*Varied and Unexpected Changes in the Well-being of Seniors in the United States amid the COVID-19 Pandemic*[1]

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**Abstract**

This paper estimates changes in well-being among seniors just before and after the community spread of COVID-19 in the United States. We analyze changes in negative and positive affect, pain, depressive symptoms, self-rated health and life satisfaction in two waves of an internet panel of 17,175 adults ages 60 to 69. We find that seniors across the country experienced large increases in negative affect (21%) and depressive symptoms (19%) as well as a decrease in positive affect (6%). Life satisfaction and self-rated health were relatively unchanged whereas self-reported pain decreased (-13%). Depressive symptoms increased only among women, changes in affect were largest among women and those with a college degree or higher. The increase in negative affect was nearly 70% higher among individuals in high COVID-19 death rate counties and over 50% higher among those who reported losing their job or significant income due to COVID-19. Differential perceptions of the risk of getting COVID-19 and of dying from the disease mediated most of the remaining increase in negative affect and about 40% of the remaining decrease in positive affect. The decrease in pain was not mediated by loss of work, exercise or other survey measures. These data suggest that although the COVID-19 pandemic negatively affected mood and depressive symptoms, other measures of well-being were either not materially affected or even improved. Moreover, preliminary results from a third wave of data collected in July and August 2020 suggest significant rebound in affect and depressive symptoms. While still not back to pre-COVID levels, these measures are much improved relative to wave 2 (April/May) averages. Pain levels are reverse in wave 3, except among those living in counties hardest hit by the pandemic in July/August, suggesting that limitations in movement might at least partially explain reductions in pain.

## 1. Introduction

The COVID-19 pandemic has radically changed the day-to-day lives of many Americans, at least temporarily. The health risks associated with the pandemic as well as the disruptions caused by measures to slow its spread may have profound effects on individual health as well as economic and psychological well-being. Recent work highlights the toll the pandemic is taking on the mental health of Americans. The prevalence of depressive symptoms among US adults increased

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from about 11% in March 2020 to 14% in April 2020.[1] A comparison of severe psychological distress among US adults ages 18 and over in April 2020 relative to 2018, found that prevalence had increased nearly three-fold.[2] Another study found increases in all categories of depressive symptoms after the pandemic.[3] Mental distress was higher in areas with more COVID-19 cases and among individuals who perceive the risks of infection and death from the disease as higher.[4] A worsening of mental health has been documented in parents and children.[5,6] Far less is understood about how the pandemic has affected other measures of well-being.

In this study, we take a broader view of well-being, analyzing changes in not only depressive symptoms but also negative affect, positive affect, life satisfaction, self-rated health and pain just before and after the recognition of community spread of COVID-19 in the US. Our work focuses specifically on seniors who were ages 60 to 69 between November 2019 and February 2020, when we fielded wave 1 of our survey. Like individuals with underlying health conditions, older adults are at higher risk of serious reactions to COVID-19 and death. This message has been conveyed by public health authorities and in the media and may cause considerable stress and anxiety for this population. Moreover, this group of relatively young seniors may have parents and other older relatives in the highest risk groups, adding an extra layer of worry and stress. We hypothesized that well-being declined across a range of dimensions, not just mental health, between wave 1 and 2 of our survey and that these changes were related to the severity of the local COVID-19 pandemic.

## 2. Methods

Between November 2019 and February 2020, we conducted an internet survey of 26,146 respondents living in the US between the ages of 60 and 69. The survey, which we developed using existing validated measures, was designed to capture the mental health and subjective well-being of seniors just above and below the age of eligibility for Medicare. Participants were drawn from a U.S. national opt-in internet panel comprising about one million households.[7] The panel, which is run by the Dynata Corporation, consists of members volunteering to periodically participate in online questionnaires for minimal rewards (e.g., bonus miles). It is used increasingly for research purposes, including COVID-19 research.[8] Because the panel is proprietary and researchers are only given data from completed surveys, we cannot calculate survey response rates for wave 1. Beginning the second week of April, we re-contacted all participants from our baseline survey and invited them to a follow-up survey that asked the same set of questions as wave 1 but supplemented them with questions about perceptions of COVID-19 risk and its consequences and COVID-19 related changes in behavior, among other things. We had a 79% response rate for the 2$^{nd}$ survey wave, with 68% of the original wave 1 sample answering all questions in the follow-up survey. Our analytic dataset included the 17,175 respondents who responded to all questions in both surveys. We matched respondents to the cumulative COVID-19 death count in their county of residence at wave 2 as of the day they started answering wave 2. Death data were taken from the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University, which aggregates data from state and local departments of health.

## 3. Measures

We considered 6 measures of well-being: (1) negative affect, (2) positive affect, (3) pain, (4) Cantril ladder, (5) depressive symptoms, (6) self-rated health. Negative affect, positive affect

and pain were measured based on a set of questions used in the Gallup Daily Survey that ask separately about whether respondents experienced the following feelings "a lot of the day yesterday": enjoyment, happiness, pain, worry, sadness, stress, and anger. The order of appearance of each of these feelings was randomized across respondents to avoid any systematic priming affects. Negative affect was constructed as the sum of responses about feelings of worry, sadness, stress and anger whereas positive affect was the sum of responses about feelings of enjoyment and happiness. We also used the Cantril Self-Anchoring Striving Scale, which has been used widely to measure "judgments of life" or "life evaluation" in contrast to affect.[9] In the version we use, we ask "on which step of the ladder would you say you personally feel you stand at this time?" The ladder runs from zero at the bottom to ten at the top of the ladder.[10] We use the 2-item version of the Patient Health Questionnaire (PHQ-2), which asks separately about how often an individual has experienced the primary symptoms of depression: dysphoric mood (feeling, "down, depressed or hopeless" and anhedoniad (little interest or pleasure in doing things" over the past two weeks.[11] Each of the two questions is scored 0-3 (based on answers ranging from "not at all" to "nearly every day") an summed. Those with a PHQ-2 score of 3 or above are coded as having depressive symptoms, which has been previously shown to have very good sensitivity and reasonable specificity for detecting depressive disorders.[12]

**4. Statistical Analyses**

We began by graphically comparing mean outcomes across waves and according to whether respondents lived in a county that was in the 90$^{th}$ percentile of COVID-19 death rates among survey respondents at wave 2. We then performed multivariate regression analysis of outcomes across waves controlling for an individual fixed effect and a wave 2 indicator. The individual fixed effect is meant to control for differences in individual characteristics that are fixed across waves, such as gender, education and race. In practice, wave 2 coefficients are not significantly affected by the introduction of individual fixed effects (results available upon request). Our initial specification is

$$WB_{it} = \alpha_0 + \alpha_1 wave2 + \mu_i + \varepsilon_{it} \quad (1)$$

We also stratify the results of equation (1) by four demographic characteristics of interest – gender, education, race and (wave 1) retirement status.

In order to understand the role of COVID-19 in mediating the across wave differences in well-being, we investigate the role of several COVID-related variables measured in wave 2. We gradually add to the model: (i) an indicator for whether the respondent lived in a 90$^{th}$ percentile death rate county, (ii) whether the respondent reported losing his/her job or a substantial portion of income as a result of COVID-19, (iii) the respondent's best guess of the odds he/she 1) would get COVID-19 and, separately, 2) die from the disease if he/she contracted it, and (iv) whether COVID-19 kept the respondent from exercising. In other words, the model is augmented such that

$$WB_{it} = \alpha_0 + \alpha_1 wave2_t + \alpha_2 COVID\ var_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

Note that since wave 1 was collected "pre-COVID," COVID-related variables were coded as zeroes in wave 1. Therefore $\alpha_2$ should be interpreted as the *interaction* between a given COVID variable

and wave 2, representing whether individuals who reported being affected differently by COVID saw different changes in well-being across waves. Standard errors were clustered by individual ID to account for repeated (wave 1 and wave 2) measures.

## 5. Results

Before analyzing the data, we compared the characteristics of our sample to the US population between the ages of 60 to 68 as captured in the 2020 Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS). The geographic distribution of respondents completing both our wave 1 and 2 surveys was similar to the ASEC sample as was the mean age, the shared married and the share divorced (see Table 1). Along several other dimensions, however, our respondents were more advantaged than the general population, with a higher share White, with a college or graduate degree, and a lower share Hispanic or uninsured. The ASEC also asks respondents to rate their health. Mean self-rated health at baseline is nearly identical in the ASEC and in our survey, although the distribution across ratings differs somewhat. Specifically, the share of individuals reporting either excellent or poor health (as opposed to very good, good or fair health) is higher in the ASEC. We also compared the share with depressive symptoms (PHQ-2 $\geq 3$) in our baseline survey to those ages 60 to 68 in the 2018 Medical Expenditure Panel Survey (MEPS), the most recent publicly available version of the data. The share with depressive symptoms is quite similar – 7.2% in our survey versus 6.44% in the MEPS.

Figure 1 shows mean outcomes in waves 1 and 2 for each of our key outcomes, separately for respondents living in counties that were below versus at and above the 90$^{th}$ percentile in COVID-19 death rates at the time of their second interview. Panel 1 shows that depressive symptoms increased for respondents in both types of counties. The increase was about 1.2 percentage points off a wave 1 rate of 7.1% with depressive symptoms for those in counties below the 90$^{th}$ percentile of COVID-19 death rates and about 2 percentage points off a base of 7.5% with depressive symptoms in counties above the 90$^{th}$ percentile of COVID-19 death rates. Negative affect (panel 2) and positive affect (panel 3) also worsened between wave 1 and 2. The increase in negative affect was about 20% or about 0.18 of a standard deviation (see Table 1 for outcomes' SDs) in negative affect for respondents in counties below the 90$^{th}$ percentile of COVID-19 death rates, the increase in negative effect was larger for counties above the 90$^{th}$ percentile, over 30%. Positive affect decreased by about 6% or 0.15 of a standard deviation for respondents in counties both below and above the 90$^{th}$ percentile of COVID-19 death rates. While the Cantril ladder also declined between wave 1 and 2, the change is quite small – about 2% of the mean ladder score and less than 1/10$^{th}$ of a standard deviation for respondents in counties both below and above the 90$^{th}$ percentile of COVID-19 death rates. The pattern for self-rated health and pain differ markedly, both from the other panels and from each other. Self-rated health is unchanged between waves 1 and 2 while pain actually declines. These patterns do not differ by county COVID-19 death rate categories. The decline in pain is quite sizeable – a 5 percentage point decline of a base of about 40% reporting pain a lot of the day yesterday.

The general pattern of results – increase in depressive symptoms and negative affect and decrease in positive affect as well as small to no change in the ladder and self-rated health and a reduction in pain between waves 1 and 2 – hold even when we control for fixed individual factors (see Table 2, col (1) for each outcome). Depressive symptoms increase by 1.4 percentage points off a base of about 7%. Negative affect increases by about 0.24 off a base off about 1.1 index

points (col (1)). As in the figures, we find more modest changes in positive affect, 0.11 index points off a base of about 1.7, and even smaller relative changes for the Cantril ladder, 0.17 index points off a base of 7.3. We find no change in self-rated health. However, pain declined by 5 percentage points between waves 1 and 2, off a base of 39% reporting a lot of pain yesterday in wave 1. With the exception of depressive symptoms, which increases only among women, and to a lesser extent negative affect, which increases more for women than men, none of these changes are moderated by gender, race or retirement (see Appendix Table 2). Surprisingly, results stratified by education suggest that changes in negative and positive affect and in the ladder were larger for those with at least a college degree relative to those with less than college (see Table 2).

The changes in depressive symptoms and negative affect were larger among respondents in counties that had higher rates of COVID-19 deaths (see col (1) for each outcome in Panel A of Table 3), though only the difference in negative affect was statistically significant. The increase in depressive symptoms is 1.2 percentage points among respondents in below 90$^{th}$ percentile COVID-19 death rate counties and 1.6 percentage points higher (but not statistically significant) for respondents in 90$^{th}$ percentile and above counties. In other words, depressive symptoms increased by 2.8 percentage points off a base of 7% for those in counties most adversely affected by COVID-19. Whether a respondent lost their job or a substantial amount of income as a result of COVID-19 (col (2)) in wave 2 mediates much of the wave 2 increase in depressive symptoms, although not the differential increase in depressive symptoms among those in 90$^{th}$ percentile and above versus below counties. Accounting for an individual's rating in wave 2 of their chance of getting COVID-19 and, separately, their chance of dying from the disease conditional on getting it (col (3)) and whether COVID-19 kept them from exercising (col 4)) even reverses the sign of the wave 2 change in depressive symptoms, suggesting that these factors – loss of livelihood, fears of COVID-19 and change in an outlet for stress reduction – mediated the observed increase in depressive symptoms between waves 1 and 2. The same basic pattern is observed for negative affect. The increase in negative affect is about 0.15 points higher for respondents in counties with COVID-19 death rates above versus below the 90$^{th}$ percentile (see col (1)). But the overall wave 1 versus wave 2 change is mediated by income/job less (col (2)) and, more substantially, by individual ratings of the chance of getting COVID-19 and dying from the disease conditional on getting it (col (3)) and whether COVID-19 kept them from exercising (col (3)).

For neither positive affect nor the ladder can we reject that the wave 2 changes are the same for those in counties with COVID-19 death rates above versus below the 90$^{th}$ percentile (col (1) for each outcome in Table 3 Panel B). The changes in positive affect are largely, although not completely, mediated by individual ratings of the chance of getting COVID-19 and dying from the disease conditional on getting it (col (3)) and whether COVID-19 kept them from exercising (col (4)). We find no change in self-rated health for either respondents in above or below 90$^{th}$ percentile COVID-19 death rates (col (1) of panel c). Controlling for respondents estimated chance of contracting COVID-19 and of dying from the COVID-19 conditional on getting it (col (3)) and whether COVID-19 kept them from exercising (col (4)), reverses the wave 2 change, implying a modest decline in poor self-rated health. None of the factors explored here appear to mediate this large relative change in pain (cols (1) – (4)).

## 6. Discussion

Our results suggest a complex pattern of short-run changes in the well-being of seniors just before and after COVID-19 was recognized as a public health crisis in the United States. Consistent with prior work, we demonstrate an increase in depressive symptoms. Negative affect also increased considerably. The increases in both depressive symptoms and negative affect were specific to women and, especially for affect, larger among respondents in areas at the high end of the COVID-19 death rate distribution. Moreover, the increases, particularly for depressive symptoms, were largely mediated by economic factors, i.e., loss of a job/income due to the pandemic, fears of getting sick or dying from COVID-19 and limits on the ability to exercise as a result of the virus, perhaps due to closed gyms or fears of going outside. Consistent with an increase in depressive symptoms and negative affect, positive affect, which captures happiness and enjoyment, declined. The decline, although more modest than the increase in negative affect, was only partially mediated by fears of the virus and changes in exercise routines.

In contrast, we found only a very modest change in the Cantril ladder. While the decline in the ladder is consistent with a worsening of evaluative well-being, as hypothesized, the size of the change is so small as to make the relative lack of a meaningful effect to be most noteworthy. Likewise, self-rated health was unchanged between wave 1 and 2. One possibility for these limited changes is that these outcomes capture more stable, long-run measures of well-being whereas affect and depressive symptoms, which explicitly ask about yesterday and the past 7-days, assess feelings over the short-run. The sizeable decline in pain, which also captures an experience yesterday, is more puzzling. It is not mediated, for example, by COVID-19 related changes in either exercise plans or economic activity. It is also not mediated by living in a high COVID-19 mortality area. It may be related to lockdowns broadly, although our current data are not well suited to assessing this issue.

Preliminary results from a third wave of data collected in July and August 2020 suggest significant rebound in affect and depression symptoms. While still not back to pre-COVID levels, these measures are much improved relative to wave 2 (April/May) averages. Pain levels are reverse in wave 3, except for those living in counties hardest hit by the pandemic in July/August, suggesting that limitations in movement not well captured by our survey measures might partially explain the pain reductions documented here.

More generally, our work suggests that the assumption of purely negative changes in well-being may be unfounded. At least for the young seniors in our data, COVID-19 did not change measures of evaluative well-being or self-rated health in the short-run and pain actually improved. This does not diminish the importance of the increases in depressive symptoms and negative affect or the decrease in positive affect but rather suggests that a more holistic view of well-being may be warranted. Moreover, as the COVID-19 pandemic continues to disrupt life in the United States, evaluative health and self-rated health may change in ways similar to depressive symptoms and affect. Likewise, the reduction in pain, if attributable to reduced activity, could backfire in the long-run as sedentary lifestyles can increase pain.

## 7. Tables and Figures

**Table 1. Comparison of Dynata Survey and ASEC**

| | Dynata, W1 and W2 | | 2020 CPS (ASEC) | |
|---|---|---|---|---|
| Variable | Obs | Mean | Obs | Mean |
| age_years | 17,175 | 64.3 | 16,382 | 63.8 |
| | | (2.59) | | (2.54) |
| 9 Census Divisions | | | | |
| NewEngland | 17,175 | 5.4% | 16,382 | 4.9% |
| MidAtlantic | 17,175 | 14.8% | 16,382 | 12.8% |
| ENCentral | 17,175 | 16.2% | 16,382 | 15.2% |
| WNCentral | 17,175 | 6.6% | 16,382 | 6.9% |
| SAtlantic | 17,175 | 20.5% | 16,382 | 20.5% |
| ESCentral | 17,175 | 4.3% | 16,382 | 6.3% |
| WSCentral | 17,175 | 7.7% | 16,382 | 11.4% |
| Mountain | 17,175 | 7.8% | 16,382 | 7.2% |
| Pacific | 17,175 | 12.5% | 16,382 | 14.8% |
| white | 17,173 | 91.1% | 16,382 | 80.9% |
| non-white | 17,173 | 8.9% | 16,382 | 19.1% |
| r_hisp | 17,173 | 3.2% | 16,382 | 10.4% |
| female | 17,175 | 61.2% | 16,382 | 52.3% |
| married | 17,175 | 64.5% | 16,382 | 65.0% |
| divorced | 17,175 | 16.5% | 16,382 | 16.1% |
| hs or below | 17,173 | 16.0% | 16,382 | 39.4% |
| some college | 17,173 | 20.1% | 16,382 | 16.1% |
| college (AA + BA) | 17,173 | 43.2% | 16,382 | 31.3% |
| graduate deg | 17,173 | 20.7% | 16,382 | 13.2% |
| working | 17,175 | 34.0% | 16,382 | 45.0% |
| inc1 (less than 30k) | 17,157 | 17.5% | 16,382 | 18.2% |
| inc2 [30k, 50k) | 17,157 | 17.6% | 16,382 | 14.8% |
| inc3 [50k, 75k) | 17,157 | 20.8% | 16,382 | 15.8% |
| inc4 [75k, 100k) | 17,157 | 15.7% | 16,382 | 13.1% |
| inc5 [100k, 150k) | 17,157 | 16.9% | 16,382 | 17.0% |
| inc6 [150k+] | 17,157 | 11.4% | 16,382 | 21.2% |
| ins_empl | 17,174 | 30.7% | 16,382 | 36.1% |
| ins_medicare | 17,174 | 48.3% | 16,382 | 42.4% |
| ins_medicaid | 17,174 | 6.9% | 16,382 | 10.2% |
| Uninsured | 17,174 | 2.6% | 16,382 | 5.0% |
| health | 17,174 | 2.57 | 16,382 | 2.58 |
| | | (0.92) | | (1.09) |
| share excellent health | 17,770 | 9.9% | 16,382 | 17.3% |
| share very good health | 17,770 | 40.5% | 16,382 | 31.4% |
| share good health | 17,770 | 34.5% | 16,382 | 32.2% |
| share fair health | 17,770 | 12.9% | 16,382 | 13.9% |
| share poor health | 17,770 | 2.3% | 16,382 | 5.2% |
| depressive symptoms (2018 MEPS) | 17,172 | 7.2% | 2901 | 6.44% |
| ladder | 17,173 | 7.30 | | |
| | | (1.81) | | |
| na_index | 17,171 | 1.09 | | |
| | | (1.25) | | |
| pa_index | 17,170 | 1.69 | | |
| | | (0.66) | | |
| pain | 17,174 | 40.0% | | |

**Table 2. Changes in Well-being across Waves; Full Sample and by Gender and Education**

| | Depressive Symptoms | | | | | Negative Affect Index | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | all | female | male | less than college | college + | all | female | male | less than college | college + |
| wave 2 indicator | 0.014 | 0.024 | -0.002 | 0.02 | 0.01 | 0.238 | 0.294 | 0.151 | 0.196 | 0.26 |
| | (0.004) | (0.005) | (0.005) | (0.007) | (0.004) | (0.016) | (0.021) | (0.024) | (0.028) | (0.020) |
| Constant | 0.071 | 0.078 | 0.061 | 0.098 | 0.057 | 1.086 | 1.192 | 0.92 | 1.187 | 1.031 |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) | (0.008) | (0.010) | (0.012) | (0.014) | (0.010) |
| Observations | 28,047 | 17,062 | 10,985 | 9,795 | 18,252 | 28,048 | 17,062 | 10,986 | 9,796 | 18,252 |
| R-squared | 0.711 | 0.709 | 0.716 | 0.729 | 0.692 | 0.745 | 0.737 | 0.75 | 0.754 | 0.74 |
| | **Positive Affect Index** | | | | | **Cantril Ladder** | | | | |
| | all | female | male | less than college | college + | all | female | male | less than college | college + |
| wave2 | -0.11 | -0.115 | -0.103 | -0.097 | -0.118 | -0.174 | -0.202 | -0.129 | -0.129 | -0.197 |
| | (0.009) | (0.012) | (0.014) | (0.016) | (0.011) | (0.018) | (0.024) | (0.028) | (0.034) | (0.022) |
| Constant | 1.686 | 1.684 | 1.689 | 1.626 | 1.719 | 7.32 | 7.263 | 7.409 | 7.037 | 7.472 |
| | (0.004) | (0.006) | (0.007) | (0.008) | (0.005) | (0.009) | (0.012) | (0.014) | (0.017) | (0.011) |
| Observations | 28,044 | 17,059 | 10,985 | 9,794 | 18,250 | 28,043 | 17,060 | 10,983 | 9,790 | 18,253 |
| R-squared | 0.721 | 0.712 | 0.736 | 0.733 | 0.713 | 0.83 | 0.826 | 0.837 | 0.83 | 0.827 |
| | **Poor Self-rated Health** | | | | | **Pain** | | | | |
| | all | female | male | less than college | college + | all | female | male | less than college | college + |
| wave2 | 0.002 | -0.001 | 0.005 | -0.001 | 0.003 | -0.049 | -0.05 | -0.049 | -0.055 | -0.047 |
| | (0.007) | (0.009) | (0.010) | (0.012) | (0.008) | (0.006) | (0.008) | (0.010) | (0.010) | (0.007) |
| Constant | 2.554 | 2.554 | 2.553 | 2.743 | 2.452 | 0.391 | 0.407 | 0.368 | 0.448 | 0.361 |
| | (0.003) | (0.004) | (0.005) | (0.006) | (0.004) | (0.003) | (0.004) | (0.005) | (0.005) | (0.004) |
| Observations | 28,051 | 17,065 | 10,986 | 9,796 | 18,255 | 28,050 | 17,064 | 10,986 | 9,796 | 18,254 |
| R-squared | 0.91 | 0.906 | 0.917 | 0.905 | 0.91 | 0.74 | 0.745 | 0.731 | 0.743 | 0.736 |

Notes: All models control for individual fixed effects and cluster standard errors by individual.

**Table 3. Changes in Well-Being across Waves; Role of COVID-Related Variables**

*Panel A: Depressive Symptoms and Negative Affect*

| | Depressive Symptoms | | | | Negative Affect Index | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (1) | (2) | (3) | (4) |
| wave 2 indicator | 0.012 | 0.009 | -0.009 | -0.016 | 0.223 | 0.207 | 0.04 | 0.009 |
| | (0.004) | (0.004) | (0.006) | (0.006) | (0.016) | (0.016) | (0.026) | (0.026) |
| above 90th COVID death rate | 0.016 | 0.016 | 0.015 | 0.014 | 0.146 | 0.143 | 0.128 | 0.124 |
| | (0.012) | (0.012) | (0.012) | (0.012) | (0.055) | (0.055) | (0.054) | (0.054) |
| lost job/income | | 0.021 | 0.019 | 0.019 | | 0.115 | 0.1 | 0.096 |
| | | (0.011) | (0.011) | (0.011) | | (0.048) | (0.048) | (0.048) |
| chance get COVID | | | 0.025 | 0.022 | | | 0.417 | 0.406 |
| | | | (0.019) | (0.019) | | | (0.086) | (0.087) |
| chance die COVID | | | 0.041 | 0.039 | | | 0.229 | 0.222 |
| | | | (0.016) | (0.016) | | | (0.072) | (0.072) |
| COVID kept from exercising | | | | 0.027 | | | | 0.113 |
| | | | | (0.008) | | | | (0.037) |
| Constant | 0.071 | 0.071 | 0.071 | 0.071 | 1.086 | 1.082 | 1.082 | 1.082 |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.008) | (0.008) | (0.008) | (0.008) |
| Observations | 28,047 | 27,045 | 27,008 | 27,007 | 28,048 | 27,046 | 27,009 | 27,008 |
| R-squared | 0.711 | 0.707 | 0.708 | 0.708 | 0.746 | 0.741 | 0.744 | 0.744 |

*Panel B: Positive Affect and Life Evaluation*

| | Positive Affect | | | | Cantril Ladder | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (1) | (2) | (3) | (4) |
| wave2 | -0.106 | -0.1 | -0.057 | -0.044 | -0.167 | -0.132 | -0.02 | 0.006 |
| | (0.010) | (0.011) | (0.016) | (0.017) | (0.020) | (0.022) | (0.031) | (0.033) |
| w2_death_rt_90p | -0.04 | -0.04 | -0.036 | -0.034 | -0.062 | -0.055 | -0.044 | -0.041 |
| | (0.028) | (0.028) | (0.028) | (0.028) | (0.073) | (0.071) | (0.070) | (0.070) |
| w2_lostjoborinc | | -0.044 | -0.04 | -0.039 | | -0.246 | -0.234 | -0.232 |
| | | (0.027) | (0.027) | (0.027) | | (0.061) | (0.061) | (0.061) |
| covidchance_you_get_w2 | | | -0.106 | -0.102 | | | -0.297 | -0.286 |
| | | | (0.047) | (0.047) | | | (0.096) | (0.096) |
| covidchance_die_w2 | | | -0.062 | -0.059 | | | -0.14 | -0.136 |
| | | | (0.038) | (0.038) | | | (0.068) | (0.068) |
| covid7d_exercise_w2 | | | | -0.044 | | | | -0.095 |
| | | | | (0.020) | | | | (0.037) |
| Constant | 1.686 | 1.687 | 1.687 | 1.687 | 7.32 | 7.323 | 7.321 | 7.321 |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.009) | (0.010) | (0.009) | (0.009) |
| | | | | | | -0.05162 | | |
| Observations | 28,044 | 27,041 | 27,004 | 27,003 | 28,043 | 27,041 | 27,004 | 27,003 |
| R-squared | 0.721 | 0.716 | 0.717 | 0.717 | 0.83 | 0.827 | 0.828 | 0.829 |

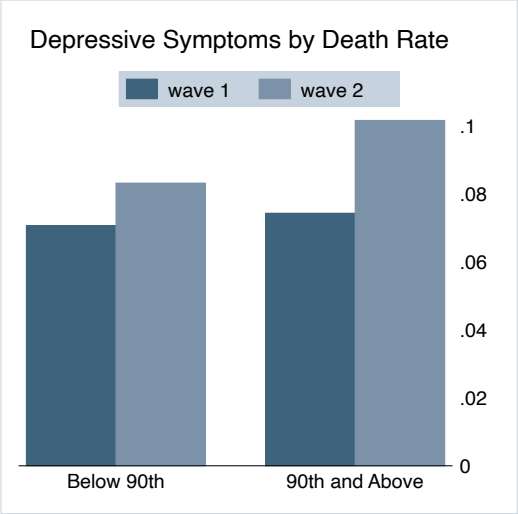
Notes: All models control for individual fixed effects and cluster standard errors by individual.

**Table 3. Changes in Well-Being across Waves; Role of COVID-Related Variables (cont.)**

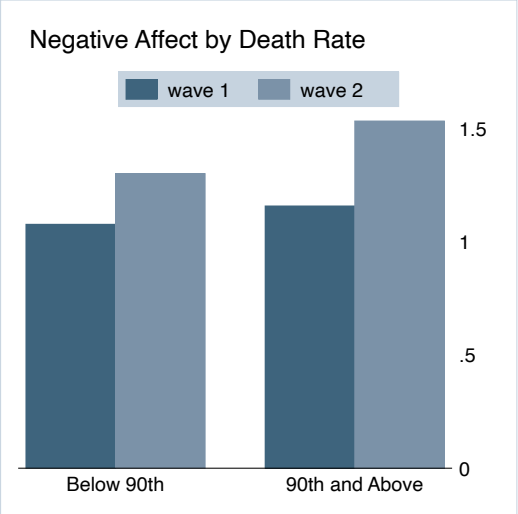
| Panel C: Self-rated Health and Pain | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Poor Self-rated Health** | | | | **Pain** | | | |
| | (1) | (2) | (3) | (4) | (1) | (2) | (3) | (4) |
| wave2 | 0.002 | 0.002 | -0.03 | -0.041 | -0.051 | -0.046 | -0.052 | -0.049 |
| | (0.007) | (0.007) | (0.011) | (0.011) | (0.007) | (0.007) | (0.010) | (0.010) |
| w2_death_rt_90p | 0 | 0.002 | 0 | -0.001 | 0.013 | 0.014 | 0.013 | 0.014 |
| | (0.023) | (0.023) | (0.024) | (0.024) | (0.019) | (0.019) | (0.019) | (0.019) |
| w2_lostjoborinc | | -0.01 | -0.012 | -0.013 | | -0.028 | -0.029 | -0.029 |
| | | (0.019) | (0.019) | (0.019) | | (0.018) | (0.018) | (0.018) |
| covidchance_you_get_w2 | | | 0.042 | 0.038 | | | 0.028 | 0.029 |
| | | | (0.033) | (0.033) | | | (0.029) | (0.029) |
| covidchance_die_w2 | | | 0.077 | 0.074 | | | -0.005 | -0.004 |
| | | | (0.024) | (0.024) | | | (0.024) | (0.024) |
| covid7d_exercise_w2 | | | | 0.04 | | | | -0.01 |
| | | | | (0.014) | | | | (0.013) |
| Constant | 2.554 | 2.553 | 2.553 | 2.553 | 0.391 | 0.391 | 0.391 | 0.391 |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| Observations | 28,051 | 27,048 | 27,011 | 27,010 | 28,050 | 27,047 | 27,010 | 27,009 |
| R-squared | 0.91 | 0.909 | 0.909 | 0.909 | 0.74 | 0.735 | 0.735 | 0.735 |

Notes: All models control for individual fixed effects and cluster standard errors by individual.

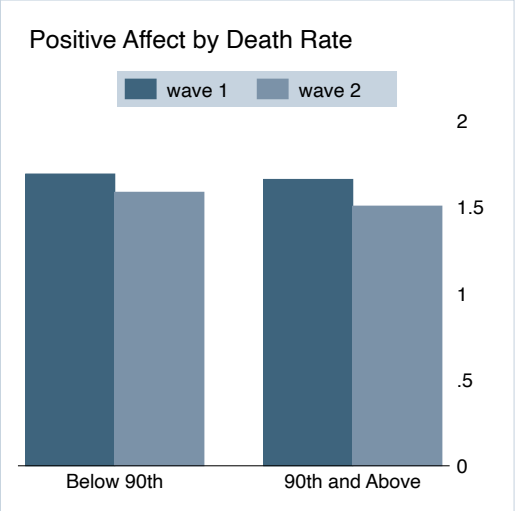
Panel 1



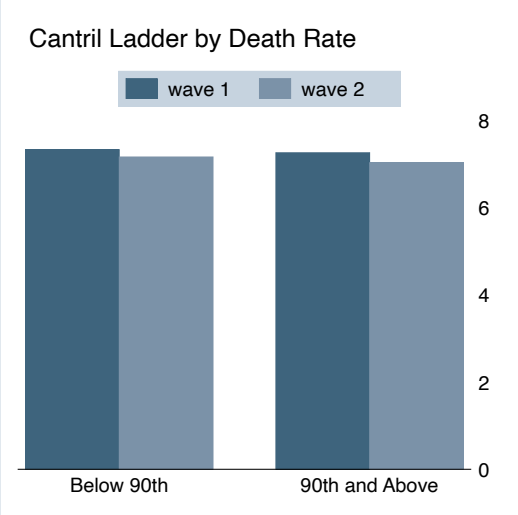

Panel 2



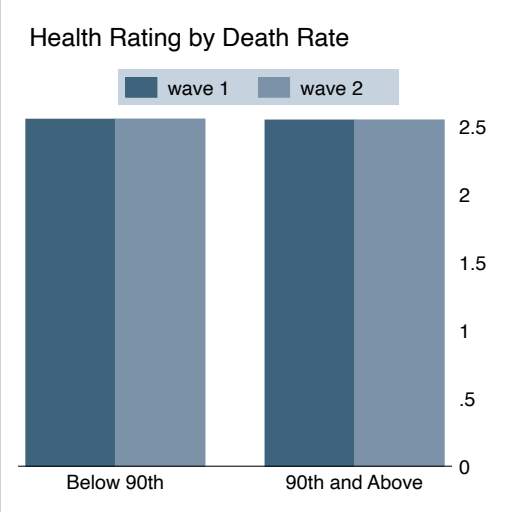

Panel 3



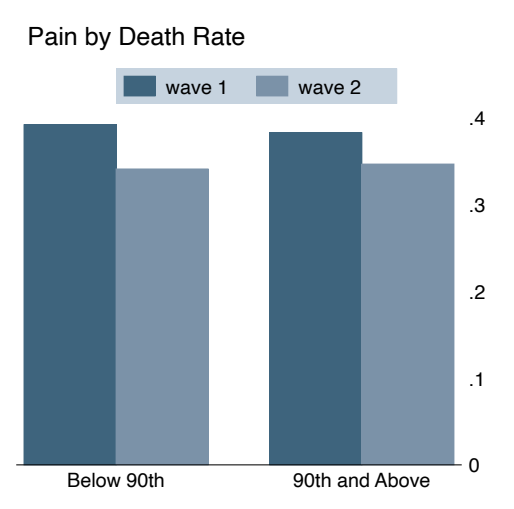

Panel 4




Panel 5




Panel 6



**Appendix Table 1. Changes in Well-being across Waves; Full Sample and by Race and Retirement Status**

| | Depressive Symptoms | | | | | Negative Affect Index | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | all | retired | not retired | white | nonwhite | all | retired | not retired | white | nonwhite |
| wave 2 indicator | 0.014 | 0.016 | 0.01 | 0.013 | 0.018 | 0.238 | 0.26 | 0.209 | 0.247 | 0.143 |
| | (0.004) | (0.005) | (0.006) | (0.004) | (0.012) | (0.016) | (0.021) | (0.025) | (0.017) | (0.054) |
| Constant | 0.071 | 0.062 | 0.084 | 0.072 | 0.066 | 1.086 | 0.988 | 1.215 | 1.098 | 0.967 |
| | (0.002) | (0.002) | (0.003) | (0.002) | (0.006) | (0.008) | (0.010) | (0.012) | (0.008) | (0.026) |
| Observations | 28,047 | 15,964 | 12,083 | 25,490 | 2,557 | 28,048 | 15,967 | 12,081 | 25,492 | 2,556 |
| R-squared | 0.711 | 0.705 | 0.717 | 0.713 | 0.69 | 0.745 | 0.741 | 0.747 | 0.747 | 0.729 |
| | **Positive Affect Index** | | | | | **Cantril Ladder** | | | | |
| | all | retired | not retired | white | nonwhite | all | retired | not retired | white | nonwhite |
| wave2 | -0.11 | -0.112 | -0.108 | -0.11 | -0.11 | -0.174 | -0.2 | -0.138 | -0.18 | -0.107 |
| | (0.009) | (0.012) | (0.014) | (0.010) | (0.010) | (0.018) | (0.024) | (0.029) | (0.019) | (0.071) |
| Constant | 1.686 | 1.709 | 1.656 | 1.688 | 1.688 | 7.32 | 7.498 | 7.085 | 7.329 | (7.229) |
| | (0.004) | (0.006) | (0.007) | (0.005) | (0.005) | (0.009) | (0.012) | (0.014) | (0.009) | (0.035) |
| Observations | 28,044 | 15,964 | 12,080 | 25,489 | 25,489 | 28,043 | 15,963 | 12,080 | 25,487 | 2,556 |
| R-squared | 0.721 | 0.715 | 0.728 | 0.721 | 0.721 | 0.83 | 0.824 | 0.834 | 0.833 | 0.811 |
| | **Poor Self-rated Health** | | | | | **Pain** | | | | |
| | all | retired | not retired | white | nonwhite | all | retired | not retired | white | nonwhite |
| wave2 | 0.002 | 0.017 | -0.019 | 0.003 | -0.015 | -0.049 | -0.045 | -0.055 | -0.05 | -0.041 |
| | (0.007) | (0.009) | (0.010) | (0.007) | (0.023) | (0.006) | (0.008) | (0.009) | (0.006) | (0.019) |
| Constant | 2.554 | 2.535 | 2.578 | 2.536 | 2.73 | 0.391 | 0.388 | 0.397 | 0.395 | 0.351 |
| | (0.003) | (0.004) | (0.005) | (0.003) | (0.011) | (0.003) | (0.004) | (0.004) | (0.003) | (0.009) |
| Observations | 28,051 | 15,968 | 12,083 | 25,494 | 2,557 | 28,050 | 15,967 | 12,083 | 25,494 | 2,556 |
| R-squared | 0.91 | 0.908 | 0.913 | 0.91 | 0.904 | 0.74 | 0.736 | 0.747 | 0.739 | 0.757 |

Notes: All models control for individual fixed effects and cluster standard errors by individual.

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