave. Likewise, between two-to-three times as many non-Hispanic Black and Hispanic respondents live within a historically redlined area at each wave, compared to non-Hispanic White respondents.

Figure 1 summarizes the results of the within-between regressions among the analytic sample ($n = 8{,}266$). This figure shows predicted probabilities (with 95% confidence bands) of experiencing violent victimization over the life course as a function of the between- and within-person components of living in a redlined area. Estimates are shown first for the full sample ($n = 8{,}266$) and then separately for non-Hispanic Black ($n = 1{,}774$), Hispanic ($n = 1{,}043$), and non-Hispanic White ($n = 5449$) respondents. All estimates adjust for covariates, weighting, and clustering by Wave I school. The full set of coefficients is provided in Appendix Table 1.

In the bivariate model (see Appendix Table 1), the between-person redlined coefficient indicates that when compared to their peers who never lived in redlined areas, respondents who live in redlined areas across their entire life course have a 7.3% higher average probability of reporting any violent victimization, conditional on covariates (b = .073; p < .001). The within-person redlined coefficient indicates that the probability of reporting violent victimization also increases by an average of 3.9% whenever respondents move from a non-redlined to a redlined area across waves (b = .039; p < .01). After including respondent- and neighborhood-level covariates, the between (b = .048, p <.001) and within-person associations (b = .022, p <.05) of living in a formerly redlined area and risk of violent victimization diminish in magnitude by roughly one-third (see Figure 1 & Appendix Table 1). This finding suggests that residents' socioeconomic status and broader neighborhood contexts explain some—but not all—of the links between historical redlining and contemporary victimization risk.

Regarding the race-stratified results, the between-person redlining coefficients appear to be larger in magnitude for non-Hispanic Black and Hispanic respondents relative to Whites. Moreover, the within-person redlining coefficient is statistically significant only for non-Hispanic Whites. However, these results should be interpreted cautiously due to the larger sample size of non-Hispanic Whites and larger statistical error among the smaller non-Hispanic Black and Black subsamples. Indeed, the Clogg tests confirm that neither of these coefficients significantly differ across racial-ethnic groups. Thus, living in a formerly redlined urban area appears to pose similar risks of violent victimization over the life course for Black, Hispanic, and White Americans.

DISCUSSION

Using contemporary and nationally representative longitudinal data from US adolescents who have transitioned to adulthood, the current study provides the first analysis, to the authors knowledge, of the relationship between residence in a historically redlined area and experiences with violent victimization over the life course. The study findings provide novel evidence of the potential long-term consequences of redlining for violent victimization, even decades after its official end. These results are consistent with other research demonstrating

a link between redlining and other forms of contemporary violence, including firearm violence,[31–38] fatal encounters with police,[28] and crime rates.[26,27,29,51]

Although this study pioneers in establishing a connection between historical redlining and contemporary risks of violent victimization, additional research is crucial. For instance, the findings suggest that contemporary risks of victimization within historically redlined areas persist regardless of neighborhood racial composition, poverty rates, or population densities. Additional research is needed to unravel the underlying mechanisms by which redlining has eroded communities and fostered environments conducive to violence. Additionally, it will be essential to explore effective strategies to mitigate disparities in victimization and promote community safety within formerly redlined areas.

Historical redlining was a deeply consequential structural policy that fundamentally impacted investment and disinvestment in communities, creating and perpetuating conditions of inequality in contemporary society. Accordingly, the findings from this study underscore the profound influence of structural racism, embodied by decades-old redlining policies, on the safety and well-being of communities, underscoring the need for an integrated public health approach and significant structural investments that address the root causes of violence and foster community resilience.[52] It is imperative that public health efforts not only focus on mitigating immediate risks but also on dismantling the long-term impacts of discriminatory policies by addressing the structural determinants of health and safety.

The findings also highlight the need for place-based interventions that enhance community safety and cohesion. Given the disinvestment in housing directly tied to historical redlining, one promising approach entails urban housing repairs and investments for low-income homeowners as a violence reduction strategy.[53–56] Other structural interventions shown to reduce violence while uplifting communities include creating safe public spaces through greening and blight remediation,[56–61] investing in strategic community lighting,[62,63] and investments in local social support services and nonprofits formed to confront crime and assist victims of violence in historically redlined communities.[64–66] The role of public health professionals is crucial in advocating for and implementing these changes. Such efforts require large investments and necessitate collaborative work with interdisciplinary teams that include community leaders and residents to develop community-informed programs that address not only the symptoms of violence but also its underlying causes.

Limitations

This should read: This study has limitation which can be more fully address in future research. First, while the Add Health dataset covers over twenty years, there are intervals between waves where no data was collected. As a result, data regarding violent victimization and residential locations during these interim periods remain unrecorded. It would be advantageous for subsequent studies exploring the relationship between redlining and violent victimization to utilize individual-level panel data with more frequent follow-up intervals. Second, the current study's approach to measuring violent victimization concentrates primarily on certain types of community-based violence. Thus, the results might not apply to other forms of victimization, including sexual assault or intimate

partner violence. Third, we lack information on where a violent incident occurred, and it remains possible that individuals may have been victimized in communities other than those they reside in. Fourth, the Add Health study uses a nationally representative school-based sampling strategy. To the extent that historical redlining impacted school placement decisions in the US, the geographic sample composition of the study population may be impacted by redlining itself. Fifth, the current study focused on the direct relationship between redlining and violent victimization. Future work would benefit from analyses that unpack the mediating and moderating pathways, including historical and contemporary markers of economic conditions and structural racism.

Finally, the Add Health data set lacks information on historical controls that capture the conditions of communities before redlining. Accordingly, while the theoretical and empirical position of this study is that the HOLC maps proxy a pivotal policy decision that fundamentally altered the trajectories of communities and impacted violent victimization risk in the contemporary 21st century, it remains possible that the effects observed in this study are due to conditions that preceded redlining.[15,16] To better disentangle the impacts of HOLC maps on contemporary violent victimization, comprehensive data collection is needed to capture historical census characteristics as a control for path dependence that can account for conditions of communities before HOLC redlining occurred.

CONCLUSIONS

Given the pervasiveness and adverse consequences of violence in the US, it is imperative to understand both the historical and contemporary drivers of violent victimization risk. This multi-level analyses of the Add Health cohort provided novel evidence that residents in historically redlined areas have a significantly higher risk of violent victimization across the life course. These findings add to a burgeoning literature suggesting that historical redlining policies have damaged the social fabric of communities and the safety of urban residents in the US. The study highlights the need for new policies that can redress the lasting harms of redlining to promote safer and healthier urban communities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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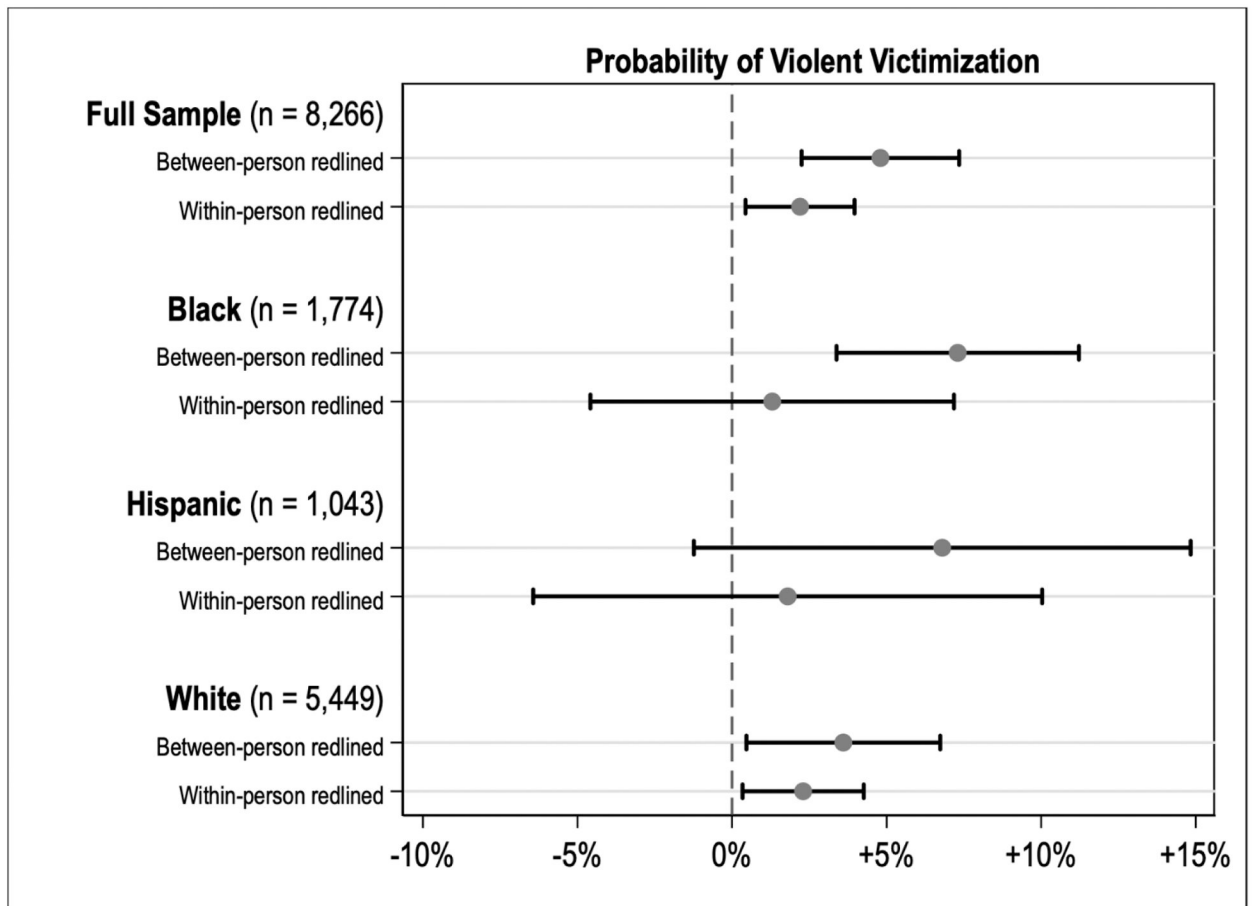
Figure 1.
Historical Redlining Status and the Probability of Violent Victimization Over the Life

Table 1.

Weighted Descriptive Statistics of Study Variables: Add Health, Waves I, III, IV, and V (N = 8,266).

	Non-Hispanic Black (n = 1,774)		Hispanic (n = 1,043)		Non-Hispanic White (n = 5,449)	
Violent Victimization (range, 0–1)						
Wave I	.25	—	.30	—	.16	—
Wave III	.12	—	.10	—	.07	—
Wave IV	.12	—	.09	—	.07	—
Wave V	.04	—	.03	—	.02	—
Lives in Redlined Area (range, 0–1)						
Wave I	.21	—	.27	—	.08	—
Wave III	.18	—	.23	—	.09	—
Wave IV	.15	—	.18	—	.09	—
Wave V	.11	—	.14	—	.06	—
Age (in years)						
Wave I	15.64	(1.83)	15.50	(1.92)	15.37	(1.78)
Wave III	22.00	(1.86)	21.95	(1.92)	21.74	(1.82)
Wave IV	28.52	(1.85)	28.41	(1.90)	28.20	(1.81)
Wave V	37.69	(1.95)	37.51	(1.98)	37.30	(1.90)
Education (range, 0–5)						
Wave I	.00	—	.00	—	.00	—
Wave III	1.38	(.90)	1.32	(.89)	1.58	(.90)
Wave IV	1.90	(1.10)	1.84	(1.03)	2.18	(1.06)
Wave V	2.07	(1.12)	2.01	(1.07)	2.31	(1.08)
Tract proportion Black						
Wave I	.53	(.33)	.09	(.14)	.05	(.10)
Wave III	.49	(.32)	.10	(.15)	.08	(.12)
Wave IV	.47	(.30)	.11	(.14)	.08	(.13)
Wave V	.44	(.29)	.10	(.12)	.08	(.13)
Tract proportion in poverty						
Wave I	.25	(.15)	.19	(.12)	.11	(.09)
Wave III	.23	(.13)	.18	(.11)	.13	(.11)
Wave IV	.23	(.14)	.16	(.11)	.13	(.10)
Wave V	.22	(.13)	.15	(.10)	.12	(.09)
Tract population density						
Wave I	1.83	(3.11)	3.49	(5.70)	.82	(1.45)
Wave III	2.00	(3.84)	3.33	(4.51)	1.32	(2.79)
Wave IV	1.88	(3.55)	3.27	(5.46)	1.42	(3.71)
Wave V	1.80	(3.66)	3.03	(4.39)	1.23	(3.21)
Female (vs. male)	.51	—	37.51	—	.49	—
Adolescent family SES (z-score)	−.58	(1.47)	−.75	(1.35)	.26	(1.19)

Note: Weighted means/proportions are reported with standard deviations in parentheses when applicable. Education is recorded on an ordinal scale ranging from less than high school (=0) to postgraduate (=5). Population density is recorded in thousands of persons per square kilometer.