

Differential Impacts of the COVID-19 Pandemic on Health Behaviors and Outcomes

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Key Takeaways

- The COVID-19 pandemic has significantly impacted people's healthy living behaviors and mental and physical health outcomes.
- The severity of the health impact differs across various subpopulations.
- During the pandemic, people from the lowest income quartile are most likely, among all, to have decreased sleep and diet quality, smoke more frequently, and experience depressive symptoms more frequently when compared to their pre-pandemic baseline levels.
- People with bachelor's or graduate degrees were more likely than the less educated groups to become inactive during the pandemic – they were more likely to sit for prolonged periods of time and to exercise less frequently than they did before the pandemic.

1. Introduction

The COVID-19 pandemic has dramatically changed the ways people live their lives. For example, individuals avoided or cut back on all activities that involved sharing space with others, including social gatherings, leisure activities such as dining at restaurants or going to the movies, and former routines such as going to the gym or riding public transportation. The behavioral changes can be attributed to both government restrictions such as shelter-in-place orders and voluntary responses to the threat of the virus (Bundorf et al., 2021).

In this paper, we examine whether and to what extent the pandemic has changed people's healthy living behaviors (e.g., exercising) and outcomes (e.g., the frequency of depressive symptoms), with evidence from a survey conducted with a nationally representative sample by the Stanford Center on Longevity at the end of 2020.

Our results show that, first, the combination of health and economic crises during the pandemic has led to significant changes in health metrics, including sleep, exercise, sedentary behaviors, weight, and depressive symptoms. Second, many of the worsening trends are manifested unevenly across subpopulations. Most notably, low-income individuals and highly educated individuals both experienced adverse changes, albeit in different areas.



2. The Sightlines Survey

Between December 2020 and January 2021, the Stanford Center on Longevity deployed a survey assessing the experiences of a nationally representative sample of American adults aged 25 to 74 years old. We excluded data from participants who entered their responses twice (caused by time-out and re-entry), who didn't finish the survey, and whose age was below 25 or above 74. Thus, our final sample size is 1,648. See the appendix for more information about the survey administration, survey questions, and summary statistics.

The survey participants were 49 percent male and were on average 47 years old. About 63% reported being non-Hispanic White, 13% non-Hispanic Black, 17% Hispanic, and 6% non-Hispanic Asian. Approximately two-thirds of the participants had a bachelor's degree or above. Just over half of the sample reported being married. About 72% of participants work (53% full-time, 8% part-time, and 11% self-employed). The median family income is \$75,000.

3. Overall changes in physical and mental health

Compared to the pre-pandemic period, about 35% of respondents reported worse sleep quality during the pandemic, 36% said they exercised less, 5 and 9% sat more (Table 1). Many of the respondents also said they experienced depressive symptoms more often than they did before the pandemic. For example, 42% experienced more frequent feelings of depression or hopelessness (compared to 7.8% who experienced these feelings less frequently). Other studies have also shown many people suffered from loneliness and isolation during the COVID-19 pandemic (Killgore et al., 2020; Palgi et al., 2020).

Table 1: Overview of changes in health behaviors and outcomes

	Worse	Unchanged	Better
Quality of sleep	34.3%	50.9%	14.7%
Amount of exercise	36.0%	38.6%	25.4%
Sedentary behavior	59.1%	33.0%	7.9%
Quality of diet	25.9%	49.5%	24.6%
Weight	34.9%	44.1%	21.0%
Smoking	5.0%	89.6%	5.3%
Drinking	17.3%	63.5%	19.2%
Depressive symptoms			
Little interest or pleasure	33.8%	58.8%	7.4%
Feeling down, depressed, or hopeless	42.8%	49.5%	7.8%
Trouble sleeping	38.4%	54.4%	7.2%
Tired, little energy	44.2%	48.5%	7.3%
Poor appetite or overeating	32.6%	59.7%	7.7%
Feel bad about oneself	28.2%	65.3%	6.5%
Trouble concentrating	32.0%	61.6%	6.4%
Moving or speaking very slowly	8.1%	85.6%	6.3%
Very fidgety or restless	16.2%	77.1%	6.7%
Suicidal thoughts	10.6%	81.3%	8.2%

Note: Data are from the Stanford Center on Longevity Sightlines 2021 Survey. The table shows the percentages of respondents who said a certain health behavior or outcome was worse, unchanged, or better than it was before the pandemic. "Unchanged" includes individuals who responded that their behaviors or outcomes didn't change compared to the pre-pandemic period and who answered that they never had a health behavior (e.g., never smoked).

4. Vulnerable subpopulations

In order to gain a better understanding of these changes in health behaviors and outcomes caused by the COVID-19 pandemic, we examined each health metric within subpopulations with different socio-demographic characteristics, such as race/ethnicity, gender, educational attainment, and income. Two groups emerged as the most vulnerable, with significant adverse changes in their physical and mental health compared to their own pre-pandemic levels.

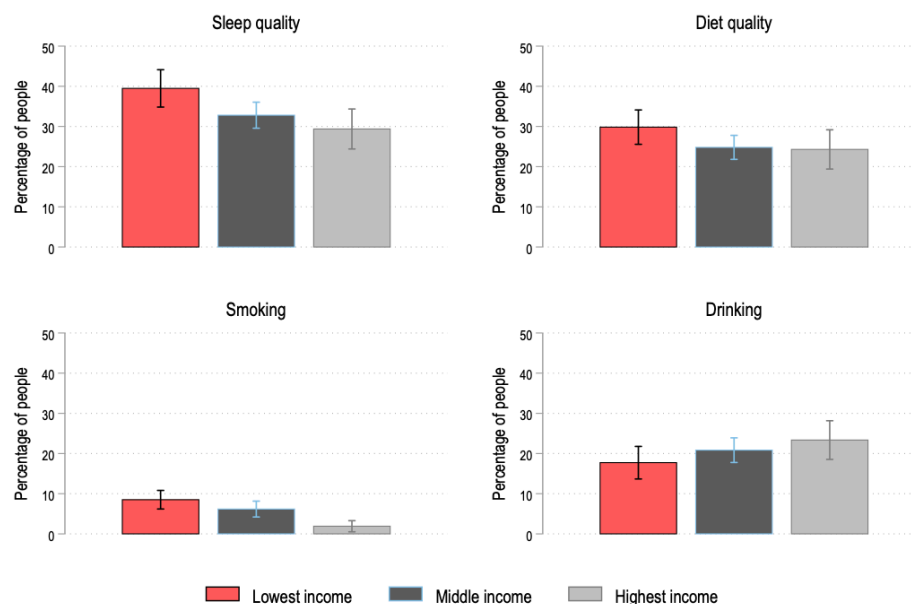
(a) The lowest income individuals

People in the lowest income group of our analyses had consistently worsened health behaviors and outcomes during the pandemic across a number of the health metrics, including sleep, diet, and smoking. We compared individuals with incomes in the lowest 25% (red bars in Figure (1)), the middle 50% (black bars), and the highest 25% (gray bars).¹ The results show that 40% of individuals in the lowest income quartile reported worse sleep quality during the pandemic. In comparison, around 30% of middle- and high-income individuals reported deteriorating sleep quality. Similarly, close to 30% of the lowest income people said their diet got worse during the pandemic, compared to 24% of their higher-income counterparts.

Moreover, close to 9% of the lowest income people said they smoked more now than before, compared to 2% of the highest income group. “This continues the well-established pattern of use of and addiction to cigarettes being concentrated in lower income groups,” said Professor Keith Humphreys, who studies addiction prevention and treatment in the Department of Psychiatry and Behavioral Sciences at Stanford University. “The increase during COVID could reflect greater smoking than normal among smokers, but based on what happened in prior national crises, it could also reflect former smokers relapsing.”

Although people with higher incomes generally fared better across many healthy living behaviors during the pandemic, it’s worth noting that they appear to have increased their alcohol consumption. The last panel in Figure (1) shows that the highest-income individuals (23%) were more likely than the lowest-income group (17%) to have increased drinking during the pandemic.

Figure 1: Percentage of people with worse health behaviors/outcomes compared to pre-pandemic



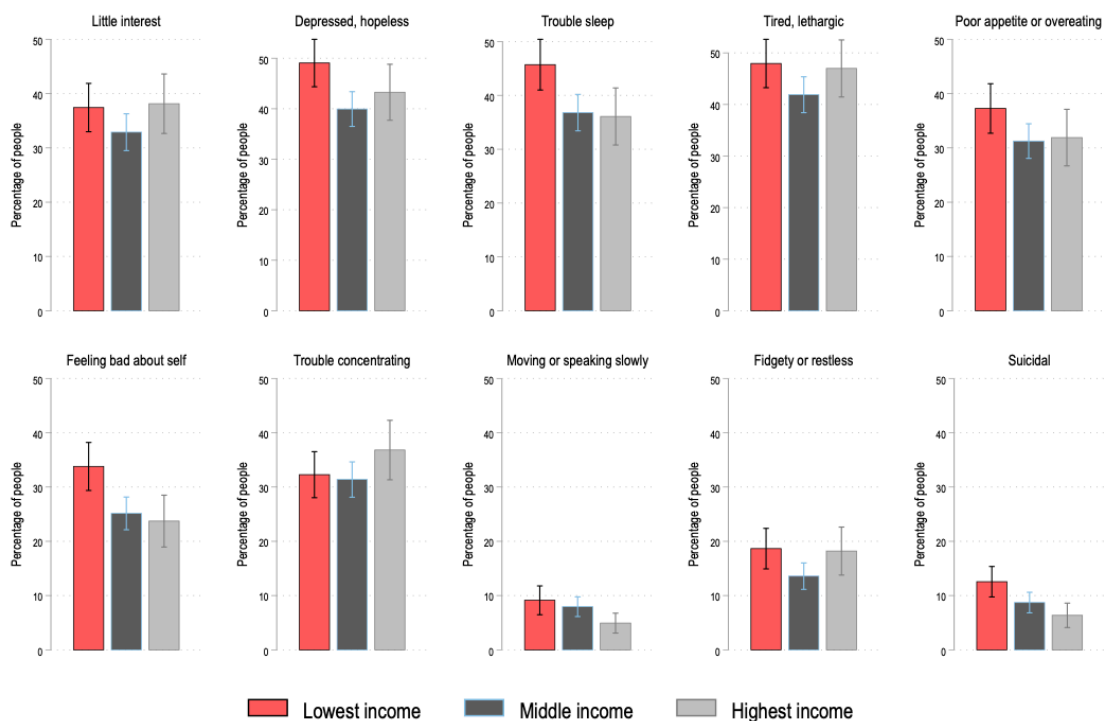
Note: Data are from the Stanford Center on Longevity Sightlines 2021 Survey. The plots show the percentages of survey respondents who reported worse sleep quality, worse diet quality, more smoking, or more drinking than their pre-pandemic levels. Weights are used. 90% confidence intervals are shown.

¹Income is at the equivalence scale to take into account the effect of family size (US Census Bureau, n.d.).

People in the lowest income group also reported experiencing worse mental health during the pandemic compared with how they felt pre-pandemic, than did people with middle incomes (Figure 2). Our survey asked respondents whether they experienced each of the ten depressive symptoms more or less often than they did before the pandemic. Compared to middle-income individuals, people in the lowest income quartile reported more frequent experiences with almost all depressive symptoms (except for "having trouble concentrating" and "moving or speaking slowly"). The gap is most striking in "depressed, hopeless," "having trouble sleeping," "tired and lethargic," "poor appetite or overeating," "feeling bad about oneself," "fidgety or restless," and "suicidal thoughts."

Many factors may have contributed to the observed downward trend in mental health. For example, the lowest-income individuals were more likely to have lost a job during the pandemic, experience financial insecurity and a lack of control in life, have concerns about the health risks of being infected by SARS-CoV-2, and to feel loneliness and isolation. They may also be less likely to be able to afford access to mental health services.

Figure 2: Percentage of people who experienced depressive symptoms more frequently than they did pre-pandemic



Note: Data are from the Stanford Center on Longevity Sightlines 2021 Survey. The plots show the percentages of survey respondents who said they experienced depressive symptoms more often than before the pandemic. Weights are used. 90% confidence intervals are shown.

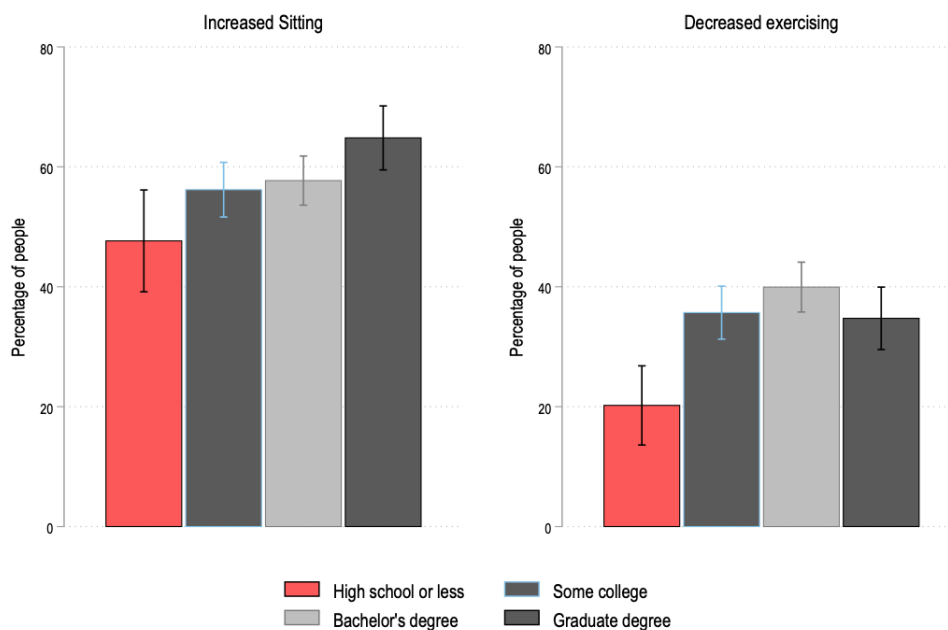
(b) Highly educated individuals

Sedentary behavior has been on the rise in recent years among people with white-collar jobs (who largely sit in front of computers) and has been found to have negative health consequences independent of an absence of exercise. An average American adult spent 6.4 hours sitting before the pandemic (Yang et al., 2019). The pandemic has exacerbated inactivity – including both excessive sitting and a lack of exercise – even further (Meyer et al., 2020), as many people worked from home and stopped going to the gym.

In our survey, respondents revealed how their sitting and exercising changed compared to their pre-pandemic levels. As shown in Figure (3), better-educated individuals were more likely than the less-educated to have increased time spent sitting and to have decreased time spent exercising. Around 65% of people with a graduate degree said they sat more than before the pandemic, compared to 47% of those who never went to college. Similarly, 40% of college graduates cut back on exercising, compared to 20% of the least educated group. The results are mainly driven by people's ability to work remotely (Streeter et al., 2021), which is often tied to educational attainment.

Well-educated individuals tend to exhibit better health behaviors in many metrics such as smoking, diet, and weight control. However, the experience of the COVID-19 pandemic tells us that they are not insulated from experiencing health challenges. “While physically demanding jobs can put people at risk for injury from repetitive overuse, physically inactive jobs, such as those that involve using a computer for many hours, can put people at unique risk from underuse,” said Michael Fredericson, Professor of Physical Medicine and Rehabilitation and head of the Stanford Lifestyle Medicine initiative. “Our bodies are meant to move, and it is incredibly important to incorporate movement throughout the day to prevent excessive muscular stress and potential injury in structures such as the back and neck.” As work-from-home is projected to continue, at least partly, in many companies, we need to consider strategies to combat the negative impact of the rising prevalence of inactivity, especially among the well-educated population.

Figure 3: Percentage of people who were less active than they were pre-pandemic



Note: Data are from the Stanford Center on Longevity Sightlines 2021 Survey. The plots show the percentages of survey respondents who said they sat more (left panel) or exercised less (right panel) than before the pandemic. Weights are used. 90% confidence intervals are shown.

5. Summary

Overall, most physical and mental health indicators got worse during the pandemic. However, the impact was unevenly felt across subpopulations. The lowest-income individuals were most likely, among all, to have a decreased quality of sleep and diet and more smoking. They were also more likely to report experiencing depressive symptoms more frequently than in the pre-pandemic period. Although education has generally been associated with good health practices, the college and graduate degree holders in our survey revealed that they were most vulnerable to inactivity—more sitting and less exercising.

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Appendix

Table A.1.: Summary statistics of demographic and socioeconomic variables

We used Prolific (www.prolific.co) to recruit an online sample of 1700 individuals between age 25 and 74 who were currently living in the United States. We stratify the sample by age, sex, race/ethnicity, and employment status. Participants were invited to complete a study entitled "Sightlines Survey: Assess the Impact of COVID-19." Data from all participants were collected using Qualtrics survey software between December 12, 2020, and January 4, 2021.

	mean	sd
Age	47.35	13.84
Male	0.49	0.50
Non-hispanic White	0.63	0.48
Non-hispanic Black	0.13	0.33
Hispanic	0.17	0.37
Non-hispanic Asian	0.06	0.24
Non-hispanic Others	0.01	0.11
High school or less	0.07	0.25
Some college or Associate degree	0.28	0.45
Bachelor's degree	0.39	0.49
Graduate degrees	0.27	0.44
Health, Poor	0.04	0.19
Health, Fair	0.21	0.40
Health, Good	0.41	0.49
Health, Very good	0.26	0.44
Health, Excellent	0.09	0.29
Married	0.54	0.50
Widowed	0.02	0.12
Separated/divorced	0.11	0.31
Never married	0.22	0.42
Cohabiting	0.12	0.32
Full time employee	0.53	0.50
Part time employee	0.08	0.27
Self employed	0.11	0.32
Students or in training	0.01	0.10
Retired	0.12	0.32
Not working (incl. unemployed, homemaker, disabled, etc.)	0.15	0.35
Can work from home 100 percent of time during Covid19	0.50	0.50
Can work from home sometimes during Covid19	0.23	0.42
Cannot work from home at all during Covid19	0.27	0.44
Northwest	0.20	0.40
Midwest	0.17	0.38
West	0.39	0.49
South	0.24	0.43
Including you, how many people live in your household full-time?	2.70	1.50
Mean family income (USD), 2020	100,220	95,425
Median family income (USD), 2020	75,000	
Observations	1648	