Pandemic precarity: COVID-19 is exposing and exacerbating inequalities in the American heartland

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Crises lay bare the social fault lines of society. In the United States, race, gender, age, and education have affected vulnerability to COVID-19 infection. Yet, consequences likely extend far beyond morbidity and mortality. Temporarily closing the economy sent shock waves through communities, raising the possibility that social inequities, preexisting and current, have weakened economic resiliency and reinforced disadvantage, especially among groups most devastated by the Great Recession. We address pandemic precarity, or risk for material and financial insecurity, in Indiana, where manufacturing loss is high, metro areas ranked among the hardest hit by the Great Recession nationally, and health indicators stand in the bottom quintile. Using longitudinal data (_n_ = 994) from the Person to Person Health Interview Study, fielded in 2019–2020 and again during Indiana's initial stay-at-home order, we provide a representative, probability-based assessment of adverse economic outcomes of the pandemic. Survey-weighted multivariate regressions, controlling for preexisting inequality, find Black adults over 3 times as likely as Whites to report food insecurity, being laid off, or being unemployed. Residents without a college degree are twice as likely to report food insecurity (compared to some college), while those not completing high school (compared to bachelor's degree) are 4 times as likely to do so. Younger adults and women were also more likely to report economic hardships. Together, the results support contentions of a Matthew Effect, where pandemic precarity disproportionately affects historically disadvantaged groups, widening inequality. Strategically deployed relief efforts and longer-term policy reforms are needed to challenge the perennial and unequal impact of disasters.

COVID-19 pandemic | economic insecurity | socioeconomic inequality | racial and ethnic inequality | disparities

The COVID-19 pandemic has revealed wide disparities in infection and recovery rates by race, ethnicity, socioeconomic status, and place of residence (1–4). Disease and death have long been recognized as reflections of the social fault lines in a society (5–7). Pointedly, research across a wide range of natural and man-made disasters, including hurricanes, floods, and economic downturns, repeatedly demonstrate the greater health burden that falls on those in disadvantaged social and geographic locations when large-scale calamities occur (8–12). However, less well understood are the cross-cutting short- and long-term impacts of such events on the economic wellbeing and life chances of individuals across sociodemographic groups. As unemployment reached near-Great Depression era levels during the early stages of the pandemic, questions remain about the potential of the COVID-19 pandemic to exacerbate historically high levels of socioeconomic inequality in the United States (13).

The little we do know is alarming. Evidence out of Europe suggests that job losses and economic hardship have disproportionately affected the less educated and those in the lower income strata (14, 15). Similarly, a microeconomic model of Americans living in the San Francisco Bay area estimated significant increases in the poverty rate, with the lowest income earners more severely affected in relative terms (16). In one unidentified American city, a survey of hourly service workers found two-thirds experienced income losses following stay-at-home orders, nearly half had been laid off, and many were unable to receive assistance regarding unemployment insurance, childcare, distance learning for their children, or basic necessities (17). Further, the burdens are not equally distributed, with reports of unemployment and income shocks due to the pandemic being highest in Latinx communities, and particularly among the undocumented (18, 19).

To date, we are lacking a broad and representative assessment of disparities in material deprivation and economic anxiety resulting from the COVID-19 pandemic, which we refer to as "pandemic precarity." Tracking these downstream consequences is critical for understanding the long-term and secondary health, psychological, and economic impacts for individuals and families. Research on the Great Recession (2007–2009) in the United States documented that, despite a general economic rebound, racial and ethnic minorities, immigrants, those with lower levels of education, and those who worked in factories or in construction have been slower or unable to recover wealth, often accumulated over generations, compared to Whites and those with college degrees (20–23). This economic crisis exacerbated inequities in ways that are masked by stock market activity or employment rates, because job opportunities during recovery were largely out of reach of historically marginalized groups.

Following this literature, we examine sociodemographic inequalities in employment, material hardship, and economic anxiety due to COVID-19, assessing outcomes before and during the pandemic using a panel design. We do so with data from a representative sample of residents in Indiana, a state that is home to

Significance

The 2008 Great Recession widened socioeconomic inequities among young adults, people of color, and those without a college degree. The COVID-19 pandemic raises renewed concerns about inequality. Leveraging pre–post data from a population-representative sample of Indiana residents, we examine employment and food, housing, and financial insecurity. Comparing data before COVID-19 reached the state and during the initial stay-at-home orders, we find socioeconomic shocks disproportionately affecting vulnerable groups, controlling for prepandemic status. Findings are consistent with patterns of inequality observed following other disasters, including Hurricane Katrina, the Chicago Heatwave, the Buffalo Creek Flood, and the Great Recession. As with these disasters, additional surges are likely to escalate short-term hardships, revealing the axes of social devastation that translate into durable inequality.

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"Middletown" (i.e., Muncie, IN), made famous by the Lynds' classic field studies of culture in America's small cities (24). During the Great Recession, Indiana ranked fifth nationally in bankruptcies, median income fell by 15%, over 20,000 jobs were lost, and demand for free meals doubled (25). Similar to national trends, although simple indicators (e.g., private sector job growth) suggest that Indiana had recovered by 2014, the structure of the state's economy shifted during the Recession, reducing opportunities for middle-wage jobs and widening gaps between workers with different educational credentials (26).

In short, Indiana—the heartland of America—is an ideal place to examine the societal fault lines of pandemic precarity, and the reproduction and widening of social inequalities. We do so using the state representative Person to Person Health Interview Study (P2P) (27), which employs a probability sampling frame and interviewer administration. As COVID-19 hit the United States, the study pivoted toward a follow-up wave assessing effects of the pandemic, resulting in panel data collected in the year before the pandemic and during the height of the first wave of stay-at-home orders.

Data and Research Design

The P2P is a face-to-face omnibus survey designed to study multilevel factors that shape health, using a stratified probability sample of households across the state of Indiana. Baseline P2P data were collected primarily in the year prior to the pandemic (October 23, 2018 to March 3, 2020). All respondents who agreed to future contact were recruited from the P2P sample between March 28 and May 31, 2020, to assess social, psychological, and economic outcomes of the pandemic ($n = 1,026$; response rate = 69%). We focus our analytical sample on respondents who answered all questions included in our models ($n = 994$). These data avoid the limitations of surveys using convenience samples or respondent panels, which are vulnerable to response and selection bias, particularly limiting inclusion of people with lower incomes, those with less education, and those living in rural communities (28–32).

The COVID-19 follow-up wave was conducted during stay-at-home orders in Indiana in April and May 2020. At this point, the daily COVID-19 case count in Indiana was lower than it would be in the late summer or early fall, but daily deaths were high (*SI Appendix*, Table S1). Moreover, unemployment in Indiana reached its peak during data collection (around 14%). Over the course of 2020, transmission would spread from largely urban areas into more rural counties. However, comparing May and October, trends in daily case, death, and unemployment rates for rural versus urban counties were similar, with rural counties experiencing lower rates than urban counties in both May and October (*SI Appendix*, Figs. S1–S3). Overall, we expect unemployment to be at its peak during the snapshot provided by these data, although economic and material insecurity may have been offset by savings, Economic Impact Payments, and supplemental unemployment payments that likely had short-term protective effects. However, despite changes in patterns of viral transmission in urban and rural areas, patterns of inequality are likely to have remained relatively stable, even if the magnitude of economic impact improved over the course of the pandemic.

Key outcome markers include four subjective and objective markers of financial strain. The first three measure respondents' reported level of housing insecurity, food insecurity, and general financial insecurity attributed to the COVID-19 pandemic. An additional outcome measures self-reported job loss or inability to find a job due to COVID-19. The association of these outcomes with categorical measures of race and ethnicity (Black, Latinx, White, and other), education (bachelors or higher, some college, high school, and less than high school), gender, age, and rurality are examined. Financial insecurity prior to the pandemic using measures of employment status and food or housing insecurity reported in the baseline is controlled. Multivariate models used to estimate effects include the predictors described above and use the same analysis sample ($n = 994$). All estimates are adjusted with poststratification weights to account for minor differences between the P2P's sample and that of Indiana, and are adjusted for clustering at the county level.

Results

Table 1 indicates that 10% of respondents attributed being laid off and/or unable to find a job in April or May of 2020 to the COVID-19 pandemic. Additionally, 11% reported being worried about having a place to live, and 27% worried about their ability to buy food due to the pandemic. About 55% indicated the pandemic made them worry about their finances in general. Rates of unemployment in the year prior to COVID-19 (4%) matched national averages during 2019, and about 24% reported being food or housing insecure, suggesting substantial economic vulnerability even before the pandemic.

Fig. 1 reports the unadjusted percentage of respondents from each racial and educational group that reported agreement or strong agreement with measures of economic precarity. Overall, Black respondents had significantly ($P < 0.05$; sample-weighted Student's t test) higher rates of economic precarity for all but one outcome (housing insecurity).* Particularly striking is the rate of pandemic-related food insecurity among Black respondents (55%), which is 134% higher than the rate among Whites (24%) and 308% higher than the rate in Indiana in 2019, prior to the pandemic (14%) (33). A higher percentage of Latinx individuals experienced economic precarity than did Whites for all economic indicators, but most differences were not statistically significant. Individuals categorized as "other race" had similar rates of economic precarity to Whites across outcomes. Education had a large and relatively linear negative association with economic precarity. Compared to those with at least a bachelor's degree, individuals with less than a high school education reported significantly higher rates of economic precarity across every outcome, whereas individuals with a high school diploma and some college tended to have economic precarity that falls between those with less than a high school education and those with a bachelor's degree.

Parameter estimates for all multivariate models provided in Fig. 2 report log odds, where values above zero indicate factors associated with increased pandemic-related economic precarity and those below zero indicate factors negatively associated (gray bars denote nonsignificance; full tables are available in *SI Appendix*, Tables S2–S5). Findings indicate that controlling for potential confounding effects, including statuses prior to COVID-19, had little effect on disparities in pandemic precarity reported above. Black individuals, compared to other race/ethnic groups, reported significantly higher levels of both food and financial insecurity ($b = 1.23$ and 0.50, respectively), as well as a greater likelihood of being fired or unemployed ($b = 0.61$) due to the pandemic. Individuals with less than a bachelor's degree reported significantly higher odds of enduring all indicators of economic precarity. Women reported significantly higher rates of housing insecurity ($b = 0.26$) and financial insecurity ($b = 0.38$) than men. Age also had a negative association with food insecurity ($b = -0.17$), with financial insecurity ($b = -0.29$), and with being fired or unemployed ($b = -0.85$) due to the pandemic. Living in a rural (i.e., nonmetropolitan) county was largely unrelated to economic precarity, with the exception that rural residents were significantly less likely to report general financial worry than those in more metropolitan counties.

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*We also examined patterns of inequality with a financial strain index, which combines multiple dimensions of economic insecurity (food, housing, and general). These findings demonstrate that younger respondents, women, Black respondents (relative to Whites), and those with less than a college degree are significantly more likely to experience multiple dimensions of economic inequality (*SI Appendix*, Fig. S4)

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Table 1. Pandemic precarity and sociodemographic statistics (n = 994)

Variable	Sample	Indiana	United States
Pandemic caused			
Housing insecurity	0.11		
Food insecurity	0.27		
Financial insecurity	0.55		
Fired/unemployed	0.10		
Prior to pandemic			
Unemployed	0.04	0.03	0.04
Food/housing Insecurity	0.24		
Age	45.77	46.16	46.36
Female	0.51	0.51	0.51
Race			
Black	0.09	0.09	0.13
Latino	0.05	0.07	0.19
Other	0.05	0.04	0.08
White	0.81	0.79	0.60
Education			
Less than high school	0.06	0.11	0.12
High school	0.24	0.34	0.27
Some college	0.40	0.39	0.41
Bachelors	0.29	0.17	0.19
Rural	0.21	0.28	0.20

Means in Indiana and United States provided for variables that have identical coding in the Census to those in the P2P. Sample means and SDs are estimated with survey weights. Economic precarity variables are dichotomized into 1 = agreed or strongly agreed and 0 = disagreed or strongly disagreed. Pre-COVID variables were collected between 23 October 2018 and 21 March 2020, with middle 90% observations recorded between 25 January 2019 and 27 February 2020.

Estimates of pre−COVID-19 food and housing insecurity were positively associated with most indicators of pandemic-driven economic precarity, including housing insecurity ($b = 0.63$), food insecurity ($b = 1.03$), and general financial insecurity ($b = 0.78$). Unemployment status prior to COVID-19 was significantly associated with having recently been fired or unemployed due to COVID-19 ($b = 1.47$). This suggests that the pandemic has disproportionately threatened the economic security of those already vulnerable and disadvantaged.

Discussion

Disadvantaged social statuses have left many Americans at greater risk for poor health and health care outcomes from the COVID-19 pandemic (1–4). Here, we show that many of the same groups who are most vulnerable to infection, hospitalization, and mortality are also experiencing disproportionate economic collateral damage. Even taking into account prepandemic variation in unemployment and material insecurity, women, young adults, Black adults, and individuals with lower levels of education have become more economically vulnerable across a range of outcomes during the pandemic in Indiana. In sum, disparities in pandemic precarity not only reflect the axes of inequality that characterize American society, they are reinforcing and exacerbating them.

Our research is restricted to one state. Although Indiana is typical "Middle America" [e.g., it ranks 10th nationally on an index of "representativeness" based on demographic, economic, religious, public opinion, and education characteristics (34)], there are clearly important limits to generalization.[†] Neither can

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[†]Regarding the pandemic, the COVID-19 test positive rate (1,431/100,000) in Indiana was similar to the median for the country as a whole (Utah at 1,696/100,000) during the time of data collection (55). Most notably, Indiana has a substantially lower proportion of Latinx residents than the United States as a whole (56).
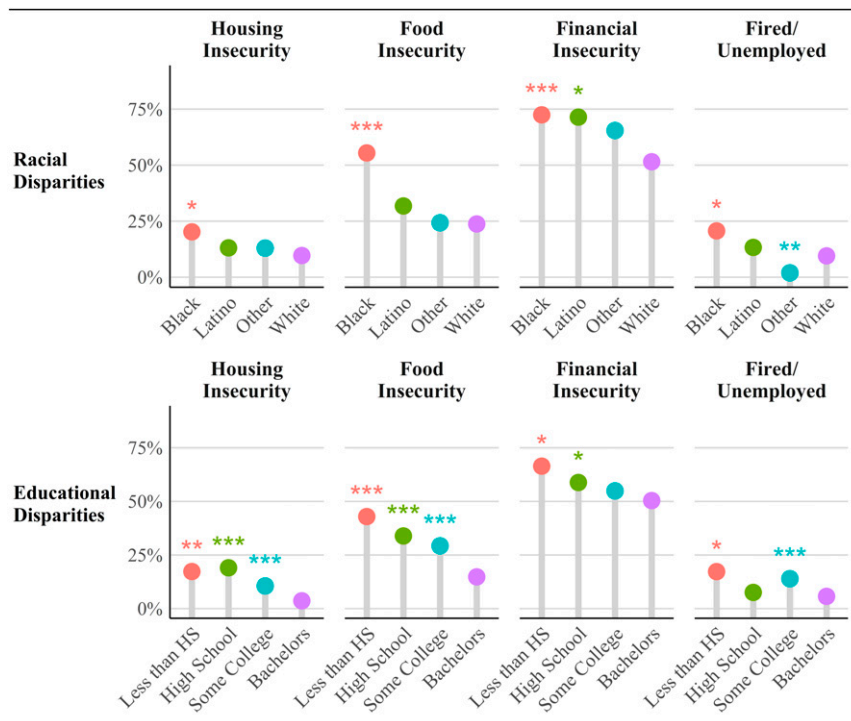
we document medium- and longer-term economic effects of the pandemic, which may differ due to the timing of financial relief through economic impact payments, supplemental unemployment benefits, and changing unemployment rates. However, we do have rare precrisis data on a representative sample of adults, combined with information about how those same individuals fared early in the COVID-19 pandemic (8).

What these findings from Indiana reveal, with important but minor nuances, is the same story observed during and following Hurricane Katrina (8, 10), the Chicago Heatwave (9), the Buffalo Creek Flood (11), and, most recently, the Great Recession (12, 22, 23, 35). Those in socially and economically marginalized groups and communities are more vulnerable to the impact of a disaster than their advantaged counterparts, and the damage extends beyond that expected by the nature of the crisis (36). If the pandemic recovery mirrors past trends, these same communities will also be much slower to rebound, due to a preexisting lack of social and economic capital compounded by an unequal flow of relief funds and recovery programs (37). Like these other cases examined through a sociological lens, the COVID-19 pandemic exposes patterns of marginality that leave some individuals and families existing in a state of permanent emergency—continually exposed to hardship, unable to protect themselves in crisis, and less resilient to major setbacks.

The COVID-19 pandemic is sometimes described as an anomalous "perfect storm" (38). In suggesting that such events stand outside the human capacity for prevention and intervention, this social construction minimizes the pressure for institutional social change (39). In contrast, in the context of other recent disasters, our findings suggest that the COVID-19 pandemic and its aftermath are a result of common, pervasive, and well-recognized human action and inaction. Applying the sociological lens to patterns of human response to disasters takes this argument one step further. Disasters are exogenous shocks to social systems that reveal enduring failings and inequities (8). They expose groups that are vulnerable due to prejudice, discrimination, and neglect. While the exact racial, gender, ethnic, or otherwise socially categorized groups may change by place or over time, those who are "categorically unequal" will disproportionately bear the burden of natural and unnatural disasters (40). And, as Charles Tilly (41) described, unless the social organization of tacitly or forcefully agreed upon social relations change, the inequities that accompany those statuses will be "durable."

Documenting similarities across disasters is critical. If unique disasters have similar effects, then specifically tailored recommendations for health and health care inequities in the face of crises are likely to be of little use in protecting vulnerable individuals in the next disaster, whatever its nature. Further, self-protective responses by individuals (42) (e.g., reducing spending, working extra hours, delaying retirement, and anticipating greater household debt) are unlikely to be successful long term or to redress persistent societal problems that shape risk for the next crisis. Instead, they are likely to have boomerang effects on inequality and on health, accumulating in greater material deprivation and poorer life chances (43–45). And, with climate change leading to cumulating disasters, the Matthew Effect, where the rich get richer and the poor get poorer, will compound widening socioeconomic disparities (35).

Investing in reducing wealth inequality will improve economic mobility, mental and physical health, and quality of life. Wealth allows individuals and families to move to safer neighborhoods, invest in their children's future success, and save for retirement (46, 47). Effects go well beyond the current adult generation, as demographic research has now convincingly documented the influence of the "long arm of childhood" on life chances (48). As some advocate rebuilding the public health infrastructure to

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Fig. 1. Racial and educational disparities in COVID-19 precarity, P2P ($n = 994$). Sample means are estimated with survey weights. Stars represent statistical significance at $*P < 0.05$, $**P < 0.01$, and $***P < 0.001$ via sample-weighted t tests, with racial reference = White and educational reference = bachelors. Economic precarity variables dichotomized into 1 = agreed or strongly agreed and 0 = disagreed or strongly disagreed.

confront the COVID-19 pandemic (39), rebuilding other social structures will translate into less damage in the face of crises, not only for disadvantaged groups but for all members of a society. This may require a pervasive and lasting shift in attitudes toward the role of organizations, institutions, government, and the poor, one that had yet to materialize in the US population's cultural response to the Great Recession (49).

In the short term, the government should maintain supplemental unemployment benefits, provide additional economic impact payments, expand educational opportunities and government training programs for the unemployed, and pass temporary federal eviction and tax relief laws. In the long term, public social expenditures and initiatives that reduce the wealth gap and strengthen the social safety net will, in turn, improve economic preparedness for disasters. These include 1) developing more generous federal standards for unemployment benefits, 2) implementing universal paid family leave, 3) expanding affordable federal housing, 4) offering a free federal savings plan to all Americans, 5) universal preschool, and 6) raising the minimum wage to increase wealth at the bottom of the socioeconomic distribution (50, 51).

Materials and Methods

Sample and Data. This research uses data drawn from the P2P—a stratified probability sample of households in Indiana with an oversample of economically depressed, rural counties. Sampling, recruitment, and survey methodology were developed in collaboration with the National Opinion Research Center, and match the gold standard General Social Survey (52). Data were collected face-to-face by professional interviewers employed by the Indiana University (IU) Center for Survey Research, and respondents were paid up to $125 for participation. The P2P was in the field from October 2018 to March 2020, with 90% of observations collected between January 2019 and February 2020. A total of 1,677 individuals completed the P2P study (wave 1), and 1,579 of these consented to be contacted for future studies.

All P2P respondents who consented to future contact were eligible for the COVID-19 rapid response follow-up (wave 2). Data collection began on March 28 and was completed on May 31, 2020, during the height of the first

wave of the pandemic in Indiana. Eligible participants were contacted through postal mail and email to invite participation. They were then recruited and consented into the study by phone. Data were collected by trained interviewers at the IU Center for Survey Research using computer-assisted telephone interviewing software. Participants received a $20 gift card for participating. A total of 1,026 eligible P2P respondents took part in the follow-up (response rate 69%). Most attrition was due to inability to reach a respondent by phone after multiple contact attempts and voice messages. The study was approved by the Institutional Review Board at IU (#1803431862 and #2003938142). Additional information about the study can be found at https://precisionhealth.iu.edu/get-involved/person-to-person.html.

Housing insecurity, food insecurity, and general financial insecurity were measured in wave 2 by asking respondents the extent to which they agreed that COVID-19 has made them worry that they "may not have a place to live," that they "may not have enough money to buy food," and "about their finances, in general" (0 = strongly disagree, 1 = disagree, 2 = agree, and 3 = strongly agree). Finally, we assessed whether respondents indicated that they had been fired because of COVID-19 or had been unable to find a job since COVID-19 (0 = disagree, 1 = agree).

To determine differences in financial strain by race following the COVID-19 pandemic, we measured four dichotomous race variables: White, Black, Latino, and other. We estimated educational disparities in financial strain with four dichotomous measures of respondents' educational attainment: bachelors or higher, some college, high school, and less than high school. To test whether the COVID-19 pandemic has affected the financial stability of age groups differently, we included a continuous indicator for respondents' age (in years, standardized and centered for all analytic models). We tested for gender disparities in financial strain with a variable for respondent sex (female). Rurality was measured at the county level using Indiana Office of Management and Budget designations of rural and urban. Alternative measures that are more fine-grained were explored at the county and ZIP code level, including Rural-Urban Continuum Codes, Rural-Urban Commuting Areas, and population density, but none significantly predicted economic outcomes. Finally, we controlled for respondents' financial strain prior to the COVID-19 pandemic, with two dichotomous variables from the previous wave of the P2P survey: respondents' unemployment status (0 = employed, 1 = unemployed) and whether respondents had stated that they had ever not had enough money to pay for food or shelter during the past 6 mo (0 = never, 1 = rarely, sometimes, or often).
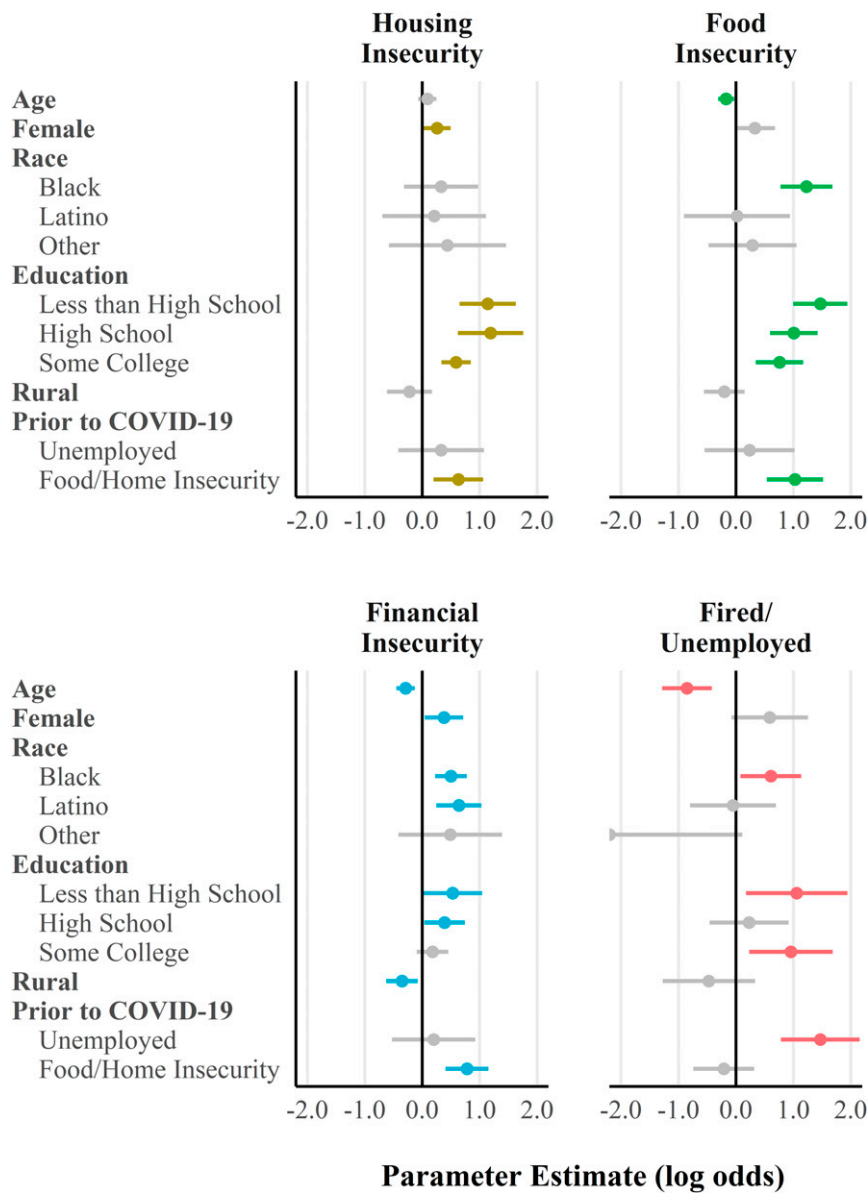
Fig. 2. Adjusted parameter estimates for disparities in COVID-19 precarity, P2P (*n* = 994). Tables of models with parameters for intercepts are provided in *SI Appendix*, Tables S2–S5. Dots represent parameter estimates, and lines represent 95% CI. Colored dots indicate statistically significant parameter estimates; gray dots indicate nonsignificant parameter estimates. All models are estimated with ordinal logistic regression, with the exception of Fired/Unemployed, which is estimated with logistic regression. Models are adjusted by sample weights and SEs clustered by shared county. Race reference category = White. Education reference category = bachelors.

Methods. We used descriptive statistics and survey-weighted Student's *t* tests to examine socioeconomic differences in each outcome included in the analysis, focusing on racial and educational differences in financial strain during the COVID-19 pandemic. We used a series of multivariate regression models to estimate how our different sociodemographic factors work in tandem to lead to financial disparities resulting from the COVID-19 pandemic. Specifically, we used ordinal logistic regression models for categorical outcomes (housing insecurity, food insecurity, financial insecurity, get help—services, get help—finances, and get help—food) and logistic regression for binomial outcomes (fired/unemployed). Each model only differs in its outcome; all models include the same set of predictors and the same sample of respondents.

Since Indiana is predominantly white, the P2P oversampled racial and ethnic minorities to provide more robust information about people from minority groups. To ensure that our analyses are representative of individuals across the state of Indiana, we applied poststratification weights to all analyses. We weighted respondents to match the proportion of people in Indiana within their given age group (ages [in years] 15 to 24, 25 to 34 35 to 44, 45 to 54, 55 to 64, and 65+), sex (male and female), and racial group (White, Black, Latino, and other). For example, the sum of our weights for respondents who are Latino men aged 15 y to 24 y was identical to the proportion of Indiana residents that are Latino men aged 15 y to 24 y. In univariate statistical analyses, these weights were multiplied by each observed value prior to aggregation. In regression analyses, the weights were treated as sample weights that alter the extent to which each data point influences the fitting criterion. Observations with smaller weight had less impact on the final parameter estimates than observations with larger weights. However, as a robustness check, we ran all models without survey weights, and arrived at substantively similar results. The demographic characteristics of the weighted P2P sample are similar to Indiana as a whole.

To address clustering at the county level, we used cluster-robust SEs. Many of our outcomes may be correlated with county-level information. However, county effects were too small to achieve convergence using a random effects modeling strategy. Since failing to control for intragroup correlation in error terms can lead to misleadingly small estimations of SEs, we used cluster-robust SEs with the sandwich estimator by shared county. Cluster-robust

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SEs by shared county allow for intragroup correlation in our parameter estimates while still assuming no correlation in SEs across counties (53). If we parameterize a typical ordinary least squares (OLS) regression as

$$y_i = \beta x_i + u_i,$$

where i denotes the ith individual in a sample and $E[u_i] = 0$, then an OLS model with robust clustered SEs could be formalized as

$$y_{ig} = x_{ig}'\beta + u_{ig},$$

where g denotes the gth cluster in the sample (54). Cluster-robust SEs are one of the most common methods for accounting for shared geography among members of a sample.

Data Sharing Plan. The P2P dataset includes identifying information, biological specimens, and protected health information. Although the final dataset will be stripped of identifiers prior to release for sharing, there remains the possibility of deductive disclosure of participants. Thus, we will make the data and associated documentation available to users by request and under a data-sharing agreement. This agreement provides for a commitment 1) to use the data only for research purposes, 2) not to attempt to identify any participant, 3) to appropriately secure the data, and 4) to destroying or returning the data after analyses are completed.

Data Availability. Study data are available by request and under a data-sharing agreement. Replication code can be accessed in Harvard Dataverse at https://doi.org/10.7910/DVN/5LZ09Y (27).

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