

Socioeconomic Factors Associated With an Intention to Work While Sick From COVID-19

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Objective: We sought to understand barriers to staying home from work when sick from COVID-19 (COVID-19 presenteeism) to understand COVID-19 health disparities and transmission and guide workplace and social policy. **Methods:** We used logistic regression models to assess which socioeconomic factors were associated with intended COVID-19 presenteeism among an online study population working outside their home in March 2020 ($N=220$). **Results:** Overall, 34.5% of participants reported intended COVID-19 presenteeism. Younger individuals and individuals making over \$90,000 per year were less likely to report COVID-19 presenteeism. Individuals who were worried about having enough food had 3-fold higher odds of intended COVID-19 presenteeism. **Conclusion:** Current policies around food access, paid sick leave, and other workplace protections need to be expanded and made more accessible to reduce health disparities as well as the transmission of COVID-19 and other infections.

Keywords: COVID-19, food security, health disparities, presenteeism, worker protections, working while sick from COVID-19

BACKGROUND

The severe acute respiratory syndrome coronavirus (SARS-CoV-2 or COVID-19) was first reported in the United States in January 2020 and by mid November 2020 had caused over 250,000 deaths nationwide.¹ Local health departments have reported that COVID-19 is disproportionately impacting people of color,² and ecological studies suggest that counties with high poverty rates have higher rates of COVID-19 mortality than low poverty counties.^{3,4} While minority race/ethnicity and low socioeconomic status (SES) are both correlated with higher rates of chronic diseases associated with increased risk of COVID-19 mortality and severe disease (eg, diabetes, coronary heart disease, and obesity),^{5,6} these pre-existing conditions likely do not fully explain documented COVID-19 disparities.

While a central focus of current COVID-19 prevention is the promotion of social distancing, differences in people's abilities to socially distance may contribute to COVID-19 health disparities. Mobility measures from mobile phones suggest that high-income areas dramatically decreased their mobility in March and April of 2020 in response to stay-at-home measures whereas the poorest areas showed an increase in mobility.⁷ This mobility discrepancy

may partially be due to individuals in lower paying jobs being more likely to work outside of their home.⁸ Additionally, people in lower paying jobs are also more likely to have high levels of in-person interaction in their jobs⁹ and less likely to work in jobs that provide personal protective equipment (PPE)¹⁰ or labor protections such as paid sick leave.¹¹

The relationship between different workplace conditions and health disparities during the COVID-19 pandemic may have similarities with the H1N1 influenza outbreak in 2009. It was estimated that 8 million working individuals who were infected with H1N1 did not take any time off work, resulting in H1N1 transmission to up to 7 million coworkers.¹² Higher incidence of H1N1 was reported among individuals who did not have paid sick leave.¹³ The risk of disease transmission in the workplace suggests that workplaces and labor protections should be central to COVID-19 response plans.¹⁴

Labor protections are particularly minimal in the United States (US) overall and in particular for lower wage workers, contributing to their economic fragility. The United States is one of the few highly developed countries without a national paid sick leave policy.¹⁵ For example, only 51% of workers in the bottom quartile of the wage distribution have paid sick days compared with 92% in the top quartile. Similarly, only 62% of service workers have paid sick leave compared with more than 91% of workers in management and professional occupations.¹⁶

The Families First Coronavirus Response Act (FFCA) was implemented on April 1, 2020 and was intended to temporarily cover the employer's cost of paid sick leave for employees who get COVID-19. The law, however, does not include companies with more than 500 employees and small companies can claim exemptions.¹⁷ Conservative estimates suggest that only 47% of private sector workers are covered under this law.¹⁸ Due to lack of worker legal protections and the current economic crisis, many individuals who do have paid sick leave may still not choose to take sick days out of fear of losing their job and the anticipated challenge of finding a new job, especially in a climate of high unemployment rates.¹⁹ The implications of job loss or income loss are severe for many individuals in the United States with 40% of adults reporting that they cannot afford an unexpected expense of \$400.²⁰

Using a best practices approach to crowdsourcing, we assessed what socioeconomic factors were associated with an individual reporting an intention to still go to work when they felt sick from COVID-19. We hypothesized that working while sick may be one pathway leading to the disproportionate burden of COVID-19 among low-income communities and communities of color.

METHODS

Study Population

Study participants were recruited through Amazon's Mechanical Turk (MTurk) service, which is a crowdsourcing online labor market where individuals complete small tasks, including survey participation. MTurk study populations are not nationally representative, but they are often more representative than other convenience sampling populations, and findings indicate external validity.^{21,22} Individuals were eligible if they were adults living in the United States, could speak and read in English, had heard of the

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Ethical Considerations and Disclosures: All participants provided written consent. This study was approved by the Johns Hopkins Bloomberg School of Public Health IRB# 12047.

Clinical significance: COVID-19 presenteeism is an understudied COVID-19 risk behavior. Understanding factors associated with individuals' intention to work when sick with COVID-19 can guide workplace policy to reduce the transmission of COVID-19 and other infectious diseases.

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coronavirus or COVID-19, and provided written informed consent. Additionally, individuals needed to have a 97% or higher approval rate and have completed at least 100 MTurk tasks. To increase reliability, attention and validity checks were embedded throughout the survey.²³ We repeated questions to ensure consistency and included survey questions that had very low probability, such as the frequency of deep-sea fishing in Alaska and the number of appendages removed. We also reviewed the amount of time for completing the survey and the completeness of the data. Individuals who failed these checks were not included in the analysis.

Participants completed the survey between March 25 and March 27, 2020, at which point 18 states had issued mandatory stay-at-home orders.²⁴ Of the 895 survey attempts, 86 (9.7%) were removed due to incomplete data, failed validity checks, no MTurk worker ID, or no informed consent. Among the 809 individuals with valid survey responses, 27.2% ($N=220$) responded yes to the question, “Are you currently required to report to work outside of your home?” and were included in this analysis. Participants were compensated \$2.50 to complete the survey. The median completion time was 13.4 minutes, equating this compensation to an \$11.20 hourly wage. This study was approved by the Johns Hopkins Bloomberg School of Public Health IRB #12047.

Measures

The primary outcome was assessed with the question, “Because of money, if I was a little sick from the coronavirus I would still need to go to work” and categorized as strongly agree or agree versus neither agree nor disagree, disagree, or strongly disagree. The concept of working while sick is known as presenteeism and will be referred to “COVID-19 presenteeism” throughout.

Exposure variables included several measures of socioeconomic status. Education was dichotomized as some college or less versus a Bachelor’s degree or more, and income was categorized as less than or equal to \$35,000, \$35,000 to \$90,000, and more than or equal to \$90,000. Occupation was coded by manually categorizing free text responses according to the International Standard Classification of Occupations.²⁵ Essential workers were defined as individuals who reported daily patient care in the medical field and/or individuals who lived in a state under a stay-at-home order at the time they completed the survey and reported they were currently required to work outside their home.²⁴ Two measures of food access were measured. Receipt of government food assistance was assessed by the question, “Does anyone in your household get food stamps or checks from the government (including yourself?)” and dichotomized as yes versus no, and a perceived measure of food security was assessed with the question, “I am worried about having enough food because of the coronavirus” and categorized as strongly agree or agree versus neither agree nor disagree, disagree, or strongly disagree.

Covariates included demographics, number of children in the household, and health status. Demographics included age, measured continuously, sex, categorized as male or female, and race categorized as White, Black, or other. The measure of the number of children under 18 living in the household was dichotomized as none versus any. Health status was assessed by asking about pre-existing conditions that may be associated with more severe COVID-19, for example, respiratory conditions, diabetes, cancer, heart disease, or high blood pressure²⁶ and were dichotomized as none versus any. Health insurance was dichotomized as yes versus no.

Statistical Testing

Summary statistics were produced to characterize participants overall and by reports of intended COVID-19 presenteeism. Unadjusted logistic regressions were used to assess relationships between the exposure variables of interest and covariates on an individual’s intended COVID-19 presenteeism. The multivariate

logistic regression model was built using a backward-selection stepwise regression with a P -value of more than 0.20 for removal from the model. All exposure variables and covariates were included based on conceptual hypotheses of the relationships between socioeconomic factors and intended COVID-19 presenteeism and considered for inclusion in the stepwise regression. A stepwise regression model was used with a limited number of variables because it was anticipated that there would be strong correlations among potential exposure variables such as income and education, and we did not want to pull variance from the model by overcontrolling for potential exposure or confounder variables.

RESULTS

Median age was 35 (standard deviation [SD] 9.6). Overall, 57.7% ($n=127$) of participants were men, 80.0% ($n=176$) were White, 53.6% ($n=118$) completed a college degree or higher, 59.6% ($n=131$) received an annual income of \$35,000 to \$90,000, 21.4% ($n=47$) worked in a professional occupation, 51.4% ($n=107$) were not considered essential workers, 75.8% ($n=166$) did not report a pre-existing condition related to risk of severe COVID-19 disease, 85.9% ($n=189$) had health insurance, 90.0% ($n=197$) did not receive government assistance, 56.4% ($n=124$) were worried about having enough food, and 59.1% ($n=130$) did not report any children under 18 in the household (Table 1).

A total of 34.5% ($n=76$) of participants reported an intention to still work if they felt a little sick with COVID-19 due to financial strain (COVID-19 presenteeism). Individuals in services and sales were most likely to report intended COVID-19 presenteeism (39.5%) followed by technicians and associate professionals (38.6%). Individuals who reported intended COVID-19 presenteeism versus individuals who did not report intended COVID-19 presenteeism were younger (median age 32 [SD 9.4] vs 36 [SD 9.5], $P=0.031$), less likely to report an income higher than \$90,000 (9.2% vs 22.9%, $P=0.004$), less likely to have health insurance (79.0% vs 89.6%, $P=0.031$), more likely to be worried about having enough food (61.8% vs 34.0%, $P<0.001$), and less likely to have a child in the household (30.3% vs 46.5%, $P=0.020$) (Table 1).

Unadjusted associations between exposure variables and covariates are shown in Table 2. Every one year increase in age was associated with a 4% decrease in odds of COVID-19 presenteeism ($P=0.007$). A number of socioeconomic factors were associated with COVID-19 presenteeism in unadjusted analyses. As compared with a salary of less than \$35,000, individuals who made \$35,000 to \$90,000 and individuals who made more than \$90,000 had 51% ($P=0.033$) and 80% ($P=0.002$) lower odds of COVID-19 presenteeism, respectively. Individuals with insurance versus no insurance had 56% lower odds of COVID-19 presenteeism ($P=0.034$), individuals who were worried about having enough food versus not worried had 314% higher odds of COVID-19 presenteeism ($P<0.001$). Individuals with at least one child in the household versus no children had 50% lower odds of COVID-19 presenteeism ($P=0.021$).

At a significance level of $P=0.20$, the backwards stepwise logistic regression model included age, income, government assistance, and worry about food (Table 2). Adjusted regression estimates showed that younger individuals and individuals who made more than \$90,000 (vs individuals who made less than \$35,000) had lower odds of reporting COVID-19 presenteeism. Having at least one child in the household was correlated with having an income more than \$90,000, which may explain why it was no longer significant in adjusted models. The influence of age and income did not greatly attenuate the relationship between worry about food and intended COVID-19 presenteeism; individuals who were worried about having enough food had 300% higher odds of reporting COVID-19 presenteeism in adjusted analyses ($P<0.001$). Findings

TABLE 1. Characteristics of Total Study Population and by Intention to Work While Sick With COVID-19, March 2020 (N = 220)

	Overall (N = 220)		No COVID-19 Presenteeism (N = 144)		COVID-19 Presenteeism (N = 76)		P
	N	%	N	%	N	%	
Age, median (SD)	35	(9.6)	36	(9.5)	32	(9.4)	0.031
Sex							0.971
Male	127	57.7	83	57.6	44	57.9	
Female	93	42.3	61	42.4	32	42.1	
Race							0.281
White	176	80.0	118	81.9	58	76.3	
Black	15	6.8	7	4.9	8	10.5	
Other	29	13.2	19	13.2	10	13.2	
Education							0.101
Some college or less	102	46.4	61	42.4	41	54.0	
Bachelor's or more	118	53.6	83	57.6	35	46.1	
Income							0.004
≤35k	49	22.3	24	16.7	25	32.9	
35k–90k	131	59.6	87	60.4	44	57.9	
≥90k	40	18.2	33	22.9	7	9.2	
Occupation							0.649
Manager	39	17.7	25	17.4	14	18.4	
Professional	47	21.4	33	22.9	14	18.4	
Technician & Associate Professional	44	20.0	27	18.8	17	22.4	
Clerical support	13	5.9	9	6.3	4	5.3	
Services & Sales	38	17.3	23	16.0	15	19.7	
Craft & Related Trade	4	1.8	2	1.4	2	2.6	
Plant & Machine	16	7.3	13	9.0	3	4.0	
Elementary Occupation	3	1.4	3	2.1	0	0.0	
Unknown	16	7.3	9	6.3	7	9.2	
Essential worker*							0.578
No	107	51.4	72	50.0	35	46.1	
Yes	113	48.6	72	50.0	41	54.0	
Pre-existing condition†							0.702
No	166	75.8	108	75.0	58	77.3	
Yes	53	24.2	36	25.0	17	22.7	
Health insurance							0.031
No	31	14.1	15	10.4	16	22.0	
Yes	189	85.9	129	89.6	60	79.0	
Government assistance							0.440
No	197	90.0	127	88.8	70	92.1	
Yes	22	10.1	16	11.2	6	7.9	
Worried about food							<0.001
No	124	56.4	95	66.0	29	38.2	
Yes	96	43.6	49	34.0	47	61.8	
≥1 child in household							0.020
No	130	59.1	77	53.5	53	69.7	
Yes	90	40.9	67	46.5	23	30.3	

*Includes individuals who reported direct patient care in the medical field and individuals who reported work outside their home when a stay-at-home order was enacted in the individuals state at the time of their response.

†Includes self-report of respiratory conditions, diabetes, cancer, HIV/AIDS, Hepatitis C, heart disease, and/or high blood pressure. SD, standard deviation.

Bold values indicate a P < 0.05.

were stable when the response of “neither agree nor disagree” to COVID-19 presenteeism was instead recoded as “yes” in the binary outcome variable. No variables demonstrated a variance inflation factor above 1.25.

DISCUSSION

An intention to work when sick from COVID-19 due to financial strain is an understudied prevention behavior in the COVID-19 pandemic. Among this study population of working US residents, 34.5% of people reported they would still work when they felt a little sick from COVID-19 due to financial strain, and findings from this study suggest that workplaces and labor protections should be central to COVID-19 response plans.

Younger individuals and individuals making more than \$90,000 per year were less likely to report COVID-19 presenteeism. In adjusted analyses, individuals who were worried about having enough food had 3-fold higher odds of reporting intended COVID-19 presenteeism, suggesting perceived food security may be a driver COVID-19 transmission. While this most directly impacts workplace transmission, COVID-19 presenteeism also puts workers’ families and communities at risk. This impact of transmission beyond the workplace may be larger for individuals of lower SES because they are more likely to use public transportation,²⁷ live crowded housing conditions,²⁸ and/or have caregiving responsibilities.²⁹ The finding on COVID-19 presenteeism demonstrates a potential pathway as to why COVID-19 is

TABLE 2. Unadjusted and Adjusted Odds of Intention to Work While Sick With COVID-19, March 2020 (N = 220)

	OR	95% CI	P	aOR*	95% CI	P
Age, median (SD)	0.96	0.93, 0.99	0.007	0.97	0.94, 1.00	0.043
Sex						
Male	REF					
Female	0.99	0.56, 1.74	0.971			
Race						
White	REF					
Black	2.33	0.80, 6.72	0.119			
Other	1.08	0.47, 2.45	0.871			
Education						
Some college or less	REF					
Bachelor's or more	0.63	0.36, 1.10	0.102			
Income						
≤35k	REF			REF		
35k–90k	0.49	0.25, 0.95	0.033	0.56	0.27, 1.14	0.111
≥90k	0.20	0.08, 0.55	0.002	0.28	0.10, 0.81	0.018
Occupation [†]						
Manager	REF					
Professional	0.76	0.31, 1.87	0.548			
Technician & Associate Professional	1.12	0.46, 2.74	0.797			
Clerical support	0.79	0.21, 3.05	0.737			
Services & Sales	1.16	0.46, 2.93	0.746			
Craft & Related Trade	1.79	0.23, 14.1	0.582			
Plant & Machine	0.41	0.10, 1.70	0.220			
Essential worker [‡]						
No	REF					
Yes	0.85	0.49, 1.50	0.578			
Pre-existing condition [§]						
No	REF					
Yes	0.88	0.45, 1.70	0.702			
Health insurance						
No	REF					
Yes	0.44	0.20, 0.94	0.034			
Government assistance						
No	REF			REF		
Yes	0.68	0.25, 1.82	0.442	0.46	0.16, 1.31	0.144
Worried about food						
No	REF			REF		
Yes	3.14	1.76, 5.60	>0.001	3.00	1.63, 5.52	>0.001
≥1 child in household						
No	REF					
Yes	0.50	0.28, 0.90	0.021			

*Adjusted odds were calculated using a backwards stepwise logistic regression with a P-value of 0.20 for model removal.

[†]Missing not included. Elementary occupation predicted report of still working perfectly and was not included (N = 3).

[‡]Includes individuals who reported direct patient care in the medical field and individuals who reported work outside their home when a stay-at-home order was enacted in the individuals state at the time of their response.

[§]Includes self-report of respiratory conditions, diabetes, cancer, HIV/AIDS, Hepatitis C, heart disease, and/or high blood pressure.

SD, standard deviation.

Bold values indicate a P < 0.05.

disproportionately impacting low income communities and communities of color.

The particularly strong impact of worrying about having enough food suggests that food security is a primary concern for individuals and may result in COVID-19 presenteeism. The United States Department of Agriculture (USDA) estimated that 10.5% of US households were food insecure at some point in 2019.³⁰ A nationally-representative survey using the same USDA measures estimated that the prevalence of food insecurity more than tripled to 38% in March of 2020.³¹ Food insecurity has been associated with elevated rates of mental health issues,³² diabetes, hypertension,³³ and higher all-cause mortality³⁴ and is a critical point of intervention. To address increased food insecurity, the FFCA increased Supplemental Nutrition Assistance Program (SNAP) benefits for adults without children, added benefits to adjust for children no longer receiving free or reduced school lunch, and allowed states to

increase individual's benefits to the maximum benefit level.¹⁷ While these provisions may have mitigated food security issues to some extent, these provisions are temporary, do not apply to those ineligible for SNAP, and don't increase benefits for those already receiving maximum benefits who are likely in greatest need of additional support. The unknown duration of these expanded benefits may reduce their impact on COVID-19 presenteeism due to concerns about their future reduction or elimination.

The prevalence of food insecurity and the association between food insecurity and COVID-19 presenteeism demonstrated here suggests some COVID-19 prevention efforts should increase the accessibility and affordability of food as a humanitarian act as well as a COVID-19 prevention activity. Addressing this singular mechanism, however, is not likely to reduce the burden of COVID-19 overall or the disproportionate burden of COVID-19 among low income communities and communities of color. COVID-19 prevention efforts

should also focus on increasing worker protections comprehensively. Current Occupational Safety and Health Administration guidelines on the provision of PPE for workers, disinfection protocols, easy access to free COVID-19 testing, and breaks for staff to wash hands should be required, not recommended in order to protect essential workers better and reduce the likelihood of workplace transmission.³⁵ More broadly, federally mandated paid sick leave should be provided to all essential workers and their families, and current loopholes restricting eligibility to federal paid sick leave in the FFCA should be closed.

Trends from the H1N1 suggest this approach to workplace wellness would reduce workplace transmission and disease incidence overall.¹² One agent based model suggested that providing employees two sick days designated for the flu reduced workplace infections by 39%.³⁶ Data on flu vaccination rates suggest that paid sick leave could also increase vaccination rates once a COVID-19 vaccine is available.³⁷ Labor rights that protect an individual against punitive action for taking sick leave would also be necessary to reduce the likelihood that individuals will feel compelled to work when sick, especially during periods of high unemployment.³⁸ Although these worker protections are crucial during active COVID-19 transmission, COVID-19 has only highlighted long-standing health disparities in the United States and demonstrated a broader need to improve the scope of workplace and social policies to address vulnerabilities of individuals of lower SES. Sustainable and systemic solutions that guarantee paid sick leave beyond the COVID-19 pandemic will increase preparation for a future health crisis and provide protection for other infectious disease outbreaks. Especially in times of financial crisis such as the COVID-19 pandemic, a hybrid model of employer mandates and federal government coverage for paid sick leave may be pertinent in order to reduce the financial burden on individual employers, as demonstrated by hybrid guaranteed sick leave policies in many European countries such as Norway and Spain.¹⁵

One limitation of this analysis is that the study population was majority non-Hispanic white, preventing detailed analyses of racial differences within and between levels of socioeconomic status. While this is typical in other crowdsourcing samples,²¹ understanding the mechanisms underlying racial health disparities in COVID-19 is crucial to effective COVID-19 policymaking. Additionally, the outcome assessed is a subjective measure of an intention to still work when sick from COVID-19 due to financial strain. Future research should assess documentation of continued work after a positive COVID-19 diagnosis. Further, we relied on self report to define the study population as individuals working outside of their home, and we classified occupational and essential worker categories manually. Individuals may have been misclassified. We followed best practices guidelines for data collection to enhance the survey validity and included validity checks in the survey, but it is possible that survey questions were answered inattentively and are subject to social desirability bias, compromising internal validity. There is no indication however, that MTurk participants are more likely to engage in disingenuous behavior than other convenience sample participants.³⁹

This analysis demonstrates that worrying about food may be linked to individuals continuing to work when sick from COVID-19. This finding suggests a need for improved quality, coverage, and access to federal benefits around food access and paid sick leave, and increased worker protections to reduce COVID-19 transmission and health disparities. While these specific policies are most important during active COVID-19 transmission, maintaining expanded labor protection policies beyond the COVID-19 pandemic will prevent workplace transmission of other infectious diseases and begin to address some of the fundamental causes of current racial and socioeconomic health disparities in other chronic and infectious diseases. Further research is needed to understand how individuals

of low socioeconomic status and of color may experience compounding structural barriers to adhere to COVID-19 social distancing guidelines. Research into the current use of expanded social and workplace benefits and barriers to their use would improve the reach of these policies and the likelihood that those in greatest need are aware and able to access them.

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