



OPEN Financial assets and mental health over time

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Financial, material, and social assets are core drivers of access to salutary resources. However, there is a paucity of research about how non-income financial assets shape mental health. We explore the relation of financial assets with symptoms of depression and of anxiety using a nationally representative, longitudinal survey of U.S. adults fielded annually from 2020 to 2023 ($n = 1,296$ unique participants). We used multivariable logistic regression models to estimate the association of financial assets and financial stress separately and together with symptoms of depression (PHQ-9 > 9), anxiety (GAD-7 > 9), and their co-occurrence, controlling for demographic indicators and year fixed effects. We found, first, that adults with <\$5,000 in accrued financial assets reported over two times the odds of positive screen for depression, anxiety, and co-occurring depression and anxiety, respectively, as adults with \geq \$100,000 in financial assets. Second, when controlling for accrued financial assets, annual household income was not associated with symptoms of anxiety. Third, the gap in positive screen for depression between household financial assets groups stayed consistent and did not differ significantly over the study period. Annual income alone does not capture the influence of all financial assets on mental health.

High rates of depression and anxiety are a hallmark of America's health in the twenty-first century. Depression and anxiety have been on the rise for over 15 years^{1,2}, and increased further during the COVID-19 pandemic³⁻⁵. Over 21 million U.S. adults reported at least one major depressive episode in 2021⁶, representing 8.3% of Americans. As of October 2023, 22.8% of U.S. adults reported frequent depressive symptoms and 29.5% reported frequent anxiety symptoms⁷. Symptoms of depression include depressed mood or loss of pleasure in activities as examples⁸. Symptoms of generalized anxiety include restlessness, feeling tense or on edge, or an inability to focus or concentrate⁹. Both can lead to limitations in function, loss of productivity, and behaviors that contribute to accumulating comorbidities and premature death¹⁰. Depression and anxiety can be debilitating¹⁰, reduce productivity^{10,11}, and reduce quality of life^{12,13}. While it is estimated that depression costs the U.S. \$326.2 billion¹¹ and anxiety costs the U.S. \$33.71 billion¹⁴, the true costs to individuals, their families, their employers, and their communities is unknown.

Mental health is responsive to economic and social factors¹⁵⁻¹⁸. There is a well-defined income gradient with mental health^{19,20}: adults with higher income report lower levels of depression and anxiety than counterparts with lower income^{6,19,21,22}. Positive income shocks have been linked with improvements in mental health²³. For example, increases in social security payouts were associated with improvements in mental health for older women in the U.S.; similarly, improvements in mental health have been documented following winning the lottery²⁴. Conversely, income loss is associated with poorer mental health and may have a stronger effect than increases in income on mental health²⁵. Potential mechanisms of how income shapes mental health include increasing access to resources that improve overall health including mental health, providing control over one's time and environment, and reducing stressors. Income alone, however, may not fully describe a person's access to financial resources. Financial assets may include other financial resources beyond income such as savings, credit, and debt^{26,27}. Together, these financial assets contribute to a holistic understanding of wealth that in turn shapes health²⁸.

Wealth, defined broadly as total assets a given person or household has, may better protect mental health than income. Whereas income represents a flow of capital, wealth represents an accumulated stock of capital²⁹. Even more than income, wealth represents more holistic access to resources that may improve or protect mental health. Wealth gaps, rather than income gaps, may better describe economic disparities³⁰, including intergenerational transfers, that drive access to resources that can then result in differential mental health³¹. However, wealth is far less studied than income as a driver of health and mental health due in part to the difficulty of measuring wealth. A growing literature suggests that wealth is associated with mental health above and beyond income³¹⁻³³.

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A systematic review of articles published between 1990 and 2006 on studies measuring wealth as an independent variable and health as a dependent variable produced 29 articles³¹. Among those studies, most reported a significant association between wealth and health, even when controlling for other measures of socioeconomic status such as income or education. A systematic review of articles on wealth and depression from inception through July 19, 2020 identified 96 articles³⁴. More than half of included articles reported a significant association of wealth with depression. Before the pandemic, having accrued household financial assets below \$20,000 was associated with 50% greater odds of reporting depressive symptoms than having more than \$20,000 in financial assets, after adjusting for income and other socio-demographic characteristics³². Studies conducted during the early pandemic showed that having less than \$5,000 in household financial assets was associated with 50% greater odds of reporting symptoms of depression in 2020³, but no greater odds of persistent depression in 2021 in fully adjusted models²⁷. Despite being a more holistic summary of capital and the accumulation of financial assets over time through potentially multiple sources, wealth is understudied relative to other socioeconomic measures such as income, education, and marital status. In a systematic review of articles on depression and assets during the COVID-19 pandemic, among 41 articles included in the review, 34 reported findings on depression and income while only 4 reported findings on wealth and depression³⁵.

It is possible that the relationship between income and mental health differs from that between accrued financial assets and mental health. For example, two people with the same income may both lose their jobs. If one has other financial assets to fall back upon (accrued through, say, inherited wealth or ability to save more money after expenditures) then that person may have a very different psychological trajectory than the person who does not have a stock of financial assets to fall back on. Having a stock of financial assets, instead of merely a flow, can provide psychological safety, the ability to pay for expenses and maintain lifestyle in the face of changing income, and may represent broader comfort in the assurance of ability to control one's environment, choices, and circumstances.

Another mechanism by which having fewer financial assets affects mental health may be through the experience of financial stress. Life stressors can harm mental health and financial stress is a particularly common stressor^{36–38}. In a scoping review of 58 longitudinal studies exploring the relation between financial stress and depression, 83% of articles reported a significant association between financial stress and higher burden of depression³⁹. Chronic exposure to stress can reduce people's coping strategies and psychological well-being⁴⁰. Additionally, experiencing financial stress may reduce one's resources and cognitive bandwidth for decision making, which could result in behaviors that harm mental health⁴¹. Stressors exist separately from income and wealth; indeed in studies comparing objective financial indicators (e.g., income) and subjective financial indicators (e.g., financial stress), financial stress was a robust predictor of worsening depression and anxiety even when controlling for objective financial indicators⁴².

Understanding key drivers of mental health can inform policy efforts to prevent worsening mental health and target interventions to reduce the burden of mental illness and reduce mental health disparities across economic groups. This paper is one of the first, to our knowledge, to assess the association of savings with mental health longitudinally since the beginning of the COVID-19 pandemic, to assess the changes in the association of savings with mental health over time, and to do so using full-scale screeners for depression and anxiety (PHQ-9, GAD-7, respectively). The study aimed to address the following two questions: (1) What was the relationship of wealth with depression and anxiety from 2020 to 2023? (2) Did the association between wealth and mental health grow over time?

Methods

Study design and sample selection

The CLIMB study is a nationally representative longitudinal survey of U.S. adults aged 18 and older, fielded via the AmeriSpeak panel. The AmeriSpeak panel, a probability-based sample of U.S. households randomly selected from the NORC National Frame that covers approximately 97% of U.S. households, served as the sampling frame. Eligibility for participation in the CLIMB study was limited to English-speaking AmeriSpeak panelists who had completed a survey within the preceding 6 months. The CLIMB study is comprised of four survey waves fielded during the COVID-19 pandemic: Wave 1 (March 2020 – April 2020), Wave 2 (March 2021 – April 2021), Wave 3 (March 2022 – April 2022), and Wave 4 (March 2023–April 2023).

To be included in the analytic sample, first, we subset to participants who responded to Wave 1 and at least one additional survey wave (Wave 2, Wave 3, or Wave 4) ($n = 1,297$). Then we dropped participants who were missing all responses to the Patient Health Questionnaire-9 (PHQ-9), a measure of depressive symptoms⁴³, and the Generalized Anxiety Disorder-7 (GAD-7), a measure of symptoms of anxiety⁴⁴, at all waves that they participated in the CLIMB Study ($n = 1$). This led to wave specific samples of: Wave 1 ($n = 1,296$); Wave 2 ($n = 1,182$); Wave 3; ($n = 1,093$); Wave 4 ($n = 938$). Post-stratification weights were constructed and applied to ensure the alignment of the CLIMB sample with the U.S. adult population, via benchmarking to the Current Population Survey.

Outcome measures

To measure depressive symptoms, we used the 9-level version of the Patient Health Questionnaire (PHQ-9), which is scored on a range of 0–27, where a score of 10 or higher acts as a clinical threshold indicator of moderate to severe symptoms⁴³. To measure symptoms of anxiety, we used the generalized anxiety disorder-7 (GAD-7), which is scored on a range of 0–21, and has a clinical threshold of 10⁴⁴. Both measures have been clinically validated^{43,44}, and are often used in primary care settings as screening tools ahead of formal diagnosis of depression and anxiety. Last, we documented the co-occurrence of elevated symptoms of depression and anxiety, which was defined by a positive screen for depression (PHQ-9 ≥ 10) and anxiety (GAD-7 ≥ 10) within the same person.

Covariates

Financial assets were measured categorically at the household level and included annual income (<\$35,000, \$35,000–\$64,999, \$65,000–\$99,999, or ≥\$100,000), accrued financial assets (<\$5,000, \$5,000–\$34,999, \$35,000–\$64,999, \$65,000–\$99,999 or ≥\$100,000), and total debts (no debt, \$1–\$19,999, ≥\$20,000), consistent with other publications^{45–48}. Accrued financial assets refer to the total amount of funds across different accounts that adults have been able to save (i.e., funds left after expenses are deducted from income flows⁴⁹). The question to determine total accrued financial assets in the CLIMB study was modified from a question asked in the National Health and Nutrition Examination Survey about total household savings: “We will now ask about household savings. By savings we mean money in all types of accounts, including cash, savings, or checking accounts, stocks, bonds, mutual funds, retirement funds (such as pensions, IRAs, 401Ks, etc.), and certificates of deposit. What category best represents how much money your household (including yourself) has in savings?”

Financial stress was defined as an indicator variable coded as 1 if respondent reported experiencing stress due to at least one of the following items in the previous 12 months: job loss, household job loss, financial problems, or difficulty paying rent. In sensitivity analyses we also deconstructed this indicator variable by each stressor.

To account for non-financial pandemic-related stress we constructed an indicator of social-emotional stress, defined by whether the respondent reported experiencing stress from loneliness, relationship problems, the death of someone close, or childcare problems. We used components of the stressors asked in all waves.

Several demographic variables were constructed, including a categorical age variable (18–29, 30–44, 45–59, ≥60 years), a categorical race and ethnicity variable (non-Hispanic White, non-Hispanic Asian, non-Hispanic Black, non-Hispanic other, or Hispanic), an indicator for respondent sex (male, female), categorical variables of respondent marital status (married/living with partner, divorced/separated, never married) and education status (high school/General Educational Development (GED) or less, some college or vocational/associates degree, bachelor’s degree, or graduate/professional degree), an indicator for respondent employment status, the respondent’s region of residence (Midwest, Northeast, South, or West), health insurance (health insurance paid for by an employer or a union; health insurance you or your family pays for yourself; Medicaid; Medicare; no health care insurance; or some other kind of health insurance) and household size measured as the number of individuals living in the respondent’s home.

Analysis

First, to describe the sample, we computed population-weighted proportions and unweighted frequencies for all covariates across each survey wave; aggregate frequencies and weighted proportions were also computed. We estimated the unadjusted relationship between each covariate and our three mental health indicators, respectively. We also mapped the frequency of positive screen for symptoms of depression, anxiety, and their co-occurrence at each wave in an Euler plot (Supplemental Fig. 1).

Second, to describe how outcomes evolved over the course of the pandemic and how they varied by key covariates, we computed the regression adjusted population-weighted prevalence of exceeding the clinical thresholds of the PHQ-9, GAD-7, and both by survey year and stratified by accrued financial assets. Weighted, adjusted probabilities were taken from multivariable logistic regressions.

Third, to estimate the contemporaneous association between accrued financial assets and the odds of exceeding clinical thresholds of the PHQ-9, GAD-7, or both, we used weighted logistic regression models with year fixed effects. Incorporating year fixed effects accounts for time-varying factors across the study period such as macroeconomic trends, and standard errors were clustered at the individual level to account for repeated measurement of individuals in our pooled cross-sectional sample. All models were adjusted for multiple covariates including contemporaneous age, race and ethnicity, sex, marital status, education status, employment status, region of residence, debt, income, health insurance, number of people in the household, and presence of pandemic-related past-year financial and social-emotional stress. Our estimation approach was selected for its robustness to the incidental parameters problem (relative to a model including individual fixed effects) and because it has been well established in the literature^{50–52}. Our adjustment variable selection was guided by prior literature demonstrating important confounders¹⁷, and empirically corroborated by LASSO regression. We were primarily interested in the change in cross-sectional relationships between accrued financial assets and mental health in our study period, accounting for year-to-year variation but not within person changes across time.

To test for changes in the association of accrued financial assets with mental health over time, we conducted a longitudinal analysis that used the subsample of individuals who participated in each of the four survey waves ($n = 824$). We present the coefficients from the time interactions with accrued financial assets in the main text and for the whole model in the Supplemental Materials. All longitudinal analyses were estimated as hierarchical linear models (HLM).

We hypothesized (1) that the association between accrued financial assets and mental health would be stronger than the association between income and mental health given that wealth may confer more mental security than income, and (2) that the relationship between accrued financial assets and mental health would strengthen over time from 2020 to 2023.

To test the robustness of our results, several alternative model specifications and estimation techniques were considered. As assets are likely correlated, additional models of the relationship between PHQ-9, GAD-7, both PHQ-9 and GAD-7, and household income, accrued financial assets, and household debts, respectively, were also estimated to test sensitivity to multicollinearity. We also estimated a model in which the covariates “Financial Stress” and “Social-Emotional Stress” were decomposed into their constituent parts. To test sensitivity to continuous instead of binary operationalization of our mental health outcomes, we estimated additional models via ordinary least squares that use continuous measures of the PHQ-9 (range: 0–27) and GAD-7 (range: 0–21), respectively.

All analyses were conducted in R version 4.1.0, and all hypothesis testing was two-sided at a significance level of 0.05. Analyses were conducted in accordance with Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for reporting observational studies. All methods were performed in accordance with the relevant guidelines and regulations. The collection of data through the CLIMB study was deemed exempt by the Institutional Review Board (IRB) at NORC at the University of Chicago (IRB Protocol Number# 23-03-1219). As secondary analysis of de-identified data was performed in the study, the need of ethics approval was waived by the IRBs at Boston University Medical Campus (under IRB# H-39986) and Johns Hopkins Bloomberg School of Public Health (under IRB# 25544). Informed consent was obtained from all subjects to participate in the study.

Results

Table 1 shows characteristics of the study sample across time. In 2023, 53.4% of the sample was female, 40.7% of the sample was 60 years or older, 68.2% of the sample was White, non-Hispanic, and 32.5% of the sample had accrued financial assets below \$5,000. Missing values are reported in Table 1.

Supplemental Fig. 1 depicts the number of respondents who exceeded the clinical thresholds of the PHQ-9, the GAD-7, and their co-occurrence at each survey year. Co-occurrence of elevated depression or anxiety symptoms was more common than either alone. Supplemental Table 1 shows the associations between exceeding the clinical threshold of the PHQ-9, GAD-7, or both and each covariate individually controlling only for year fixed effects.

Figure 1 shows the weighted regression adjusted prevalence of positive screening for depression and anxiety by accrued financial assets group. Prevalence of positive screen for depression and anxiety was higher in groups with lower accrued financial assets.

Table 2; Fig. 2 report the fully adjusted odds ratios of positive screen for depression, anxiety, or their co-occurrence controlling for concurrent respondent accrued financial assets and age, race and ethnicity, sex, region of residence, marital status, education, employment, income, debt, health insurance, household size, and past year stress (financial and social-emotional), and year fixed effects. Adults with under \$5,000 relative to over \$100,000 in accrued financial assets reported 2.19 (95% CI: 1.42, 3.39) times the odds of symptoms of depression, 2.05 (95% CI: 1.25, 3.36) times the odds of symptoms of anxiety, and 2.33 (95% CI: 1.38, 3.94) times the odds of co-occurring symptoms of anxiety and depression, when controlling for variables listed above. Income did not have a significant association with symptoms of anxiety but accrued financial assets did. Having \$5,000–\$34,999, \$35,000–\$64,999, \$65,000–\$99,999 in accrued financial assets was associated with 2.55 (95%CI: 1.56, 4.18), 2.40 (95%CI: 1.34, 4.27), and 2.99 (95%CI: 1.54, 5.80) times the odds, respectively, of screening positive for symptoms of anxiety or depression relative to \$100,000.

Finally, we tested for the change in the association of accrued financial assets and mental health over time (coefficients for accrued financial assets categories shown in Table 3 and full model output shown in Supplemental Table 4). In general, interactions between categories of accrued financial assets and survey waves were not statistically significant. For the two interaction terms that were statistically significant, hypothesis testing produced p -values > 0.05 , suggesting no statistically significant difference in the association between variables over time. Thus, we did not find substantial evidence that the association of lower accrued financial assets with poorer mental health was time-varying.

Sensitivity results

Supplemental Table 2 show the odds of positive screen of depression (a), anxiety (b), and their co-occurrence (c) in models that control for income (without accrued financial assets or debt), accrued financial assets (without income or debt), and the final model that controls for debt (without income or accrued financial asset). Having less than \$5,000 in accrued financial assets was associated with 2.91 times the odds of depression, 2.10 times the odds of anxiety, and 2.79 times the odds of their co-occurrence relative to having at least \$100,000, when we did not control for income or debt.

Supplemental Fig. 2 shows the bivariable association of each financial or social-emotional stressor experienced in the last 12 months with positive screen for depression, anxiety, or both controlling only for year fixed effects: household job loss, difficulty paying rent, relationship problems, and loneliness were significantly associated with positive screen for depression; household job loss, financial problems, difficulty paying rent, death of someone close, relationship problems, and loneliness were significantly associated with positive screen for anxiety.

Supplemental Table 3 shows the adjusted relationship between accrued financial assets and mental health using continuous definitions of the PHQ-9 and GAD-7 (and linear regression). When using the continuous measures, patterns were largely consistent with main findings; adults with lower accrued financial assets had higher symptoms of depression and anxiety, respectively, indicative of more severe symptoms.

Discussion

Using a nationally representative cohort of U.S. adults surveyed annually from Spring 2020 through Spring 2023, we found overall that persons with lower wealth (defined by accrued financial assets) reported more symptoms of depression than persons with more wealth and that these associations were consistent from 2020 to 2023. We found, first, that even when controlling for income, having higher accrued financial assets was associated with lower prevalence of depression, anxiety, and their co-occurrence, suggesting that wealth above and beyond income has a relationship with mental health. Adults with less than \$5,000 in accrued financial assets reported higher odds of positive screen for depression, anxiety, and their co-occurrence, respectively, relative to adults with \$100,000 or more. Second, consistent with our primary hypothesis, it was interesting that when controlling for accrued financial assets, income did not have a significant association with positive screen for anxiety. Third, we found that the significant association between wealth and mental health was consistent across the study

	2020 n = 1,296	n Missing	2021 n = 1,182	n Missing	2022 n = 1,093	n Missing	2023 n = 938	n Missing
Age		0		0		0		0
18–29	194 (20.6%)		135 (16.2%)		91 (13.8%)		61 (10.5%)	
30–44	458 (24.8%)		417 (25.6%)		390 (26.0%)		309 (23.3%)	
45–59	314 (25.0%)		288 (24.6%)		261 (23.5%)		243 (25.5%)	
60+	330 (29.6%)		342 (33.6%)		351 (36.7%)		325 (40.7%)	
Race and Ethnicity		0		0		0		0
Black, non-Hispanic	118 (12.0%)		98 (10.8%)		101 (12.6%)		77 (11.2%)	
Asian, non-Hispanic	31 (2.8%)		29 (3.0%)		27 (2.5%)		25 (2.7%)	
White, non-Hispanic	857 (62.7%)		799 (64.0%)		745 (64.4%)		664 (68.2%)	
Other, non-Hispanic	68 (5.8%)		60 (5.6%)		55 (5.8%)		33 (3.9%)	
Hispanic	222 (16.7%)		196 (16.6%)		165 (14.7%)		139 (14.0%)	
Female	635 (51.6%)	0	580 (51.4%)	0	538 (52.2%)	0	464 (53.4%)	0
Marital Status		0		0		0		0
Married/living with partner	768 (55.9%)		708 (57.5%)		565 (48.5%)		519 (53.4%)	
Divorced/separated	227 (18.5%)		205 (17.9%)		222 (21.4%)		196 (23.0%)	
Never married	301 (25.6%)		269 (24.6%)		306 (30.1%)		223 (23.5%)	
Education		0		0		0		0
HS/GED or less	289 (37.9%)		259 (36.4%)		243 (38.0%)		192 (31.3%)	
Some college or vocational/associates	580 (27.8%)		525 (28.0%)		482 (26.9%)		377 (26.7%)	
Bachelor's degree	242 (19.3%)		222 (19.6%)		208 (19.6%)		204 (22.8%)	
Graduate/professional degree	185 (15.1%)		176 (15.9%)		160 (15.4%)		165 (19.3%)	
Unemployed	583 (50.8%)	3	539 (51.5%)	0	478 (49.9%)	2	401 (49.9%)	4
Region		0		0		0		0
West	329 (23.9%)		303 (24.5%)		275 (23.3%)		231 (23.2%)	
Midwest	355 (20.8%)		325 (20.9%)		310 (21.7%)		263 (21.8%)	
Northeast	182 (17.3%)		160 (16.5%)		154 (17.5%)		139 (16.8%)	
South	430 (38.1%)		394 (38.1%)		354 (37.5%)		305 (38.2%)	
Income		27		40		35		31
< \$35,000	388 (33.4%)		324 (32.0%)		279 (30.2%)		205 (25.4%)	
\$35,000–\$64,999	355 (28.1%)		317 (27.3%)		286 (27.5%)		217 (24.5%)	
\$65,000–\$99,999	306 (22.0%)		264 (21.4%)		252 (21.6%)		232 (24.2%)	
≥ \$100,000	220 (16.5%)		237 (19.4%)		241 (20.7%)		253 (25.9%)	
Health Insurance		5		4		5		8
Health insurance paid for by an employer or a union	511 (35.3%)		484 (35.6%)		462 (36.1%)		389 (37.2%)	
Health insurance you or your family pays for yourself	159 (11.9%)		134 (11.1%)		114 (9.8%)		102 (9.5%)	
Medicaid	144 (10.7%)		132 (11.1%)		119 (12.3%)		106 (13.0%)	
Medicare	289 (28.2%)		285 (29.7%)		271 (30.2%)		255 (32.2%)	
No health care insurance	111 (8.0%)		90 (7.5%)		65 (6.3%)		42 (4.4%)	
Some other kind of health insurance	77 (5.8%)		53 (5.0%)		57 (5.3%)		36 (3.7%)	
Debt		22		37		37		30
No debt	233 (19.9%)		245 (22.1%)		247 (24.9%)		198 (23.2%)	
< \$20,000	642 (51.0%)		567 (49.7%)		514 (48.3%)		454 (51.0%)	
≥ \$20,000	399 (29.1%)		333 (28.2%)		295 (26.8%)		256 (25.8%)	
Accrued Financial Assets		34		50		49		48
< \$5,000	496 (41.7%)		370 (35.2%)		340 (33.5%)		284 (32.5%)	
\$5,000–\$34,999	323 (24.8%)		295 (23.9%)		271 (26.2%)		196 (22.2%)	
\$35,000–\$64,999	89 (6.4%)		92 (8.2%)		80 (7.0%)		68 (7.9%)	
\$65,000–\$99,999	90 (6.8%)		65 (6.1%)		62 (7.1%)		58 (6.4%)	
≥ \$100,000	264 (20.3%)		310 (26.6%)		291 (26.3%)		284 (31.0%)	
Financial Stressor	493 (40.1%)	0	396 (33.2%)	0	324 (30.1%)	0	287 (29.5%)	0
Social Emotional Stressor	560 (43.8%)	0	643 (53.3%)	0	519 (47.2%)	0	434 (48.5%)	0
Household Size	3.19 (1.71)	0	3.11 (1.60)	0	2.54 (1.57)	0	2.80 (1.52)	0

Table 1. Unweighted frequencies and Population-Weighted proportions, stratified by Survey Year. Descriptive statistics were computed using the sample of individuals that responded to at least one of the survey waves. “Financial Stress” indicates respondent experienced any of the following: job loss, household job loss, financial problems, difficulty paying rent. “Social-Emotional Stress” indicates respondent experienced any of the following: loneliness, relationship problems, the death of someone close, childcare problems. Income, accrued financial assets, and debt were all measured at the household level. GED: General Educational Development.

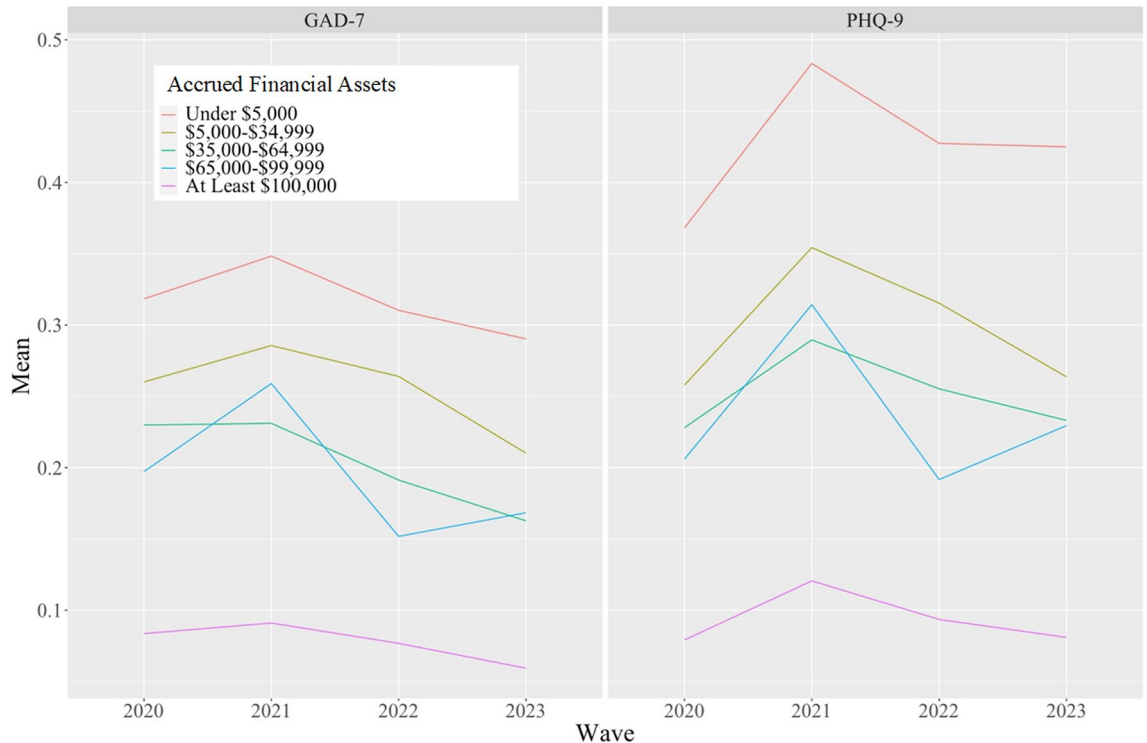


Fig. 1. Population-weighted regression adjusted probability of exceeding PHQ-9 or GAD-7 between 2020 and 2023, by accrued financial assets. “PHQ-9” indicates being at or above its clinical threshold of 10 out of a possible 27, reflective of having at least moderate depressive symptoms. Similarly, “GAD-7” indicates being at or above its clinical threshold of 10 out of a possible 21, reflective of having at least moderate symptoms of generalized anxiety. Probabilities taken from multivariable logistic regression with year fixed effects. Models employed a cluster-robust within-survey year estimator adjusted for individual characteristics. Survey weights used.

period, and it did not grow over that time period. Our first hypothesis that accrued financial assets would be more strongly associated with anxiety and depression than income was supported partially by the results. Our second hypothesis that this relationship would grow over time was not supported by these findings; however, the relationship between financial assets and mental health did not weaken across time, suggesting a sustained association between these factors over the study period.

Our finding that wealth may matter more for mental health than income is consistent with some, but not other, findings. For example, in a study of Australian adults in 2002, wealth was determined to be at least as important as, if not more than, income in its association with well-being⁵³. A more recent study of European countries using data collected from 2004 to 2017 identified that family assets played a protective role against depression and further that different assets mattered differently for mental health outcomes with liquid assets (such as total amounts in checking and savings accounts) mattering more than less liquid assets (such as stocks and bonds)⁵⁴. In a study surveying European countries, income had a stronger relationship with mental health than wealth among retired people, although the magnitude of associations varied across country contexts, whereby wealth mattered less in countries with more generous social support⁵⁵. In this way, it is possible that wealth plays a more important role in protecting mental health in places that have less generous social policies, where household assets must be used to cover expenses for basic needs.

This is one of the only studies, to our knowledge, to measure changes in the relation between non-income accrued financial assets and mental health indicators over time across all ages of U.S. adults. We found the relationship between wealth and mental health was persistent—from 2020 to 2023; that is, the relationship did

	PHQ-9			GAD-7			Both		
	OR ^a	95% CI ^a	p-value	OR ^a	95% CI ^a	p-value	OR ^a	95% CI ^a	p-value
Age									
60 ≥	–	–		–	–		–	–	
18–29	3.22	1.78, 5.82	< 0.001	3.56	1.94, 6.55	< 0.001	4.06	2.06, 7.99	< 0.001
30–44	3.11	1.87, 5.20	< 0.001	3.71	2.14, 6.43	< 0.001	4.04	2.20, 7.42	< 0.001
45–59	2.31	1.45, 3.68	< 0.001	2.55	1.56, 4.16	< 0.001	2.87	1.68, 4.90	< 0.001
Race and Ethnicity									
Black, non-Hispanic	–	–		–	–		–	–	
Asian, non-Hispanic	1.33	0.55, 3.23	0.52	0.67	0.25, 1.79	0.42	0.79	0.30, 2.08	0.63
White, non-Hispanic	1.77	1.10, 2.86	0.019	1.84	1.12, 3.02	0.017	1.48	0.87, 2.54	0.15
Other, non-Hispanic	1.95	1.02, 3.71	0.043	1.86	0.93, 3.73	0.080	1.16	0.58, 2.34	0.67
Hispanic	1.60	0.90, 2.85	0.11	1.54	0.87, 2.75	0.14	1.33	0.72, 2.48	0.36
Female	1.32	1.00, 1.73	0.049	1.23	0.91, 1.65	0.17	1.15	0.83, 1.58	0.40
Marital Status									
Married/living with partner	–	–		–	–		–	–	
Divorced/separated	1.41	1.00, 1.99	0.049	1.36	0.94, 1.96	0.10	1.27	0.85, 1.89	0.24
Never married	1.31	0.95, 1.81	0.10	1.04	0.76, 1.42	0.80	1.01	0.72, 1.42	0.96
Education									
Bachelor's degree	–	–		–	–		–	–	
HS/GED or less	1.30	0.86, 1.98	0.22	1.42	0.91, 2.23	0.13	1.41	0.88, 2.29	0.16
Some college or vocational/associates	1.21	0.83, 1.75	0.32	1.22	0.81, 1.83	0.35	1.22	0.78, 1.90	0.38
Graduate/professional degree	1.00	0.62, 1.61	0.99	1.18	0.69, 2.02	0.54	1.01	0.56, 1.82	0.97
Unemployed	1.74	1.30, 2.34	< 0.001	1.61	1.19, 2.18	0.002	1.85	1.32, 2.58	< 0.001
Region									
West	–	–		–	–		–	–	
Midwest	1.12	0.77, 1.62	0.56	1.40	0.94, 2.09	0.10	1.24	0.81, 1.92	0.32
Northeast	0.97	0.61, 1.52	0.88	1.42	0.89, 2.24	0.14	1.18	0.70, 1.98	0.54
South	1.12	0.78, 1.62	0.53	1.54	1.06, 2.25	0.025	1.30	0.87, 1.94	0.21
Income									
Under \$34,999	1.87	1.16, 3.02	0.011	1.04	0.59, 1.83	0.89	1.50	0.85, 2.66	0.16
\$35,000–\$64,999	1.47	0.96, 2.24	0.075	0.71	0.44, 1.13	0.15	0.99	0.60, 1.65	0.97
\$65,000–\$99,999	1.14	0.78, 1.67	0.49	0.85	0.54, 1.32	0.46	1.00	0.62, 1.61	> 0.99
≥ \$100,000	–	–		–	–		–	–	
Accrued Financial Assets									
\$0–\$4,999	2.19	1.42, 3.39	< 0.001	2.05	1.25, 3.36	0.005	2.33	1.38, 3.94	0.002
\$5,000–\$34,999	1.98	1.31, 3.00	0.001	2.43	1.55, 3.82	< 0.001	2.55	1.56, 4.18	< 0.001
\$35,000–\$64,999	1.89	1.16, 3.08	0.011	2.06	1.22, 3.48	0.007	2.40	1.34, 4.27	0.003
\$65,000–\$99,999	2.33	1.41, 3.86	< 0.001	2.42	1.31, 4.47	0.005	2.99	1.54, 5.80	0.001
≥ \$100,000	–	–		–	–		–	–	
Debt									
No Debt	–	–		–	–		–	–	
Under \$19,999	1.20	0.85, 1.69	0.31	1.15	0.79, 1.68	0.45	1.33	0.91, 1.96	0.14
≥ \$20,000	1.52	1.05, 2.20	0.025	1.39	0.94, 2.08	0.10	1.62	1.07, 2.46	0.022
Health Insurance									
Employer sponsored	–	–		–	–		–	–	
Self-insured	0.90	0.61, 1.33	0.60	1.31	0.86, 2.00	0.20	1.06	0.67, 1.68	0.79
Medicaid	1.18	0.73, 1.89	0.50	1.42	0.89, 2.27	0.14	1.27	0.77, 2.11	0.35
Medicare	1.12	0.69, 1.83	0.65	1.28	0.78, 2.11	0.33	1.27	0.76, 2.14	0.37
None	0.54	0.33, 0.89	0.016	0.98	0.62, 1.54	0.92	0.78	0.46, 1.30	0.34
Other	0.92	0.55, 1.55	0.76	1.10	0.63, 1.92	0.75	0.98	0.54, 1.76	0.94
Financial Stressor	2.08	1.65, 2.61	< 0.001	2.10	1.62, 2.73	< 0.001	2.26	1.71, 2.97	< 0.001
Social-Emotional Stressor	3.19	2.55, 3.98	< 0.001	3.05	2.41, 3.85	< 0.001	3.06	2.36, 3.97	< 0.001
Household Size	0.99	0.90, 1.08	0.76	0.96	0.87, 1.06	0.42	0.95	0.86, 1.06	0.35

Table 2. Weighted logistic regression models predicting odds of exceeding the clinical threshold of the PHQ-9, GAD-7, or both. ^a OR = Odds Ratio, CI = Confidence Interval Odds ratios (“OR”) and 95% CIs were estimated using logistic regression, adjusted for age, race and ethnicity, sex, education, employment status, health insurance, census region, marital status, employment, pandemic-related social emotional financial stress, and household size. All models were adjusted for time using with survey-year fixed effects and standard errors clustered at the individual level. “PHQ-9” indicates being at or above its clinical threshold of 10 out of a possible 27, reflective of having at least moderate depressive symptoms. Similarly, “GAD-7” indicates being at or above its clinical threshold of 10 out of a possible 21, reflective of having at least moderate symptoms of anxiety. “PHQ-9 & GAD-7” indicates co-occurrence of anxiety and depression. “Financial Stress” indicates respondent experienced any of the following: job loss, household job loss, financial problems, difficulty paying rent. “Social-Emotional Stress” indicates respondent experienced any of the following: loneliness, relationship problems, the death of someone close, childcare problems. Income, accrued financial assets, and debt were all measured at the household level. Hypothesis testing was two-sided, at a significance level of 0.05. GED: General Educational Development. Significant values are in bold.

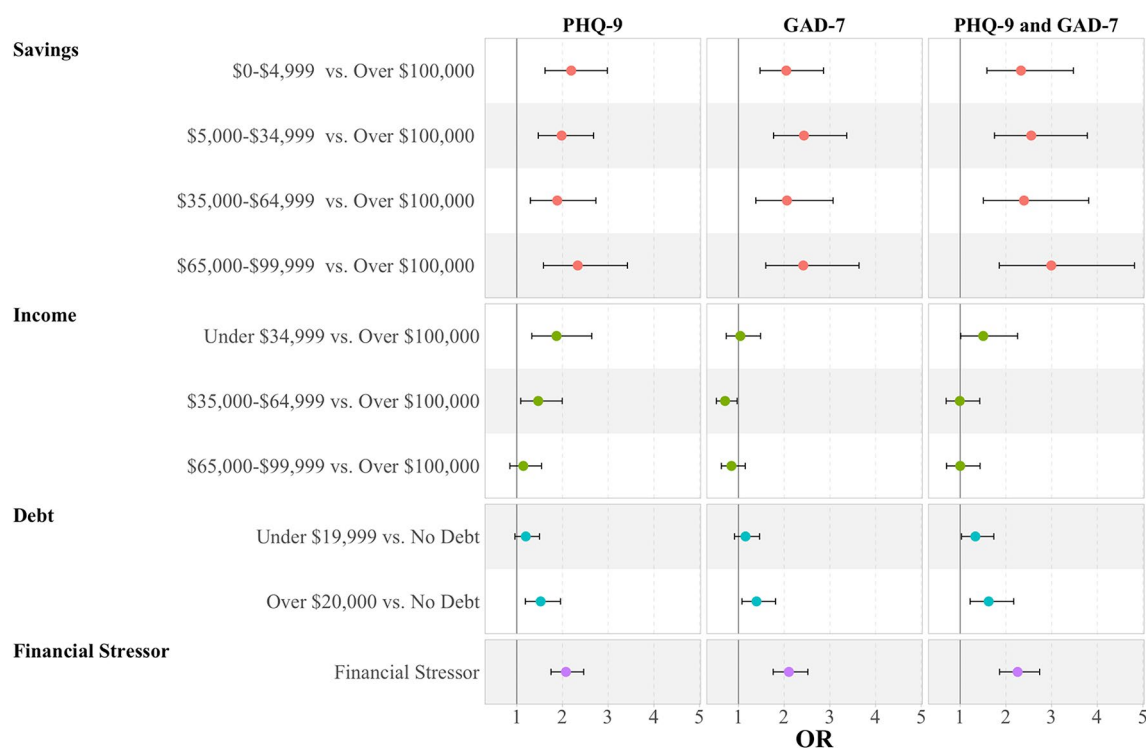


Fig. 2. Associations between accrued financial assets, income, debt, financial stress, and the odds of exceeding the clinical threshold of the PHQ-9, GAD-7, or Both. *Note:* Odds ratios (“OR”) and 95% CIs were estimated using logistic regression, adjusted for age, race and ethnicity, sex, education, employment status, health insurance, census region, marital status, employment, pandemic-related social emotional financial stress, and household size. All models were adjusted for time using with survey-year fixed effects and standard errors clustered at the individual level. Reference groups: Income: $\geq 100k$, Accrued Financial Assets: $\geq 100k$, Debt: No Debt. “PHQ-9” indicates being at or above its clinical threshold of 10 out of a possible 27, reflective of having at least moderate depressive symptoms. Similarly, “GAD-7” indicates being at or above its clinical threshold of 10 out of a possible 21, reflective of having at least moderate symptoms of anxiety. “Financial Stress” indicates respondent experienced any of the following: job loss, household job loss, financial problems, difficulty paying rent. Income, accrued financial assets, and debt were all measured at the household level. Hypothesis testing was two-sided, at a significance level of 0.05.

not weaken. These findings contribute to a growing literature on economic inequity and poor mental health^{20,56}. It is notable that gaps in mental health between accrued financial assets groups persisted over time despite record-breaking government investments in social and economic policy to support low-income groups during the COVID-19 pandemic. It is possible that in the absence of such social and economic policy, inequities could have widened, as suggested by cumulative inequality theory⁵⁷. Even with population-level changes in symptoms of depression and anxiety over time, persons with lower accrued financial assets experienced a greater burden

Characteristic	PHQ-9			GAD-7			Both		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
<i>Accrued Financial Assets * Time</i>									
\$0-\$4,999 * 2021	1.43	0.25, 8.12	0.68	2.03	0.37, 11.3	0.42	3.84	0.36, 41.2	0.27
\$5,000-\$34,999 * 2021	3.85	0.66, 22.6	0.14	0.99	0.19, 5.28	> 0.99	4.61	0.43, 49.9	0.21
\$35,000-\$64,999 * 2021	1.01	0.10, 10.6	> 0.99	0.58	0.06, 6.05	0.65	0.91	0.04, 22.2	0.95
\$65,000-\$99,999 * 2021	0.72	0.06, 8.79	0.80	3.46	0.37, 32.5	0.28	1.46	0.07, 32.0	0.81
\$0-\$4,999 * 2022	3.70	0.55, 25.0	0.18	4.06	0.59, 27.8	0.15	9.65	0.63, 148	0.10
\$5,000-\$34,999 * 2022	5.01	0.74, 33.7	0.10	1.83	0.28, 11.9	0.53	15.2	0.97, 239	0.053
\$35,000-\$64,999 * 2022	5.32	0.45, 62.3	0.18	5.90	0.54, 64.7	0.15	10.0	0.34, 296	0.18
\$65,000-\$99,999 * 2022	4.54	0.33, 62.8	0.26	10.6	0.73, 156	0.084	11.2	0.25, 499	0.21
\$0-\$4,999 * 2023	2.17	0.33, 14.2	0.42	5.98	0.70, 51.4	0.10	11.1	0.48, 258	0.13
\$5,000-\$34,999 * 2023	4.28	0.65, 28.2	0.13	6.25	0.76, 51.5	0.088	33.5	1.35, 829	0.032
\$35,000-\$64,999 * 2023	1.30	0.11, 15.3	0.84	2.18	0.15, 32.5	0.57	5.77	0.13, 255	0.36
\$65,000-\$99,999 * 2023	10.7	0.85, 135	0.066	29.9	2.18, 410	0.011	10.7	0.20, 576	0.24

Table 3. Time-varying relationship between accrued financial assets and mental health. Odds ratios (“OR”) and 95% CIs were estimated using logistic regression, adjusted for age, race and ethnicity, sex, education, employment status, income, debt, accrued financial assets, health insurance, census region, marital status, employment, pandemic-related social emotional financial stress, and household size. Longitudinal analyses were estimated as hierarchical linear models (HLM). Reference group: Accrued financial assets of \$100,000 or over in 2020. “GAD-7” indicates being at or above its clinical threshold of 10 out of a possible 21, reflective of having at least moderate symptoms of anxiety. Income, accrued financial assets, and debt were all measured at the household level. Hypothesis testing was two-sided, at a significance level of 0.05. The odds ratios of year interacted with accrued financial assets category are shown; full model output in Supplemental Table 4.

of poor mental health symptoms across all time periods. We also note that having accrued financial assets of \$100,000 or more was associated with a lower odds ratio of a positive screen for depression or anxiety relative to all other accrued asset categories. The magnitude of the difference was similar across comparisons, suggesting that while the highest category was associated with improved mental health, there was not a meaningful difference in mental health across lower levels of accrued financial assets (e.g., \$0-\$4,999 compared to \$65,000-\$99,999) relative to \$100,000 or more. It is possible that the lack of social safety net in the U.S. requires a high level of accrued financial assets to bestow psychological relief or that certain populations see a diminished health effect of assets⁵⁸ due to larger structural forces that create health.

This paper adds to a small but growing literature^{34,35,54,59} that advocates for a more holistic representation of assets^{28,31} beyond income in understanding the relation between economic context and mental health. Wealth inequality, which includes inherited assets in addition to earned assets, is increasingly understood as one of core drivers of inequity between groups³⁰. Having more assets may, for example, assist with coping in the face of stressors, leading to improved psychological outcomes⁶⁰. Understanding the detailed elements that contribute to a person’s financial standing (such as through stocks of capital in addition to flows from income) may help explain inequities that widen due to political and social decisions that perpetuate economic inequity^{61,62}, contributing to health disparities⁶³.

These findings should be considered in light of four primary limitations. First, we used two screening instruments to measure mental health; while the PHQ-9 and GAD-7 have been validated in national cohorts to have high sensitivity and specificity^{43,44,64}, the gold standard for the assessment of depression or generalized anxiety disorder are diagnoses made by health professionals. Second, as with all longitudinal studies, the CLIMB study had drop out across the four years of data collection. As such it is possible that there is selection bias based on participants who stayed in the sample. Third, economic measures were collected as categorical values based on thresholds in nominal dollars. Results should be interpreted as nominal, as opposed to real, changes in economic measures. Fourth, we are unable to determine the source of accrued financial assets. That is, adults could have accrued stock of financial assets through inherited wealth, sale of property, or excess income relative to expenses, which may each have different relations with mental health. However, given the paucity of literature on non-income financial assets and health, this study of financial assets broadly with mental health contributes to the literature, with future opportunities for research into details of stock accumulation and influence on mental health.

In summary, we found that having higher household accrued financial assets was significantly associated with symptoms of depression, anxiety, and their co-occurrence from 2020 to 2023. While the study was conducted during the COVID-19 pandemic, it is possible and consistent with literature from other time periods that these findings would hold during other times as well. These findings contribute to a growing literature that suggests that wealth matters even when taking into account income in driving mental health. Policies that address

underlying economic factors⁶⁵ and encourage the accrual of assets²⁸, such that people can cover their expenses and save money over time, may help to improve population mental health.

Data availability

Data for the CLIMB study are available upon reasonable request and consideration of the CLIMB study team. Requests should be sent to Dr. Ettman at cettman1@jhu.edu.

Received: 29 December 2023; Accepted: 18 October 2024

Published online: 09 November 2024

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Acknowledgements

The authors would like to thank Emma Dewhurst for helpful conversations on wealth and mental health, Dr. C. Ross Hatton for research assistance, and Priya Dohlman for research assistance and copy-editing.

Author contributions

C.K.E. conceived the project, acquired the data, interpreted the data, and drafted the manuscript. B.T. conducted data analysis, interpreted data, and drafted the manuscript. S.M.A. supported acquisition of the data through funding and reviewed the draft manuscript. M.K.M. contributed to analysis strategy, interpreted the data, and reviewed the draft manuscript. S.G. acquired the data, interpreted the data and reviewed the manuscript. All authors reviewed the manuscript.

Funding

CLIMB Wave 1 was supported by the Rockefeller-Boston University Commission on Social Determinants, Data and Decision Making. CLIMB Waves 2–4 were supported by the de Beaumont Foundation.

Declarations

Competing interests

The authors declare no competing interests.

Additional information

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1038/s41598-024-76990-x>.

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