Supplemental Online Content

Berkowitz SA, Basu S. Unemployment insurance, health-related social needs, health care access, and mental health during the COVID-19 pandemic. *JAMA Intern Med*. Published online November 30, 2020. doi:10.1001/jamainternmed.2020.7048

eMethods.

eReferences.

This supplemental material has been provided by the authors to give readers additional information about their work.

eMethods.

Data source, study setting, and participants

In this repeated cross-section study, we used data from the US Census Bureau's Household Pulse Survey Public Use Files (https://www.census.gov/householdpulsedata). The Household Pulse survey is a collaboration between the "U.S. Census Bureau and the USDA Economic Research Service (ERS), the Bureau of Labor Statistics (BLS), the National Center for Health Statistics (NCHS), the National Center for Education Statistics (NCES), and the Department of Housing and Urban Development (HUD)."[1] The Pulse survey is a brief, internet-based survey, fielded in English and Spanish, designed to enable population estimates of the household experience during COVID-19 across the US.[1] Pulse was initially fielded over 12 weeks (April 23, 2020 to July 21, 2020). During the second 6 weeks (June 11 to July 21, 2020), a question about unemployment insurance benefits was added, so for this study we use data from this period. The Pulse Survey was designed to be fielded rapidly with minimal staff involvement. To obtain a large number of responses each week, survey invitations were sent to a very large number of potential respondents with less than usual follow-up. This design choice resulted in a survey with an anticipated response rate under 5%.[1] Inclusion criteria for this study include being a working age adult (defined as being born between 1955 and 2002, inclusive), and living in a household that experienced pandemic-related job loss that led to income disruption. Pandemic-related job loss was defined as meeting both of the following criteria: 1) report of experiencing a loss of employment income on or after March 13, 2020, and 2) having no regular earned income source in the 7 days preceding the survey (defined as the kind of income a respondent had pre-pandemic), to meet their spending needs. We selected these criteria as individuals in

households that had lost jobs but then restored a regular source of income by returning to work would not need UI. The Household Pulse Survey Instrument is publicly available at: https://www2.census.gov/programs-surveys/demo/technical-documentation/hhp/2020_COVID-19_Household_Pulse_Survey-Week-of-6_11_2020_English.pdf. The UNC IRB did not consider this human subjects research (Study Number: 20-2657).

Unemployment insurance benefits

We categorized as receiving UI those who reported using UI benefits to meet spending needs in the last 7 days, while those who did not report using UI were categorized as not receiving UI. Other sources of income to meet spending needs that respondents could report included "Credit cards or loans", "Money from savings or selling assets"; "Borrowing from friends or family"; "Stimulus (economic impact) payment"; and "Money saved from deferred or forgiven payments". As noted above, those who reported using a regular source of income similar to what was used pre-pandemic were considered not to be experiencing a pandemic-related income disruption, and were thus excluded.

Outcomes

We considered several outcomes relevant to the pathways between UI and short-term health impacts. For health-related social needs outcomes, we considered two outcomes related to food, and two related to housing. The first food outcome was food sufficiency. Survey respondents were asked a food sufficiency question that references themselves and others in their household derived from NHANES III, and food sufficiency is related to the

now more commonly used concept of food security.[2–4] As is standard, those who responded that they sometimes or often did not have enough to eat were considered to have food insufficiency.[4] The second food related outcome was whether the respondent was confident they would be able to afford needed food in the next 4 weeks, with those who were not at all confident or somewhat confident considered to be lacking confidence, and those who were moderately confident or very confident considered to have confidence. For housing outcomes, respondents who reported that they did not own a home free and clear (i.e., they were either paying off a mortgage or loan, or were renting), and who had not had their payment deferred, were categorized as either having or not having made last month's payment on time. The second housing outcome was whether the respondent was confident they would be able to make the next payment on time, with those who reported no or slight confidence categorized as lacking confidence, and those who reported moderate or high confidence categorized as having confidence. Respondents who reported they owned their home free and clear, and were thus not at risk for missing housing payments or worrying about housing payments were excluded from the analyses of the housing outcomes (but included in the other analyses).

Healthcare access outcome questions were asked in reference to the respondent. For healthcare access outcomes, we considered whether a respondent reported having any health insurance (employer-sponsored, individual, Medicare, Medicaid, TRICARE, Veterans Affairs, Indian Health Service, or other) versus not reporting any coverage. We further examined whether respondents reported delaying healthcare in the last 4 weeks. Finally, because coronavirus-related care could be offered via free public testing at the point of

service, we examined whether respondents reported delaying non-coronavirus healthcare, as that may have been more impacted by current financial resources.

Mental health outcome questions were asked in reference to the respondent. For mental health outcomes, we examined depressive and anxiety symptoms. Respondents were asked the Patient Health Questionnaire (PHQ) 2 for depressive symptoms and Generalized Anxiety Disorder (GAD) 2 questions for anxiety symptoms.[5,6] Scores range from 0 to 6 (more depressive or anxiety symptoms), and, in keeping with scoring recommendations, we used a cutpoint of ≥3 on both the PHQ2 and GAD2 to indicate potentially clinically significant symptoms.[5,6]

Covariates

We considered several covariates that may confound the association between receipt of UI benefits and health outcomes. These were: age (the Household Pulse survey releases respondent birth year data but not age, so we subtracted reported birth year from 2020 to create a proxy for age, which we refer to as age for convenience), gender (male or female), self-reported race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic Asian, and non-Hispanic other or multiracial), education (< high school diploma, high school diploma, > high school diploma), 2019 (i.e., pre-pandemic) annual household income category (less than $25,000, $25,000 - $34,999, $35,000 - $49,999, $50,000 - $74,999, $75,000 - $99,999, $100,000 - $149,999, $150,000 - $199,999, and $200,000 and above), marital status (married versus not), and household size. Because the impact of the pandemic was heterogeneous across states and time, we included variables for state of

residence (all 50 states plus the District of Columbia were included, which we refer to as states for convenience), and the week of survey administration.

Statistical analysis

The Household Pulse Survey contains person weights to produce nationally representative estimates, so these were used for all analyses. We first conducted descriptive statistics. Next, we examined unadjusted associations between receipt of UI benefits and study outcomes using chi-squared tests. Finally, we conducted regression analyses to examine adjusted associations between UI benefits and study outcomes. To estimate relative risks, rather than odds ratios, given common outcomes, we fit Log Poisson models with robust error variance.[8] The unit of analysis was the survey response for a given week, and participants could complete the survey on more than one week. For descriptive statistics and unadjusted analyses, we used a respondent's first survey response. For regression analyses, we included all survey responses, used generalized estimating equations with responses clustered at the respondent-level to account for repeated measures, and used robust variance estimation. Regression models included all of the above listed covariates for adjustment. In addition, for the two food outcomes, we also adjusted for past food sufficiency status (defined the same way current food sufficiency but referencing the period before March 13, 2020) as this was the one study outcome with a pre-pandemic version of the variable available.

Missingness for variables was generally low (< 5%) but for income missingness was 13.2%. Therefore, we used multiple imputation to address missing data. Inspection of the pattern of missing data suggested that data were likely to be missing at random as

missingness was correlated with other variables in the dataset (e.g., missing income was more common for respondents who reported lower educational attainment).[9] Therefore, we used Markov Chain Monte Carlo multiple imputation under a multivariate normal assumption to address this issue (PROC MI). We conducted adjusted analyses as described above in 10 imputed datasets (PROC GENMOD), and combined the results using PROC MIANALYZE. Most survey questions were asked to all respondents, so all exposures, outcomes, and covariates listed above, were included for imputation. The exception was the housing outcomes—these were purposely not asked to certain participants (e.g., those who did not have to make housing payments because they owned their home outright). Since this type of missingness was intentional in the survey design, we did not impute responses for housing outcomes. Because of repeated observations, models included 79032 observations, except for models examining missing a housing payment and lacking confidence in affording housing next month. Because those questions were not asked of individuals who owned their home free and clear (and thus were not 'at risk' of experiencing the outcome), they were excluded from these analyses, resulting in 54794 observations.

Analyses were conducted in SAS version 9.4 and R version 3.5.3. Given multiple outcomes in this study, we used the false discovery rate approach to control for type 1 error.[10] Therefore, we present regression results with both a nominal p-value and a 'q-value' which can be interpreted as indicating the proportion of results with that q-value or lower that would be expected to be a false positive accounting for all the analyses conducted.[11,12] Thus a q-value < 0.05 indicates that, accounting for multiple analyses, a

given result is expected to be a false positive less than 5% of the time. We interpreted a q-value < 0.05 to indicate statistical significance.

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