Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Original Research

The challenge of COVID-19 for adult men and women in the United States: disparities of psychological distress by gender and age

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ABSTRACT

Objectives: During the COVID-19 pandemic, the prevalence of psychological distress rose from 11% in 2019 to more than 40% in 2020. This study aims to examine the disparities among US adult men and women.

Study design: We used 21 waves of cross-sectional data from the Household Pulse Survey that were collected between April and December 2020 for the study. The Household Pulse Survey was developed by the U.S. Census Bureau to document the social and economic impact of COVID-19.

Methods: The study population included four groups of adults: emerging adults (18–24 years); young adults (25–44 years); middle-aged adults (45–64 years); and older adults (65–88 years). Psychological distress was measured by their Generalized Anxiety Disorder score and the Patient Health Questionnaire. The prevalence of psychological stress was calculated using logistic models adjusted for socio-demographic variables including race/ethnicity, education, household income, and household structure. All descriptive and regression analysis considered survey weights.

Results: Younger age groups experienced higher prevalence of psychological distress than older age groups. Among emerging adults, the prevalence of anxiety (42.6%) and depression (39.5%) was more than twice as high as older adults who experienced prevalence of anxiety at 20% and depression at 16.6%. Gender differences were also more apparent in emerging adults. Women between 18 and 24 years reported higher differential rates of anxiety and depression than those with men (anxiety: 43.9% vs. 28.3%; depression: 33.3% vs. 24.9%).

Conclusion: Understanding the complex dynamics between COVID-19 and psychological distress has emerged as a public health priority. Mitigating the negative mental health consequences associated with the COVID-19 pandemic, for younger generations and females in particular, will require local efforts to rebuild capacity for social integration and social connection.

Introduction

The experience of unexpected morbidity and mortality, in addition to diverse public health measures designed to prevent community transmission of the SARS-CoV-2 virus associated with the COVID-19 pandemic, has disrupted social integration and patterns of social contacts, creating vulnerability to the onset of mental health symptoms. As one of the global communities most impacted by this pandemic, the population of the United States (US) experienced a significant increase in the prevalence of psychological distress over the past year due to greater health anxiety, financial worry, and loneliness among US adults.[1] In 2019, the national-level prevalence of psychological distress was 11%,[2] which increased to 36% during the first wave of the COVID-19 pandemic.[3] COVID-19's social, economic, and political sequelae increased community vulnerability in patterns which mirrored natural disasters.[4] The precipitous increase in this year's COVID-19–related psychological distress is consistent with the prevalence of mental health symptoms associated with prior climate events.[5]

Bierman and Schieman[6] revealed that social distancing measures used to reduce COVID-19 community infection may lead to greater subjective isolation, resulting in an adverse impact on psychological distress. Older adults are more susceptible to COVID-19 incidence and death[7] and psychological distress associated with

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social isolation.[8] However, a recent study of psychological distress during the pandemic found that younger generations in the US reported higher levels of anxiety and depression than older adults.[9] It is likely that different age-groups respond disparately to the social and economic impact of COVID-19.

Prior research found that women usually experienced higher levels of psychological distress than men.[10–13] However, it is not clear if the role gender plays is the same among different age-groups and if there are consistent age or gender gaps during the pandemic. In addition, socio-economic[14] status such as education,[15] household income,[16] and household structure[17] are all important factors of mental health status. Understanding disparities of psychological distress during the pandemic will provide insights for future public health intervention and promotion.

Mirowsky and Ross[18] theorized psychological well-being and distress as two ends of a continuum of mental health. Psychological distress produced by experiencing anxiety and depression together was described as a feeling of powerlessness generated by disadvantaged social conditions.[18] The COVID-19 pandemic is recognized in our study to be a medical and social phenomenon whose complex dynamics resemble patterns of psychological distress. Symptoms of depression or anxiety are considered as byproducts of the medical sequelae of COVID-19, combined with social policies and public health measures implemented to reduce community infection.

Using 21 waves of the Household Pulse Survey (HPS) conducted by the US Census Bureau, this study aims to examine and describe the age and gender trends of depression and anxiety among US adults from the inception of COVID-19 in March 2020 through December of 2020.[19] We aim to identify the patterns of psychological distress by age, gender, and other sociodemographic factors.

Methods

Data

The HPS was developed by the US Census Bureau as part of an initiative to document the social and economic impact of COVID-19.[19] The HPS uses the Census Bureau's Master Address File to select a sample of US households. One adult per household was recruited to answer a 20-min survey that included questions about the impact of COVID-19 on their entire household such as mental health, loss of employment income, and food insecurity. This study included 21 waves of data from three survey phases in 2020. Phase one contains 12 waves of weekly data between April 23 and July 21. Phase two and phase three data were collected biweekly with five waves between August 19 and October 26 in phase two and four waves collected between October 28 and December 21 in phase three.

Measures

The dependent variables are anxiety and depression, measured using a modified version of the two-item Generalized Anxiety Disorder (GAD-2) and the two-item Patient Health Questionnaire (PHQ-2) and that collects information on symptoms over the last seven days (rather than the typical 14 days). Anxiety was measured using GAD-2 questions offering respondents the following choices: 'feeling nervous, anxious, or on edge?' and 'Are you not able to stop or control worrying?' PHQ-2 questions identifying symptoms of depression included the following: 'Over the last seven days, how often have you been bothered by having little interest or pleasure in doing things?' and 'feeling down, depressed, or hopeless?' Responses indicating how often anxiety and depression were experienced included not at all = 0; several days = 1; more than half the days = 2; and nearly every day = 3. A sum score of three or greater on either the depression or anxiety measure was considered having symptoms of depression or anxiety.

Our main exposure variables were gender (male, female) and age. Age was categorized as emerging adults (18–24 years), young adults (25–44 years), middle-aged adults (45–64 years), and older adults (65–88 years). We included race/ethnicity (single race of White, Black, Hispanic, and Asian and other race or multiracial), education (high school or lower, some college, and bachelor degree or higher), household income (income from all family members before tax), and household structure (married with no kids, married with kids, living alone, living alone with kids, and other), as potential confounders.

The total sample size was 1,653,180 for the 21 waves (ranging between 39,232 and 119,170 in each wave) after deleting observations missing anxiety and depression. Missing values associated with household income were coded as unknown.

Statistical analysis

Statistical software R version 3.6.2 and library 'survey' were used for the analysis. Survey data analysis accounted for survey weights with each survey wave weighted equally. We computed descriptive statistics to summarize sample characteristics and the prevalence of anxiety disorder and depressive disorder. Next, we calculated the adjusted prevalence by age-gender interaction using logistic models for each wave adjusting for sociodemographics. Among the 21 waves of study, the age-gender interactions were statistically significant at the 5% level for either anxiety or depression in 13 waves. Therefore, we calculated the wave-specific prevalence from age-gender interaction models to visualize the trend and differences. Lastly, we performed gender-stratified Poisson regression analyses of the aggregated 21-wave data to estimate the adjusted prevalence ratios (PRs). PRs were reported because odds ratios can substantially overestimate the prevalence ratios for common outcomes (when prevalence > 10%). The 95% confidence intervals (CIs) for all prevalence and PR estimates were reported.

Results

Overall prevalence of anxiety and depression by age and gender

As shown in Table 1, age was inversely associated with prevalence of anxiety and depression. Among emerging adults (18–24 years), the prevalences were 42.6% for anxiety (95% CI: 41.7%, 43.6%) and 39.5% for depression (95%CI: 38.5%, 40.4%), more than twice those among older adults (65–88 years): 20% (95% CI: 19.7%, 20.4%) and 16.6% (95% CI: 16.2%, 16.9%), respectively. The prevalence of anxiety in women was 36.8% (95%CI: 36.6%, 37.1%), 8.5% higher than in men (28.3%, 95% CI: 28.1%, 28.6%), whereas the prevalence of depression was 4.0% higher in women (28.2%, 95%CI: 28.0%, 28.4%) than in men (24.2%, 95%CI: 23.9%, 24.4%).

Trend of anxiety and depression from age-by-gender interaction analysis

Fig. 1 displays the adjusted wave-specific prevalence of anxiety and depression with 95% CIs from May to December 2020, including the gaps between men and women by age-group. Most of the age-groups showed their highest peaks in November and July. Among men, the highest anxiety and depression levels were found in the young adult groups (25–44 years), and the differences were minimal between emerging, young, and middle-aged adults. Among women, the distress levels decreased by age, leaving large

Table 1
Sample characteristics: frequencies (n), percentage (%) and weighted percentage (wt %) and weighted prevalence (%) of anxiety and depression by all variables (total sample size: 1,652,180 from 21-wave data).

Variables	Sample characteristics			wt Prevalence (%) and 95% CI			
	N	%	wt %	Anxiety		Depression	
Age-group							
Emerging adults (18–24)	46,422	2.8	7.3	42.6	(41.7, 43.6)	39.5	(38.5, 40.4)
Young adults (25–44)	554,539	33.5	36.5	39.4	(39.0, 39.7)	30.7	(30.4, 31.1)
Middle-aged adults (45–64)	642,364	38.9	34.5	31.7	(31.4, 32.0)	24.8	(24.5, 25.1)
Older adults (65–88)	409,855	24.8	21.8	20.0	(19.7, 20.4)	16.6	(16.2, 16.9)
Gender							
Male	673,150	40.7	48.3	28.3	(28.1, 28.6)	24.2	(23.9, 24.4)
Female	980,030	59.3	51.7	36.8	(36.6, 37.1)	28.2	(28.0, 28.4)
Race/ethnicity							
White	1,265,683	76.6	64.1	31.4	(31.2, 31.6)	24.5	(24.3, 24.7)
Black	116,002	7.0	11.0	34.3	(33.7, 34.9)	29.3	(28.7, 29.9)
Hispanic	139,459	8.4	16.1	37.0	(36.4, 37.7)	30.5	(29.9, 31.2)
Asian	72,298	4.4	5.0	26.5	(25.7, 27.3)	22.2	(21.5, 23.0)
Other	59,738	3.6	3.8	41.4	(40.4, 42.4)	33.7	(32.7, 34.6)
Education							
High school or lower	215,390	13.0	37.6	34.1	(33.7, 34.5)	29.6	(29.2, 30.0)
Some college	523,118	31.6	30.5	35.5	(35.2, 35.8)	29.3	(29.0, 29.6)
Bachelor or higher	914,672	55.3	31.9	28.5	(28.3, 28.7)	19.4	(19.2, 19.6)
Household income							
Less than $49,000	469,052	28.4	36.9	40.4	(40.0, 40.8)	35.3	(34.9, 35.6)
$50,000–$99,000	501,588	30.3	29.0	31.1	(30.8, 31.4)	24.0	(23.7, 24.4)
$100,000–$149,000	283,222	17.1	13.8	26.5	(26.1, 26.9)	18.6	(18.2, 19.0)
$150,000 or higher	294,364	17.8	12.9	22.6	(22.2, 22.9)	14.4	(14.1, 14.8)
Unknown	104,954	6.3	7.3	30.5	(29.8, 31.2)	24.8	(24.1, 25.5)
Household structure							
Married no kids	545,070	33.0	31.9	24.8	(24.5, 25.1)	18.6	(18.3, 18.9)
Married with kids	386,861	23.4	23.1	31.6	(31.2, 32.0)	22.3	(21.9, 22.6)
Live alone	280,516	17.0	8.4	31.0	(30.6, 31.5)	27.7	(27.3, 28.2)
Live alone with kids	82,426	5.0	2.7	40.0	(39.1, 40.9)	32.9	(32.0, 33.7)
Other	358,307	21.7	33.9	40.9	(40.5, 41.3)	35.3	(34.9, 35.6)

CI, confidence interval.

gender gaps between emerging adults (18–24 years). The differences in anxiety between women and men were 15.6% in emerging adults, 7.3% in young adults, 7.1% in middle-aged adults, and 5.7% in older adults. And the gender gaps in depression were 8.4%, 1.4%, 3.3%, and 1.4%, respectively, for all four age-groups.

Prevalence ratios of anxiety and depression by sociodemographic variables

Table 2 shows the gender-stratified overall PRs and 95%CIs of anxiety and depression for all variables. Household income and household structure were associated with both anxiety and depression. For both the male and female subgroups, the prevalence of anxiety and depression displayed a gradient decrease when household income increased. Compared with household income <$49,000 among men, the PRs of anxiety disorder were 0.78 (95%CI: 0.76, 0.81) for household income $50,000–$99,000, 0.66 (95%CI: 0.63, 0.68) for household income $100,000–149,000, and 0.57 (95%CI: 0.55, 0.59) for household income $150,000+. Similar PRs were found among women and depression in men and women. The PRs of anxiety or depression among those who lived alone with children were 14%–26% higher than those who were married with or without children (i.e. PRs between 1.14 and 1.26). The association of education with depression was more apparent than with anxiety. Having a bachelor or higher degree was associated with lower PRs of depression (PR = 0.84, 95%CI: 0.82, 0.87 in men, PR = 0.81, 95%CI: 0.79, 0.83 in women) compared with a high school or lower degree, while the PRs of anxiety for were 0.95 (95%CI: 0.92, 0.97) in men and 0.99 (95%CI: 0.98, 1.01) in women. Further, Black and Asian individuals had lower prevalences of both anxiety and depression compared with White individuals, and the PRs were between 0.86 and 0.96 among Black individuals and between 0.80 and 0.90 among Asian individuals.

Discussion

The COVID-19 pandemic along with the public health measures used to reduce the spread of the virus is found to be associated with mental health challenges such as increased levels of anxiety and depression among US adults.[20] Our study found that US adults had experienced high levels of anxiety and depression between April and December in 2020 during the COVID-19 pandemic. The levels of anxiety and depression fluctuated closely to COVID-19 incidence with two peaks in July and November 2020. Younger adults reported higher prevalence of psychological distress than older age-groups. Gender differences are most apparent among emerging adults (18–24 years) with women reported higher levels of distress than men.

Our findings are consistent with previous studies conducted among respondents in Belgium, France, and Canada that young adults showed not only higher initial levels but also a more rapid increase rate during the course of the pandemic, leading to the more divergent age-gaps in anxiety and depression.[21,22] The age differences might also reflect the existing differences identified in the earlier epidemiological studies before the COVID-19 pandemic. For instance, the prevalence rate of anxiety disorder usually peaks in early adulthood and decreases with age.[23–25] The lowest and most stable levels were found in the oldest age-group (65–88 years), although older adults might be more susceptible to psychological distress associated with social isolation[8] and COVID-19 incidence and death.[7] This can be partially explained by their health insurance status. Adults aged 65 years or older qualify

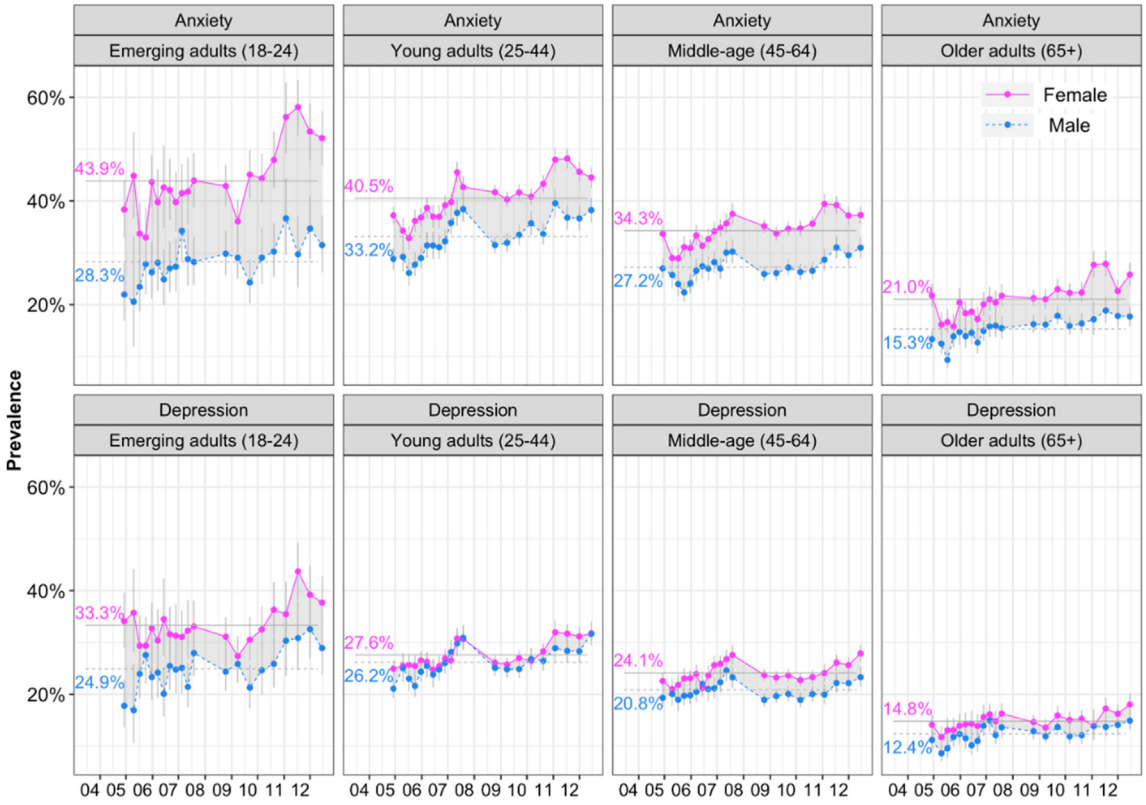

Fig. 1. Wave-specific prevalences of anxiety and depression with 95% CIs estimated the age-gender interaction model adjusting for sociodemographic variables. The gray horizontal lines are the mean prevalences calculated from the 21-wave-specific estimates.

for Medicare if they worked for more than ten years in Medicare-covered employment. From January through June in 2020, approximately 13.4% of the US adults aged 18–64 years were uninsured, compared with only 0.9% for those aged 65 years and older.[26]

Similar to prior research on mental distress, women usually experience higher levels of psychological distress than men.[10–13] Similar age-gender interactions were also found in a study conducted in the UK during the COVID-19 pandemic that indicated young women (18–24 years) had the highest level of anxiety and depression than any other age and gender groups.[27] Women in this age-group experienced stressors including the transitions into online learning if still in college, new graduates looking for jobs, and those assuming new or increased responsibilities caring for

Table 2
Prevalence ratios (PRs) of anxiety and depression for men and women (aggregated 21-wave data).

Variables	Anxiety among men		Anxiety among women		Depression among men		Depression among women	
	PR (95 % CI)	P	PR (95 % CI)	*P*	PR (95 % CI)	*P*	PR (95 % CI)	*P*
Age-group (reference: emerging adults 18–24)								
Young adults (25–44)	1.15 (1.11, 1.21)	<0.001	0.94 (0.92, 0.97)	<0.001	1.05 (1.00, 1.09)	0.033	0.86 (0.83, 0.89)	<0.001
Middle-aged adults (45–64)	0.96 (0.92, 1.00)	0.080	0.81 (0.79, 0.84)	<0.001	0.86 (0.82, 0.90)	<0.001	0.76 (0.74, 0.79)	<0.001
Older adults (65–88)	0.55 (0.52, 0.58)	<0.001	0.51 (0.50, 0.53)	<0.001	0.52 (0.49, 0.55)	<0.001	0.49 (0.47, 0.51)	<0.001
Race/ethnicity (reference: White)								
Black	0.95 (0.92, 0.99)	0.009	0.86 (0.84, 0.87)	<0.001	0.96 (0.92, 1.00)	0.042	0.91 (0.89, 0.93)	<0.001
Hispanic	0.99 (0.96, 1.03)	0.680	0.95 (0.93, 0.97)	<0.001	0.98 (0.95, 1.02)	0.357	0.96 (0.94, 0.99)	0.004
Asian	0.81 (0.77, 0.85)	<0.001	0.80 (0.77, 0.83)	<0.001	0.90 (0.85, 0.95)	<0.001	0.90 (0.86, 0.94)	<0.001
Other	1.16 (1.11, 1.21)	<0.001	1.11 (1.08, 1.14)	<0.001	1.17 (1.12, 1.23)	<0.001	1.13 (1.09, 1.17)	<0.001
Education (reference: high school or lower)								
Some college	1.04 (1.01, 1.06)	0.005	1.05 (1.03, 1.07)	<0.001	1.03 (1.00, 1.06)	0.034	0.99 (0.97, 1.01)	0.482
Bachelor or higher	0.95 (0.92, 0.97)	<0.001	0.99 (0.98, 1.01)	0.477	0.84 (0.82, 0.87)	<0.001	0.81 (0.79, 0.83)	<0.001
Household income (reference: less than $49,000)								
$50,000–$99,000	0.78 (0.76, 0.81)	<0.001	0.85 (0.83, 0.86)	<0.001	0.75 (0.73, 0.77)	<0.001	0.79 (0.77, 0.81)	<0.001
$100,000–$149,000	0.66 (0.63, 0.68)	<0.001	0.76 (0.74, 0.77)	<0.001	0.60 (0.58, 0.63)	<0.001	0.66 (0.64, 0.68)	<0.001
$150,000 or higher	0.57 (0.55, 0.59)	<0.001	0.66 (0.64, 0.68)	<0.001	0.48 (0.46, 0.50)	<0.001	0.55 (0.53, 0.57)	<0.001
Unknown	0.75 (0.72, 0.79)	<0.001	0.80 (0.78, 0.82)	<0.001	0.75 (0.71, 0.79)	<0.001	0.73 (0.70, 0.75)	<0.001
Household structure (reference: married no kids)								
Married with kids	1.01 (0.98, 1.04)	0.504	1.04 (1.02, 1.06)	<0.001	0.97 (0.93, 1.01)	0.089	0.98 (0.95, 1.01)	0.197
Live alone	1.05 (1.01, 1.08)	0.004	1.08 (1.05, 1.10)	<0.001	1.22 (1.17, 1.26)	<0.001	1.21 (1.18, 1.25)	<0.001
Live alone with kids	1.20 (1.14, 1.27)	<0.001	1.14 (1.10, 1.17)	<0.001	1.26 (1.18, 1.34)	<0.001	1.18 (1.14, 1.22)	<0.001
Other	1.21 (1.18, 1.25)	<0.001	1.25 (1.22, 1.27)	<0.001	1.35 (1.30, 1.39)	<0.001	1.34 (1.31, 1.37)	<0.001

CI, confidence interval.

sick family members. Another study also disclosed that women and married women with children reported higher levels of COVID-19 fear than their counterparts, indicating women's larger psychological burden over the pandemic.[28] The associations with educational attainment, household income, and household structure during pandemic aligned with previous research before the pandemic.[14–17]

This study has some potential limitations. First, the data set is cross sectional, which prevents us from making causal inferences. Self-reported data might have information biases such as misclassifications due to the recall biases. Second, the PHS collected information on distress symptoms over the last seven days rather than the standard 14 days for surveys before the pandemic, so we were unable to make the exact prepandemic and postpandemic comparisons. There are potential but unmeasured confounding variables such as physical health conditions, family support, social isolation, etc.

There are several strengths of this study despite these limitations. The findings might be generalizable to the adult populations as the analysis was conducted based on the large sample sizes from national-level surveys. Prevalence estimates are reliable because similar patterns of age-gender interaction were observed in all survey waves, and sociodemographic variables were adjusted in the models. Our findings revealed high levels of psychological distress among adults during the COVID-19 pandemic and identified the high-risk younger adults particularly young women, possibly magnifying the pre-existing social inequalities and increasing population health disparities that were prevalent before the pandemic.[29] This trend is alarming as high rates of sustained anxiety impacts mental and physical resilience, compromising the emotional capacity for coping with day-to-day challenges and the physical capacity to sustain efficient immune response.[30]

Results will help policy makers target vulnerable social groups and provide them with resources and support. As our country develops cross-sector strategies to 'build back better' from COVID-19,[31] building mental health resilience at the individual and community level will provide a foundation for challenges to be faced in the future.

Author statements

Ethical approval

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Competing interests

None declared.

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