Perceived mental health impacts of the COVID-19 pandemic: The roles of social support and social engagement for working age adults in the United States

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ABSTRACT

In this paper we assess if two protective mechanisms for mental health - social support and social engagement – are associated with lower risk of reporting worsening mental health as a result of the pandemic. Using a demographically representative sample of working age adults in the United States ($N = 4014$) collected in February and March of 2021, we use logistic regression models to predict self-reported worsening mental health as a result of the pandemic using social support – measured as instrumental and emotional support – and social engagement. We use additional stratified models to determine if these relationships are consistent across rural-urban areas. Results indicate that among urban working age adults, emotional support, high levels of instrumental support, and some types of social engagement were associated with significantly lower risk of worsening mental health. However, among rural working age adults, only emotional support and high levels of instrumental support were significantly associated with lower odds of worsening mental health. Findings suggest that while emotional support may be effective for working age adults in lowering risk of worsening mental health from the pandemic, social engagement may not be for rural residents. The results support use of mental health promotion and prevention approaches that bolster emotional support through familial and local social networks, and raises caution about the efficacy of social engagement approaches in rural contexts.

1. Introduction

The COVID-19 pandemic significantly impacted mental health and psychological well-being across rural-urban contexts (Vindegaard and Benros, 2020; Mueller et al., 2022; Monnat, 2021). In addition to illness and death from the virus, strategies to control the spread of COVID-19 caused major life stressors, including job loss, financial hardship, social isolation, and homelessness (Vindegaard and Benros, 2020; Mueller et al., 2022; Monnat, 2021; Serafini et al., 2020; Xiong et al., 2020). Prior research suggests that social support and social engagement are associated with reduced risk for developing symptoms of mental illness following major life stressors (Vindegaard and Benros, 2020; Alloway and Bebbington, 1987; Takizawa et al., 2006; van Tilburg et al., 2021; Cohen, 2004; Windle, 1992; Heinsch et al., 2020). However, the role of social support and engagement in protecting mental health among working age adults during the pandemic has received very little attention. Working age adults are a particularly important group as they experienced some of the most direct economic stressors resulting from

the pandemic (e.g. job loss, financial hardship, lack of childcare, etc.). Moreover, most current studies on psychological distress and potential protective factors do not account for rural-urban context – leaving the potential for gaps in public health recommendations for rural areas. Therefore, we assess if social support and social engagement are, in fact, associated with lower risk of reporting worsening mental health as a result of the pandemic among a cross-sectional sample of rural and urban working age adults in the U.S.

Numerous studies have shown that social support has direct and indirect benefits for mental health (Cohen et al., 2000; House et al., 1988; Lamu and Olsen, 2016; Teo et al., 2013). Social support is a multidimensional construct described as "support accessible to an individual through social ties to other individuals, groups, and the larger community" (Lin et al., 1979). Scholarly work often converges on two conceptual domains of social support: instrumental support and emotional support. Instrumental support is a form of tangible assistance, and can include food, money, a service, or information and has been shown to reduce suicidal ideation and improve self-reported well-being (Cooke

et al., 1988; Gottlieb and Bergen, 2010; Åslund et al., 2014; Kleiman et al., 2014; Khazaeian et al., 2017). Emotional support is intended to bolster one's feelings or improve one's psychological state through receipt of empathy, caring, or positive appraisal and is strongly associated with reduced depressive symptoms from a variety of life stressors (Cooke et al., 1988; Valente, 2010; Bjornestad et al., 2019; Santini et al., 2015; Werner-Seidler et al., 2017; Kutek et al., 2011). Individuals in rural areas have reported greater numbers of supportive friends and family members than those living in urban areas (Henning-Smith et al., 2019), raising important questions about if and how these social supports influenced mental health during the pandemic.

Like social support, research has shown social engagement to be protective for mental health. Social engagement refers to the extent to which individuals participate in activities within their community or society. The exact mechanisms of social engagement are complex, though studies have shown that participation in activities increases social engagement and subsequently reduces psychological distress in older adults (Mackenzie and Abdulrazaq, 2021). One study found that individuals with high levels of social engagement had lower levels of fibrinogen, a systemic inflammatory marker associated with symptoms of depression, psychological distress, and mental illness (Walker et al., 2020; Fancourt and Steptoe, 2020; Toker et al., 2005). Social engagement also facilitates social interactions, thereby increasing exposure to social support (House et al., 1988; Gottlieb and Bergen, 2010). Social engagement varies by rural-urban context. Some research suggests greater participation in volunteerism among rural residents (Henning-Smith et al., 2022), while others show declining differences (Paarlberg et al., 2022). Participation in faith-based activities is higher is some rural areas than urban areas (Paarlberg et al., 2022), while participation in social activities is lower in some rural than urban communities (Henning-Smith et al., 2019; Meng and Chen, 2014). In addition, few of these studies focused on working-age adults, with most targeting older adults.

Other factors have been shown to influence mental health. For example, the number, frequency, and extent of disruptions from stressful life events is highly correlated with subsequent symptoms of depression, anxiety, and post-traumatic stress (Schweizer and Hankin, 2020; Simon et al., 2019). Age, sex, race/ethnicity, unemployment, poverty, and relationship status are also associated with poor mental health outcomes among those experiencing life stressors (Teo et al., 2013; Thoits, 1999; Hammen, 2005).

In this study, we examine if social support and social engagement are associated with lower risk of self-reported worsening mental health impacts of the COVID-19 pandemic among a sample of working age adults. In particular, we test two hypotheses:

Hypothesis 1. Among working age adults, those with greater social support and social engagement will have lower odds of reporting worsening mental health as a result of the pandemic, net of major COVID-19 impacts and socio-demographic characteristics.

Hypothesis 2. The relationship between social support and social engagement and worsening mental health as a result of the pandemic will be stronger in rural than in urban counties.

2. Materials and methods

2.1. Data

Data were drawn from the National Well-being Survey (NWS), a cross-sectional national survey of 4014 working age adults in the U.S. that was conducted in February and March of 2021 – approximately one year into the pandemic (Monnat and Rhubart, 2021) when new COVID-19 infections were declining and similar across rural and urban counties (HealthData.gov, 2022). The survey was administered online by Qualtrics Panels. To recruit respondents, Qualtrics utilized its existing database that includes millions of potential survey respondents. Respondents were compensated, including gift cards, flyer miles, and rewards points,

though the method and amount of compensation varied based on respondent preferences. Screening questions were used to meet demographic quotas and ensure the sample was representative of the broader U.S. working age population based on race/ethnicity, sex, and age. Unless otherwise stated, a post-stratification weight that accounts for age, sex, race/ethnicity, and education was applied to all results to ensure the results were generalizable to the broader population. The NWS survey and broader research project followed all ethical standards for human subjects research and received approval from the Syracuse University Institutional Review Board (IRB) office. The final publicly available dataset contained no identifiable human subject data and therefore did not require IRB oversight from the authors' current institution. The sample included 1136 rural residents and 2878 urban residents as defined by the Economic Research Service's Rural Urban Continuum Codes 4–9 (Economic Research Service, 2020). After removing cases with missing data, the final sample contained 928 rural working age adults and 2330 urban working age adults. The NWS completion rate – the total number of surveys completed among those who clicked on the survey link and viewed the invitation and informed consent – was 40%.

2.2. Dependent variable

The outcome variable of interest was a self-reported measure of whether the COVID-19 pandemic negatively affected a respondent's mental health (American Psychological Association, 2021). Participants were asked: "Overall, please rate how the COVID-19 pandemic has affected the following aspects of your life: Mental health" and could choose from the following response options: substantially improved, somewhat improved, no change, somewhat worsened, or substantially worsened. Those who indicated that their mental health was somewhat or substantially worsened were coded as 1. Those who indicated their mental health had improved or that there was no change were coded as 0. Similar to other self-rated mental health questions used in national surveys, mental health was not defined for respondents. Therefore, respondents were able to interpret the meaning in a way that made sense to them. Factors related to their mental health history and their mental health in relation to those around them could influence their responses.

2.3. Predictor variables

To capture social support, we used previously validated measures of both instrumental and emotional support. We used a composite score from responses to two questions included on the 22-year longitudinal Fragile Families and Child Wellbeing Study to capture instrumental support: "Is there someone you could count on if you needed a loan for $200?" and "Is there someone you could count on if you needed a place to live?" (Harknett and Knab, 2007; The Trustees of Princeton University, 2022). "No" responses were coded as 0 and "yes" responses were coded as 1. The responses were summed and scored: 0 = no instrumental support, 1 = low instrumental support, 2 = high instrumental support. To measure emotional support, respondents answered: "How much are friends and relatives willing to listen when you need to talk about your worries or problems?" from the Chicago Community Adult Health Survey (University of Michigan, 2011). Those who indicated "a great deal" or "some" were coded as 1 and those who indicated "a little" or "not at all" were coded as 0.

Social engagement was measured using four questions that comprise the social relationships and activities scale developed and validated by NORC for the second wave of the National Life, Health, and Aging Project (Waite et al., 2011). These questions include: "Thinking about the past year as a whole, how often did you engage in the following activities? (include virtual/online participation) – 1) do volunteer work for an organization or association, 2) attend meetings, events, or get togethers of any organized group, 3) get together socially with friends or relatives, and 4) aside from weddings and funerals, about how often did

you attend religious services? (Include religious services you attended virtually/online.)" Responses were recoded into at least once or twice a month (1 = frequent engagement) or less (0 = infrequent engagement). Missing responses and those who indicated "don't know" were assumed to have not engaged in that activity and recoded as 0 (Pew Research Center, 2019).

To control for the spectrum of major impacts that could have been experienced during the pandemic, we control for self-reported pandemic-related impacts. Participants were asked: "Which of the following experiences of COVID-19 applied to you?". Appendix A presents the unweighted and weighted share of respondents who experienced any of the following major impacts as a result of the COVID-19 pandemic: death of a family member or friend (13.41%); evicted or mortgage went into default (8.99%); could not pay bills or afford food (31.65%); or lost their job, experienced a pay reduction or were unable to work because children could not attend daycare/school (32.04%). We created a composite variable of the sum total number of major COVID-19 impacts. Approximately 47.30% of respondents experienced none of the four major COVID-19 impacts. Nearly one third (28.21%) experienced one major COVID-19 impact, and 24.49% experienced two or more of the major COVID-19 impacts. Because so few respondents experienced three or four of the major COVID-19 impacts, those who experienced two or more were combined into one category.

Model covariates included sex, age, race/ethnicity, relationship status, the presence of other adults in the household, the presence of children in the household, employment status, and income. The breakdown of these covariates is presented in Table 2. A dichotomous race/ethnicity variable was used to ensure adequate cell sizes in the rural-urban stratified models, and subsequent comparisons across the rural-urban stratified models.

2.4. Statistical approach

We begin by presenting the unweighted and weighted descriptive statistics for model variables as well as national estimates (Table 1). Then we present results from logistic regression models (Table 2) predicting if respondents indicated that the COVID-19 pandemic had a negative impact on their mental health. This includes three models: a base model with only social support and engagement (Model 1), a model that adds major COVID-19 impacts (Model 2), and a full model that adds sociodemographic characteristics and rural-urban status (Model 3). We then replicate Table 3 with rural-urban stratified models (Tables 3 and 4). Model diagnostics (VIF/TOL) did not indicate any concerns with multicollinearity. All analyses were conducted in SAS Statistical Software version 9.4 and are weighted so that results are proportional to the broader working age population by age, sex, race/ethnicity, and education.

Table 1
Unweighted and weighted descriptive statistics and national estimates for model variables (N = 3258).

Variable	Level	N	Sample		National Population[a]
			Unweighted percent (mean)	Weighted percent (mean)	
Self-reported mental health impacts from the pandemic	Positive or no mental health impacts	2019	61.97	62.61	–
	Negative mental health impacts	1239	38.03	37.39	–
Emotional support	Friends and relatives willing to listen a little or not at all	828	25.41	25.99	–
	Friends and relatives willing to listen at least some of the time	2430	74.59	74.01	–
Instrumental support	None	450	13.81	14.56	–
	Low	482	14.79	15.89	–
	High	2326	71.39	69.56	–
Social engagement	Volunteer frequently	582	17.86	17.87	–
	Gather socially frequently	1444	44.32	43.61	
	Attend meetings frequently	764	23.45	22.85	–
	Attend religious services frequently	1279	39.26	37.42	–
Major COVID-19 impacts	No major impacts	1541	47.30	48.28	–
	1 major impact	919	28.21	27.10	–
	2 or more major impacts	798	24.49	24.62	–
Sex	Male	1645	50.49	51.31	49.2[b]
	Female	1613	49.51	48.69	50.8[b]
	Age	3258	(40.74)	(40.69)	–
Race/ethnicity	Non-Hispanic White	1993	61.17	61.27	60.1
	Non-Hispanic black	403	12.37	12.16	12.3
	Hispanic	608	18.66	18.80	18.2
	Other	254	7.80	7.77	9.4
Relationship status	Single, divorced, or widowed	1477	45.33	47.36	–
	Married/unmarried couple	1781	54.67	52.64	–
Other adults (age 18+) in the home	None	754	23.14	23.79	–
	At least 1 other adult	2504	76.86	76.21	–
Children (<age 18) in the home	None	1904	58.44	59.47	–
	At least 1 child	1354	41.56	40.53	–
Income	<$50,000	1561	47.91	49.10	39.0
	$50,000+	1575	48.34	46.87	61.0
	Don't know income	122	3.74	4.03	–
Employment status	Employed	1998	61.33	58.93	59.6
	Retired, homemaker, or student	538	16.51	17.27	–
	Unemployed or receive disability benefits	722	22.16	23.80	–
Rural-urban status	Rural	928	28.48	13.67	15.0[c]
	Urban	2330	71.52	86.33	85.0[c]

[a] Data from the 2020 American community survey unless otherwise stated.
[b] Estimates are for the working age (18–64) population.
[c] Data from the Economic Research Service's rural urban continuum codes.

Table 2

Weighted descriptive statistics for dependent and independent variables ($N =$ 3258).

Variable	Level	Rural ($N =$ 928)	Urban ($N =$ 2330)	X^2 (p-value)
Self-reported mental health impacts from the pandemic	Negative mental health impacts	40.45	36.90	2.048 (0.152)
Emotional support	Friends and relatives willing to listen at least some of the time	67.95	74.97	9.738 (0.002)
Instrumental support	None	20.61	13.60	16.493 (0.001)
	Low	16.70	15.76	
	High	62.69	70.64	
Social engagement	Volunteer frequently	13.73	18.52	5.951 (0.015)
	Gather socially frequently	40.09	44.17	2.567 (0.109)
	Attend meetings frequently	16.57	23.84	11.401 (0.001)
	Attend religious services frequently	34.80	37.83	1.491 (0.222)

3. Results

Table 1 presents the unweighted and weighted descriptive statistics of the model variables as well as the national estimates of the working age population for model variables that were available through the 2015–19 American Community Survey. Here we describe the weighted results. Approximately 37.39% of working age adults indicated that the COVID-19 pandemic negatively impacted their mental health. Along dimensions of social support, 74.01% reported that their friends and relatives were willing to listen at least some of the time and 69.56% reported high instrumental support (i.e. having both someone to count on if they needed a loan for $200 and if they needed a place to live). Along social engagement, 17.87% frequently volunteered, 43.61% frequently gathered with friends or relatives socially, 22.85% frequently attended organizational meetings, and 37.42% frequently attended religious services. Once weighted, the demographic characteristics of the sample used largely aligned with national estimates, except for income. This discrepancy may reflect that national estimates include older adults (age 65+) who were not included in our sample.

Table 2 presents the weighted descriptive statistics for self-reported mental health impacts from the pandemic and each of the main social support and engagement variables by rural-urban status and associated Chi-square test results. While there are no significant rural-urban differences in the share of respondents who reported negative mental health impacts, those in urban counties were significantly more likely than those in rural counties to report that their friends and relatives were willing to listen at least some of the time (74.97% vs. 67.95%) and to have a high level of instrumental support (70.64% vs. 62.69%). In addition, those in urban counties were significantly more likely than those in rural counties to volunteer frequently (18.52% vs. 13.73%) and attend organized meetings frequently (23.84% vs. 16.57%).

Table 3 presents the logistic regression models predicting if respondents experienced negative mental health impacts as a result of the COVID-19 pandemic. Model 1 presents the base model of social support and social engagement on reports of worsening mental health. Compared to those with no instrumental support, those with high instrumental support were 41% less likely to report worsening mental health as a result of the pandemic. Compared to those whose friends and relatives were willing to listen only a little or none of the time, those whose friends and relatives were willing to listen at least some of the time were 39% less likely to report worsening mental health as a result of the pandemic. Social engagement was not significant. When major COVID-19 impacts were added to the model (Model 2), the overall

effects of social support were largely unchanged. Frequently volunteering and frequently attending religious services became significant, with 25% and 18% lower odds of reporting worsening mental health, respectively. In addition, compared to those who experienced no major COVID-19 impacts, those who experienced 1 major impact and 2 or more major impacts were 81% and 2.6 times more likely, respectively, to report worsening mental health as a result of the pandemic. When sociodemographic controls were added to the model (Model 3), the relationship between worsening mental health and social support and social engagement largely remained the same. In addition, the effects of major COVID-19 impacts remained significant.

Tables 4 and 5 replicate the analyses from Table 3 using rural-urban stratified models. For rural respondents (Table 4), compared to those with no instrumental support, those with high instrumental support were 55% less likely to report worsening mental health as a result of the pandemic. Compared to those whose friends and relatives who were willing to listen only a little or none of the time, those whose friends and relatives were willing to listen at least some of the time were 53% less likely to report worsening mental health as a result of the pandemic. None of the social engagement measures were significant. When major COVID-19 impacts were added to the model (Model 2), the overall effects of social support and engagement were largely unchanged, except for those with high instrumental support, which became marginally significant ($p = 0.063$). When sociodemographic controls were added to the model (Model 3), the relationship between worsening mental health and social support measures remained the same as Model 2 and the social engagement measures remained insignificant.

Among urban residents (Table 5), compared to those with no instrumental support, respondents with high instrumental support were 36% less likely to report worsening mental health as a result of the pandemic. Compared to those whose friends and relatives were willing to listen only a little or none of the time, those whose friends and relatives were willing to listen at least some of the time were 48% less likely to report worsening mental health as a result of the pandemic. Among the social engagement measures, those who frequently volunteered or frequently attended religious services were significantly less likely to report worsening mental health (25% and 19% lower odds, respectively). When major COVID-19 impacts were added to the model (Model 2) and sociodemographic controls were added to the model (Model 3), the relationship between worsening mental health and social support and social engagement remained largely unchanged.

4. Discussion

The COVID-19 pandemic had significant impacts on mental health and well-being and precipitated major life stressors, including job loss, financial hardship, social isolation, and homelessness. While previous work has documented mental health impacts of the pandemic, including in rural areas (Vindegaard and Benros, 2020; Mueller et al., 2022; Monnat, 2021; Olff et al., 2021), research is needed on the protective mechanisms that may mitigate the mental health impacts of the pandemic and determine whether these vary across rural-urban contexts. Therefore, in this paper we used data from a survey conducted in February and March of 2021 of a U.S. nationally representative sample of working age adults to assess if social support and social engagement are associated with lower risk of worsening mental health as a result of the pandemic among working-age adults. The sampling window captured a period of time when new COVID-19 infections were similar across rural and urban counties and there was a general decline prior to and during data collection (HealthData.gov, 2022).

We found that emotional support was an important form of social support in reducing the risk of reporting worsening mental health from the pandemic across rural-urban contexts. In addition, high levels of instrumental support were also associated with lower risk of worsening mental health. These findings indicate the important role that friends and relatives can play in providing support and reducing the risk of

Table 3

Logistic regression models predicting odds of respondents reporting that the pandemic had worsened their mental health[a] (N = 3258).

	Model 1			Model 2			Model 3		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Instrumental support [ref. = none]									
Moderate	0.862	[0.664, 1.119]	0.264	0.831	[0.637, 1.084]	0.173	0.796	[0.608, 1.043]	0.098
High	0.593	[0.469, 0.749]	<0.001	0.641	[0.505, 0.813]	<0.001	0.636	[0.496, 0.815]	<0.001
Emotional support [ref. = friends/relatives listen a little/ none]									
Friends & relatives listen at least some of the time	0.608	[0.504, 0.733]	<0.001	0.647	[0.534, 0.782]	<0.001	0.645	[0.532, 0.782]	<0.001
Social engagement									
Volunteer frequently	0.844	[0.678, 1.051]	0.129	0.754	[0.602, 0.945]	0.014	0.754	[0.600, 0.948]	0.016
Gather socially frequently	1.115	[0.953, 1.304]	0.176	1.098	[0.936, 1.289]	0.249	1.088	[0.925, 1.279]	0.310
Attend meetings frequently	1.188	[0.972, 1.452]	0.093	1.163	[0.948, 1.427]	0.147	1.178	[0.957, 1.450]	0.121
Attend religious services frequently	0.870	[0.738, 1.025]	0.097	0.821	[0.694, 0.971]	0.021	0.826	[0.696, 0.981]	0.029
Major COVID-19 impacts [ref. = none]									
1 major impact				1.811	[1.517, 2.162]	<0.001	1.763	[1.473, 2.111]	<0.001
2 or more major impacts				2.601	[2.161, 3.132]	<0.001	2.566	[2.117, 3.109]	<0.001
Sex [ref: = male]									
Female							1.374	[1.165, 1.622]	<0.001
Race/ethnicity [ref. = not NH White]									
Non-Hispanic White							1.310	[1.107, 1.550]	0.002
Relationship status [ref. = single, divorced or widowed]									
Married/unmarried couple							1.077	[0.892, 1.302]	0.440
Age							0.981	[0.975, 0.987]	<0.001
Other adults (age 18+) in the home [ref = none]									
At least 1 other adult							0.955	[0.781, 1.166]	0.649
Children (<age 18) in the home [ref = none]									
At least 1 child							0.753	[0.636, 0.893]	0.001
Employment status [ref. = employed]									
Retired, homemaker or student							0.932	[0.766, 1.134]	0.480
Unemployed and/or receiving disability benefits							1.287	[1.062, 1.560]	0.010
Income [ref. = $50,000+]									
<$50,000							0.845	[0.707, 1.010]	0.065
Don't know income							0.804	[0.534, 1.209]	0.294
Somers' D	0.225			0.309			0.352		
c	0.613			0.654			0.676		
AIC	4161			4053			4008		
−2 log L	4145			4033			3968		

[a] Models include a sampling weight to account for sex, age, race/ethnicity, and education.

adverse effects from life stressors on mental health during the crises like the pandemic. Findings affirm that positive effects of emotional support on stressful life events found in prior studies held true for working age adults during the pandemic and can guide future prevention science (Vindegaard and Benros, 2020; Alloway and Bebbington, 1987; Cohen, 2004). Specifically, study findings support implementation of mental health promotion and prevention approaches that emphasize peer support models that foster well-being by bolstering social support through local social networks (Hardy et al., 2019). Importantly, while high instrumental support mattered in rural counties, this relationship was not significant once major COVID-19 impacts were controlled for. This suggests that those with greater instrumental support were also those who experienced fewer major COVID-19 impacts.

Interestingly, frequent volunteering and religious service attendance were the only forms of social engagement that were associated with lower odds of reporting worsening mental health and only appeared to matter in urban counties. While previous work on other subpopulations showed that social engagement can have significant benefits for self-reported mental health across geographic settings, our findings raise the importance of tailored interventions and applicability (Jenkinson et al., 2013; Mackenzie and Abdulrazaq, 2021). Insignificant findings related to social gathering and attending organizational meetings also raise questions about the usefulness of social engagement for mental health during a time of social distancing, particularly whether activities occurring remotely can facilitate meaningful interactions or relationships for working age adults.

Our findings point to the predominant role of major life impacts from the COVID-19 pandemic on mental health across rural-urban contexts. A

Table 4
Logistic regression models predicting odds of respondents reporting that the pandemic had worsened their mental health among rural residents[a] (*N* = 928).

	Model 1			Model 2			Model 3		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Instrumental support [ref. = none]									
Moderate	0.717	[0.372, 1.382]	0.320	0.751	[0.386, 1.464]	0.401	0.753	[0.375, 1.509]	0.423
High	0.454	[0.252, 0.818]	0.009	0.562	[0.306, 1.032]	0.063	0.575	[0.302, 1.091]	0.090
Emotional support [ref. = Friends/relatives listen a little/none]									
Friends & relatives listen at least some of the time	0.465	[0.282, 0.766]	0.003	0.460	[0.277, 0.763]	0.003	0.446	[0.263, 0.756]	0.003
Social engagement									
Volunteer frequently	0.912	[0.473, 1.759]	0.783	0.816	[0.418, 1.592]	0.551	0.850	[0.425, 1.703]	0.647
Gather socially frequently	1.174	[0.765, 1.803]	0.463	1.095	[0.707, 1.695]	0.685	1.086	[0.689, 1.712]	0.723
Attend meetings frequently	0.998	[0.538, 1.854]	0.996	1.015	[0.542, 1.904]	0.962	1.132	[0.584, 2.197]	0.713
Attend religious services frequently	0.868	[0.552, 1.364]	0.540	0.896	[0.566, 1.418]	0.638	0.960	[0.598, 1.541]	0.866
Major COVID-19 impacts [ref. = none]									
1 major impact				1.377	[0.847, 2.238]	0.197	1.362	[0.824, 2.251]	0.228
2 or more major impacts				2.426	[1.458, 4.039]	0.001	2.567	[1.477, 4.463]	<0.001
Sex [ref: = male]									
Female							2.281	[1.437, 3.623]	<0.001
Race/ethnicity [ref. = not NH White]									
Non-Hispanic White							1.939	[1.031, 3.647]	0.040
Relationship status [ref. = single, divorced or widowed]									
Married/unmarried couple							0.891	[0.538, 1.476]	0.655
Age							0.991	[0.974, 1.009]	0.347
Other adults (age 18+) in the home [ref = none]									
At least 1 other adult							0.896	[0.502, 1.602]	0.712
Children (<age 18) in the home [ref = none]									
At least 1 child							1.291	[0.798, 2.086]	0.298
Employment status [ref. = employed]									
Retired, homemaker or student							0.918	[0.531, 1.586]	0.758
Unemployed and/or receiving disability benefits							1.041	[0.629, 1.724]	0.876
Income [ref. = $50,000+]									
<$50,000							1.019	[0.596, 1.744]	0.944
Don't know income							0.474	[0.113, 1.984]	0.307
Somers' D	0.302			0.368			0.411		
c	0.651			0.684			0.706		
AIC	572.2			564.4			563.8		
−2 log L	556.2			544.4			523.8		

[a] Models include a sampling weight to account for sex, age, race/ethnicity, and education.

large share of people experienced at least one major life impact (52.7%), and a substantial amount experienced two or more major life impacts (24.5%) in just the first year of the pandemic. Our results show significantly higher likelihood of reporting worse mental health as a result of the pandemic among those who experienced these major events. These findings also align with previous work suggesting that symptoms of mental health illness are dependent on the number, frequency and extent of stressful events (Schweizer and Hankin, 2020; Simon et al., 2019). These impacts – especially the loss of a family member or friend and evictions/loss of housing and employment can have long term consequences for the health and well-being of individuals and their families (Olff et al., 2021; Every-Palmer et al., 2020; Mazza et al., 2020). They may also contribute to higher risk of suicide (Brown and Schuman, 2020; Monteith et al., 2020). Resources should be invested to incentivize people entering the mental health care field to meet the increased demand for services in the wake of COVID-19, especially in rural areas that already have mental health care professional shortages (Agency for Healthcare Research and Quality, 2021; Kronenfeld and Pendedo, 2021).

4.1. Limitations

Findings from this research should be considered in light of several limitations. First, we used self-reported impacts of the pandemic on mental health, and we did not measure actual changes in measures of psychological distress. However, studies have validated self-reports for mental health for assessing both symptoms and incidence of mental health illness (McAlpine et al., 2018). Second, our measurement of social engagement is limited in that it does not distinguish between in-person vs. remote/virtual engagement. These different modes may

influence the effects of social engagement. In addition, while we controlled for the number of adults in the household, it as not possible to differentiate between roommates, partners, etc. Finally, the mechanisms through which social support and social engagement are associated with worsening mental health from the pandemic cannot be delineated from this research. This was outside of the scope of this paper and deserves further attention in future research.

4.2. Conclusions

This paper builds on previous work showing that among working age adults in the U.S., social support was associated with significantly lower risk of worsening mental health from the pandemic. In urban contexts, active forms of social engagement (e.g. volunteering and religious service attendance) were also associated with lower risk. Previous research affirms that many common mental health disorders, like depression and anxiety, can be prevented from occurring even for individuals with predisposing risk factors (Mendelson and Eaton, 2018). Our findings support approaches where social support is viewed as a modifiable risk factor that can be targeted through primary prevention to reduce the development of symptoms of mental health illness (Zimmerman et al., 2020). In particular, public and mental health promotion and prevention that focuses on developing and strengthening individuals' existing social networks among families and local communities may be useful.

Funding

Table 5

Logistic Regression Models Predicting Odds of Respondents Reporting that the Pandemic had Worsened their Mental Health among Urban Residents[a] (*N* = 2330).

	Model 1			Model 2			Model 3		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Instrumental support [ref. = none]									
Moderate	0.914	[0.687, 1.216]	0.430	0.865	[0.646, 1.157]	0.329	0.820	[0.610, 1.102]	0.189
High	0.636	[0.492, 0.822]	<0.001	0.668	[0.514, 0.868]	0.003	0.653	[0.498, 0.858]	0.002
Emotional support [ref. = friends/relatives listen a little/ none]									
Friends & relatives listen at least some of the time.	0.639	[0.522, 0.782]	<0.001	0.686	[0.558, 0.844]	0.000	0.683	[0.554, 0.842]	<0.001
Social engagement [ref. = no Freq. Engagement]									
Volunteer frequently	0.832	[0.659, 1.050]	0.121	0.746	[0.587, 0.948]	0.016	0.745	[0.584, 0.951]	0.018
Gather socially frequently	1.100	[0.929, 1.303]	0.268	1.097	[0.924, 1.304]	0.291	1.093	[0.917, 1.301]	0.321
Attend meetings frequently	1.225	[0.990, 1.515]	0.062	1.192	[0.959, 1.481]	0.113	1.196	[0.959, 1.490]	0.112
Attend religious services frequently	0.870	[0.728, 1.038]	0.122	0.810	[0.686, 0.971]	0.023	0.819	[0.680, 0.986]	0.035
Major COVID-19 impacts [ref. = none]									
1 major impact				1.891	[1.563, 2.289]	<0.001	1.850	[1.524, 2.247]	<0.001
2 or more major impacts				2.618	[2.143, 3.198]	<0.001	2.605	[2.117, 3.205]	<0.001
Sex [ref: = male]									
Female							1.253	[1.045, 1.502]	0.015
Race/ethnicity [ref. = NH White]									
Non-Hispanic White							1.226	[1.021, 1.473]	0.029
Relationship status [ref. = single, divorced or widowed]									
Married/unmarried couple							1.133	[0.923, 1.392]	0.233
Age							0.980	[0.973, 0.986]	<0.001
Other adults (age 18+) in the home [ref = none]									
At least 1 other adult							0.952	[0.768, 1.180]	0.652
Children (<age 18) in the home [ref = none]									
At least 1 child							0.688	[0.572, 0.827]	<0.001
Employment status [ref. = employed]									
Retired, homemaker or student							0.930	[0.752, 1.150]	0.505
Unemployed and/or receiving disability benefits							1.340	[1.087, 1.654]	0.006
Income [ref. = $50,000+]									
<$50,000							0.823	[0.679, 0.997]	0.047
Don't know income							0.855	[0.556, 1.314]	0.476
Somers' D	0.200			0.284			0.331		
c	0.600			0.642			0.665		
AIC	3599			3502			3461		
−2 log L	3583			3482			3421		

[a] Models include a sampling weight to account for sex, age, race/ethnicity, and education.

CRediT authorship contribution statement

Danielle Rhubart: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Jennifer Kowalkowski:** Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ypmed.2022.107171.

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