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# Psychological Outcomes Associated with Stay-at-Home Orders and the Perceived Impact of COVID-19 on Daily Life

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ABSTRACT

The COVID-19 pandemic has resulted in the widespread implementation of extraordinary physical distancing interventions (e.g., stay-at-home orders) to slow the spread of the virus. Although vital, these interventions may be socially and economically disruptive, contributing to adverse psychological outcomes. This study examined relations of both stay-at-home orders and the perceived impact of COVID-19 on daily life to psychological outcomes (depression, health anxiety, financial worry, social support, and loneliness) in a nationwide U.S. community adult sample (N = 500; 47% women, mean age = 40). Participants completed questionnaires assessing psychological outcomes, stay-at-home order status, and COVID-19's impact on their daily life. Being under a stay-at-home order was associated with greater health anxiety, financial worry, and loneliness. Moreover, the perceived impact of COVID-19 on daily life was positively associated with health anxiety, financial worry, and social support, but negatively associated with loneliness. Findings highlight the importance of social connection to mitigate negative psychological consequences of the COVID-19 pandemic.

## 1. Introduction

The World Health Organization (WHO) announced on January 30, 2020 that the severe acute respiratory syndrome coronavirus (COVID-19) was a Public Health Emergency of International Concern. Currently, COVID-19 has infected over 4 million people and resulted in over 280,000 deaths worldwide (WHO, 2020). Currently, approximately 1,350,000 individuals in the U.S. have been infected with COVID-19 and over 80,000 have died due to the virus (Centers for Disease Control and Prevention [CDC], 2020). Moreover, due to COVID-19's long incubation period, ease of transmission, high mortality rate (relative to the seasonal flu), and lack of pharmacological interventions (Linton et al., 2020; Shereen et al., 2020), governments have had to implement extraordinary physical distancing interventions to slow the spread of the virus. Within the U.S., stay-at-home orders have been implemented in most states and the District of Columbia (Mervosh et al., 2020).

From a public health perspective, there is strong justification for such interventions – physically separating people is an effective strategy for preventing the spread of infectious diseases (Ahmed et al., 2018; Jackson et al., 2014), including COVID-19 (Flaxman et al., 2020; Thakkar et al., 2020). However, although stay-at-home orders are vital for protecting physical health (CDC, 2020), such interventions can also be socially and economically disruptive (Chen et al., 2011; Reger et al., 2020; Thunström et al., 2020). Indeed, recent reviews have suggested that the negative social and economic consequences of current stay-at-home orders and the COVID-19 pandemic itself (e.g., economic downturn, frequent exposure to distressing media coverage) could contribute to adverse psychological outcomes, including increased loneliness, reduced social support, depression, anxiety, and financial concerns (Asmundson & Taylor, 2020; Courtet et al., 2020; Reger et al., 2020). Given the recent and sudden emergence of COVID-19, research in this area is understandably limited. However, several studies from China during the initial COVID-19 outbreak revealed associations of COVID-19 with increased anxiety, depression, and stress (Cao et al., 2020; Wang et al., 2020; Zhang et al., 2020). Further, the overall negative impact of COVID-19 on the economy, daily life, social activity, and the ability to work were associated with greater psychological difficulties (Cao et al., 2020; Zhang et al., 2020). Although research on the psychological outcomes associated with COVID-19 is limited, available findings are consistent with those obtained in past studies on the psychological consequences of other pandemics. For example,

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Hawryluck et al. (2004) found that quarantine during the 2003 SARS outbreak was associated with high rates of depression (31.2%) and anxiety (28.9%). Likewise, elevated levels of anxiety were observed during the 2009 H1N1 pandemic (Wheaton et al., 2012).

To extend this research to the psychological impact of COVID-19 in the U.S., the present study examined associations of stay-at-home orders and the perceived impact of COVID-19 on daily life to relevant psychological outcomes (i.e., depression, health anxiety, financial worry, perceived social support, and loneliness). We predicted that both stay-at-home orders and the perceived impact of COVID-19 on daily life would evidence significant positive associations with all psychological difficulties and a significant negative association with social support when controlling for relevant demographic variables. We also predicted a significant interaction of stay-at-home orders and perceived impact of COVID-19 on the outcomes of interest, such that the relation of stay-at-home order status to negative psychological outcomes would be stronger for participants who perceived COVID-19 as having a greater impact on their daily life.

## 2. Method

### 2.1. Participants

Participants included a nationwide community sample of 500 adults from 45 states in the U.S. who completed online measures through an internet-based platform (Amazon's Mechanical Turk; MTurk) from March 27, 2020, through April 5, 2020. The study was posted to MTurk via CloudResearch (cloudresearch.com), an online crowdsourcing platform linked to MTurk that provides additional data collection features (e.g., creating selection criteria). MTurk is an online labor market that provides "workers" with the opportunity to complete different tasks in exchange for monetary compensation, such as completing questionnaires for research. As such, MTurk provided the opportunity to collect a large nationwide sample in a relatively short amount of time, facilitating timely examination of the initial impact of the COVID-19 pandemic in the U.S. Data provided by MTurk-recruited participants have been found to be as reliable as data collected through more traditional methods (Buhrmester et al., 2011). MTurk samples also have the advantage of being more diverse than other internet-recruited or college student samples (Buhrmester et al., 2011). For the present study, inclusion criteria included (1) U.S. resident, (2) at least a 95% approval rating as an MTurk worker, (3) completion of at least 5,000 previous MTurk tasks (referred to as Human Intelligence Tasks [HITS]), and (4) valid responses on questionnaires (i.e., assessed by accurate completion of multiple attention check items).

Participants (47% women; 51.8% men; 0.2% transgender; 0.6% non-binary; 0.4% other) ranged in age from 20 to 74 years (*Mage* = 40.0 ± 11.6). All states in the U.S. were represented, with the exception of Delaware, New Hampshire, North Dakota, Vermont, and West Virginia. The states with the greatest representation in the sample were Florida (11.2%), California (8.6%), Pennsylvania (6%), Texas (5.6%), New York (5.4%), North Carolina (4.6%), Michigan (4.4%), Ohio (4%), Illinois (3.4%), and Washington (3%). Most participants identified as White (85%), followed by Black/African-American (8.4%), Asian/Asian-American (6.6%), Latinx (1.9%), and Native American (1.6%). Regarding educational attainment, 11.8% had completed high school or received a GED, 35.6% had attended some college or technical school, 43% had graduated from college, and 9.6% had advanced graduate/professional degrees. Most participants were employed full-time (69.2%), followed by employed part-time (16.2%) and unemployed (14.6%). Annual household income varied, with 30.6% of participants reporting an income of < $35,000, 33.6% reporting an income of $35,000 to $64,999, and 35.8% reporting an income of ≥ $65,000. Regarding household composition, 58.6% of participants reported living alone and the remaining 41.4% reported living with at least one other person (ranging from 2-8 other household members; *mean* = 3.2 ± 1.1). In addition, 44.1% of participants reported having at least one child in their household (ranging from 1-3 children in the household; *mean* = 0.72 ± 0.94). Few participants reported having sought out testing for COVID-19 (1%) or having been infected with COVID-19 (0.8%).

### 2.2. Procedure

All procedures received approval from the university's Institutional Review Board. To ensure the study was not being completed by a bot (i.e., an automated computer program used to complete simple tasks), participants first responded to a Completely Automatic Public Turing test to Tell Computers and Humans Apart (CAPTCHA) prior to providing informed consent. On the consent form, participants were also informed that "…we have put in place a number of safeguards to ensure that participants provide valid and accurate data for this study. If we have strong reason to believe your data are invalid, your responses will not be approved or paid and your data will be discarded." Data were collected in blocks of nine participants at a time and all data, including attention check items and geolocations, were examined by researchers before compensation was provided. Attention check items included three explicit requests embedded within the questionnaires (e.g., "If you are paying attention, choose '2' for this question"), two multiple-choice questions (e.g., "How many words are in this sentence?"), a math problem (e.g., "What is 4 plus 2"), and a free-response item (e.g., "Please briefly describe in a few sentences what you did in this study"). Participants who failed one or more attention check items were removed from the study ($n$ = 53 of 553 completers). Workers who completed the study and whose data were considered valid (based on attention check items and geolocations; $N$ = 500) were compensated $3.00 for their participation.

### 2.3. Measures

A demographic questionnaire assessed age, sex, annual income, household composition, and racial/ethnic background. COVID-19 related experiences and stressors were assessed via a 20-item measure developed for this study. Participants were asked about a variety of relevant experiences associated with the COVID-19 pandemic. Of interest to the present study were two questions from this measure assessing: (1) stay-at-home order status (i.e., "Do you live in a state that has instituted a stay-at-home order?" [0 = no; 1 = yes]); and (2) perceived impact of COVID-19 (i.e., "To what extent has the situation associated with COVID-19 affected the way you live your life?"). Participants responded to the latter question using a 5-point Likert-type scale ranging from 1 (no impact at all) to 5 (impacted my life a great deal).

Current depression symptoms were assessed using the depression subscale of the 21-item version of the Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995). Participants are presented with a series of statements reflecting the experience of symptoms of depression (e.g., "I found it difficult to work up the initiative to do things," "I felt that I had nothing to look forward to"). Participants are instructed to rate each item on a 4-point Likert-type scale indicating the extent to which the item applied to them in the past week (0 = "did not apply to me at all", 1 = "applied to me some of the time", 2 = "applied to me a good part of the time", 3 = "applied to me most of the time"). All items from the depression subscale were summed to create one composite score (ranging from 0 – 21), with higher scores indicating greater depression symptoms. This measure has demonstrated good reliability and validity (Lovibond & Lovibond, 1995). Internal consistency of the depression subscale was acceptable (α = .90).

The Short Health Anxiety Inventory (SHAI; Abramowitz et al., 2007; Salkovskis et al., 2002) is an 18-item self-report measure assessing health anxiety symptoms. For each item, participants choose one response from a group of four statements of increasing severity (e.g.,

**Table 1**
Descriptive statistics for and correlations among primary variables of interest.

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. Stay-at-home | — | .06 (.190) | .08 (.080) | .10 (.020) | .09 (.030) | .13 (.005) | -.08 (.078) |
| 2. COVID-19 impact | | — | .00 (.957) | .19 (<.001) | .13 (.004) | -.16 (<.001) | .20 (<.001) |
| 3. Depression severity | | | — | .47 (<.001) | .40 (<.001) | .54 (<.001) | -.39 (<.001) |
| 4. Health anxiety | | | | — | .41 (<.001) | .38 (<.001) | -.24 (<.001) |
| 5. Financial worry | | | | | — | .34 (<.001) | .24 (<.001) |
| 6. Loneliness | | | | | | — | -.79 (<.001) |
| 7. Social support | | | | | | | — |
| Mean/% yes | 82.4% | 3.97 | 7.51 | 32.29 | 8.67 | 2.01 | 5.38 |
| SD | — | 1.05 | 9.05 | 9.32 | 3.53 | 0.66 | 1.41 |

*Note.* $p$ values are presented in parentheses following the correlation statistic. Stay-at-home = "Do you live in a state that has instituted a stay-at-home order?" (0 = no; 1 = yes); COVID-19 impact = "To what extent has the situation associated with COVID-19 affected the way you live your life?"

1 = "I do not worry about my health", 2 = "I occasionally worry about my health", 3 = "I spend much of my time worrying about my health", 4 = "I spend most of my time worrying about my health"). The SHAI has demonstrated good reliability, internal consistency, and construct validity (Salkovskis et al., 2002). All items were summed to create one composite score (ranging from 18 – 72), with higher scores indicated greater health anxiety. Internal consistency in the present sample was acceptable ($\alpha$ = .93).

Financial worry was assessed using three items from the Family Economic Strain Scale (FESS; Hilton & Devall, 1997), which assesses concerns about the availability of finances in the future ("I am afraid that my income will decrease;" "I worry about having money to celebrate holidays and other special occasions;" and "I worry about financial matters"). Participants rate items on a 5-point Likert-type scale ranging from 1 (never) to 5 (always). Previous research using the full scale has provided evidence for its reliability and construct validity (Hilton & Devall, 1997). All items were summed to create one composite score (ranging from 3 – 15), with higher scores indicting greater financial worry. Internal consistency of the items used in this study were acceptance ($\alpha$ = 86).

The UCLA Loneliness Scale – Version 3 (ULS-3; Russell, 1996) is a 20-item self-report measure of perceptions of loneliness and social isolation. Participants rate items (e.g., "No one really knows me well;" "I lack companionship;" "There are people I feel close to [reverse scored]") based on how often they apply to themselves on a 4-point Likert-type scale ranging from 1 (never) to 4 (often). Higher scores are indicative of greater loneliness. The ULS-3 has demonstrated adequate test-retest reliability and good construct validity (Russell, 1996). All items were summed to create one composite score (ranging from 20 – 80), with higher scores indicating greater loneliness. Internal consistency in the present sample was acceptable ($\alpha$ = .94).

Perceived availability of social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988). The MSPSS is a 12-item measure designed to assess perceived availability of social support from three primary sources: family (e.g., " I can talk about my problems with my family"), friends (e.g., "I can count on my friends when things go wrong"), and significant others/special persons (e.g., "There is a special person who is around when I am in need"). Participants rate items on a 7-point Likert-type scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). The MSPSS has demonstrated good test-retest reliability and discriminant and construct validity (Zimet et al., 1988). All items were summed to create one composite score (ranging from 12 – 84), with higher scores indicating greater social support. Internal consistency in the present sample was acceptable ($\alpha$ = .96).

### 2.4. Analysis Plan

Descriptive statistics for the primary variables of interest (stay-at-home order status, perceived impact of COVID-19, depression symptom severity, health anxiety, financial worry, loneliness, and social support) were computed, as were point-biserial and Pearson product-moment correlations to examine zero-order associations among variables. Next, a series of hierarchical linear regression analyses were conducted to evaluate hypotheses. Demographic variables (i.e., age, sex, racial/ethnic background [racial/ethnic minority vs. non-minority], income level [< $50,000/year vs. ≤ $50,000/year], and whether participants lived alone or with others) relevant to the outcome variables were entered in the first step of each model. Stay-at-home order status and perceived impact of COVID-19 (centered) were entered in the second step of each model, followed by the product of these variables in the third step. Depression symptom severity, health anxiety, financial worry, loneliness, and social support served as dependent variables. Given that five regression models were conducted, $p$ was set at .01. Unstandardized betas are presented to allow evaluation of effect size. A power analysis demonstrated that a sample size of 500 offered sufficient power (≥ .80) to detect a medium effect with an alpha level of $p$ = .01 (Faul et al., 2009).

## 3. Results

### 3.1. Preliminary Analyses

At the time of data collection, 82.4% ($n$ = 412) of participants were living in states with active stay-at-home orders. Participants living in states with stay-at-home orders had been under these orders for an average of 5.71 days ($SD$ = 4.54). Descriptive data for and correlations among the primary variables of interest are presented in Table 1. Of note, one participant did not complete the perceived impact of COVID-19 item and another did not complete the financial worry items.

### 3.2. Primary Analyses

Outcomes for all regression models evaluating hypotheses are presented in Table 2.

#### 3.2.1. Depression

The overall model was significant, accounting for 7% of the variance in depression symptom severity, $F$ (8, 490) = 4.53, $p$ < .001, $f$ = .24. However, neither stay-at-home order status nor perceived impact of COVID-19 accounted for a significant amount of unique variance in depression symptom severity above and beyond the covariates, $\Delta R^2$ = .01, $F$ (2, 491) = 2.16, $p$ = .116, $f$ = .07, although both age and income level were uniquely negatively associated with depression symptom severity in this step of the model. The addition of the interaction between stay-at-home order status and perceived impact of COVID-19 did not significantly improve the model, $\Delta R^2$ = .00, $F$ (1, 490) = .02, $p$ = .879, $f$ = .00.

**Table 2**
Main and interactive associations of stay-at-home order status and perceived impact of COVID-19 to psychological outcomes (N = 500).

| | *Depression Severity* | | | *Health Anxiety* | | | *Financial Worry* | | | *Loneliness* | | | *Social Support* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Variable* | *b* | *SE* | *p* | *b* | *SE* | *p* | *b* | *SE* | *p* | *b* | *SE* | *p* | *b* | *SE* | *p* |
| *Step 1* | | | | | | | | | | | | | | | |
| Race | -1.03 | 1.12 | .358 | -0.22 | 1.17 | .850 | 0.42 | 0.43 | .328 | -0.12 | 0.08 | .152 | 0.44 | 0.17 | .011 |
| Age | -0.14 | 0.04 | .000 | -0.05 | 0.04 | .180 | 0.001 | 0.01 | .925 | -0.01 | 0.003 | .015 | 0.01 | 0.01 | .197 |
| Sex | 0.54 | 0.81 | .503 | 2.35 | 0.85 | .006 | 0.77 | 0.31 | .014 | -0.07 | 0.06 | .244 | 0.21 | 0.13 | .091 |
| Income | -2.83 | 0.81 | .001 | -1.74 | 0.85 | .042 | -2.04 | 0.31 | .000 | -0.27 | 0.06 | .000 | 0.56 | 0.13 | .000 |
| Live alone | 0.82 | 1.03 | .427 | 1.59 | 1.08 | .141 | 0.99 | 0.40 | .013 | -0.05 | 0.08 | .505 | 0.36 | 0.16 | .023 |
| *Step 2* | | | | | | | | | | | | | | | |
| Race | -0.68 | 1.13 | .548 | 0.52 | 1.16 | .656 | 0.70 | 0.43 | .101 | -0.10 | 0.08 | .231 | 0.44 | 0.17 | .011 |
| Age | -0.14 | 0.04 | .000 | -0.07 | 0.04 | .072 | -0.003 | 0.01 | .816 | -0.01 | 0.003 | .032 | 0.01 | 0.01 | .369 |
| Sex | 0.61 | 0.81 | .458 | 2.19 | 0.84 | .009 | 0.75 | 0.31 | .015 | -0.04 | 0.06 | .455 | 0.16 | 0.12 | .200 |
| Income | -3.02 | 0.82 | .000 | -2.17 | 0.84 | .010 | -2.20 | 0.31 | .000 | -0.28 | 0.06 | .000 | 0.56 | 0.12 | .000 |
| Live alone | 0.85 | 1.04 | .415 | 1.14 | 1.07 | .285 | 0.89 | 0.39 | .023 | -0.01 | 0.08 | .897 | 0.27 | 0.16 | .092 |
| Stay-at- Home | 2.11 | 1.05 | .045 | 2.78 | 1.08 | .010 | 1.28 | 0.40 | .001 | 0.25 | 0.08 | .001 | -0.32 | 0.16 | .043 |
| COVID-19 Impact | 0.17 | 0.39 | .666 | 1.60 | 0.40 | .000 | 0.43 | 0.15 | .003 | -0.09 | 0.03 | .002 | 0.23 | 0.06 | .000 |
| *Step 3* | | | | | | | | | | | | | | | |
| Interaction | 0.16 | 1.06 | .879 | 1.10 | 1.08 | .312 | 0.21 | 0.40 | .605 | 0.02 | 0.08 | .783 | -0.04 | 0.16 | .792 |

*Note.* *p* values listed as .000 are $p < .001$. Race = Racial/ethnic background (0 = racial/ethnic minority, 1 = non-minority); Sex (0 = Male; 1 = Female); Income = income level (0 = < $50,000/year; 1 = ≤ $50,000/year); Live alone = Whether participants live alone or have other individuals in their household (0 = live alone; 1 = live with others); Stay-at-home = "Do you live in a state that has instituted a stay-at-home order?" (0 = no; 1 = yes); COVID-19 impact = "To what extent has the situation associated with COVID-19 affected the way you live your life?;" Interaction = Stay-at-home status × Perceived impact of COVID-19.

#### 3.2.2. Health Anxiety

The overall model was significant, accounting for 8% of the variance in health anxiety, $F$ (8, 490) = 5.24, $p < .001$, $f = .26$. The addition of stay-at-home order status and perceived impact of COVID-19 in the second step of the model accounted for significant variance in health anxiety above and beyond covariates, $\Delta R^2 = .05$, $F$ (2, 491) = 12.02, $p < .001$, $f = .21$, with both stay-at-home order status and perceived impact of COVID-19 demonstrating significant unique positive associations with health anxiety. Likewise, female sex was uniquely positively associated with health anxiety and income level was uniquely negatively associated with health anxiety in this step of the model. The addition of the interaction between stay-at-home order status and perceived impact of COVID-19 did not significantly improve the model, $\Delta R^2 = .00$, $F$ (1, 490) = 1.02, $p = .312$, $f = .01$.

#### 3.2.3. Financial Worry

The overall model was significant, accounting for 14% of the variance in financial worry, $F$ (8, 489) = 9.60, $p < .001$, $f = .37$. Stay-at-home order status and perceived impact of COVID-19 accounted for significant unique variance in financial worry above and beyond covariates, $\Delta R^2 = .04$, $F$ (2, 490) = 10.21, $p < .001$, $f = .19$, with both stay-at-home order status and perceived impact of COVID-19 emerging as significant unique predictors. In addition, income level was uniquely negatively associated with financial worry in this step of the model. The addition of the interaction between stay-at-home order status and perceived impact of COVID-19 did not significantly improve the model, $\Delta R^2 = .00$, $F$ (1, 489) = 0.27, $p = .605$, $f = .00$.

#### 3.2.4. Loneliness

The overall model was significant, accounting for 10% of the variance in loneliness, $F$ (8, 490) = 7.08, $p < .001$, $f = .31$. The addition of stay-at-home order status and perceived impact of COVID-19 in the second step of the model accounted for significant variance in loneliness above and beyond covariates, $\Delta R^2 = .04$, $F$ (2, 491) = 9.64, $p < .001$, $f = .19$. However, whereas stay-at-home order status was significantly positively associated with loneliness, the perceived impact of COVID-19 was significantly negatively associated with loneliness. In addition, income level was uniquely negatively associated with loneliness in this step of the model. The addition of the interaction between stay-at-home order status and perceived impact of COVID-19 did not significantly improve the model, $\Delta R^2 = .00$, $F$ (1, 490) = 0.08, $p = .783$, $f = .00$.

#### 3.2.5. Perceived Social Support

The overall model was significant, accounting for 12% of the variance in perceived social support, $F$ (8, 490) = 8.13, $p < .001$, $f = .34$. Stay-at-home order status and perceived impact of COVID-19 accounted for significant variance in perceived social support above and beyond the covariates, $\Delta R^2 = .03$, $F$ (2, 491) = 9.27, $p < .001$, $f = .18$. However, only perceived impact of COVID-19 was uniquely associated with perceived social support, and this association was positive (vs. negative as hypothesized). In addition, income level was uniquely positively associated with perceived social support in this step of the model. The addition of the interaction between stay-at-home order status and perceived impact of COVID-19 did not significantly improve the model, $\Delta R^2 = .00$, $F$ (1, 490) = 0.07, $p = .792$, $f = .00$.

### 3.3. Exploratory Analyses

Given evidence of robust age and sex differences in the outcomes of interest (Altemus, 2006; Borys & Perlman, 1985; Christensen et al., 1999; Luhman & Hawkley, 2016), as well as evidence that the impact of COVID-19 may vary as a function of age and sex (Dowd et al., 2020; Wenham et al., 2020), a series of hierarchical linear regression analyses were conducted to explore whether age or sex moderated associations between (a) stay-at-home orders and psychological outcomes (2-way interaction); (b) the perceived impact of COVID-19 and psychological outcomes (2-way interaction); and (c) the interaction of stay-at-home order status and the perceived impact of COVID-19 and psychological outcomes (3-way interaction). None of the examined interactions significantly improved the models. Specifically, none of the 2-way or 3-way interactions involving age accounted for significant variance in any of the psychological outcomes ($\Delta R^2$s = .00 to .01, $Fs < 1.80$, $ps > .148$, $fs < .07$). Likewise, none of the interactions involving sex accounted for significant unique variance in any psychological outcomes ($\Delta R^2$s = .00 to .005, $Fs < .95$, $ps > .332$, $fs = .00$).

Finally, given that the presence of children in the household could exacerbate some of the negative psychological outcomes associated with COVID-19 and related stay-at-home orders (e.g., health anxiety, financial worries), an exploratory hierarchical linear regression was conducted to examine the main and interactive effects of having children in the home on psychological outcomes. Given the overlap

between variables representing whether participants lived alone and whether participants had children in their home ($\chi^2$ = 78.91, $p$ < .001), the former variable was removed from this model. Results revealed no significant unique associations between having children in the home and any of the psychological outcomes of interest ($bs$ = -.29 to .29, $ps$ > .023). Likewise, none of the interactions of having children in the home with stay-at-home order status or the perceived impact of COVID-19 were significant in any of the models ($\Delta R^2$s = .00 to .008, $Fs$ < 1.42, $ps$ > .237, $fs$ < .06). Notably, the same pattern of non-significant associations for all main and interactive effects involving having children in the home was found when using a continuous variable reflecting the number of children in the household (vs. the dichotomous variable reflecting the presence or absence of children in the home).

## 4. Discussion

The goal of the present study was to examine associations of stay-at-home orders and the perceived impact of COVID-19 on daily life to relevant psychological outcomes (i.e., depression, health anxiety, financial worry, perceived social support, and loneliness). Study hypotheses were partially supported. Although the interaction of stay-at-home order status and the perceived impact of COVID-19 on daily life did not account for significant variance in any of the outcomes, each of these factors was independently associated with several psychological outcomes. As predicted, being under a stay-at-home order was associated with greater health anxiety, financial worry, and loneliness, consistent with the theorized unintended negative consequences of such orders (Reger et al., 2020) and past research on the psychological consequences of quarantine during a pandemic (Brooks et al., 2020). Moreover, consistent with research on the psychological consequences of COVID-19 in China (Cao et al., 2020; Wang et al., 2020; Zhang et al., 2020) and past research on the psychological consequences of other pandemics (Tausczik et al., 2012; Wheaton et al., 2012), the perceived impact of COVID-19 on daily life was associated with greater health anxiety and financial worry. Contrary to predictions, the perceived impact of COVID-19 was negatively associated with loneliness and positively associated with social support.

Stay-at-home orders or experiencing changes to daily life habits due to COVID-19 may increase perceptions of risk for harm to one's physical, social, and financial health, resulting in increased health anxiety and financial worry. Moreover, stay-at-home orders may result in sudden changes to one's social life. Reduced contact with once common social connections may initially bring about increased feelings of loneliness and social isolation. However, findings also suggest that one potential positive outcome of this pandemic may be an increase in social support seeking or connectedness as individuals try to adjust to changes in daily life. Although being under a stay-at-home order was associated with increased loneliness, the perception that COVID-19 had a greater impact on one's daily life was associated with increased social support and reduced loneliness. These findings are consistent with suggestions that the wide-spread shared experience of COVID-19 may increase closeness and social cohesion (Courtet et al., 2020), similar to what has been observed in past mass tragedies (Calo-Blanco et al., 2017; Hawdon & Ryan, 2011).

Notably, despite evidence that the impact of COVID-19 may vary as a function of age and sex (Dowd et al., 2020; Wenham et al., 2020), results revealed few associations between age or sex and the psychological outcomes of interest. Likewise, none of the examined associations of stay-at-home order status or the perceived impact of COVID-19 on daily life with psychological outcomes varied as a function of age or sex. Together, these results suggest that the associations of stay-at-home orders and the perceived impact of COVID-19 with psychological outcomes – at least in the early stages of this pandemic and related public health interventions – do not differ as a function of age or sex. However, whether these associations will become stronger for individuals of a particular sex or age group as the pandemic persists remains to be determined. Conversely, income level was uniquely inversely associated with health anxiety, financial worry, and loneliness, and uniquely positively associated with perceived social support. As such, these findings suggest that individuals with lower incomes may be particularly at-risk for the negative psychological outcomes of COVID-19 and related social and economic consequences. As this pandemic and related social distancing interventions persist (even if to a lesser degree), widespread interventions focused on promoting mental health and well-being (including a sense of connection) among less financially secure individuals are also needed.

Study limitations warrant consideration. The use of cross-sectional data precludes conclusions about the nature or direction of the associations examined. We also do not know the extent with which these psychological symptoms existed prior to COVID-19 and the implementation of stay-at-home orders. Likewise, self-report questionnaires may be influenced by social desirability or recall difficulties that could affect the validity of provided data. Future studies would benefit from incorporating structured clinical interviews and/or timeline follow-back procedures to assess psychological symptoms and their temporal relation to physical distancing or COVID-19-related stressors. Given our recruitment methods and sample (relatively non-diverse self-selected MTurk workers), results may not generalize to the larger U.S. population, other countries, or vulnerable populations (e.g., individuals with chronic medical conditions; health care workers; hospitalized patients). Replication of findings is needed within other samples and populations.

In addition, results only speak to the early associations of stay-at-home orders and the perceived impact of COVID-19 to psychological outcomes, and these variables accounted for only a modest amount of the variance in the examined outcomes. Longer-term prospective studies are needed to evaluate if the observed relations increase or decrease in magnitude as the pandemic continues. Indeed, studies on the trajectory of psychological symptoms over the course of past pandemics have found that, although initial reactions tend to be characterized by elevated levels of anxiety and worry, these symptoms tend to decrease over the course of the pandemic (Jones & Salathé, 2009; Tausczik et al., 2012). Given the relatively high mortality rate associated with COVID-19, the lack of adequate testing in some countries, and the absence of effective pharmaceutical interventions for COVID-19, it remains to be seen whether a similar trajectory will occur with the current pandemic. Finally, it will be important for future research to examine the relation of these psychological outcomes to future adaptive and maladaptive behaviors. For example, individuals with elevated health anxiety may engage in greater help-seeking behavior (e.g., visiting emergency rooms, visiting multiple doctors), taxing health care resources. Alternatively, health anxiety may be associated with the avoidance of seeking out care due to fears of contagion, potentially putting the individual's physical health at risk if they are infected with COVID-19 or suffering from another medical problem that requires attention (Asmundson & Taylor, 2020). Likewise, loneliness may contribute to alcohol abuse (Åkerlind & Hörnquist, 1992) or increased suicide risk (Calati et al., 2019; Joiner et al., 2012).

Despite limitations, results of this study highlight associations between stay-at-home orders, the perceived impact of COVID-19 on an individual's life, and a variety of positive and negative psychological outcomes. In the absence of effective infection prevention efforts, widespread testing and tracking, and/or pharmacological interventions (e.g., vaccines) for COVID-19, large-scale public health interventions such as physical distancing or stay-at-home orders are necessary to reduce the spread of the virus and infection-related mortality. However, in the context of these necessary public health interventions, results of this study highlight the need for concurrent psychological interventions aimed at mitigating the potential negative psychological consequences of COVID-19 and related social distancing interventions, including interventions aimed at increasing social connection and social support

(Reger et al., 2020). In particular, as this pandemic persists, it is imperative that evidence-based tele-mental health services are made available and accessible to vulnerable individuals throughout the duration of stay-at-home orders and other social distancing interventions (Reger et al., 2020).

## Author Statement

M. T. Tull and K. L. Gratz developed the study concept. M. T. Tull, K. L. Gratz, J. P. Rose, K. Edmonds, and J. Richmond designed the study. K. Scamaldo and K. Edmonds collected the data. M. T. Tull analyzed the data, with assistance from J. Richmond and K. Scamaldo. M. T. Tull, K. Edmonds, K. Scamaldo, and J. Richmond drafted the manuscript, and K. L. Gratz and J. P. Rose provided critical revisions. All authors approved the final manuscript for submission.

## Declaration of Competing Interest

Authors have no conflicts of interest to declare.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2020.113098.

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