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Original Contribution

Do Generous Unemployment Benefit Programs Reduce Suicide Rates? A State Fixed-Effect Analysis Covering 1968–2008

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The recent economic recession has led to increases in suicide, but whether US state unemployment insurance programs ameliorate this association has not been examined. Exploiting US state variations in the generosity of benefit programs between 1968 and 2008, we tested the hypothesis that more generous unemployment benefit programs reduce the impact of economic downturns on suicide. Using state linear fixed-effect models, we found a negative additive interaction between unemployment rates and benefits among the US working-age (20–64 years) population ($\beta = -0.57$, 95% confidence interval: −0.86, −0.27; $P < 0.001$). The finding of a negative additive interaction was robust across multiple model specifications. Our results suggest that the impact of unemployment rates on suicide is offset by the presence of generous state unemployment benefit programs, though estimated effects are small in magnitude.

recession; social epidemiology; suicide; unemployment; unemployment benefits

Abbreviations: CI, confidence interval; ICD, *International Classification of Diseases*.

Editor's note: *An invited commentary on this article appears on page 53, and the authors' response appears on page 56.*

Previous studies have suggested that economic downturns are associated with increased suicide rates (1–4), particularly among working-age males (5, 6), who are at increased risk of job loss during recessions (7). An important question is whether unemployment insurance policies aimed at mitigating the financial hardship associated with job loss reduce the number of suicides associated with rising unemployment rates (8). During the recent US recession, family incomes fell 40% on average for long-term unemployed workers, and slightly more than a quarter of unemployed workers experienced economic hardship after job loss. It is estimated that income would have fallen even more without the protection afforded by unemployment insurance, which replaced 43% of lost earnings for long-term unemployed workers claiming benefits (9). While research has documented an increase in suicide when the economy worsens (2–4, 10–14), no studies have examined the potentially offsetting impact of unemployment benefit programs in the United States.

Unemployment benefit programs could be expected to protect against suicide risk through a number of potential pathways. First, benefits may mitigate the impact of individual job loss on suicide risk by providing a social safety net for the unemployed and their families, which may be reflected in lower overall suicide rates during recessions when placed in the context of generous unemployment benefits. Second, the presence of unemployment benefit programs may provide comfort to the employed at risk of job loss, thereby reducing negative mental health effects associated with stress (15, 16).

Most previous studies linking unemployment benefit programs to health have focused only on the association between actual receipt of unemployment benefits and self-rated health among the unemployed. In general, these studies suggest that unemployed workers receiving benefits have better subjective health and mental health than unemployed workers who do not receive unemployment benefits (17–19). A potential caveat of these studies is the strong selection associated

Table 1. Suicide Rates, Unemployment Rates, and Maximum Unemployment Benefits in US States and the District of Columbia, 1968–2008

State	Age- and Sex-Standardized Suicide Rate per 100,000 Working-Age (20–64 Years) Adults			Unemployment Rate			Unemployment Benefit, 1999 US$		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Alabama	19.5	17.5	22.1	4.8	2.0	8.7	5,064	4,039	6,852
Alaska	23.0	9.1	35.4	7.6	5.1	11.6	8,855	6,689	11,671
Arizona	28.6	23.0	36.6	4.2	1.9	7.0	5,274	4,528	6,471
Arkansas	20.0	14.4	24.7	4.7	2.7	8.0	7,525	5,916	8,550
California	23.2	13.7	35.6	5.4	3.6	8.6	7,472	5,783	10,319
Colorado	28.6	21.0	35.4	4.0	1.3	8.4	8,490	7,591	9,582
Connecticut	14.2	8.7	19.6	4.2	0.6	8.1	11,646	9,244	14,340
Delaware	15.6	5.6	26.0	3.8	1.8	7.2	7,915	6,731	10,006
District of Columbia	8.8	0.0	22.4	5.1	2.0	10.2	10,634	7,086	14,955
Florida	24.6	19.4	30.2	4.0	1.0	6.6	6,456	4,722	7,716
Georgia	21.5	16.1	30.0	3.5	1.1	7.3	6,034	4,731	7,102
Hawaii	13.5	4.9	23.7	3.5	1.9	6.7	9,250	7,988	10,933
Idaho	24.5	16.0	33.2	5.2	2.4	9.7	7,226	6,829	7,862
Illinois	16.0	12.2	19.5	4.7	1.6	8.5	9,702	8,412	10,870
Indiana	20.0	15.9	23.4	4.4	1.5	9.4	6,907	5,337	8,863
Iowa	18.6	14.3	24.3	3.5	1.6	8.5	8,610	7,335	13,294
Kansas	19.9	15.7	23.9	3.3	1.1	5.7	7,681	7,090	8,508
Kentucky	21.9	17.7	25.0	4.8	2.7	9.9	6,884	5,533	8,675
Louisiana	20.6	16.4	26.5	4.9	2.1	9.4	6,981	5,144	10,087
Maine	19.4	9.7	26.9	4.8	2.5	7.9	9,241	8,201	10,401
Maryland	17.2	12.7	23.4	3.3	1.3	6.4	7,042	6,309	8,343
Massachusetts	13.5	9.1	17.0	4.6	1.9	9.3	16,604	12,868	21,708
Michigan	19.9	15.8	25.5	6.0	2.0	11.9	8,474	7,150	10,353
Minnesota	18.0	13.4	23.3	4.0	1.6	6.3	9,439	8,252	11,422
Mississippi	18.1	13.9	22.0	4.9	1.9	10.7	4,955	4,289	6,090
Missouri	21.2	17.8	25.5	4.0	0.9	7.1	5,695	4,567	6,873

Table continues

with claiming or being eligible for unemployment benefits. Eligibility to receive benefits, as well as the amount of benefits received, is determined on the basis of a worker's career, salary, and reason for job loss; each of these factors is plausibly an independent predictor of suicide. In addition, only about two-thirds of eligible workers claim benefits (9). As a result, unemployed workers receiving benefits are a selected sample differing in key characteristics from unemployed workers not receiving or ineligible for benefits. Using cross-country data from European countries, Stuckler et al. (2) examined whether national aggregate expenditures on unemployment cash benefits modified the impact of unemployment rates on suicide mortality, but they found no evidence of an effect. A potential problem with this approach is that aggregate spending on unemployment cash benefits reflects both program generosity and the number of unemployed persons in receipt of benefits. If unemployment cash benefits increase when the unemployment rate increases, an interaction will yield potentially biased estimates of the contribution of unemployment insurance benefits to reducing suicides associated with recessions.

Building on prior research (2, 17–19), we exploited the large variation in maximum allowable unemployment benefit laws over the past several decades across US states to investigate whether more generous benefit programs reduce the number of suicides associated with recessions. The Federal-State Unemployment Insurance Program, created by the Social Security Act of 1935, provides the states with autonomy to organize the program, provided that some conditions on coverage and eligibility are met. Although the dollar value of benefits received is individually determined, state laws define the maximum amount and duration of benefits that workers are entitled to receive after job loss (20). Importantly, changes in state laws are presumably uncorrelated with state suicide rates, demographic profiles, or other state characteristics. Prior research also suggests that changes in unemployment benefit policy are unrelated to changes in other state programs (21). While our approach did not enable us to

Table 1. Continued

State	Age- and Sex-Standardized Suicide Rate per 100,000 Working-Age (20–64 Years) Adults			Unemployment Rate			Unemployment Benefit, 1999 US$		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Montana	26.6	15.3	37.2	5.2	1.6	8.4	7,066	6,351	8,690
Nebraska	16.9	11.7	24.9	2.7	0.6	4.9	5,523	4,617	6,604
Nevada	36.5	25.9	49.4	4.7	1.8	8.4	6,994	6,466	7,774
New Hampshire	17.5	8.4	27.0	3.7	0.8	7.9	6,806	5,569	8,956
New Jersey	12.0	9.6	14.7	4.8	2.2	9.2	9,274	6,910	11,706
New Mexico	30.5	23.7	40.7	4.9	2.5	8.5	6,655	5,868	9,511
New York	12.9	9.7	16.7	4.9	2.0	7.8	8,157	5,610	10,183
North Carolina	20.9	17.3	25.1	3.8	1.9	7.8	8,258	6,218	9,823
North Dakota	14.3	2.7	23.0	3.7	1.8	5.9	7,300	6,535	8,220
Ohio	19.6	15.2	23.6	4.6	2.1	8.9	10,046	7,369	12,555
Oklahoma	22.6	17.8	26.8	3.7	0.8	7.7	7,383	6,471	8,841
Oregon	24.9	20.4	29.0	5.8	2.9	10.2	8,338	6,099	9,786
Pennsylvania	19.1	16.7	21.0	4.7	2.0	7.5	10,510	6,734	12,453
Rhode Island	11.9	1.4	25.7	5.1	2.3	9.5	10,823	7,768	13,399
South Carolina	19.5	16.2	23.0	4.1	1.2	8.0	6,152	4,940	7,934
South Dakota	17.2	2.0	26.2	3.1	0.9	5.2	5,601	4,641	6,862
Tennessee	22.0	19.4	24.4	4.3	2.2	8.3	5,805	4,830	6,790
Texas	21.1	16.8	24.9	3.8	1.6	7.2	6,992	4,796	8,023
Utah	24.5	20.1	30.5	3.4	1.1	6.3	8,577	7,221	11,777
Vermont	17.8	0.0	32.8	3.9	1.8	6.5	6,902	5,876	8,550
Virginia	21.9	17.0	28.8	2.8	1.4	4.2	6,698	5,854	7,862
Washington	23.1	18.4	28.3	5.5	2.8	9.7	10,586	8,824	14,002
West Virginia	20.2	15.6	24.7	6.1	1.7	13.1	8,613	5,784	11,000
Wisconsin	20.4	17.0	24.4	4.6	2.5	7.6	8,671	7,285	12,618
Wyoming	24.4	7.7	42.8	3.8	1.7	7.8	7,203	6,172	8,090
Total	20.2	0.0	49.4	4.4	0.6	13.1	7,991	4,039	21,708

identify the direct effect of benefits on the unemployed, it allowed us to estimate whether the impact of recessions on suicide is offset by increased unemployment benefit generosity. Following other studies that have examined the link between mortality rates and labor market conditions, we also investigated whether there were heterogeneous effects by age group and sex.

METHODS

Data

Data on maximum unemployment insurance benefits were obtained from the Employment and Training Administration of the US Department of Labor (22). Maximum benefits were disaggregated by the maximum allowable amount per week (in US dollars) and the maximum number of weeks for which workers were entitled to receive benefits. These two values were multiplied to obtain the total allowable benefit in a given year. All amounts were adjusted to US constant dollars using the Consumer Price Index for All Urban Consumers, obtained from the Bureau of Labor Statistics. We used the natural log of benefit levels to calculate the effect of a proportional increase in maximum benefit levels.

State suicide deaths and population counts came from the Compressed Mortality Files collected by the Centers for Disease Control and Prevention (23). Data contained the number of suicide deaths by state, year, sex, and age group (20–24, 25–34, 35–44, 45–54, and 55–64 years). Suicide was defined on the basis of *International Classification of Diseases* (ICD) codes for suicide and self-inflicted injury (codes E950–E959; Eighth and Ninth revisions of the ICD) for 1968–1998 and intentional self-harm (codes X60–X84; Tenth revision of the ICD) for 1999–2008. The sample comprised 14,557 state-year-age-sex observations, covering 798,600 deaths that occurred from 1968 to 2008.

State unemployment rates were calculated on the basis of the March Supplement of the Current Population Survey, accessed through the Current Population Survey Integrated Public Use Microdata Series (24). For each state and year, we estimated the sex-specific proportion of persons aged 30–64 years in the labor force who reported being unemployed.

We used the unemployment rate at these ages as an overall indicator of economic conditions for the working-age population in every state. For each state and year, we also obtained data from the Current Population Survey March Supplement on 1) average real state wages and salaries, adjusted to US constant dollars using the Consumer Price Index for All Urban Consumers, and 2) the state-specific distribution of the population's educational attainment. Additionally controlling for state-specific race/ethnicity distributions did not change estimates because there was little change over time in racial/ethnic composition within states, so this variable was not included in the final models.

Methods of analysis

Researchers have emphasized that measuring effects on the additive scale is most appropriate for assessing the public health relevance of an exposure (25, 26). Therefore, we modeled the absolute suicide mortality rate in a linear ordinary least-squares model. We chose this approach because multiplicative models, such as Poisson or log-linear models, impose the assumption that effects of changes in unemployment rates and benefits are a function of the underlying suicide rate in a community. Therefore, in a community with a high background suicide rate, multiplicative relationships would imply that increases in unemployment would have larger absolute effects on the number of suicides than they would in a community with a low background suicide rate. In contrast, additive models allow for the possibility that a certain number of persons in the population commit suicide when unemployment rates increase—regardless of the background suicide rate in the community—and that among these persons who become suicidal in the context of higher unemployment rates, some are protected by generous unemployment benefits. In supplementary models, we also implemented a negative binomial model with the number of deaths as the outcome variable and the log of number of persons as the offset variable to test for a multiplicative interaction. We chose a negative binomial model over a regular Poisson model to account for overdispersion.

The basic model has the following generic form:

$$D_{jtas} = \alpha_t + U_{jts}\beta + \mathrm{UB}_{jt}\delta + \boldsymbol{X}_{jt}\theta + U \times \mathrm{UB}_{jt}\omega + \boldsymbol{S}_j + \boldsymbol{T}_t + \boldsymbol{S}_j \times \boldsymbol{T}_t + \varepsilon_{jtas},$$

where D is the mortality rate for state j in year t, stratified by age a and sex s; U is the sex-specific state unemployment rate; α is the year-specific intercept; UB is the maximum state unemployment benefit for a given year; $\boldsymbol{X}$ is a vector of controls; S is a state fixed effect; $\boldsymbol{S} \times \boldsymbol{T}$ is a vector of state-specific linear time trends; and ε is the regression error term. State fixed effects control for all time-invariant differences across states and use only within-state variation over time to identify the impact of unemployment and benefits on suicide. Year fixed effects control for factors affecting trends in suicide at the national level. State-specific linear terms control for state-specific factors that linearly affect state trends. $\boldsymbol{X}$ is a vector of controls including age, sex, cohort population size, the log of average state wages and salaries, and the percentage of the population with a college degree.

Our key estimate of interest is $U \times \mathrm{UB}$, which assesses the interaction between unemployment rates and unemployment benefits. We assessed the interaction between these variables to test whether larger maximum unemployment benefits offset the impact of an economic downturn—proxied by an increase in the state unemployment rate—on suicide. In stratified models, we also investigated whether effects of unemployment rates and benefits differed by age and sex. All models were based on robust standard errors clustered at the state level.

RESULTS

Trends in suicide rates and the generosity of unemployment benefits varied considerably across US states (Table 1). Nevada had the highest suicide rate (36.5 deaths per 100,000 population), while the suicide rate was lowest in the District of Columbia (8.8 per 100,000). Massachusetts has historically provided the highest maximum unemployment benefits, while Mississippi has had the lowest average benefits.

Figure 1 shows age- and sex-standardized suicide rates plotted against state unemployment rates, separately for states and years above (≥$7,990; solid line) and below (<$7,990; dotted line) the mean level of benefits across all states and years ($7,990 in US constant dollars). Total suicide rates increased as unemployment rates rose. However, the positive association between unemployment rates and suicide was greater for states and years with maximum unemployment benefits below the sample mean than for states and years with more generous unemployment benefits.

Table 2 shows results from the linear additive models (full model estimates are shown in Web Table 1, available at http://aje.oxfordjournals.org/). Controlling for all confounders, a 1-percentage-point increase in the state unemployment rate was associated with 0.16 (95% confidence interval (CI): 0.08, 0.24) more suicide deaths per 100,000 population (model 1, Table 2). Incorporating both unemployment rates and benefits (model 2), the effect of maximum unemployment benefits was null ($\beta = -0.10$, 95% CI: −1.62, 1.42). Model 3 shows that there was a negative interaction between the state unemployment rate and maximum unemployment benefits ($\beta = -0.57$, 95% CI: −0.86, −0.27), suggesting that the impact of unemployment rates on suicide was offset by higher unemployment benefits. Again, the main effect of maximum unemployment benefits was null ($\beta = 0.20$, 95% CI: −1.31, 1.71). Alternative models including maximum benefits as a share of average state wages and salaries showed similar results. Despite the additive interaction, we found no evidence of a multiplicative interaction between unemployment rates and benefits in negative binomial models, as confidence intervals were wide and included the null (Web Table 1).

To better illustrate the findings in model 3, Figure 2 shows the number of additional suicides predicted by unemployment rates for scenarios in which unemployment benefits were above (≥$7,990) and below (<$7,990) the historical mean ($7,990 per person in US constant dollars). Higher unemployment rates predicted higher suicide rates, but this association was steeper when unemployment benefits were low.

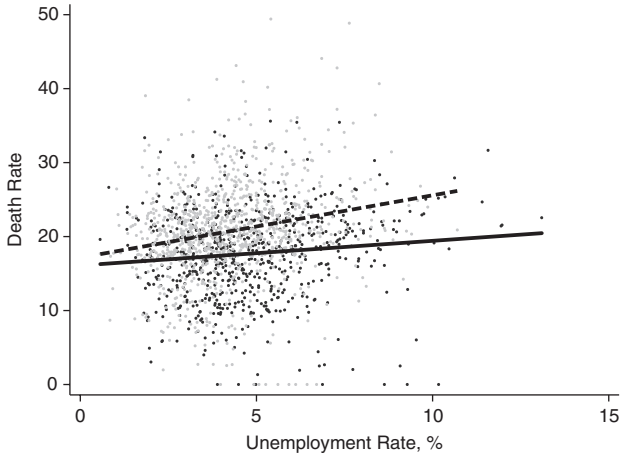

Figure 1. Age- and sex-standardized rates of suicide in the working-age (20–64 years) population (number of deaths per 100,000 working-age population) according to working-age unemployment rates, United States, 1968–2008. Black dots indicate state-years with high benefit levels; gray dots indicate state-years with low benefit levels. The solid line shows the line of best fit through state-years with high benefit levels; the dashed line shows the line of best fit through state-years with low benefit levels. High and low benefit levels are those above (≥$7,990) and below (<$7,990) the mean level ($7,990 per person in US constant dollars), respectively.

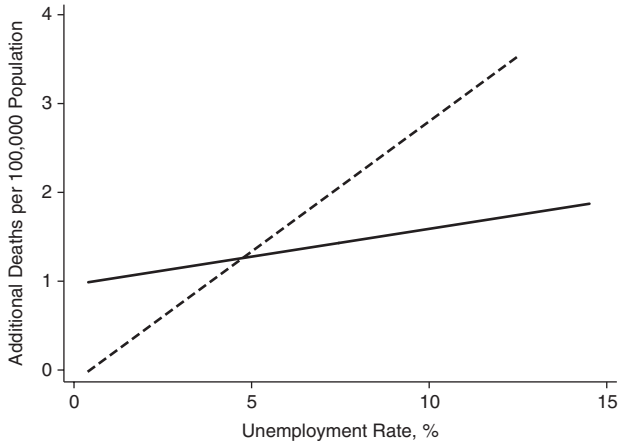

Figure 2. Predicted numbers of additional suicide deaths per 100,000 working-age (20–64 years) population found to be dependent on working-age unemployment rates and unemployment benefit generosity in an ordinary least-squares (model 3), United States, 1968–2008. Predicted values were based on working-age unemployment rates, unemployment benefit levels, and an interaction term. The solid line shows the predicted value for state-years with high benefit levels; the dashed line shows the predicted value for state-years with low benefit levels. High and low benefit levels are those above (≥$7,990) and below (<$7,990) the mean level ($7,990 per person in US constant dollars), respectively.

We next investigated whether the observed effects of unemployment benefit programs were consistent by sex and age group. Figure 3 shows the estimated interaction term from these stratified models; estimates for main effects of unemployment rates and benefits are shown in Web Figures 1 and 2. Although confidence intervals were wide in sex-specific models, the additive interaction term was negative for both men ($\beta = -0.22$; 95% CI: −0.51, 0.080) and women ($\beta = -0.13$; 95% CI: −0.28, 0.021); effects did not differ by sex. There was a negative interaction between unemployment rates and benefits among all age groups, such that the impact of unemployment rates on suicide was offset by larger unemployment benefits; estimates for persons aged 45–54 years were similar but confidence intervals were wider. Although unemployment benefits appeared to mitigate the impact of increased unemployment most markedly for persons aged 20–24 years, there were no clear differences across age groups.

Table 2. Estimated Impact of State Unemployment Rates and Unemployment Benefits on Suicide Rates per 100,000 Working-Age (20–64 Years) Adults (Fixed-Effects Models) in US States and the District of Columbia, 1968–2008[a]

	Ordinary Least-Squares Model					
	Model 1		Model 2		Model 3	
	β	95% CI	β	95% CI	β	95% CI
Unemployment rate	0.16	0.08, 0.24	0.16	0.08, 0.24	0.18	0.10, 0.26
Maximum unemployment benefit[b]			−0.10	−1.62, 1.42	0.20	−1.31, 1.71
Maximum unemployment benefit × unemployment rate					−0.57	−0.86, −0.27
Average real state wages and salaries[b]	−0.50	−2.85, 1.84	−0.47	−2.87, 1.93	−0.52	−2.93, 1.89

Abbreviation: CI, confidence interval.

[a] All models included state fixed effects, year fixed effects, state-specific linear trends, age cohort, sex cohort, the log of population size, and the percentage of the population that had graduated from college. Unemployment rates and logged maximum unemployment benefits were centered by subtracting the mean values of 4.423 and 8.950, respectively.

[b] Logged 1999 dollars.

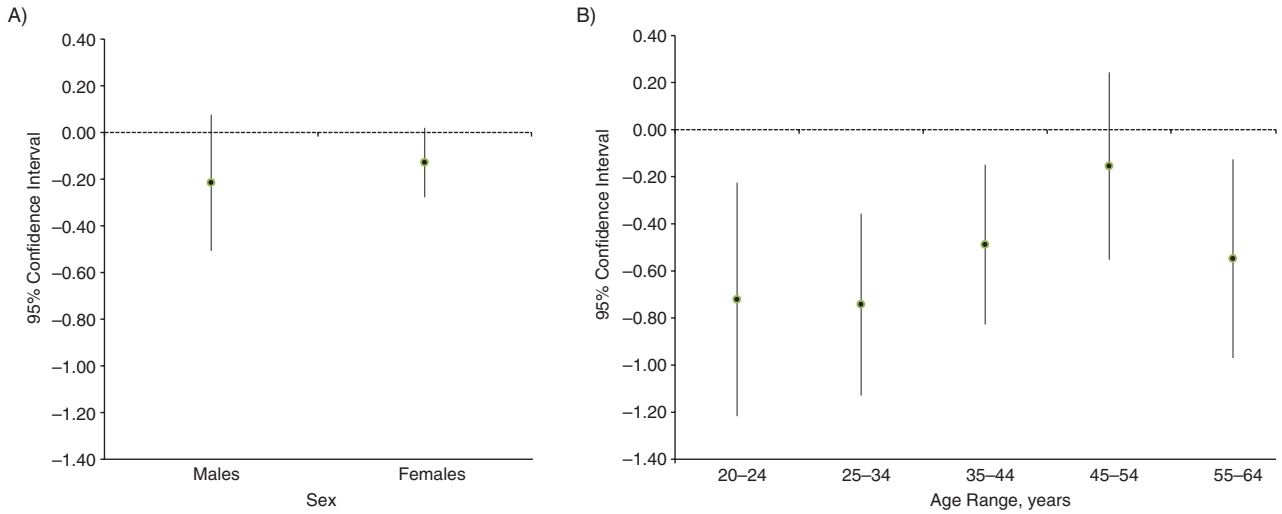

Figure 3. Estimated effect of the additive interaction between the unemployment rate and state unemployment benefits on suicide rates (number of deaths per 100,000 working-age (20–64 years) population), by sex (A) and age group (B), United States, 1968–2008. Vertical bars, 95% confidence intervals.

Robustness checks

We conducted several robustness checks to verify our results. Introducing state quadratic time trends in addition to or in place of linear time trends produced similar results; eliminating time trends altogether also did not materially affect the results. We also examined whether our results held when we allowed state and year fixed effects to be sex-specific and found that while the estimated effects are smaller in magnitude, the additive interaction remained negative ($P = 0.06$) (Web Table 2). To ensure that our models were robust to possible autocorrelation, we reran our analyses using Newey-West standard errors, which are used when the error structure is assumed to be heteroscedastic and possibly autocorrelated up to some lag point, which we set at 10 years. We also tested Prais-Winsten models, which use generalized least squares for estimation in linear regression models where the errors are serially correlated following a first-order autoregressive process. Lastly, we experimented with autoregressive models that included lagged dependent variables. In all instances, our results were consistent.

As a falsification test, we implemented the main models on neoplasm mortality rates instead of suicide rates, where we expected to observe no effects of unemployment and benefits (27). Accordingly, we found no effect of unemployment, unemployment benefits, or the interaction term on neoplasm mortality at accepted levels of statistical significance ($P < 0.05$) (Web Table 3). We experimented with an alternative model that included weekly unemployment benefit claims for each state instead of annual unemployment rates, to account for the fact that many unemployed workers are ineligible for benefits or do not claim benefits. Results did not differ notably from those based on the unemployment rate. Lastly, the number of suicides in some state-year-age-sex combinations was low, which may have led to imprecise results; thus, we refitted the models on the basis of aggregated age-standardized data at the state-year-sex level. We obtained similar results in all instances.

DISCUSSION

This analysis was motivated by recent studies suggesting that economic recessions increase the risk of suicide (2, 4, 10, 11). In previous research, Stuckler et al. (2) found no protective effect of unemployment benefit expenditures across European countries. Our study, based on data on program generosity rather than expenditure levels, suggested that unemployment benefit programs in the United States are associated with a reduced impact of economic downturns on suicide rates. We found no evidence of differential effects of unemployment benefits by age or sex.

While we found an additive interaction between unemployment rates and benefits, we found no multiplicative interaction using negative binomial models, since confidence intervals were wide. When main effects operate in the same direction, models that are less than additive must be much less than multiplicative, and they therefore also will reveal an interaction on a multiplicative scale. However, a subadditive interaction need not necessarily imply a submultiplicative interaction when the main effects operate in opposite directions, as with unemployment rates increasing suicide risk and unemployment benefits being expected to decrease suicide risk. In this instance, multiplicative models implied a risk that was closer to the null than the risk implied by an additive effects model. Similarly, we found evidence that the effects deviated from an additive scale, but they did not deviate significantly from a multiplicative scale. This finding is also consistent with our expectation that the effect of unemployment benefits does not vary with the baseline suicide rate. This illustrates the fact that unemployment rates themselves

account for only a small fraction of all suicides, with other factors (such as divorce rates, alcohol regulation, and gun laws) being potentially more important (28). The statistical power to detect a multiplicative interaction may also be lower than the power to detect an additive interaction.

Our results shed some light on the mechanisms linking unemployment rates to suicide. Theoretically plausible mechanisms linking economic conditions and unemployment to suicide include financial distress, stigma, social isolation, and reduced "meaning in life." We found that larger maximum cash unemployment benefits mitigate the impact of increasing unemployment on suicide rates. This interaction between unemployment rates and benefit generosity suggests that the increase in suicides during recessions may partially be due to income loss among the unemployed or fear of income loss among other groups during periods of economic uncertainty. Economic recessions have previously been linked to increased levels of job insecurity and psychological distress, even among persons who do not experience job loss (15, 16). Unemployment benefits may therefore protect against suicide by providing a social safety net for all workers at risk of unemployment and their families, mitigating the negative mental health effects of job insecurity.

Consistent with our results, previous evidence suggests that the association between unemployment and mortality may be modified by the institutional context (18, 29). For example, prior research suggests that higher expenditures in labor market programs mitigate the impact of economic downturns on mortality (2). Similarly, generous unemployment benefit levels might reduce the mental health effects of job stress and insecurity associated with economic downturns (8, 30).

Our analysis had a number of limitations. While our study suggested that unemployment benefit policy mitigates the effect of unemployment rates on suicide risk, it did not address the question of whether receiving unemployment benefits during individual spells of unemployment directly affects suicide risk. Additionally, while prior research found that changes to unemployment benefit programs are uncorrelated with changes in other policies (21) and despite the inclusion of many confounders, our estimates may partially pick up effects of other policies that covary with unemployment benefits on suicide rates. Policies such as gun legislation, mental health spending, or other income support programs could be hypothesized to also reduce suicide rates. Nevertheless, it is difficult to imagine that the timing of changes in these or other policies potentially associated with suicide would have systematically coincided with changes in unemployment benefit levels across different states. It is also unlikely that these policies would have an effect on suicide rates through their interaction with unemployment rates. Lastly, our models assumed that unemployment benefit policies are associated with suicide rates concurrently; it is possible that there are long-term effects of unemployment benefits that were not captured in our models.

Our findings suggest that generous unemployment insurance benefits reduce the impact of economic downturns. Unemployment benefit policies may provide comfort to persons who are prone to suicide during economic downturns, highlighting the potential mental health gains of expanding the generosity of benefits. Given the small magnitude of estimated effects, however, raising unemployment benefit levels would probably be an inefficient way to reduce the number of suicides. If benefits similarly influence more common but less severe mental health outcomes, such as depression, the public health impact may be important, but our data did not permit evaluation of other outcomes. Nonetheless, because unemployment benefit programs are not specifically designed to reduce suicide rates but rather to stabilize consumption of goods and services (31), the finding that they mitigate the mental health effects of recessions is evidence of a positive unintended consequence of unemployment benefit policies.

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