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RESEARCH ARTICLE

COVID-19 disruption to routine behaviours and effects on mental health

Melissa L. Finucane[a,b], Samer Atshan[c], Andrew M. Parker[a], Katherine Carman[d], Kathleen Mullen[e] and Philip Armour[c]

[a]*Department of Behavioral and Policy Sciences, RAND Corporation, Pittsburgh, PA, USA;* [b]*Office of Science and Innovation, Union of Concerned Scientists, Washington, DC, USA;* [c]*RAND School of Public Policy, RAND Corporation, Santa Monica, CA, USA;* [d]*Department of Economics, Sociology, and Statistics, RAND Corporation, Santa Monica, CA, USA;* [e]*Department of Economics, University of Oregon, Eugene, OR, USA*

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Abstract

The SARS-Cov-2 (COVID-19) pandemic has had enormous psychological and economic impacts around the globe. Early responses to the pandemic, including different forms of quarantine and social/physical distancing led to new workforce, educational, and mobility patterns. Such changes placed many people at greater risk of poor mental health. Maintenance of behavioural routines may buffer the impacts of stress on mental health. However, relationships between disruptions to routines and mental health outcomes during the pandemic – or how these relationships are moderated by changes in workforce participation – have been understudied. This article describes the development and implementation of an index of disruptions to routine behaviours during the COVID-19 pandemic in a national, probabilistic sample in the United States. We hypothesised and found that reported experience of the COVID-19-related disruptions to routines was associated with higher levels of psychological distress. We also hypothesised and found that individuals' work status affected their ability to weather their experiences of the pandemic. In practical terms, the findings suggest that different types of support – from mental health support, to financial support, to help (re)establishing a routine – might be needed for different people, depending on the types of disruptions experienced.

Keywords: COVID-19 pandemic; disruption; mental health; employment; longitudinal study

1. Introduction

From the outset of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 or COVID-19) pandemic, scholars and practitioners from multiple disciplines anticipated that disruptions to lives and livelihoods would have profound negative impacts on mental health (Holmes et al., 2020). Recommendations to protect against anxiety and depressive

Corresponding author. Email: mfinucane@ucsusa.org

symptoms included support for preserving healthy behavioural routines (McGoron et al., 2022; Pilz et al., 2022) because such routines may serve as a buffer during times of hardship (Couto Pereira et al., 2024). As the pandemic unfolded, widespread and compounded health, social, and economic impacts were observed (Fosco et al., 2022; Hossain et al., 2020; Nicola et al., 2020), with impacts extending, as anticipated, far beyond the direct physical health effects. The consequences of school and work closures reached across domains, affecting mental health, labour supply and demand, financial health, and the global economy (Alfaro et al., 2020; Altig et al., 2020; Cruz-Cárdenas et al., 2021; Davis et al., 2023; Eichenbaum et al., 2021; H. Liu et al., 2024).

The lived experience of the COVID-19 pandemic differed across individuals, depending in part on sociodemographics, natural and built environments, and institutional response capacity (Finucane et al., 2022; Memmott et al., 2021; Menting et al., 2023; Warren et al., 2022; Zacher & Rudolph, 2021). In the United States, as in many national contexts during the pandemic, mental health impacts seemed worse for: women compared with men; those under 60 years of age compared with those over 60; Hispanics compared with other racial/ethnic groups; poorer compared with wealthier households; and people living in the South of the United States compared to those in the New England region (Breslau et al., 2020; Ettman et al., 2020; McGinty et al., 2020; Prowse et al., 2021). The social distancing responses during the pandemic may have affected disproportionately people already struggling emotionally (Armitage & Nellums, 2020; Brooks et al., 2020; Caroppo et al., 2021). Additional stress may have come from financial loss or uncertainty, juggling childcare or eldercare and working from home, or lack of access to vaccines or other health-care resources. These observations are consistent with findings from research on prior disasters and downturns (B. D. Meyer & Sullivan, 2013; Quarantelli, 2000; Wisner et al., 2004).

In this article, we conceptualise the pandemic's impacts as a form of 'routine disruption,' that is, a disaster that prevented individuals from undertaking routine behaviours (Parks et al., 2018). Routine behaviours are purposeful, repetitive patterns of tasks or procedures performed (consciously or subconsciously) in particular situations or at predictable times (Banovic et al., 2016; Hamermesh, 2004; Zisberg et al., 2007). Specifically, we seek to understand the extent to which individuals were prevented from engaging in routine behaviours due to the pandemic, and how the disruption may directly or indirectly affect mental health.

1.1. Theoretical foundations

1.1.1. Risk responses and routine

Theories of risk perception and behavioural decision making under uncertainty describe a complex interplay of factors that guide people's assessment of and responses to risk, including characteristics of individuals, the nature of the risk event, information complexity and availability, and social and cultural elements (Cutter et al., 2008; Douglas & Wildavsky, 1982; Finucane et al., 2000; Kasperson et al., 1988; Lerner & Keltner, 2001; Loewenstein et al., 2001; Slovic, 2013; Slovic et al., 2004). These factors' independent and interactive effects result in diverse reactions to risk, which become particularly apparent when people experience major disruptive events (e.g., a socio-ecological disaster such as a hurricane or an oil spill; a personal health crisis such as a chronic illness; a severe economic downturn such as the Great Recession; or global public health disaster such as a pandemic). Prior research emphasises that such major disruptive events are

processes that unfold over time and result in a breakdown of individual or collective routines (Brunsma & Picou, 2008; Quarantelli, 2000; Quarantelli & Dynes, 1977; Smith & Wenger, 2007).

Some social theorists (Beck, 1992; Beck et al., 1994; Bury, 1982; Giddens, 1984; 1991) suggest that routine in daily life is a mechanism by which people can increase their sense of stability and security. Routinisation through predictable and repetitive actions, thoughts, or feelings offers a way to mitigate life's uncertainties and the associated negative outcomes that are normally only seen as distant possibilities. Routines are often embedded in social structures that shape collective risk perceptions and responses because societal norms and institutional practices influence how risk is recognised, communicated, and managed (Kasperson et al., 1988; 2022).

Importantly, the concept of reflexive modernisation (Beck et al., 1994) suggests that modern societies are increasingly characterised by self-awareness and self-critique. That is, institutions and individuals have become more aware of the risks produced by modernisation itself and continuously monitor and adjust their practices in response to new information and changing circumstances. Reflexivity is greatest in the face of crises because people become aware of discontinuities or violations of socially sanctioned or taken-for-granted assumptions and behaviours (Akram & Hogan, 2015). Additionally, crises may lead to profound re-thinking of personal explanatory systems such as an individual's biography or self-concept (Bury, 1982). When social or biographical practices stop working at a collective or individual level, significant consequences for people's daily lives may emerge (Giddens, 1984; Locock & Ziébland, 2015). Naturally, threats to personal or social aspects of identity are highly emotionally charged because predictability is central to psychological security and wellbeing. The loss of daily routines may be coupled with stress-based responses and negative mental health impacts over time (Cummins et al., 2003; Giddens, 1984; Hogan, 2001; Hogan et al., 2011).

1.1.2. Disruption and distress

The extent to which a crisis or disaster disrupts functioning depends on people's 'capacity to anticipate, cope with, resist, and recover' from the disaster impacts (Wisner et al., 2004, p. 11). Drawing on the conservation of resources (COR) theory, disruption to routines represents a loss of socio-economic resources (i.e., social or economic conditions that facilitate access to resources such as money, status, or shelter) that people usually draw upon to buffer life challenges. The COR model highlights how psychological stress can arise from the loss, threat of loss, or investment without return in such resources (Hobfoll, 1989; 2001; Hobfoll & Lilly, 1993). These losses need to be offset by other types of resources and chronic loss of (or threat to) these resources may result in a cycle where meeting the ongoing demands of stress is increasingly difficult (Halbesleben et al., 2014; Hobfoll, 1989; 2001).

A growing body of research suggests that individuals with lower levels of – or lower access to – socio-economic resources during the COVID-19 pandemic experienced more disruptions in their daily routines and this was related to higher levels of symptoms of mental disorders (Chirico et al., 2021; H. Liu et al., 2024). Additionally, empirical research on the impact of the pandemic on people's working lives demonstrates that disruptions were a predictor of stress, disengagement, and lower job satisfaction (Mockaitis et al., 2022). There is long-standing acceptance that psychometrically

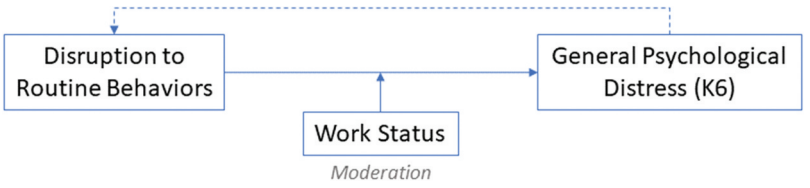

Figure 1. Conceptual model of links between disruption to routine behaviors, mental health, and work status.

validated quantitative measures of psychological distress (including anxiety and depressive symptoms) are linked with a range of adverse physical and mental health outcomes (Drapeau et al., 2012; Winefield et al., 2012; Zhu et al., 2022).

1.1.3. Variance in work demands and resources

At the beginning of the COVID-19 pandemic workers experienced significant change in their working conditions (Gómez et al., 2020; Kraft et al., 2021; Zoch et al., 2021). The increased work demands related to the pandemic are widely reported, including working from home, closing of childcare facilities, job insecurity, work-privacy conflicts, and longer hours (B. Meyer et al., 2021). However, work demands and resources vary across people (Bakker & Demerouti, 2017), with some people more able than others to address stress by minimising resource losses or accumulating resources to offset possible future losses (Lazarus & Folkman, 1984; Salmela-Aro & Upadyaya, 2018).

The changes that workers experienced during the COVID-19 pandemic depended on what industry people worked in and the nature of their work. Workers who were unable to perform their jobs in their workplaces and could not work from home, were likely to be laid off or become unemployed. The loss of employment and earnings directly impacted their financial well-being, which could lead to financial stress and diminished sense of self-worth, both of which may also impact their mental health (Leana et al., 1998; Parks et al., 2018).

Workers considered ‘essential’ and remaining at their place of work may have experienced increased stress resulting from longer working hours, increased interactions with upset or anxious customers, and concerns about increased exposure to infection. Workers who could work from home likely faced changes in their physical working space, modality of communication with co-workers, and need to juggle work with childcare responsibilities, given the concurrent closure of schools. Even where the restrictions were relatively short-lived, such dramatic changes in working conditions could result in long-term effects to future employment and earnings (Antonji et al., 2016; K. Liu et al., 2016; Oreopoulos et al., 2012) and associated negative mental health impacts (Llena-Nozal, 2009; Strazdins et al., 2011). Disruption of routine behaviours also could differ across these groups: those who continued to work outside the home may have experienced little change in their routine behaviours, while those who lost their jobs or suddenly found themselves working from home may have experienced a greater change.

Based on the theoretical and empirical work described above, we depict in Figure 1 a conceptual framework showing the potential moderating effect of work status on the relationship between pandemic-related disruption to routine behaviours and mental health.

1.2. Research questions

Based on the extant literature, this research addresses three main questions:

(1) What individual differences exist in the extent to which people have been prevented from engaging in routine behaviors?
(2) Is disruption to routine behaviours associated with worse mental health, holding all else constant?
(3) To what extent does work status moderate the relationship between disruption and mental health?

We hypothesised that the reported experience of the COVID-19-related disruptions to routines in our sample would be associated with higher levels of psychological distress. We also hypothesised that individuals' work status (essential worker at workplace; essential worker remote; unemployed) would affect residents' ability to weather their experiences of the pandemic.

This study uses a correlational design. Consequently, we are limited in the potential conclusions we can make about direct causal linkages between the predictor variable (disruptions) and dependent variable (general psychological distress). However, our data include longitudinal assessments, measuring distress pre-pandemic. Including this pre-measure allows us to model change and account for potential endogeneity (i.e., correlation between the predictor variable and the error term).

2. Methods

2.1. Data

Data in this study come from two national surveys collected through a probability-sampled online panel, RAND's American Life Panel (Pollard & Baird, 2017; Carman & Nataraj, 2020). All panel members update basic socioeconomic and demographic characteristics on a quarterly basis. Beginning in June 2020, we began longitudinal data collection to better understand the impacts of the pandemic. In total, 8 waves of data were collected, and we draw on the first wave, from June 2020 for this paper. Panel members were recruited for the wave 1 survey if they had reported during the demographics update that they were employed in February 2020. Participation rate for the wave 1 survey was 87%, with a total of 1,137 responses; 4 participants were dropped for missing data, resulting in a final sample of 1,133 responses. Because respondents were already participating in the American Life Panel, we are able to link their responses to data collected from an earlier survey fielded between February and April 2019, which included a 6-item Kessler index of mental health preceding the onset of the pandemic, and refer to this as the 'baseline' survey. Not all respondents who participated in the 2020 survey participated in the prepandemic baseline survey. Therefore, prepandemic mental-health levels were missing for 92 participants in the 2020 survey. The analysis in this paper uses the sub-sample which has complete information on respondents during and before the pandemic ($N = 1{,}041$). Characteristics for this sub-sample are provided in Table 1. (Characteristics for the full sample of all 1,133 respondents in the 2020 wave 1 survey are provided in the Supplementary, Table S1). There were no significant differences between the characteristics for the sample that took the 2020 wave 1 survey ($n = 1{,}133$) and the final sub-sample with complete data across the 2020 wave 1 and 2019 baseline surveys ($n = 1{,}041$).

Table 1. Characteristics of subsample that includes only respondents with complete data.

Respondent characteristics	Subsample (N = 1,041)
Female, n (%)	476 (46%)
Age, mean (SD)	54 (13)
Hispanic, n (%)	139 (13%)
Race, n (%)	
White	827 (79%)
Asian	42 (4.0%)
Black	93 (8.9%)
Other	79 (7.6%)
Married, n (%)	628 (60%)
Education, n (%)	
High School or Less	112 (11%)
Some College	329 (32%)
Bachelors or more	600 (58%)
Family Income, n (%)	
Less than $20,000	67 (6.4%)
$20,000–$39,999	162 (16%)
$40,000- $74,999	302 (29%)
$75,000 or more	510 (49%)
Own children in household, n (%)	322 (31%)
Work Status in June, n (%)	
Leavers	317 (30%)
Mixed	197 (19%)
Stayers	310 (30%)
Unemployed	149 (14%)
Did not work in the past week	68 (6.5%)
Disruption Index, mean (SD)	9.2 (5.2)
D1: Interacting with friends, mean (SD)	2.19 (1.15)
D2: Daily chores, mean (SD)	0.94 (1.06)
D3: Doing usual job, mean (SD)	1.36 (1.30)
D4: Taking care of family, mean (SD)	0.99 (1.14)
D5: Planning future, mean (SD)	1.72 (1.29)
D6: Imagining return to normal, mean (SD)	1.96 (1.24)
General Psychological Distress Early Pandemic (K-6), mean (SD)	4.6 (4.5)
General Psychological Distress Prepandemic K-6, mean (SD)	4.3 (4.7)

Respondents completed informed consent protocols before completing the surveys, approved by RAND's Human Subjects Protection Committee. Surveys, questionnaires and datasets are available publicly (RAND ALP surveys 520 and 551; https://alpdata.rand.org/).

2.2. Measures

2.2.1. Disruption to routine behaviors

We developed a new 6-item measure to assess disruption to routine behaviours. Our measure adapted a measure by Parks et al. (2018) that was developed originally to assess disruption of routine behaviours in the context of the Deepwater Horizon Oil Spill. Four of the items (D1-D4) in our measure were similar to items in the Parks et al. measure and two items (D5-D6) were developed de novo. We asked respondents to rate the extent to which, during the past 30 days, the COVID-19 outbreak prevented

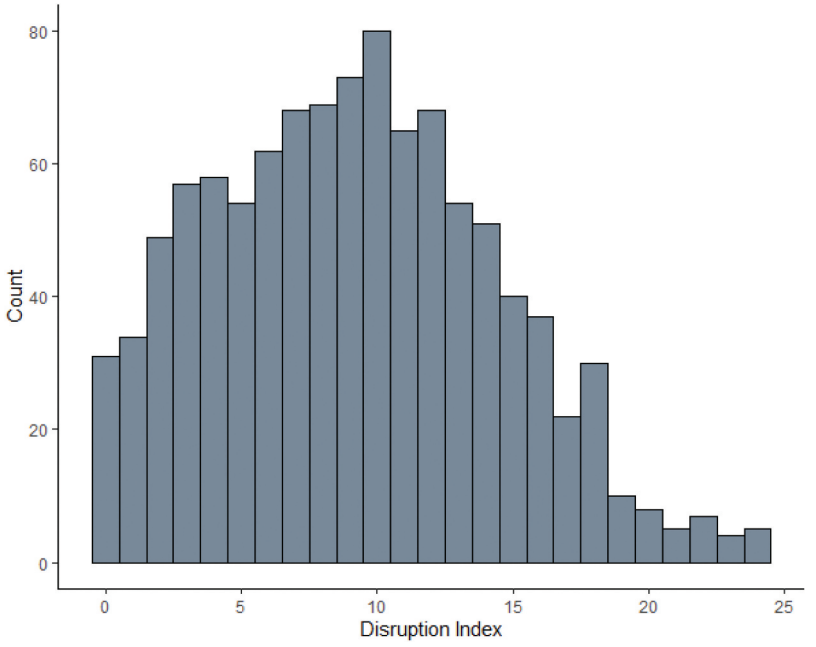

Figure 2. Unweighted histogram of the disruption index.

them from engaging in six routine behaviours: (D1) Interacting with friends, (D2) taking care of usual daily chores, (D3) doing usual job or other tasks, (D4) being able to take care of family or other dependents, (D5) planning for the future, and (D6) imagining a return to 'normal life' in the future. The response scale for all items was: not at all (0), a little (1), somewhat (2), very much (3), totally (4). Each respondent's

Table 2. Correlations between disruption index items.[a]

	D1: Interacting with friends	D2: Taking care of chores	D3: Doing usual job	D4: Taking care of family	D5: Planning future	D6: Imagining return to normal
D2: Taking care of chores	0.35					
D3: Doing usual job	0.36	0.54				
D4: Taking care of family	0.30	0.56	0.45			
D5: Planning future	0.40	0.40	0.43	0.46		
D6: Imagining return to normal	0.38	0.40	0.41	0.41	0.61	
Disruption Index	0.64	0.74	0.74	0.72	0.77	0.74

[a]These correlations are calculated using the subsample ($N = 1{,}041$) with complete data for the 2019 baseline survey

ratings for the six items were summed to create a disruption index (Cronbach's $\alpha = 0.82$) ranging from 0 to 24, with higher values indicating more disruption. Figure 2 shows the distribution of disruption index. (The last column of Table A2 in the Appendix shows means and standard deviations for each disruption item for the weighted subsample, N = 1,041). Correlations between individual items were moderately high as shown in Table 2.

2.2.2. Mental health

To assess mental health during the pandemic in the wave 1 survey, we use the Kessler-6 (K-6), a six-item measure designed to identify psychological distress through clinically significant mental health conditions. Each item asks about the frequency (all of the time, most of the time, some of the time, a little of the time, and none of the time) of experiencing mental health symptoms *during the past 30-days* (Kessler et al., 2002; 2003). Responses to these six items are summed to create an index of psychological distress (Cronbach's $\alpha = 0.90$) ranging from 0 to 24, with higher values indicating more distress. The prepandemic K-6 measure collected in the 2019 baseline survey differed slightly in wording from the wave 1 survey K-6 measure. While the six items and the response scale remained the same in the two surveys, respondents in 2019 were asked to consider their experiences during their *worst month* in the past year rather than in the last 30 days. Consequently, the 2019 data are used only as a control in multivariate regression, rather than directly comparing the pre- and during-pandemic measures (i.e., a difference score could not be calculated).

2.2.3. Work status

Work status was based on reported employment status and work-from-home status. To determine employment status, participants in the June 2020 wave 1 survey were asked to report changes to their employment situation since February 2020, by indicating whether they are working in the same job they previously had, and whether they had started to do any new work for pay. To determine work-from-home status, participant responses to two statements about working from home during the pandemic were evaluated: (1) 'In the past 7 days, on how many days did you leave your home to do your MAIN job?' and (2) 'In the past 7 days, how many days have you worked from home for your MAIN job?'. Work status was then coded as follows:

- Stayers: Participants who indicated they were working with days leaving their home for work being zero while days reported working from home is one or more.
- Leavers: Participants who indicated they were working with days working from home being zero while days reported leaving their home for work is 1 or more.
- Mixed: Participants who indicated they were working with mixed number of days working from home and leaving their home for work (both more than zero).
- Did not work in the past week: Participants who indicated they were working but have reported 0 on both the number of days worked from home and the number of days they've left home in the past 7 days.
- Unemployed: Participants who reported they no longer working in the same job they had, and they have not started to do any new work.

2.2.4. Control variables

The ALP provided regularly updated background characteristics including eight questions about sociodemographic characteristics, measured in March of 2020. These included respondent's age, gender (1 = Male), marital status (1 = Married or living with a partner; 0 = Divorced, widowed, separated or never married), race (White; Black; Asian; Other) and ethnicity (1 = hispanic), education (high school, GED or Less; some college, bachelors or more), and family income (Less than $20,000; $20,000–$39,999; $40,000 – $74,999; $75,000 or more)

2.3. Statistical analysis

Descriptive statistics, statistical tests, and regressions were all conducted in R 4.2.1. Population statistics reported in the text use sampling weights generated to account for non-response and match the sample demographics to the 2019 Current Population Survey with respect to age, gender, race/ethnicity, household income, household size, and education following the method described in Pollard and Baird (2017).

To assess the association between work status and disruption, we conduct linear regression analysis, first using the disruption index as the dependent variable, followed by models for each of the items about disruptions to routine behaviours. All regression models also include sociodemographic variables as controls.

To assess the association between disruption and psychological distress, we conducted linear regression analysis with the K-6 index as a dependent variable and disruption and work status as independent variables. We also include pre-pandemic K-6 levels as an independent variable to help reduce omitted variable bias. We examine whether the association between disruption and psychological distress at the beginning of the pandemic was moderated through work status by fitting an additional model with K-6 as the dependent variable and an additional interaction term between work status and the disruption index. A significant interaction term would suggest that the association between disruption and K-6 varies across different work status groups. Finally, since K-6 is a right-skewed index variable, we repeated regressions with K-6 as a dependent variable using a negative binomial specification as a robustness check.

3. Findings

3.1. Overview of demographics, mental health, and disruptions index by work status

Several demographic characteristics significantly differed across the different types of Work Status, as shown in Table 3.

The median (and interquartile range) for Prepandemic K-6, Early Pandemic K-6, and the Disruption Index for each type of work status are shown in Table 4. A Kruskal-Wallis rank sum test revealed a significant difference by Work Status for the Early Pandemic K-6 scores and Disruption Index, but not for Prepandemic K-6 scores. Compared with the other groups, the Leavers revealed lower median Early Pandemic K-6 and Disruption Index scores.

The pairwise correlation between the Prepandemic K-6 and Early Pandemic K-6 is 0.56; the correlation between the Prepandemic K-6 and Disruption Index is 0.23; and the correlation between the Early Pandemic and Disruption Index is 0.45.

Table 3. Demographic characteristics by work status.

Characteristic	Work status					
	Leavers (N = 317)	Mixed (N = 197)	Stayers (N = 310)	Unemployed (N = 149)	Did not work in the past week (N = 68)	p-value[a]
Female, n (%)	157 (50%)	91 (46%)	142 (46%)	59 (40%)	27 (40%)	0.3
Age, mean (SD	54 (12)	54 (12)	54 (14)	57 (12)	56 (13)	0.006
Hispanic, n (%)	52 (16%)	21 (11%)	34 (11%)	20 (13%)	12 (18%)	0.2
Race, n (%)						0.4
White	252 (79%)	163 (83%)	245 (79%)	114 (77%)	53 (78%)	
Asian	7 (2.2%)	8 (4.1%)	18 (5.8%)	7 (4.7%)	2 (2.9%)	
Black	30 (9.5%)	18 (9.1%)	24 (7.7%)	13 (8.7%)	8 (12%)	
Other	28 (8.8%)	8 (4.1%)	23 (7.4%)	15 (10%)	5 (7.4%)	
Married, n (%)	181 (57%)	139 (71%)	190 (61%)	77 (52%)	41 (60%)	0.005
Own children in household, n (%)	109 (34%)	62 (31%)	90 (29%)	40 (27%)	21 (31%)	0.5
Education, n (%)						<0.001
High School or Less	55 (17%)	13 (6.6%)	7 (2.3%)	27 (18%)	10 (15%)	
Some College	148 (47%)	45 (23%)	65 (21%)	52 (35%)	19 (28%)	
Bachelors or more	114 (36%)	139 (71%)	238 (77%)	70 (47%)	39 (57%)	
Family Income, n (%)						<0.001
Less than $20,000	23 (7.3%)	7 (3.6%)	7 (2.3%)	23 (15%)	7 (10%)	
$20,000–$39,999	62 (20%)	23 (12%)	26 (8.4%)	42 (28%)	9 (13%)	
$40,000- $74,999	104 (33%)	49 (25%)	76 (25%)	47 (32%)	26 (38%)	
$75,000 or more	128 (40%)	118 (60%)	201 (65%)	37 (25%)	26 (38%)	

[a]p-values obtained from comparing percentages across work status groups using Pearson's Chi-squared test for categorical variables and Kruskal-Wallis rank sum test for age.

Table 4. Median (and interquartile range) for general psychological distress (K-6) prepandemic and early pandemic, and the disruption index for each type of work status.

	Work status					
	Leavers, N = 317[a]	Mixed, N = 197[a]	Stayers, N = 310[a]	Unemployed, *N* = 149[a]	Did not work in the past week, N = 68[a]	*p*-value[b]
Prepandemic K-6	2.0 (0.0, 6.0)	3.0 (1.0, 6.0)	3.0 (1.0, 6.0)	3.0 (1.0, 8.0)	2.0 (0.0, 6.2)	0.4
Early Pandemic K-6	2.0 (1.0, 6.0)	4.0 (1.0, 6.0)	3.0 (1.0, 6.0)	4.0 (2.0, 8.0)	3.0 (1.0, 7.0)	0.005
Disruption Index	7.0 (4.0, 11.0)	10.0 (6.0, 13.0)	9.0 (6.0, 12.0)	11.0 (8.0, 15.0)	9.0 (4.0, 13.2)	<0.001

[a]Median (IQR).
[b]Kruskal-Wallis rank sum test.

Table 5. Linear regression analysis predicting the disruption index.

	Disruption index	
Variables (*N*=1041)	Estimate[a]	95% CI[b]
(Intercept)	8.96***	6.65, 11.27
Male	−0.79*	−1.43, −0.16
Hispanic	1.09*	0.02, 2.17
Race		
White	–	–
Asian	0.14	−1.46, 1.74
Black	0.81	−0.32, 1.94
Other	0.32	−1.01, 1.65
Age	−0.02	−0.05, 0.01
Married	−0.15	−0.87, 0.56
Own children living in household	0.51	−0.26, 1.28
Education		
High School or Less	–	–
Some College	0.24	−0.87, 1.35
Bachelors or more	0.55	−0.58, 1.68
Family Income		
Less than $20,000	–	–
$20,000–$39,999	0.32	−1.14, 1.78
$40,000- $74,999	−0.79	−2.21, 0.62
$75,000 or more	−0.71	−2.19, 0.76
Work Status in June		
Leavers	–	–
Mixed	2.01***	1.08, 2.94
Stayers	1.41**	0.57, 2.26
Unemployed	3.44***	2.43, 4.45
Did not work in the past week	1.52*	0.19, 2.86
Adjusted R^2	0.068	

[a]*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
[b]CI = Confidence Interval.

3.2. Disruption to routine behaviors

The first research question asks: What individual differences exist in the extent to which people have been prevented from engaging in routine behaviours? To address this question, we conducted a linear regression with the disruption index as the dependent variable (see Table 5). After adjusting for other socio-demographic variables, overall disruption was significantly more common among females compared to males (β = −0.79, 95% CI = −1.43, −0.16), and Hispanic compared to non-Hispanics (β = 1.09, 95% CI = 0.02, 2.17). Disruption levels also differed among work status groups. Compared to the Leavers group, all groups experienced more disruption, with the unemployed group experiencing the most disruption, followed by Mixed, those who did not work in the past week, and Stayers. Given the prevalence of disruption among the population (mean = 9.2, SD = 5.2, range = 0–24), these differences are modest, being considerably less than a standard deviation. (We also ran the linear regression analysis after excluding item D6 from the disruption index and found the pattern of results unchanged, with the exception that the effect of Hispanic was no longer significant).

Table 6 shows linear regression results for each item in the disruption index. These results indicate that the difference in disruption between males and females were primarily experienced in relation to interacting with friends, planning for the future, and imagining return to normal. Whereas the difference in disruption between Hispanic and Non-Hispanic respondents was primarily experienced in relation to doing daily chores and imagining a return to normal. Unemployed individuals experienced the highest disruption on all 6 items except for doing daily chores. For example, the Unemployed were the least likely to imagine a return to normal compared to the Leavers group (β = 0.47, 95% CI = 0.23, 0.72).

3.2. Mental health

The second research question asks: Is disruption associated with worse mental health, holding all else constant? Table 7 shows linear regression results for three models with mental health as the dependent variable. The first predicts K-6 with covariates and work status; the second adds disruption; and the third adds the interactions between work status and disruption. Table A2 in the Appendix shows the same regressions using a negative binomial specification. Experiencing disruption was significantly associated with worse mental health (Model 2, β = 0.28, 95% CI = 0.24, 0.32). This effect was robust in the negative binomial specification (Model 2, IRR = 1.07, 95% CI = 1.06, 1.08). Age, being in the high-income bracket, and prepandemic levels of mental health were significantly associated with mental health levels despite adjustment for disruption in Model 2. On average, every one-year increase in age was associated with 0.04 improvement on the K-6 mental health score (Model 1, β = −0.04, 95% CI = −0.06, −0.01). The average difference in K-6 between participants in the high-income bracket ($75,000 or more) and those in the low-income bracket (less than $20,000) was 1.35 (Model 1, β = −1.35, 95% CI = −2.32, −0.28). Having a prior history of worse mental health as measured in the 2019 baseline survey was associated with having worse mental health during the pandemic in June 2020 (Model 1, β = 0.49, 95% CI = 0.44, 0.54).

The third research question asks: To what extent does work status moderate the relationship between disruption and mental health? While unemployed participants and participants who stayed home for work experienced worse mental health compared to those who were leaving for work (Model 1), these effects were attenuated upon adjusting for the disruption index (Model 2). The average expected difference in mental health decreased for both groups

Table 6. Linear regression analyses predicting disruption items.

	D1: Interacting with friends		D2: Daily chores		D3: Doing usual job		D4: Taking care of family		D5: Planning future		D6: Imagining return to normal	
Variables (N = 1,041)	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]
(Intercept)	1.93***	1.41, 2.45	0.87***	0.39, 1.34	1.34***	0.77, 1.90	1.39***	0.87, 1.90	1.70***	1.12, 2.28	1.74***	1.18, 2.30
Male	−0.22**	−0.36, −0.07	0.02	−0.11, 0.15	−0.14	−0.30, 0.01	−0.07	−0.22, 0.07	−0.21**	−0.37, −0.05	−0.17*	−0.33, −0.02
Hispanic	0.23	−0.01, 0.47	0.28*	0.06, 0.50	0.13	−0.13, 0.39	0.14	−0.10, 0.38	−0.02	−0.29, 0.25	0.33*	0.07, 0.59
Race												
White	–	–	–	–	–	–	–	–	–	–	–	–
Asian	−0.19	−0.55, 0.17	0.45**	0.12, 0.78	−0.07	−0.46, 0.32	0.12	−0.24, 0.48	−0.07	−0.47, 0.33	−0.10	−0.49, 0.29
Black	−0.06	−0.32, 0.19	0.16	−0.07, 0.39	0.18	−0.10, 0.45	0.33**	0.08, 0.58	0.02	−0.26, 0.31	0.18	−0.09, 0.46
Other	−0.11	−0.41, 0.18	0.21	−0.07, 0.48	0.10	−0.23, 0.42	0.07	−0.23, 0.37	0.02	−0.31, 0.36	0.04	−0.28, 0.36
Age	0.00	−0.01, 0.01	0.00	−0.01, 0.01	0.00	−0.01, 0.00	−0.01	−0.01, 0.00	−0.01	−0.01, 0.00	0.00	−0.01, 0.01
Married	0.03	−0.13, 0.19	−0.11	−0.26, 0.04	0.03	−0.14, 0.21	0.05	−0.11, 0.21	−0.10	−0.28, 0.08	−0.05	−0.23, 0.12
Own children living in household	0.02	−0.15, 0.19	0.07	−0.09, 0.22	0.13	−0.06, 0.32	−0.02	−0.19, 0.15	0.17	−0.03, 0.36	0.15	−0.04, 0.33
Education												
High School or Less	–	–	–	–	–	–	–	–	–	–	–	–
Some College	0.05	−0.20, 0.30	−0.07	−0.30, 0.16	0.05	−0.22, 0.32	0.07	−0.17, 0.32	0.16	−0.12, 0.44	−0.02	−0.29, 0.24
Bachelors or more	0.27*	0.02, 0.53	−0.06	−0.29, 0.17	0.16	−0.11, 0.44	−0.05	−0.31, 0.20	0.18	−0.10, 0.46	0.05	−0.23, 0.32

(*continued*)

Table 6. (*Continued*).

Variables (N = 1,041)	D1: Interacting with friends		D2: Daily chores		D3: Doing usual job		D4: Taking care of family		D5: Planning future		D6: Imagining return to normal	
	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]
Family Income												
Less than $20,000	–	–	–	–	–	–	–	–	–	–	–	–
$20,000–$39,999	−0.15	−0.47, 0.18	0.00	−0.30, 0.30	0.08	−0.28, 0.44	−0.12	−0.44, 0.21	0.22	−0.15, 0.58	0.28	−0.07, 0.64
$40,000- $74,999	−0.21	−0.53, 0.10	−0.28	−0.57, 0.01	−0.26	−0.60, 0.09	−0.24	−0.56, 0.07	0.05	−0.31, 0.40	0.16	−0.18, 0.50
$75,000 or more	−0.07	−0.40, 0.26	−0.22	−0.53, 0.08	−0.23	−0.59, 0.13	−0.32	−0.65, 0.00	0.01	−0.36, 0.38	0.12	−0.24, 0.48
Work Status in June												
Leavers	–	–	–	–	–	–	–	–	–	–	–	–
Mixed	0.27*	0.07, 0.48	0.35***	0.16, 0.55	0.57***	0.34, 0.80	0.27*	0.06, 0.47	0.40***	0.16, 0.63	0.15	−0.08, 0.38
Stayers	0.37***	0.18, 0.56	0.29***	0.12, 0.47	0.05	−0.15, 0.26	0.09	−0.10, 0.28	0.39***	0.17, 0.60	0.22*	0.02, 0.43
Unemployed	0.54***	0.32, 0.77	0.34**	0.13, 0.55	1.12***	0.88, 1.37	0.37**	0.15, 0.60	0.59***	0.34, 0.84	0.47***	0.23, 0.72
Did not work in the past week	0.07	−0.23, 0.37	0.41**	0.13, 0.69	0.39*	0.07, 0.72	0.30*	0.00, 0.60	0.22	−0.11, 0.56	0.13	−0.20, 0.45
Adjusted R^2	0.045		0.046		0.109		0.034		0.038		0.028	

[a]*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
[b]CI = Confidence Interval.

Table 7. Linear regression analyses predicting mental health (K-6) with covariates (model 1), the disruption index (model 2), and interaction of work status by disruption index (model 3).

	Model 1: mental health (K-6)		Model 2: mental health (K-6)		Model 3: mental health (K-6)	
Variables (*N*=1041)	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]
(Intercept)	5.02***	3.26, 6.79	3.23***	1.59, 4.88	3.41***	1.71, 5.11
Male	−0.23	−0.69, 0.23	−0.02	−0.44, 0.41	0.01	−0.42, 0.43
Hispanic	0.65	−0.13, 1.42	0.36	−0.36, 1.07	0.41	−0.31, 1.13
Race						
White	–	–	–	–	–	–
Asian	0.36	−0.79, 1.52	0.24	−0.83, 1.30	0.23	−0.84, 1.29
Black	−0.16	−0.97, 0.66	−0.41	−1.16, 0.34	−0.42	−1.17, 0.33
Other	0.16	−0.80, 1.12	0.03	−0.85, 0.92	0.01	−0.87, 0.90
Age	−0.04**	−0.06, −0.01	−0.04***	−0.06, −0.02	−0.04***	−0.06, −0.02
Married	0.25	−0.26, 0.76	0.25	−0.23, 0.73	0.24	−0.24, 0.71
Own children living in household	−0.28	−0.84, 0.27	−0.41	−0.92, 0.10	−0.41	−0.92, 0.11
Education						
High School or Less	–	–	–	–	–	–
Some College	−0.13	−0.93, 0.67	−0.13	−0.86, 0.61	−0.11	−0.85, 0.63
Bachelors or more	−0.36	−1.18, 0.46	−0.44	−1.19, 0.31	−0.44	−1.20, 0.31
Family Income						
Less than $20,000	–	–	–	–	–	–
$20,000–$39,999	−0.37	−1.42, 0.69	−0.55	−1.52, 0.43	−0.57	−1.54, 0.41
$40,000- $74,999	−0.89	−1.92, 0.13	−0.80	−1.75, 0.15	−0.85	−1.80, 0.10
$75,000 or more	−1.35*	−2.42, −0.28	−1.34**	−2.33, −0.35	−1.37**	−2.36, −0.38
Prepandemic K-6 (2019 baseline)	0.49***	0.44, 0.54	0.42***	0.37, 0.47	0.42***	0.37, 0.47
Work Status in June						
Leavers	–	–	–	–	–	–
Mixed	0.62	−0.05, 1.29	0.06	−0.57, 0.68	−0.42	−1.67, 0.83
Stayers	0.93**	0.32, 1.54	0.54	−0.03, 1.10	−0.06	−1.12, 1.00
Unemployed	1.02**	0.29, 1.74	0.07	−0.61, 0.76	0.02	−1.47, 1.51
Did not work in the past week	0.55	−0.42, 1.51	0.11	−0.78, 1.00	0.87	−0.71, 2.45
Disruption Index			0.28***	0.24, 0.32	0.26***	0.19, 0.33

(*continued*)

Table 7. (*Continued*).

Variables (*N*=1041)	Model 1: mental health (K-6)		Model 2: mental health (K-6)		Model 3: mental health (K-6)	
	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]	Estimate[a]	95% CI[b]
Work Status in June * Disruption Index						
Mixed * Disruption Index					0.05	−0.07, 0.17
Stayers * Disruption Index					0.07	−0.04, 0.18
Unemployed * Disruption Index					0.01	−0.12, 0.14
Did not work in the past week * Disruption Index					−0.08	−0.22, 0.07
Adjusted R^2	0.339		0.436		0.437	

[a]*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
[b]CI = Confidence Interval.

compared to the Leavers group and the estimates became non-significant. This suggests that including disruption partially captures the effect of work status on mental health. However, work status was not found to significantly moderate the association between disruption and mental health (Model 3) since the estimates for the interaction terms were quite small (<0.1) and not significant. (We also ran the linear regression analyses for Models 2 and 3 after excluding item D6 from the disruption index and found the pattern of results unchanged).

4. Discussion

The main aim of this paper was to develop a reliable index of disruptions to routine behaviours and examine: 1) individual differences in the extent of disruptions, 2) how disruptions related to general psychological distress early in the COVID-19 pandemic, and 3) whether the relationship between disruption and distress varied across people experiencing different working conditions. Using survey responses from a large, national, probabilistic sample of adults in the United States, the findings of this research suggest that disruptions to routine behaviours can be measured reliably. Our six-item disruptions index had high internal consistency, and disruptions early in the pandemic varied by gender, ethnicity, and work status. After controlling other sociodemographic variables, we found more disruption reported among females (vs. males) and Hispanic (vs. non Hispanic) people. The unemployed group experienced the most disruption compared with those leaving home to work. The strength of the relationships between each of the six disruption items and gender, ethnicity, and work status varied, suggesting variation in the type of disruption experienced by different types of people.

We hypothesised and found that the reported experience of disruptions was associated with higher levels of psychological distress early in the pandemic (relative to prepandemic levels of distress). We also found that individuals' work status was related to psychological distress but did not moderate the relationship between disruptions and distress. Our findings indicating that disruption captures the effect of work status on mental health suggests a mediation effect that

we did not hypothesise. Future work could examine whether work status influences the types of disruptions experienced and through this influences mental health.

The present findings are consistent with prior empirical work demonstrating how the health, social, and economic impacts of the COVID-19 pandemic (Alfaro et al., 2020; Altig et al., 2020; Cruz-Cárdenas et al., 2021; Davis et al., 2023; Eichenbaum et al., 2021; Hossain et al., 2020; H. Liu et al., 2024; Nicola et al., 2020) have been experienced differently across individuals (Breslau et al., 2020; Eichenbaum et al., 2021; Ettman et al., 2020; Finucane et al., 2022; Memmott et al., 2021; Menting et al., 2023; Prowse et al., 2021; Warren et al., 2022; Zacher & Rudolph, 2021). The present research adds to this understanding by capturing one potential mechanism by which individual differences might be explained, namely disruption to routine behaviours. This study advances our understanding of variation in disruptions to routine behaviours due to the pandemic and how these might directly or indirectly affect mental health. An implication of the findings for policymakers and practitioners is that different types of support – from mental health support, to financial support, to help (re)establishing a routine – might be needed for different people, depending on the types of disruptions experienced.

The conceptual framework for our study was based on social and behavioural theories of risk, which suggest that routines offer a mechanism for mitigating life's uncertainties and associated negative outcomes, but when social or biographical practices cease at a collective or individual level, psychological security and wellbeing are threatened (Akram & Hogan, 2015; Beck et al., 1994; Bury, 1982; Giddens, 1984; 1991; Kasperson et al., 1988; 2022; Locock & Ziébland, 2015). Additionally, our framework was informed by the conservation of resources theory (Hobfoll, 1989; 2001; McGinty et al., 2020), which highlights how disruption to routines can be associated with psychological stress arising from the loss of social and economic resources. Consistent with these theoretical foundations and a growing body of empirical research, the present findings suggest that individuals who experienced more disruptions in their daily routines early in the COVID-19 pandemic also reported more psychological distress (Chirico et al., 2021; H. Liu et al., 2024). While some losses might be offset by other types of resources, the nature or quantity of additional stress caused by different types of losses during the COVID-19 pandemic needs to be examined in more detail to pinpoint interventions that could prevent or address the ongoing demands of stress, particularly for individuals facing historic disadvantage.

The main limitations of this research are as follows. First, while we demonstrated strong reliability in the new disruptions index, and the predictive models provide some support for its validity, future studies should examine the extent to which self-reported experiences of disruption reflect real-world disruptions to behaviours along diverse dimensions. Second, the correlational design of this study limits the conclusions we can draw about causal linkages between disruptions and mental health. Third, unpacking the extent to which disruption itself has a negative effect independent of the task(s) being disrupted requires a stronger research design than was possible with the present study. Fourth, the slight wording difference in the K-6 question administered in 2019 versus 2020 limited our ability to compare respondents' prepandemic versus early pandemic mental health status. Nonetheless, including the prepandemic measure of K-6 in analyses allowed us to model change and account for potential endogeneity. Future studies exploring this longitudinal dataset in more detail could provide insights into how other outcomes (e.g., health service use, financial wellbeing) evolve over time. Finally, concepts such as 'disruption,' 'work status,' and 'psychological distress' are complex and may be defined and measured in diverse ways. Additional research is needed to determine how alternative definitions and

measures may affect the relationships explored in the present study. Also, important in future research are measures of control variables to capture changes in other outcomes (e.g., income, physical activity, social engagement) that may have been disrupted during the pandemic. Not including these measures may have caused omitted variable bias since their effects would instead be attributed to the disruption outcome.

5. Conclusion

This study makes a substantial contribution to our understanding of one potential mechanism by which the COVID-19 pandemic has impacted individuals' mental health, namely through different types or levels of disruption to routine behaviours. Our new measure of disruption provides a preliminary step towards more nuanced assessments of disruptions that cause resource losses and how this relates to stress during disaster events. Importantly, the longitudinal, within-person design of this study allowed us to control for prepandemic mental health status. Additional research is needed to validate the new measure of disruption and to permit analysis of causal mechanisms by which behavioural disruptions negatively impact psychological wellbeing over time.

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Supplementary material

Supplemental data for this article can be accessed online at https://doi.org/10.1080/13698575.2025.2495801

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