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Research paper

Helpful activities during the COVID-19 pandemic: Perceived benefits and actual association with psychiatric symptoms and psychological wellbeing

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ABSTRACT

Background: Few studies have rigorously examined the effectiveness of commonly reported coping activities during the COVID-19 pandemic. This study was designed to assess perceived helpful activities during the pandemic and to investigate the extent to which these activities were associated with psychological outcomes.
Method: Adults living in the US ($N = 204$), who were part of a longitudinal family study of depression responded to an online survey. They reported on their perceived helpful activities during the pandemic. General linear regression models (GLM) were used to evaluate the association between perceived helpful activities and current psychiatric symptoms, controlling for demographic factors, and pre-pandemic psychiatric history and symptoms.
Results: The top perceived helpful activity during COVID-19 was *communicating with friends/family* via *telephone text or video* (75.5 %). However, of the top five activities endorsed, *cooking/baking* was associated with the most clinical outcomes, including lower anxiety/depression and greater psychological wellbeing (all $ps < 0.05$). These relationships were most prominent among younger individuals < age 40 years, females, and those with recent psychiatric history, although they extended to younger males, and individuals at high or low depression risk.
Limitations: Close ended items limited variability in coping activities reported. The study lacked data on substance use. The sample was racially and ethnically homogenous.
Conclusions: These findings move beyond anecdotal evidence that cooking/baking as a coping activity yields protection against psychopathology. Its ready accessibility and ability to confer benefits across a range of individual characteristics, make it a useful adjunct in therapeutic interventions for people confined to their homes.

1. Introduction

The COVID-19 pandemic has generated unprecedented scientific and clinical focus on mental health. This interest includes psychiatric symptoms since the onset of the pandemic, as well as demographic, and clinical risk factors associated with pandemic-related mental illness. With some exceptions, most studies on pandemic-related psychiatric outcomes have found increased prevalence of psychiatric symptoms, notably depression and anxiety (Abbott, 2021; Gloster et al., 2021; Xiong et al., 2020). In addition to demographic and clinical risk factors such as younger age, female gender, and pre-existing psychopathology (Daly and Robinson, 2021; Pan et al., 2020; Varma et al., 2021; Wenham et al., 2020), pandemic-specific circumstances, such as disruptions of family, work, and social routines, have been identified as major contributors to increased psychopathology (Flanagan et al., 2021; Gloster et al., 2021).

However, fewer studies have addressed coping mechanisms beyond anecdotes (Puyat et al., 2020). The COVID-19 pandemic limited individuals' ability to leave home to access treatment services or engage in usual routines that could have alleviated their stress (Adams-Prassl et al., 2022; Catling et al., 2022; Šik Novak et al., 2022). Mandated and self-imposed lockdowns, which included curtailing of outdoor and social activities, forced individuals to fall back on, or become newly involved in activities or routines that could be accessed while staying home. As

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companies, schools & universities, and social venues shut down, their employees, students, and patrons, were now required to work, learn, and access entertainment from home. Similarly, individuals who experienced psychiatric symptoms had to rely on alternative ways of coping with stress and alleviating their symptoms while remaining at home and mostly indoors (Puyat et al., 2020).

In dealing with the stress of the pandemic, certain activities seemed to predominate and were most frequently cited in the literature. Not surprisingly, there was a ubiquitous reliance on social media and communication technologies that permitted remote interactions, in the workplace (e.g., via Zoom, Webex, Microsoft Teams), with friends/family (Instagram, Snapchat, FB, others), or entertainment sites (YouTube, Netflix, Amazon, etc.) (McClain et al., 2021). Other common coping mechanisms included engaging in music-related activities (singing, dancing, listening) (Ferreri et al., 2021; Krause et al., 2020; Mas-Herrero et al., 2020), exercising (Kaur et al., 2020; Tavares et al., 2022), cooking/baking (Güler and Haseki, 2021; McKay, 2020), arts and crafts (Schafer et al., 2021), and online gaming (Krause et al., 2020).

Although some studies have addressed coping methods during the pandemic and have made useful contributions to the extant literature on COVID-19 and mental health, they remain limited in number and scope. Many of the reports are mostly descriptive, with little systematic investigation of their effect on psychiatric symptoms during the pandemic. Another main drawback of pandemic related studies is their retrospective reports of psychiatric or psychological health prior to the onset of the pandemic.

In contrast, our study's key strength minimizes recall bias and other drawbacks associated with retrospective assessments and allows us to test for the moderating effects of family history, age, gender, and psychiatric history. Moreover, psychiatric history was based on rigorous and detailed clinical information obtained via structured clinical interviews and DSM-based best-estimated reliability diagnoses by doctoral-level clinicians (Leckman et al., 1982). These rigorous methods stemmed from an existing longitudinal family study of major depressive disorder (MDD) (Weissman et al., 1987; Weissman et al., 2016), designed to account for prospectively measured psychiatric symptoms and disorders.

With these strengths, our study was designed to investigate the extent to which coping activities were utilized during the pandemic, and how those activities were related to concurrent psychiatric symptoms, factoring in existing pre-existing psychiatric history and symptomatology. First, we evaluated which activities people found most helpful during the pandemic. Second, we examined whether and how the most reported activities were associated with psychiatric symptoms and psychiatric well-being during the pandemic. Finally, we assessed the extent to which these associations, if significant, were moderated according to gender, age, familial risk of MDD, and psychiatric history.

2. Method

2.1. Data source

The sample was part of a longitudinal study of families at high and low risk for depression (Weissman et al., 1987; Weissman et al., 2016). From its inception in 1982, the original participants (G1) consisted of two groups of individuals, classified as high or low risk of depression based on their depression status. The offspring (G2) of the probands were followed up for subsequent decades, and then the grand offspring (G3) were evaluated up to the present. The study spanned eight waves of data collection over a period of four decades. The data collection was comprehensive and included genetic, biological (EEG, MRI), clinical, and social assessments. Rigorous methodologies were employed such as use of direct, structured clinical interviews and best-estimates reliability diagnoses. The longitudinal study and methods have been described in detail elsewhere (Endicott and Spitzer, 1978; Leckman et al., 1982; Weissman et al., 1987; Weissman et al., 2016).

2.2. Current sample

Prior to the COVID-19 pandemic, seven waves of data had been completed, with the eighth wave completed during the pandemic. The last wave before the pandemic (Wave 7, *T1*) was completed 0–2.5 years prior to the pandemic. Wave 8 was the most recent wave of data collection – and consisted of G2 and G3 individuals ($N = 204$). This wave contained COVID-focused surveys, as well as other psychological and psychiatric symptom measures, which had been administered at one or more waves prior to the pandemic.

The study's sample consisted of 204 individuals who had completed assessments pre-pandemic (Wave 7, *T1*) and who responded to an online survey during the pandemic (Wave 8, *T2*). This online sample is described extensively elsewhere (Murphy et al., 2021) and was collected from August 2020 to February 2021. Briefly, the sample comprised male and female (57 %) adults. Their median age was 41 years, and 53 % had a college degree/higher. In addition, 50 % were married/remarried and 35.8 % were single/never married.

2.3. Procedures and measures

As described in Murphy et al. (2021), the main instrument was an online self-reported survey administered during the COVID-19 pandemic (August 2020–February 2021). Data were entered, collected, and stored using the HIPAA-compliant Qualtrics software (Qualtrics, 2020). Included in the survey were widely used and validated psychiatric questionnaires and symptom checklists, including the Personal Health Questionnaire-9-item (PHQ-9) depression and suicidality measures (Kroenke et al., 2001), Inventory of Depressive and Anxiety Symptoms-Expanded Version (IDASII) depression, anxiety, suicidality, and wellbeing measures (Watson, 2008; Watson et al., 2012), and Social Adjustment Scale-Self-Report (SASSR) (Rzepa and Weissman, 2014). For the psychiatric symptom measures, higher scores indicated more anxiety/depression/psychiatric symptoms. For the psychological wellbeing item, higher scores indicate greater wellbeing. For the social adjustment scale, higher scores indicate *lower/poorer* social adjustment. The psychiatric and symptom measures were also assessed in Wave 7, before the pandemic onset. During the pandemic, participants additionally reported on pandemic-related concerns, work, living arrangements, coping activities, and perceived impact of the pandemic on themselves and loved ones.

We used existing and new data to generate the four moderator variables of interest which were age (18–39 versus 40+), gender (male vs. female), MDD Risk (high vs. low risk), and psychiatric history (No history, past only, recent psychiatric history). Psychiatric history was based on lifetime DSM criteria for psychiatric disorders from baseline through wave 7. Individuals with no psychiatric history did not have any lifetime psychopathology. Past only psychiatric history met the DSM criteria at one time but were in full remission two or more years prior to wave 7. Recent psychiatric history met DSM criteria within 2 years of wave 7 to the present.

2.4. Coping activities

The survey provided a list of activities, where participants could endorse up to 13 listed activities or select “other” if their activity of choice was not listed. The listed activities were derived from literature reviews showing the most utilized mechanisms for relieving stress during the pandemic while lockdown and social distancing mandates were at their peak. The activities are listed in Fig. 1 as well as Supplemental section (eTable 1). The item was denoted as Q47 in the survey and read: “Which of the following have been helpful to YOU during the COVID-19 outbreak?” For each of the 13 items listed, participants were required to indicate whether they used the method, and how helpful it was. The response options were scored on Likert scale as follows: 1 = Not at all/I didn't try this; 2 = Slightly; 3 = Somewhat; 4 = Moderately; 5 = Very

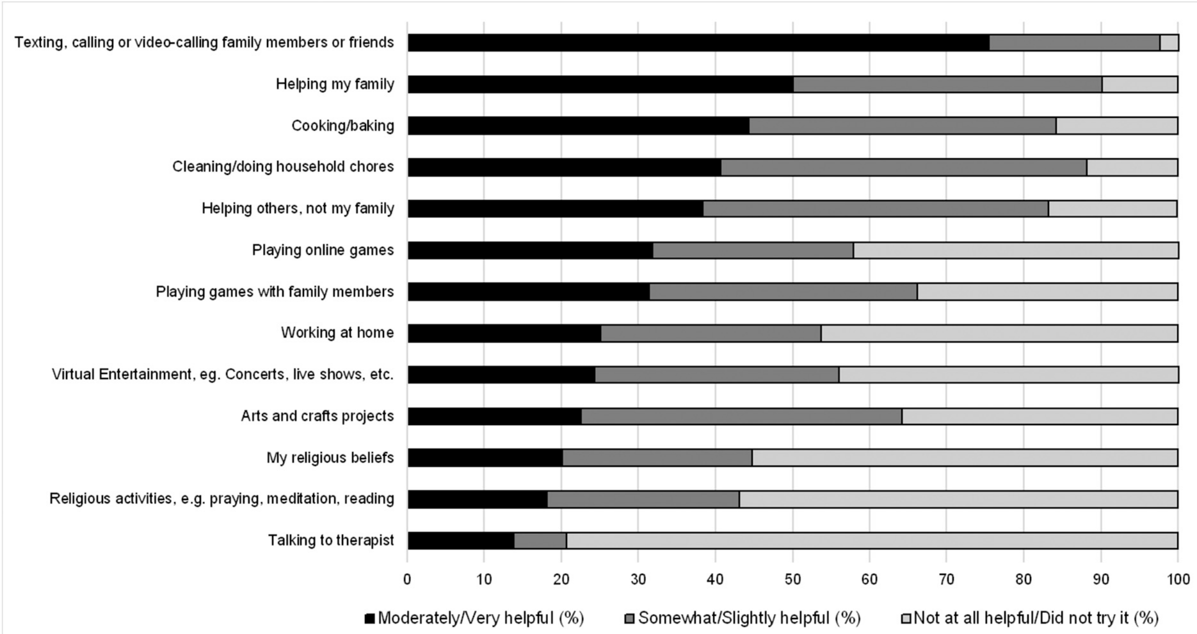

Fig. 1. helpful activities during the COVID-19 pandemic.

much.

3. Statistical analyses

3.1. Part I analyses

We collapsed the responses from the coping activities into 3 categories: 0 = Not at all/I didn't try this; 1 = Slightly/somewhat; 2 = Moderately/very much. We then used descriptive analyses to obtain frequencies of endorsement of each item, and then examined the distributions by age, gender, MDD risk, and psychiatric history.

We used linear regressions to examine the relationships between the 13 helpful/coping activities and nine psychiatric/psychological outcomes at Wave 8 (GLM). The helpful activities were the predictors (each separately), on each outcome, separately. In each model, we controlled for age, sex, educational level, marital status, pre-pandemic psychiatric/psychological symptoms and family membership for analyses involving MDD risk.

3.2. Part II analyses

We examined the relationship between the most endorsed helpful activity and each of the outcome variables. We controlled for age, sex, educational level, marital status, pre-pandemic psychiatric/psychological symptoms and family membership for analyses involving MDD risk.

We then examined the same relationships but stratified by sex (younger:18–39 vs older:40+), sex (male vs. female). Sex * age (Younger-female, younger-male, older-female, older-male), MDD risk (high-risk vs. low-risk), and psychiatric history (no psychiatric history, past-only psychiatric history, recent psychiatric history).

4. Results

Of the 13 responses provided (respondents were allowed to pick as many that applied), the following activities were classified as the top five coping mechanisms during the pandemic. They were "communicating with friends/family via telephone, text, or video" (75.5 %), "helping family members" (50 %), "cooking and baking" (44.4 %), "cleaning/household chores" (40.7 %), and "helping non-family members" (38.5 %). All the responses are shown in Fig. 1 (and eTable 1), going from the most to least endorsed. The percentages reflect the proportion of the full sample that endorsed a particular item. We stratified by gender (males vs. females), and age (younger than 40 years vs. age 40+) and found that with few exceptions, the order of activities endorsed were roughly the same across age and gender (eFigure 1).

We found a statistically significant correlation between family membership and the response "playing games with family members." However, because this activity was not among the top five endorsed and was not related to any of the psychiatric outcomes during the pandemic, this relationship was not clinically meaningful.

4.1. Helpful activities relationship to psychological/psychiatric symptoms during the pandemic

In the tables and/or in the text, we report the unstandardized regression coefficients (B), and where the relationships are significant at $p < .05$, we also report the standardized coefficients (β). The unstandardized coefficient indicates the resulting unit change in the psychiatric and psychological symptom measures, based on one unit change in the helpful activity. The standardized coefficients denote the proportion of the variance in the psychiatric and psychological outcomes accounted for by the helpful activity, and they allow us to directly compare the relative effects of the activity across all symptom measures.

There were seven psychiatric symptom outcomes and two psychological outcomes, yielding a total of nine mental health outcomes which were assessed both before and after the pandemic. Table 1 shows the estimates with the regression weights (B) and standard errors. We found that *cooking & baking* emerged as the activity related to the most outcomes – seven out of the nine assessed. *Cooking & baking* was associated with lower PHQ-9 depression ($B = -0.9$ (0.3), $\beta = -0.16$, $p < .01$), lower IDASII depression ($B = -0.8$ (0.3), $\beta = -0.15$, $p < .01$), lower IDASII suicidality ($B = -0.2$ (0.1), $\beta = -0.13$, $p < .05$), anxiety ($B = -0.5$ (0.2), $\beta = -0.15$, $p < .01$), ill-temper ($B = -0.6$ (0.2), $\beta = -0.15$, $p < .01$), greater wellbeing ($B = 1.1$ (0.5), $\beta = 0.15$, $p < .05$) and greater social adjustment ($B = -0.1$ (0.05), $\beta = -0.23$, $p < .001$). *Helping my family* was related to two outcomes, associated with lower PHQ-depression ($B = -0.9$ (0.4), $\beta = -0.13$, $p < .01$), and greater psychological wellbeing ($B = 1.7$ (0.5), $\beta = 0.22$, $p < .005$). The next five activities were each

Table 1
Relationships between helpful activities and psychiatric/psychological outcomes during COVID-19 pandemic.

	PHQ9 depression	PHQ9 suicidality	IDASII depression	IDASII suicidality	IDASII anxiety	IDASII traumatic symptoms	IDASII Ill-Temper	IDASII well being	SASSR overall adjustment
Texting, calling, video-calling, etc.	−0.3 (0.5)	0.03 (0.03)	−0.2 (0.4)	0.04 (0.2)	−0.5 (0.3)†	−0.2 (0.3)	−0.1 (0.4)	1.0 (0.7)	**−0.1 (0.05)***
Talking to therapist	0.1 (0.4)	**0.07 (0.03)****	0.02 (0.4)	0.2 (0.2)	0.2 (0.3)	0.4 (0.3)	0.1 (0.3)	−0.3 (0.6)	0.1 (0.04)
Religious Activities	0.1 (0.4)	−0.015	0.01 (0.3)	0.01 (0.1)	−0.01 (0.2)	0.3 (0.2)	−0.4 (0.3)	0.9 (0.5)†	−0.04 (0.04)
Cooking/baking	**−0.9 (0.3)****	−0.018	**−0.8 (0.3)****	**−0.2 (0.1)***	**−0.5 (0.2)***	−0.3 (0.2)	**−0.6 (0.2)****	**1.1 (0.5)***	**−0.1 (0.03)*****
Arts and crafts projects	−0.5 (0.3)	0.003 (0.02)	**−0.7 (0.3)***	−0.2 (0.1)†	−0.1 (0.2)	−0.2 (0.2)	−0.4 (0.3)†	0.9 (0.5)†	−0.04 (0.03)
Cleaning or doing household chores	−0.6 (0.3)†	−0.018 (0.02)	−0.2 (0.3)	−0.1 (0.1)	−0.3 (0.2)	0.2 (0.2)	−0.1 (0.2)	0.6 (0.5)	−0.04 (0.03)
Playing games with family members	−0.2 (0.3)	−0.01 (0.02)	−0.2 (0.3)	0.1 (0.1)	−0.1 (0.2)	0.01 (0.2)	−0.1 (0.1)	0.7 (0.5)	−0.04 (0.03)
Playing online games	0.2 (0.3)	−0.012 (0.02)	0.2 (0.3)	0.1 (0.1)	0.04 (0.2)	**0.4 (0.2)***	0.2 (0.2)	0.6 (0.4)	−0.001 (0.03)
Virtual entertainment	0.1 (0.3)	−0.03 (0.02)	0.1 (0.3)	−0.01 (0.1)	0.1 (0.2)	0.4 (0.2)†	0.2 (0.2)	0.4 (0.5)	0.0 (0.03)
Working at home	−0.3 (0.3)	−0.01 (0.02)	−0.2 (0.3)	−0.03(0.1)	−0.1 (0.2)	−0.1 (0.2)	−0.3 (0.3)	0.4 (0.5)	−0.02 (0.03)
Religious beliefs	−0.3 (0.4)	−0.03 (0.02)	−0.3 (0.3)	−0.1 (0.1)	−0.3(0.2)	0.2 (0.2)	−0.3 (0.3)	1.0 (0.5)†	**−0.1 (0.04)***
Helping my family	**−0.8 (0.4)***	−0.03 (0.02)	−0.6 (0.3)†	−0.04 (0.1)	−0.1 (0.2)	−0.01 (0.2)	−0.2 (0.3)	**1.7 (0.5)*****	−0.1 (0.03)†
Helping others (not family)	−0.4 (0.3)	0.01 (0.02)	0.1 (0.3)	−0.03 (0.1)	0.03 (0.2)	0.3 (0.2)	0.05 (0.2)	0.7 (0.4)	−0.01 (0.03)

Note. Table shows unstandardized regression estimates (B), and standard errors obtained via general linear models (GLM) controlling for psychiatric symptoms at wave 7 (pre-pandemic), demographic factors, including age, education, sex, and marital status. Standardized regression coefficients (β) are reported in the text only for significant relationships. For all PHQ-9 or IDASII psychiatric symptom scores, higher scores mean greater number or severity of symptoms (more illness). For IDASII wellbeing, higher scores mean greater wellbeing. For SASSR overall social adjustment, higher scores mean *poorer/lower* social adjustment.
Two-tailed significance.
Estimates in bold are significant at $p < .05$.
*** $p < .001$.
** $p < .01$.
* $p < .05$.
† $p < 0.10$.

related to one outcome each. *Communicating with family/friends,* via *text, telephone, or video was* associated with greater social adjustment ($B = -0.1$ (0.05), $\beta = -0.14$, $p < .05$); *talking to a therapist* was associated with greater PHQ-9 suicidality ($B = 0.1$ (0.03), $\beta = 0.19$, $p < .01$); *arts & crafts projects* was associated with lower IDASII depression ($B = -0.7$ (0.3), $\beta = -0.11$, $p < .05$); *playing online games* was associated with greater traumatic symptoms ($B = 0.4$ (0.2), $\beta = 0.12$, $p < .05$); *religious beliefs* was associated with greater social adjustment ($B = -0.1$ (0.04), $\beta = -0.15$, $p < .05$).

4.2. Moderating effects of gender, age, MDD risk and psychiatric history on relationships between cooking & baking and mental health outcomes

Table 2 shows the relationship between cooking & baking and mental health outcomes for men and women. Among women, cooking and baking was associated with lower PHQ-9 depression ($B = -0.97$ (0.48), $p = .045$), lower IDASII Depression ($B = -2.58$ (1.11), $p = .022$), lower IDASII suicidality ($B = -34$ (0.14), $p = .016$), and greater social adjustment ($B = -0.12$ (0.04), $p = .005$). Among men, cooking & baking was associated with lower anxiety *(*$B = -0.63$ (0.3), $p = .041$; lower traumatic symptoms ($B = 0.62$ (0.26), $p = .019$), lower ill temper ($B = -0.88$ (0.4), $p = .031$), and greater social adjustment ($B = -0.14$ (0.05), $p = .003$).

Table 3 shows the relationship between *cooking & baking* and mental health outcomes for individuals younger than 40 years, and those age 40 years+. Among those younger than 40 years, *cooking & baking* was associated with lower PHQ-9 depression ($B = -1.10$ (0.50) $p = .029$); lower IDASII depression ($B = -4.72$ (1.25), $p < .001$); lower anxiety ($B = -1.00$ (0.36), $p = .007$); lower ill-temper ($B = 1.22$ (0.42), $p = .005$); greater wellbeing ($B = 2.25$ (0.71), $p = .002$); and greater social adjustment ($B = -0.17$ (0.05), $p = .001$). Among individuals aged 40+,

Table 2
Gender-stratified association between *cooking & baking* and psychiatric/psychological outcomes during COVID-19 pandemic.

Psychiatric/Psychological outcomes	Females		Males	
	B (s.e.B)/β	p-Value	B (s.e.B)/β	p-Value
PHQ-9 depression	**−0.97 (0.48)/ −0.16**	**0.045**	−0.68 (0.40)	0.094
PHQ-9 suicidality	−0.02 (0.03)	0.573	−0.01 (0.03)	0.592
IDASII depression	**−2.58 (1.11)/ −0.16**	**0.022**	−1.64 (0.98)	0.097
IDASII suicidality	**−0.34 (0.14)/ −0.21**	**0.016**	−0.07 (0.20)	0.734
IDASII anxiety	−0.48 (0.29)	0.101	**−0.63 (0.30)/ −0.18**	**0.041**
IDASII traumatic symptoms	−0.10 (0.30)	0.749	**−0.62 (0.26)/ −0.20**	**0.019**
IDASII Ill-temper	−0.42 (0.30)	0.164	**−0.88 (0.40)/ −0.21**	**0.031**
IDASII well being	1.24 (0.64)	0.056	1.00 (0.69)	0.147
SASSR social adjustment	**−0.12 (0.04)/ −0.21**	**0.005**	**−0.14 (0.05)/ −0.25**	**0.003**

Note. Regression estimates obtained via general linear regression models (GLM). Where relationships are significant, standardized coefficients (β) are also shown in table. All GLM models control for the psychiatric/psychological symptoms at wave 7, education, marital status. Additionally, the sex-stratified models also control for age, while the age-stratified models control for sex.
n (female) = 117; n (male) = 87.
Estimates in bold are significant at $p < .05$.

Table 3
Age-stratified association between *cooking & baking* and psychiatric/psychological outcomes during the COVID-19 pandemic.

Psychiatric/ Psychological outcomes	Age 18–19 (younger)		Age 40+ (older)	
	B (s.e.B)/β	p-Value	B (s.e.B)/β	p-Value
PHQ-9 depression	**−1.10 (0.50)/−0.19**	**0.029**	−0.70 (0.42)	0.102
PHQ-9 suicidality	−0.01 (0.04)	0.823	−0.02 (0.02)	0.375
IDASII depression	**−4.72 (1.25)/−0.30**	**<0.001**	0.15 (0.82)	0.861
IDASII suicidality	**−0.42 (0.17)/−0.21**	**0.016**	−0.10 (0.15)	0.485
IDASII anxiety	**−1.00 (0.36)/−0.23**	**0.007**	−0.26 (0.24)	0.279
IDASII traumatic symptoms	−0.50 (0.34)	0.148	−0.14 (0.24)	0.560
IDASII Ill-temper	**−1.22 (0.42)/−0.24**	**0.005**	−0.18 (0.24)	0.467
IDASII well being	**2.25 (0.71)/ 0.30**	**0.002**	−0.03 (0.60)	0.945
SASSR social adjustment	**−0.17 (0.05)/−0.30**	**0.001**	**−0.10 (0.04)/−0.16**	**0.028**

Note. Regression estimates obtained via general linear regression models (GLM). Where relationships are significant, standardized coefficients (β) are also shown in table. All GLM models control for the psychiatric/psychological symptoms at wave 7, education, marital status. Additionally, the sex-stratified models also control for age, while the age-stratified models control for sex.
n (Age 18–39) = 97; n (age 40+) = 107.
Estimates in bold are significant at $p < .05$.

cooking and backing was associated with greater social adjustment ($B = -0.10$ (0.04), $p = .028$).

The effects of *cooking & baking* on mental health outcomes, stratified by age and gender yielded four subgroups, females under age 40, males under age 40, females age 40+, and males age 40+. The results for these subgroups are shown in eTable 2. There were no significant relationships between *cooking & baking* and mental health outcomes for males or females aged 40+. For younger women, *cooking & baking* was significantly related to lower IDASII depression ($B = -5.90$ (1.90), $\beta = -0.34$, $p = .003$), and lower IDASII suicidality ($B = -0.42$ (0.19), $\beta = -0.23$, $p = .023$), and greater wellbeing ($B = 3.02$ (0.90), $\beta = 0.39$, $p = .002$), and social adjustment ($B = -0.17$ (0.07), $\beta = -0.29$, $p = .017$). For younger men, *cooking & baking* was related to lower ill-temper ($B = -1.55$ (0.68), $\beta = -0.31$, $p = .029$), and greater social adjustment ($B = -0.19$ (0.08), $\beta = -0.33$, $p = .015$).

Table 4 shows the relationships between cooking and baking and mental health outcomes for individuals at high and low MDD familial risk. Among individuals at high MDD risk, *cooking & baking* was associated with lower IDASII suicidality ($B = -0.33$ (0.16), $p = .046$), lower IDASII ill-temper ($B = -0.68$ (0.31), $p = .031$), and greater social adjustment ($B = -0.14$ (0.04), $p = .001$). There were non-significant trends, of associations with lower PHQ9-depression ($p = .06$), lower IDASII depression ($p = .09$), and lower IDASII anxiety ($p = .08$). Among individuals at low MDD risk, *cooking & baking* was associated with lower PHQ-9 depression ($B = -1.05$ (0.50), $p = .040$), lower IDASII depression ($B = -2.96$ (1.21), $p = .017$), greater IDASII wellbeing ($B = 1.84$ (0.76), $p = .014$), and greater social adjustment ($B = -0,10$ (0.05), $p = .048$).

Table 5 shows the relationships between *cooking & baking* and mental health outcomes for individuals with recent psychiatric history. There were no significant relationships between *cooking & baking* and mental health outcomes among individuals with no psychiatric history, or with past-only psychiatric history (eTable 4). However, among individuals with recent psychiatric history, cooking and backing were associated with lower PHQ-9 depression ($B = -1.62$ (0.56), $p = .005$); lower IDASII depression, ($B = -3.79$ (1.27), $p = .004$), lower IDASII anxiety (B = −1.19 (0.40), $p = .004$), lower IDASII ill-temper ($B = -1.02$ (0.37), $p = .007$), greater IDASII wellbeing ($B = 1.59$ (0.65), $p = .017$), and greater

Table 4
Association between cooking & baking and psychiatric/psychological outcomes during the COVID-19 pandemic among those with recent psychiatric history, and according to familial MDD-risk status.

Psychiatric & psychological outcomes	Recent psychiatric history		High MDD risk		Low MDD risk	
	B (s.e. B)/β	p-Value	B (s.e. B)/β	p-Value	B (s.e. B)/β	p-Value
PHQ-9 depression	**−1.62 (0.56)/ −0.26**	**0.005**	−0.82 (0.44)	0.063†	**−1.05 (0.50)/ −0.19**	**0.040**
PHQ-9 suicidality	−0.04 (0.04)	0.259	−0.03 (0.03)	0.387	0.01 (0.02)	0.782
IDASII depression	**−3.79 (1.27)/ −0.26**	**0.004**	−1.75 (1.00)	0.085†	**−2.96 (1.21)/ −0.20**	**0.017**
IDASII suicidality	−0.36 (0.21)	0.099†	**−0.33 (0.16)/ −0.16**	**0.046**	0.02 (0.13)	0.878
IDASII anxiety	**−1.19 (0.40)/ −0.27**	**0.004**	−0.55 (0.31)	0.075†	−0.30 (0.25)	0.206
IDASII traumatic symptoms	−0.37 (0.34)	0.276	−0.26 (0.28)	0.356	−0.15 (0.30)	0.627
IDASII Ill-temper	**−1.02 (0.37)/ −0.23**	**0.007**	**−0.68 (0.31)/ −0.16**	**0.031**	−0.64 (0.42)	0.131
IDASII well being	**1.58 (0.65)/ 0.23**	**0.017**	0.76 (0.60)	0.208	**1.84 (0.76)/ 0.23**	**0.014**
SASSR social adjustment	**−0.17 (0.05)/ −0.30**	**0.001**	**−0.14 (0.04)/ −0.24**	**0.001**	**−0.10 (0.05)/ −0.18**	**0.048**

Note. Regression estimates obtained via general linear regression models (GLM). Where relationships are significant, standardized coefficients (β) are also shown in table. All GLM models control for the psychiatric/psychological symptoms at wave 7, education, marital status, age, and sex. The MDD-risk models control for family membership. n (Recent psychiatric history) = 97.
n (High-risk) = 125; n (Low-risk) = 79.
Estimates in bold are significant at $p < .05$.
† $p < .10$.

social adjustment ($B = -0.17$ (0.05), $p = .001$).

5. Discussion

This study was designed to investigate most common mechanisms of coping with stress and psychiatric symptoms during the COVID-19 Pandemic. We utilized a longitudinal dataset with pre-pandemic measures of psychiatric and psychological functioning. Consequently, this study remains one of the few to generate prospective data on the relative effectiveness of coping mechanisms during a global crisis.

The results broadly suggest that people relied on routines that were accessible and allowed for social (human) interaction. The top five activities were engaged by 35–75 % of individuals asked. Not surprisingly, *texting, calling and video-calling family and friends* was the top activity endorsed. Consistent with other studies, our study found that people most reported activities that called for social engagement with family and friends. However, *cooking and baking* was most associated with psychiatric symptom reduction, and increased social and psychological wellbeing. This is a relatively new empirical finding and extends the potential therapeutic effects of cooking and baking beyond anecdotal accounts. The effects of cooking and baking were evident across a range of characteristics, including males or females, individuals at high or low risk for MDD. We noted that the effects seemed very prominent among younger individuals, especially females, and in individuals who had a recent history of psychiatric disorders. Since these groups may have already been most vulnerable to developing symptoms from the pandemic, it is reassuring that they appeared to benefit the most from this activity. Another possibility for the age disparity was that those over 40 also baked and cooked but those were people, particularly women, who did so more regularly before the pandemic, so it wasn't a new coping mechanism and thus not associated with changes in their functioning.

Although it is currently unknown and beyond the scope of this study to reveal the specific mechanisms by which cooking and baking can reduce psychiatric symptoms and improve wellbeing, our findings can be contextualized through several existing theories of human needs and motivations. These theories examined together, guide our interpretation of our results, and provide a fertile ground for additional research on coping mechanisms during times of crisis.

Globally, cooking and baking are associated with food, which is a primary reinforcer when consumed, and satisfies a primal need for survival. At times of stress or during global crises, such needs tend to be more salient. These instincts are rooted in biology but nevertheless, result in marked behavioral responses when anxiety-producing events occur as was the case with the COVID pandemic (Benker, 2021; Lehberger et al., 2021). Related to this stress-related food purchase is the stress induced food cravings, manifest usually as an urge for "comfort" foods. Accordingly, much baking during the pandemic was relegated to high-calorie, high-sugar and high-carbohydrate foods such as pies, cakes and tarts (Chee et al., 2020; Sánchez-Sánchez et al., 2020). Studies on these behaviors have highlighted "pandemic baking" to suggest that the pandemic may have had "*…a cascade effect on eating behaviors, which may be an inadvertent strategy to cope with stress* (Chee et al., 2020)."

One of the unique elements of the pandemic involved the closing of restaurants, and other eateries where people not only had meals, but socialized. Some people may have sought to re-create a social atmosphere with close family and friends by preparing shared meals at home or simply as a hobby to pass the extra time that they now had (Brasted, 2021; Güler and Haseki, 2021; McKay, 2020). Additionally, and utilizing the theory of casual versus serious leisure (Stebbins, 2015), the activity of cooking baking as a fun thing, while emerging from the activity with newly learned knowledge and skills, and a sense of creativity made this activity an empowering engagement for many at a time when they felt a loss of control and self-efficacy (Conner et al., 2018; Güler and Haseki, 2021).

Given that cooking and baking was reported among other activities, and ranked in the top five, this begs the question of what about cooking and baking that differentiated it from the other activities that were highly ranked as being helpful. It is probably that these other activities were construed to be helpful but were also inherently fraught due to their being a necessary part of home and work life, and less about leisurely pursuits. First, the use of technology, including social media for communications and remote social interactions, while extremely helpful and necessary during the pandemic, was quite pervasive and used in a variety of contexts, including work, business, and interacting with family members. While these activities may have enhanced social relationships and reduced isolation, the reliance on digital platforms may have resulted in added stress (De et al., 2020; Singh et al., 2022). Interacting with family and friends, while comforting, at times, may yield conflict at other times. Further, reports of increased domestic abuse during the pandemic suggested that closeness with family is not always associated with desirable outcomes (Piquero et al., 2021). Furthermore, helping family members or others outside of family may be an activity done out of necessity and a sense of moral obligation, but not for fun or creativity.

5.1. Limitations

Our study used a range of coping activities, but these were close-ended items. However, we allowed individuals to include an additional item if it was not listed. Consequently, we may have missed other activities if individuals reported additional activities that were not listed. Secondly, we used a single response to indicate that someone did not try an activity, or they did not find an activity at helpful. Our justification was that for an activity to be helpful, it must be accessible, and "did not try" suggests that it was not accessible and therefore not helpful. Third, we had a range of outcome variables, with psychiatric symptoms, but did not have data on substance abuse. However, substance abuse tends to be highly correlated with depression and anxiety, so we believe that some of this variance may have been captured in our psychiatric symptoms that were measured. A fourth limitation was that our measurement of depression was limited to clinical interviews, symptom checklists and DSM-based criteria. More recently, certain countries in Asia have expanded their approach to detecting depression through the use of advanced brain imaging technologies such as infrared (Olszewska-Guizzo et al., 2022). Such infrared technology reportedly can assess mood state (when exposed to different therapeutic environments during the COVID-19 pandemic), which is further validated by machine learning (Husain et al., 2020; Li et al., 2022). This approach warrants further investigation as a tool for detecting depression during crises. Finally, our sample was racially and ethnically homogenous, as was the custom for family-based studies in 1982 when the project began; therefore, we cannot assess whether patterns would extend to other races or ethnic backgrounds. However, many of the findings around coping activities have been shown to be utilized word-wide, across a range of cultures and ethnic groups. Thus, our study has utility for interventions that can be applied in other groups, even if modifications based on cultural habits may apply.

5.2. Conclusion

There has been a notable increase in studies of cooking/baking as a coping activity during the pandemic although the literature on cooking-related psychological effects remains more anecdotal than empirical. Our findings add to the few studies of the systematic relationship between cooking and baking, and psychiatric outcomes. The COVID-19 pandemic is now in the rear-view mirror and the worst has passed. People have returned to work, school, and entertainment venues as they did before the pandemic. Social distancing and mask mandates have been lifted. Vaccinations are optional. Nevertheless, there will be long felt effects particularly with respect to mental health, resulting in long-term modifications in therapeutic modalities and service delivery. Therefore, it is instructive to identify approaches that worked or did not work, and why. Drawing on past theories and recent speculation, we surmise that cooking and baking are therapeutic and, in clinical settings, can be useful adjuncts in therapeutic interventions for stress-related psychiatric symptoms and disorders. Moreover, our results lend themselves to further scientific inquiry on the specific mechanisms by which they may reduce psychiatric symptomatology and improve mental health.

CRediT authorship contribution statement

Eleanor Murphy contributed materially to conceptualization, methodology, formal statistical analysis, original draft preparation, writing – review and editing, and visualization.

Connie Svob contributed materially to methodology, visualization, writing – review and editing, and funding acquisition.

Marc Gameroff contributed materially to resources, data curation, writing-review and editing, and project administration.

Ardersheer Talati contributed materially to supervision, writing – review and editing, and funding acquisition.

Milenna T. van Dijk contributed materially to writing – review and editing.

Priya Wickramaratne – contributed materially to writing – review and editing.

Tanzin Yangchen – contributed materially to project administration, writing – review and editing.

Myrna Weissman – contributed materially to resources, supervision, funding acquisition, writing-review and editing.

All authors have read and agreed to the final version of the manuscript.

Declaration of competing interest

In the last three years, Dr. Weissman has received funding from NIMH, John J Templeton Foundation and Brain and Behavior {NARSAD} and has received royalties from Oxford University Press, Perseus Books Group, American Psychiatric Association Publishing, and Multi-Health Systems. None of these present any conflict with the present work, and no other authors report any disclosures.

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Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of The New York State Psychiatric Institute (NYSPI IRB protocol #6145) for studies involving humans.

Informed consent statement

Informed online consent was obtained from all subjects involved in the study.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2023.07.009.

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