



## Empirical Research

# Psychological inflexibility and intolerance of uncertainty moderate the relationship between social isolation and mental health outcomes during COVID-19

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## ABSTRACT

The COVID-19 pandemic has had an enormous impact on human activity worldwide, in part due to many governments issuing stay-at-home orders and limiting the types of social interactions in which citizens can engage. Previous research has shown that social isolation can contribute to psychological distress. The impact of increased social isolation on mental health functioning during the COVID-19 crisis, as well as potential mechanisms to buffer this impact, have yet to be investigated. The current study explored the moderating role of psychological flexibility and related constructs on the relationships between social isolation and mental health outcomes during the COVID-19 pandemic. Cross-sectional data from 278 participants, the majority residing in the United States, were collected during a 3-week period from mid-April to early May 2020 via online survey. A series of hierarchical linear regression analyses indicated statistically significant relationships between social isolation and psychological distress (depression, anxiety, and stress), well-being, and valued living. Psychological inflexibility, intolerance of uncertainty, and emotional suppression significantly moderated these relationships in a number of instances. Greater psychological flexibility and acceptance of difficult experiences appeared to act as a buffer against the negative effects of increased social isolation, while amplifying the benefits of social connectedness. Implications for promoting mental health and buffering against the harmful effects of social isolation during the COVID-19 pandemic and beyond are discussed.

Several largescale disease outbreaks have occurred in recent years and received widespread coverage in various media. These epidemics have allowed researchers to examine aspects of mental health responses among affected populations. For example, one of the first highly infectious diseases during which widespread measures of mental health were collected was the Severe Acute Respiratory Syndrome (SARS) outbreak in the early 2000s. The SARS outbreak, caused by a novel coronavirus, infected approximately 8,098 people and resulted in 774 deaths worldwide (Centers for Disease Control and Prevention, 2017). Mental health responses studied during this event included trait anxiety, coping strategies, and coping flexibility in Chinese undergraduates (Cheng & Cheung, 2005), fear of contagion in Canadian healthcare workers (Mauder et al., 2003), and depression and sleep quality in Taiwanese nursing staff (Chen et al., 2006).

The next major outbreak was the H1N1 epidemic in 2009, during which the CDC estimated that 151,700–575,400 people died worldwide

(Centers for Disease Control and Prevention, 2019). Characteristics of mental health evaluated during this epidemic included anxiety (Wheaton et al., 2012) and stress responses of those with afflicted loved ones (Elizarrarás-Rivas et al., 2010). During this event, researchers also began to focus on more complex responses to disease outbreak, including preparedness (Prati et al., 2011), protective behavior (Durham et al., 2012), and parental transmission of fear to children (Remmerswaal and Muris, 2011).

Currently, the world is in the grip of the COVID-19 pandemic which, at the time of this writing, has infected over 22 million individuals and caused over 780,000 deaths worldwide (Dong et al., 2020). In efforts to reduce the spread of the disease, many governments have instituted measures that include voluntary and involuntary stay-at-home orders, quarantine periods, shuttering of businesses, social distancing, and limitations on sizes of gatherings. To date, only a few studies have examined the impact of the current pandemic, and the measures

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intended to contain it, on mental health functioning. One study found high levels of depression, anxiety, insomnia, and stress in Chinese healthcare workers (Lai et al., 2020). Another study found high levels of depression, anxiety, and stress in the Chinese general population (Wang et al., 2020). Further research found that Turkish adults who had low tolerance of uncertainty had lower overall well-being (Satici et al., 2020). Using U.S. Census Bureau data from 2019 to 2020, Twenge and Joiner (2020) showed the prevalence of depression and anxiety in U.S. adults in 2020 is more than three times the rate it was in 2019. Although a number of other studies are currently being conducted, and some are available as pre-prints, to our knowledge, there have been few other published studies examining mental health functioning during the COVID-19 pandemic in the United States to date.

As a result of some of the aggressive tactics that have been used to slow the spread of the disease in the U.S., millions of individuals have been forced to stay home, or work from home if they have not lost their jobs, effectively cutting off a vast number of people from most typical sources of in-person social interaction. As of this writing, stay-at-home orders that had been in place for months in most U.S. states have largely been lifted, but there are still numerous restrictions on social gatherings and businesses. Such drastic, widespread, and long-lasting measures to eliminate physical interactions are unprecedented in modern society and raise questions about the potential deleterious effects of social isolation on the mental health and well-being of affected individuals, as well as measures that can be taken to mitigate these effects. Social isolation has been defined as “an objective lack of interactions with others or the wider community” (Leigh-Hunt et al., 2017) and is known to contribute to mental health problems, including general psychological distress (Espinosa & Rudenstine, 2020), decreased well-being (Liao & Weng, 2018), and depression (Santini et al., 2015). It is a strong predictor of depression in older adults (Challands et al., 2017; Cruwys et al., 2013; Taylor et al., 2018) and, in a large national Australian survey, it was found to predict depression across the lifespan (Levula et al., 2018). In a systematic review, social isolation was found to be closely related to social anxiety disorder (Teo et al., 2013). In a similar fashion, social connectedness (the opposite of social isolation) has been found to be inversely related to trait anxiety (Lee & Robbins, 1998) and has been shown to be a protective factor against the effects of micro-aggressions on anxiety in Black Americans when viewed as connection to ethnic community (Liao et al., 2016). In a review of systematic reviews, Leigh-Hunt et al. (2017) found strong support for the association between social isolation and mortality, mediated through cardiovascular disease and mental health. In terms of prevalence, Hawthorne (2008) found up to 16% of the general Australian population struggled with some form of social isolation under non-pandemic conditions. It seems clear that the current circumstances of the COVID-19 pandemic may increase actual and perceived social isolation and potentially exacerbate related negative mental health outcomes.

One potential method of mitigating negative mental health outcomes is through increased psychological flexibility. Psychological flexibility is the skill of changing or persisting in behavior, when doing so serves an individual's values (Hayes et al., 2012). The emphasis of psychological flexibility is on relating to one's psychological experiences (e.g., thoughts, feelings, physical sensations) differently, rather than on attempting to alter the content or intensity of those experiences. Directly changing the content of psychological experiences can be difficult, if not impossible (e.g., Abramowitz et al., 2001), and it is often more useful to learn to act toward meaningful life goals, even when difficult psychological content is present (Kashdan & Rottenberg, 2010). This is especially true when outside circumstances that lead to psychological distress are largely out of one's control and, therefore, changing those circumstances is not possible.

The inverse of psychological flexibility as described above is psychological inflexibility, which is generally characterized as rigidity in responding to one's psychological experiences that does not align with one's stated values and may lead to psychological suffering and reduced

levels of functioning. A common pattern of responding that contributes to inflexibility is experiential avoidance (Hayes et al., 2012), which consists of avoidance of difficult and unpleasant psychological experiences, even when doing so causes problems in one's life. In addition to psychological inflexibility, intolerance of uncertainty (Lee et al., 2010), and emotional suppression (Gross & John, 2003) all represent manners in which one relates to their difficult psychological experiences. In a sense, intolerance of uncertainty and emotional suppression can both be understood as experiential avoidance, or specific instances of psychological inflexibility, that focus on difficulty accepting thoughts and feelings related to uncertainty and rigid emotional control, respectively. In the context of the COVID-19 pandemic, uncertainty and the challenging emotional experiences that accompany it may be heightened.

Acceptance and commitment therapy (ACT), a therapeutic approach that targets increased psychological flexibility, has been a successful psychological treatment in many domains of mental health, including those that result from outside circumstances that are difficult to control, such as chronic pain (Hann & McCracken, 2014) and cancer (González-Fernández & Fernández-Rodríguez, 2019). During the current COVID-19 pandemic, which is also characterized by a lack of external control over circumstances, Pakenham et al. (2020) explored the moderating role of psychological flexibility on mental health outcomes in Italy. They found psychological flexibility mitigated the effects of the COVID-19 lockdown on measures of anxiety, depression, and COVID-19-related distress, while psychological inflexibility exacerbated those effects. Although this study did not explicitly address pandemic-related social isolation, it provided valuable insight into the potential of psychological flexibility to buffer negative mental health outcomes during the pandemic. Psychological flexibility has been studied in the context of ostracism (a narrower type of social isolation), and recent research found that when high levels of ostracism led to psychological distress, high levels of psychological flexibility mitigated the impact, suggesting that psychological flexibility may also be one way to moderate the negative consequences of social isolation (Waldeck et al., 2017). Taken together, this suggests that the role of psychological flexibility and other constructs related to acceptance of difficult experiences may be of particular interest for individuals and clinicians considering how best to mitigate the potentially harmful effects of increased social isolation amid the COVID-19 pandemic.

The purpose of the present study was to investigate the impact of psychological inflexibility and related constructs (intolerance of uncertainty and regulating emotion through suppression) on the relationship between social isolation and both “negative” (i.e., anxiety, depression, stress) and “positive” (i.e., well-being, valued living) mental health outcomes during the COVID-19 pandemic. We hypothesized that increased psychological inflexibility, intolerance of uncertainty, and emotional suppression would exacerbate negative outcomes resulting from social isolation. No hypotheses were made in terms of moderating the relationship between social isolation and positive aspects of mental health. A secondary aim was to explore predictors of mental health outcomes through main effects analyses.

## 1. Method

### 1.1. Participants

The study was approved by the university's Institutional Review Board. A total of 349 participants were recruited. The study had two recruitment modalities: psychology undergraduates at a Midwestern university and snowball recruitment via professional email lists and social media websites. Students were offered extra credit for participation, and all participants had the opportunity to enter a drawing for a \$25.00 Visa gift card. Of the 349 participants, 31 confirmed they were undergraduates seeking extra credit. However, extra credit seeking was the only way to identify these participants as students, and there may have been more student participants who chose not to receive extra

credit. Individuals 18 years or older who could read and understand English and could access the survey online were included in the study.

## 1.2. Measures

Participants were asked to provide demographic information including age, gender, race/ethnicity, education, family and relationship status, current living situation, household income and employment status prior to COVID-19, and country and region of residence.

## 1.3. Outcome variables

**Depression Anxiety and Stress Scales (DASS-21).** The DASS-21 (Henry & Crawford, 2005) is a 21-item self-report scale of psychological distress, consisting of three 7-item subscales measuring depression, anxiety, and stress over the past week. Each item is scored on a 4-point scale from 0 to 3, with higher scores representing higher levels of each construct (range = 0–21). Response options include “Did not apply to me at all – NEVER” (0); “Applied to me to some degree, or some of the time – SOMETIMES” (1); “Applied to me to a considerable degree, or a good part of the time – OFTEN” (2); and “Applied to me very much, or most of the time – ALMOST ALWAYS” (3). Sample items from the depression subscale include “I couldn’t seem to experience any positive feeling at all” and “I felt downhearted and blue.” Sample items from the anxiety subscale include “I felt I was close to panic” and “I felt scared without good reason.” Sample items from the stress subscale include “I tended to over-react to situations” and “I found it difficult to relax.” In a nonclinical sample ( $N = 1,794$ ), Henry and Crawford (2005) observed mean scores of 2.83 ( $SD = 3.87$ ), 1.83 ( $SD = 2.95$ ), 4.73 ( $SD = 4.20$ ) for depression, anxiety, and stress, respectively. The measure also showed good convergent and discriminant validity. In the current sample, internal consistency was excellent for the DASS total score ( $\alpha = 0.94$ ) and good to excellent for the subscales (depression:  $\alpha = 0.90$ , anxiety:  $\alpha = 0.84$ , stress:  $\alpha = 0.89$ ).

**Valuing Questionnaire (VQ).** The VQ (Smout et al., 2014) is a 10-item self-report questionnaire measuring two aspects related to valued living, progress and obstruction. The items are scored on a 7-point scale from 0 to 6, with higher numbers reflecting higher amounts of either progress or obstruction toward valued living during the past week (range = 0–30). Response anchors are “Not at all true” (0) and “Completely true” (6). Items from the progress subscale include “I was proud about how I lived my life” and “I continued to get better at being the kind of person I want to be.” Items from the obstruction subscale include “I was basically on ‘auto-pilot’ most of the time” and “Difficult thoughts, feelings, or memories got in the way of what I really wanted to do.” The VQ has shown good convergent validity (Smout et al., 2014) and had good internal consistency in the current sample ( $\alpha = 0.85$  and  $\alpha = 0.89$  for obstruction and progress, respectively).

**World Health Organization Well-Being Index (WHO-5).** The WHO-5 (Topp et al., 2015) is a 5-item measure of psychological well-being over the past two weeks. The items are scored on a 6-point scale from 0 to 5, with higher scores indicating higher levels of well-being (scores multiplied by 4, range = 0–100). Response options include “All of the time” (5), “Most of the time” (4), “More than half the time” (3), “Less than half the time” (2), “Some of the time” (1), and “At no time” (0). Sample items include “I have felt calm and relaxed” and “I have felt active and vigorous.” The WHO-5 has shown construct validity (Topp et al., 2015) and had good internal consistency in this sample ( $\alpha = 0.88$ ).

## 1.4. Predictor variable

**Friendship Scale.** The Friendship Scale (Hawthorne, 2006) is a 6-item self-report questionnaire measuring social isolation. Each item is scored on a 5-point scale from 0 to 4 (range = 0–24) and refers to experiences over the past four weeks. Response options include “Almost

always” (0), “Most of the time” (1), “About half the time” (2), “Occasionally” (3), and “Not at all” (4). Sample items include “I felt isolated from other people,” “I felt alone and friendless,” and “I had someone to share my feelings with.” Half the items are reversed scored. In the current study, the direction of the scale was reversed such that higher scores represented greater social isolation. Scores from 0 to 2 are considered “very socially connected,” 3 to 5 are “socially connected,” 6 to 8 are “some social support,” 9 to 12 are “isolated,” and 13 to 24 are “very socially isolated.” The Friendship Scale has shown good concurrent and discriminant validity (Hawthorne, 2006). In the current sample, internal consistency was good ( $\alpha = 0.85$ ).

## 1.5. Moderator variables

**Acceptance and Action Questionnaire-II (AAQ-II).** The AAQ-II (Bond et al., 2011) measures psychological inflexibility with a 7-item self-report questionnaire. Participants rate each statement from 1 to 7; higher scores indicate higher levels of psychological inflexibility (range = 7–49). In the current study, we used a modified version of the AAQ-II, with a scale ranging from 1 to 6. Response options included “Never true” (1), “Very seldom true” (2), “Seldom true” (3), “Sometimes true” (4), “Frequently true” (5), and “Almost always true” (6). Sample items include “Emotions cause problems in my life” and “My painful experiences and memories make it difficult for me to live a life that I would value.” In the original (unmodified) version, individuals scoring higher than the 24 to 28 range have been considered as having clinical levels of psychological inflexibility. As noted by Bond et al. (2011), the AAQ-II has acceptable to good test-retest reliability of  $r = 0.81$  and  $0.79$  at 3 and 12 months, respectively. In the current sample, internal consistency of the modified version of the scale was excellent ( $\alpha = 0.93$ ). The AAQ-II was selected for its brevity, considering the number of other measures used in the study, and its widespread usage.

**Emotional Regulation Questionnaire (ERQ).** The ERQ (Gross & John, 2003) is a 10-item questionnaire measuring how individuals regulate their emotions. The 10 questions are scored from 1 to 7. Response anchors include “Strongly Disagree” (1), “Neutral” (4), and “Strongly Agree” (7). Items are divided into two subscales (Reappraisal and Suppression), with higher numbers indicating greater use of the particular emotion regulation strategy. In the current study, only the Suppression subscale was used. Sample items from this subscale include “I control my emotions by not expressing them” and “When I am feeling negative emotions, I make sure not to express them.” The subscales have good convergent and discriminant validity and questionable test-retest reliability ( $r = 0.69$ ) at 6 months (Gross & John, 2003). In this sample, the Suppression subscale showed acceptable internal consistency ( $\alpha = 0.72$ ).

**Intolerance of Uncertainty Scale-Short Form (IUS-12).** The IUS-12 (Carleton et al., 2007) is a 12-item self-report measure of intolerance of uncertainty. The items are scored on a 5-point scale from 1 to 5, with higher numbers indicating more intolerance of uncertainty (range = 12–60). Response options include “Not at all characteristic of me” (1), “A little characteristic of me” (2), “Somewhat characteristic of me” (3), “Very characteristic of me” (4), and “Entirely characteristic of me” (5). Sample items include “Unforeseen events trouble me greatly” and “When I am uncertain I can’t function well.” The IUS-12 has good convergent validity (Carleton et al., 2007), and internal consistency in this sample was excellent ( $\alpha = 0.91$ ).

## 1.6. Procedure

After providing informed consent, participants were asked to complete the online battery, which took approximately 20 min. Upon completion, participants were asked if they would like to enter into the gift card drawing and were given the opportunity to opt in to future waves of the study (data analysis for these waves is still ongoing). Data for the current study was collected during a 3-week period, between

April 16 and May 9, 2020. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

## 2. Results

Statistical analyses were conducted in R (R Core Team, 2016) with R Studio (RStudio Team, 2016) and the following packages: tidyverse (Wickham et al., 2019), boot (Canty & Ripley, 2020), furniture (Barrett & Brignone, 2017), interactions (Long, 2019a), jtools (Long, 2019b), and reghelper (Hughes, 2020).

### 2.1. Sample characteristics and missing data

A total of 349 individuals responded to the survey. Of these, 71 were excluded from analyses because they did not respond to any of the outcome measures. As suggested by Meade and Craig (2012), the remaining cases were screened for length of consecutive repeated responses and Mahalanobis distance. No cases were omitted based on these measures. Therefore, 278 participants were included in the analyses. No data were missing for demographic variables included in analyses (age, race/ethnicity, and gender). Across predictor, outcome, and moderator variables, data were missing for 3.7% of responses. For each analysis, cases were excluded if they were missing data for any variable in the model (i.e., listwise deletion; van Buuren, 2018). This resulted in 254 participants in each of the final regression models.

Demographic information is presented in Table 1. Participants ranged in age from 18 to 83 years. Almost all participants were from the United States ( $n = 265$ , 95.3%), although three participants (1.1%) were from Australia, two (0.7%) from Canada, and one each (0.4%) from Ireland, Norway, Sweden, and the United Kingdom. One participant (0.4%) did not report their country of residence. In terms of regional distribution of U.S. participants, 188 (67.6%) were from the Midwest, 44

(15.8%) from the West, 19 (6.8%) from the Northeast, 14 (5%) from the South, and 13 (4.7%) did not report their regional location.

The mean level of social isolation in our sample was in the “some social support” range. The sample showed slightly elevated scores (approximately one-half *SD* above the mean) on measures of depression, anxiety, and stress compared to a nonclinical sample of adults (Henry & Crawford, 2005). In terms of values progress and obstruction, they were comparable to nonclinical samples in the literature (Smout et al., 2014). However, mean well-being in the current sample was lower (1 *SD* below the mean) than what has been previously reported in a nonclinical sample (Bech et al., 2003). Descriptive statistics for predictor, moderator, and outcome variables are presented in Table 2, and a correlation matrix is shown in Table 3. Correlations between variables were all under  $r = 0.64$ , and variance inflation factors (VIFs) were all less than 2.5, suggesting multicollinearity was not an issue.

### 2.2. Moderation analyses

In order to test the effect of potential moderators on the relationships between social isolation and mental health outcomes, hierarchical linear regression analyses were performed with each moderator for each of the four outcome variables. In step 1 of the regression analyses, age, race/ethnicity, and gender variables were added as a block. In step 2, all predictor and moderator variables were added as a block (as main effects), and in step 3, interactions between each moderator and social isolation were tested one at a time for each outcome. Due to our small sample size and the number of interactions we were interested in testing, we chose to test each interaction in a separate model rather than as a block or within an SEM framework. All variables were retained in the models at each of the steps, regardless of significance. Predictor and moderator variables were mean centered prior to analyses and prior to creating the interaction terms. A total of four main effects and 12 primary interaction models were tested. We also tested an additional nine secondary interaction models using the subscales of the DASS-21.

Following initial regression analyses, model residuals were analyzed in order to determine whether they met the assumptions of linear regression. Interaction models that included the DASS-21 as the outcome variable violated parametric assumptions (i.e., homogeneity of variance and normal distribution of residuals). For these models, we performed bootstrap resampling with approximately 1,000 bootstrap samples in order to calculate standard errors and bias corrected and accelerated (BCa) confidence intervals that do not rely on parametric

**Table 1**  
Descriptive statistics for demographic variables.

Variable	M/count	SD/%
Age	39.6	15.8
Gender		
Male	50	18.0%
Female	224	80.6%
Another gender	4	1.4%
Race/Ethnicity		
White	249	89.6%
Non-white <sup>a</sup>	29	10.4%
Household income prior to COVID-19		
Less than \$50,000	77	27.7%
\$50,000–\$100,000	93	33.5%
More than \$100,000	107	38.5%
Employment prior to COVID-19		
Full-time (30+ hours per week)	137	49.3%
Part-time (<30 h per week)	33	11.9%
Unemployed	9	3.2%
Student	54	19.4%
Retired	22	7.9%
Self-employed	20	7.2%
On disability	3	1.1%
Years of education	16.3	2.6
Marital/relationship status		
Married and living together	134	48.2%
Married and living apart	2	0.7%
Not married and living together	34	12.2%
Not married and living apart	37	13.3%
Single	69	24.8%
Did not answer	2	0.7%
Living situation		
Alone	48	17.3%
With other people	230	82.7%

<sup>a</sup> Non-white consists of Asian ( $n = 7$ ), Black/African American ( $n = 6$ ), Hispanic ( $n = 4$ ), Middle Eastern ( $n = 2$ ), Mixed Race ( $n = 8$ ), and Other ( $n = 2$ ).

**Table 2**  
Descriptive statistics for outcomes, predictors, and moderator variables.

Variable	Possible Range	Range	M/count	SD/%
<b>Outcomes</b>				
Distress	0–63	0–58	15.3	11.8
Depression	0–21	0–21	5.3	4.7
Anxiety	0–21	0–19	3.4	3.9
Stress	0–21	0–21	6.7	4.7
Values obstruction	0–30	0–30	11.9	7.2
Values progress	0–30	1–30	18.3	6.7
Well-being	0–100	4–100	50	21.4
<b>Predictor</b>				
Social isolation	0–24	0–23	7.1	5.3
<b>Moderators</b>				
Psychological inflexibility (modified)	7–42	7–42	18.5	8.6
Emotional suppression	4–28	4–24	12.7	4.8
Intolerance of uncertainty	12–60	12–55	29.7	9.5

Note. Distress = Depression, Anxiety, Stress Scales; values obstruction and progress = Valuing Questionnaire; well-being = World Health Organization Well-Being Index; psychological inflexibility = Acceptance and Action Questionnaire-II; emotion suppression = Emotional Regulation Questionnaire, Suppression subscale; intolerance of uncertainty = Intolerance of Uncertainty Scale-Short Form.



**Table 3**

Pearson correlations between predictor, moderator, and outcome variables.

	1	2	3	4	5	6	7	8
1) Distress	1.00 ***							
2) Values obstruction	0.73***	1.00***						
3) Values progress	−0.49***	−0.54***	1.00***					
4) Well-being	−0.68***	−0.69***	0.58***	1.00***				
5) Social isolation	0.65***	0.59***	−0.52***	−0.61***	1.00***			
6) Psychological inflexibility	0.72***	0.67***	−0.49***	−0.61***	0.60***	1.00***		
7) Emotion suppression	0.20**	0.29***	−0.20**	−0.17*	0.41***	0.32***	1.00***	
8) Intolerance of uncertainty	0.63***	0.59***	−0.39***	−0.50***	0.46***	0.65***	0.14*	1.00***

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

assumptions (Wehrens et al., 2000).

Five of the primary moderation models emerged as statistically significant. As shown in the last row of Table 4, results indicated that psychological inflexibility moderated the relationship between social isolation and distress ( $B = 0.03$ , 95% BCa CI: LL = 0.05, UL = 0.00). Subsequent simple slopes analyses indicated that for individuals reporting low levels of psychological inflexibility (Fig. 1, panel A, dashed line with short dashes), higher levels of social isolation were moderately associated with higher levels of distress (simple slope = 0.43,  $\beta = 0.19$ ,  $SE = 0.16$ ,  $t = 2.70$ ,  $p = .007$ ). In contrast, for individuals reporting high levels of inflexibility (Fig. 1, panel A, solid line), this relationship was much stronger (simple slope = 0.90,  $\beta = 0.40$ ,  $SE = 0.13$ ,  $t = 7.00$ ,  $p < .001$ ).

Secondary moderation analyses using each of the DASS-21 subscales showed a more nuanced pattern of findings with regard to this relationship. As shown in Fig. 2, psychological inflexibility moderated the effect of social isolation on anxiety (panel A;  $B = 0.01$ ,  $\beta = 0.12$ ,  $SE = 0.00$ ,  $t = 2.55$ ,  $p = .012$ ) and depression (panel B;  $B = 0.01$ ,  $\beta = 0.12$ ,  $SE = 0.00$ ,  $t = 3.15$ ,  $p = .002$ ), but not stress ( $B = 0.00$ ,  $\beta = 0.03$ ,  $SE = 0.01$ ,  $t = 0.74$ ,  $p = .461$ ). For those who reported high levels of psychological inflexibility (Fig. 2, panels A and B, solid lines), greater social isolation was associated with more anxiety (simple slope = 0.21,  $\beta = 0.28$ ,  $SE = 0.05$ ,  $t = 3.85$ ,  $p < .001$ ) and depression (simple slope = 0.42,  $\beta = 0.47$ ,  $SE = 0.05$ ,  $t = 8.02$ ,  $p < .001$ ). For those who reported low levels of inflexibility (Fig. 2, panels A and B, dashed line with short dashes), the relationship between social isolation and anxiety was non-significant (simple slope = 0.02,  $\beta = 0.03$ ,  $SE = 0.07$ ,  $t = 0.33$ ,  $p = .738$ ), and the relationship with depression was attenuated (simple slope = 0.20,  $\beta = 0.22$ ,  $SE = 0.07$ ,  $t = 3.00$ ,  $p = .003$ ) relative to high levels of inflexibility. It therefore appears that the moderating effect of psychological inflexibility on the association between social isolation and distress was driven by effects on anxiety and depression, but not stress.

Intolerance of uncertainty moderated the relationship between social isolation and distress ( $B = 0.03$ , 95% BCa CI: LL = 0.05, UL = 0.01), as shown in Table 5. For individuals who reported low levels of intolerance of uncertainty (Fig. 1, panel B, dashed line with short dashes), higher levels of social isolation were moderately associated with higher distress (simple slope = 0.44,  $\beta = 0.20$ ,  $SE = 0.15$ ,  $t = 2.86$ ,  $p = .005$ ). On the other hand, for those who reported high levels of intolerance of uncertainty (Fig. 1, panel B, solid line), there was a much stronger association (simple slope = 0.96,  $\beta = 0.43$ ,  $SE = 0.14$ ,  $t = 7.03$ ,  $p < .001$ ). Secondary analyses indicate that the moderating role of intolerance of uncertainty was driven by its effect on the relationship between social isolation and anxiety ( $B = 0.02$ ,  $\beta = 0.19$ ,  $SE = 0.00$ ,  $t = 3.87$ ,  $p < .001$ ), but not depression ( $B = 0.01$ ,  $\beta = 0.06$ ,  $SE = 0.00$ ,  $t = 1.37$ ,  $p = .173$ ) or stress ( $B = 0.01$ ,  $\beta = 0.07$ ,  $SE = 0.00$ ,  $t = 1.65$ ,  $p = .101$ ). As shown in Fig. 2, panel C, for those reporting high intolerance of uncertainty (solid line), higher levels of social isolation were associated with greater anxiety (simple slope = 0.27,  $\beta = 0.36$ ,  $SE = 0.06$ ,  $t = 4.71$ ,  $p < .001$ ), while this relationship was nonsignificant for those reporting low intolerance (dashed line with short dashes; simple slope =  $-0.02$ ,  $\beta = -0.03$ ,  $SE = 0.06$ ,  $t = -0.33$ ,  $p = .741$ ).

Finally, secondary analyses indicated that emotional suppression

moderated the effect of social isolation on stress ( $B = 0.02$ ,  $\beta = 0.09$ ,  $SE = 0.01$ ,  $t = 2.27$ ,  $p = .024$ ), a finding that did not emerge when including only the DASS-21 total score in the analyses. As shown in Fig. 2 panel D, for those who reported high levels of suppression (solid line), greater social isolation was related to greater stress (simple slope = 0.31,  $\beta = 0.34$ ,  $SE = 0.06$ ,  $t = 5.48$ ,  $p < .001$ ). The relationship was less pronounced for those who reported low levels of suppression (dashed line with smaller dashes; simple slope = 0.15,  $\beta = 0.16$ ,  $SE = 0.07$ ,  $t = 2.12$ ,  $p = .035$ ). The interactions of emotional suppression and social isolation were not significant for depression ( $B = 0.00$ ,  $SE = 0.01$ ,  $t = 0.24$ ,  $p = .810$ ) or anxiety ( $B = 0.01$ ,  $SE = 0.01$ ,  $t = 0.91$ ,  $p = .363$ ). In sum, results were consistent with our hypotheses: high levels of psychological inflexibility and intolerance of uncertainty exacerbated the adverse links between social isolation and distress during the COVID-19 pandemic. Results were partially supported for emotional suppression, as high levels of suppression exacerbated the association between social isolation and stress, but not anxiety or depression.

In terms of positive mental health outcomes, psychological inflexibility moderated the relationship between social isolation and well-being ( $B = 0.04$ ,  $p = .043$ ), as shown in the last row of Table 6. Subsequent simple slopes analyses revealed that, for individuals reporting high levels of psychological inflexibility (Fig. 3, panel A, solid line), higher levels of social isolation were moderately associated with lower levels of well-being (simple slope =  $-1.37$ ,  $\beta = -0.33$ ,  $SE = 0.27$ ,  $t = -5.04$ ,  $p < .001$ ). In contrast, for those reporting low levels of psychological inflexibility (Fig. 3, panel A, dashed line with short dashes), the relationship was stronger (simple slope =  $-2.11$ ,  $\beta = -0.52$ ,  $SE = 0.34$ ,  $t = -6.18$ ,  $p < .001$ ). Similarly, intolerance of uncertainty moderated the relationship between social isolation and well-being ( $B = 0.05$ ,  $p = .017$ ; see Table 7). For participants who reported high levels of intolerance of uncertainty (Fig. 3, panel B, solid line), higher levels of social isolation were moderately associated with lower levels of well-being (simple slope =  $-1.23$ ,  $\beta = -0.30$ ,  $SE = 0.29$ ,  $t = -4.25$ ,  $p < .001$ ). However, for those who reported low intolerance (Fig. 3, panel B, dashed line with short dashes), there was a stronger relationship (simple slope =  $-2.15$ ,  $\beta = -0.52$ ,  $SE = 0.33$ ,  $t = -6.60$ ,  $p < .001$ ).

Lastly, as shown in Table 8, emotional suppression moderated the relationship between social isolation and values progress ( $B = 0.05$ ,  $p < .001$ ). For individuals who reported high levels of emotional suppression (Fig. 3, panel C, solid line), greater social isolation was moderately associated with less progress toward values (simple slope =  $-0.31$ ,  $\beta = -0.24$ ,  $SE = 0.09$ ,  $t = -3.32$ ,  $p = .001$ ). However, for those who reported low levels of emotional suppression (Fig. 3, panel C, dashed line with short dashes), this association was more pronounced (simple slope =  $-0.80$ ,  $\beta = -0.62$ ,  $SE = 0.12$ ,  $t = -6.84$ ,  $p < .001$ ). Though no hypotheses were made regarding moderators of social isolation and positive aspects of mental health (well-being and valued living), results showed that high levels of psychological inflexibility, intolerance of uncertainty, and emotional suppression attenuated the negative relationships between social isolation and aspects of positive mental health.

**Table 4**

Hierarchical linear regression analysis examining the moderating role of psychological inflexibility on the relationship between social isolation and distress.

Variable	<i>B</i> ( <i>SE</i> )	95% BCa CI		$\beta$	$R^2$	$\Delta R^2$
		LL	UL			
Step 1						
Intercept	26.09 (1.95)***			0.00	.16	.16***
Age	−0.28 (0.04)***			−0.37		
Gender (Male)	−0.02 (1.78)			0.00		
Gender (Another gender)	10.38 (5.56)			0.11		
Race (Nonwhite)	2.60 (2.25)			0.07		
Step 2						
Intercept	18.18 (1.35)***			0.00	.65	.49***
Age	−0.08 (0.03)*			−0.10		
Gender (Male)	0.65 (1.19)			0.02		
Gender (Another gender)	1.80 (3.71)			0.02		
Race (Nonwhite)	0.77 (1.48)			0.02		
Social isolation	0.74 (0.12)***			0.33		
Psychological inflexibility	0.53 (0.08)***			0.38		
Emotion suppression	−0.25 (0.11)*			−0.10		
Intolerance of uncertainty	0.27 (0.06)***			0.21		
Step 3						
Intercept	<b>17.96</b> (1.34)	15.53	20.90	−0.06	.66	.01**
Age	<b>−0.09</b> (0.03)	−0.16	−0.03	−0.12		
Gender (Male)	0.22 (1.19)	−1.49	2.41	0.01		
Gender (Another gender)	0.97 (3.67)	−10.80	9.51	0.01		
Race (Nonwhite)	1.20 (1.47)	−2.32	4.26	0.03		
Social isolation	<b>0.66</b> (0.12)	0.90	0.39	0.29		
Psychological inflexibility	<b>0.47</b> (0.08)	0.32	0.65	0.34		
Emotion suppression	<b>−0.24</b> (0.10)	−0.44	−0.05	−0.10		
Intolerance of uncertainty	<b>0.29</b> (0.06)	0.16	0.44	0.24		
Social isolation x Psychological inflexibility	<b>0.03</b> (0.01)	0.05	0.00	0.10		

Note.  $N = 254$ . Bootstrap replications = 1177. Reference categories are female for gender and white for race. BCa CI = bias corrected and accelerated bootstrap confidence intervals (estimates are bold when BCa CI does not cross zero); LL = lower limit; UL = upper limit.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

### 2.3. Main effects analyses

A number of significant main effects also emerged from the hierarchical regression analyses and are worth noting. After accounting for all relevant variables, older age was consistently associated with better outcomes. In particular, older age predicted lower levels of distress (see Table 4, Step 3), less values obstruction (see Table 9, Step 2), and higher levels of well-being (see Table 6, Step 3). Table 9 presents the main effects for values obstruction. After controlling for all relevant variables, greater values obstruction was predicted by greater social isolation,

higher psychological inflexibility, and more intolerance of uncertainty. Higher levels of psychological inflexibility also predicted less progress toward values (see Table 8, Step 3), and emotional suppression predicted greater well-being (see Tables 6 and 7, Step 3).

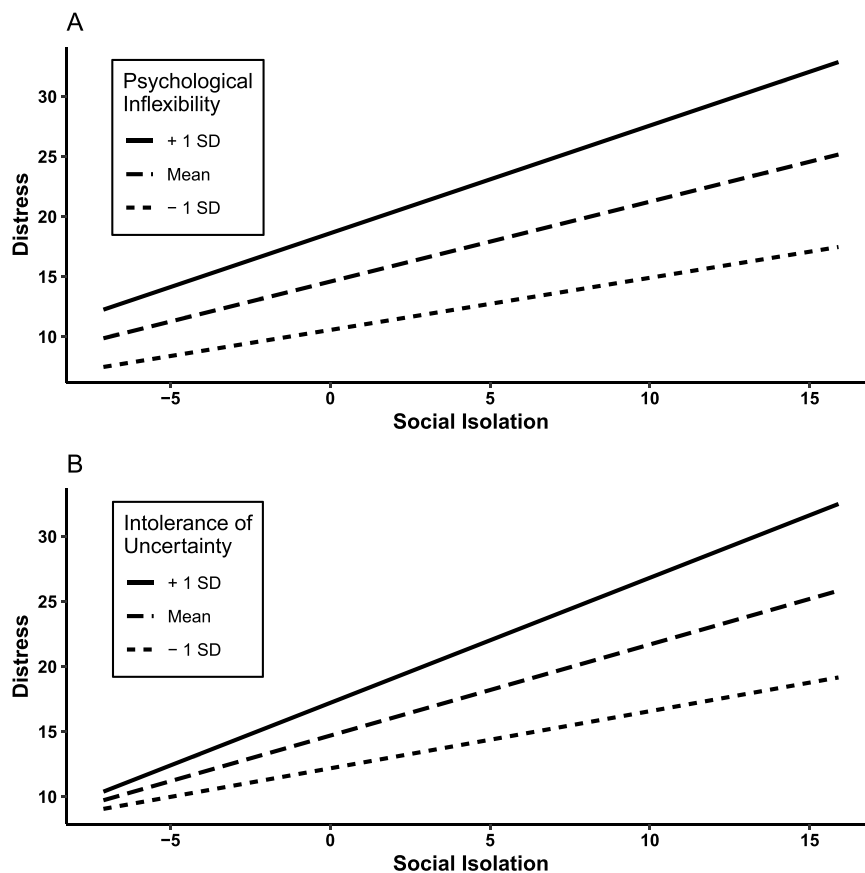
### 3. Discussion

The purpose of the current study was to explore the moderating effects of psychological inflexibility, intolerance of uncertainty, and emotional suppression on the relationships between social isolation and mental health outcomes during the COVID-19 pandemic. With respect to “negative” mental health outcomes, results showed that the relationship between social isolation and psychological distress (composite depression/anxiety/stress) was moderated by both psychological inflexibility and intolerance of uncertainty. In both cases, higher levels of social isolation were related to worse mental health outcomes, and the strength of these relationships increased across participants as the levels of the moderators increased (low, average, high).

Secondary moderation analyses, which consisted of parsing the DASS-21 outcome measure into its constituent subscales, yielded similar findings, but with more precision, potentially providing more insight into participants’ experiences during the pandemic. The relationship between social isolation and anxiety, in particular, was moderated by psychological inflexibility and intolerance of uncertainty in much the same way as the composite DASS-21 outcome measure, with an interesting exception: in both cases, individuals with the lowest levels of those moderators (i.e., most psychologically flexible, most tolerant of uncertainty) did not demonstrate a significant difference in anxiety across the range of social isolation/connectedness. In other words, being high in psychological flexibility and tolerance of uncertainty appears to have had a protective effect for participants in terms of their reported anxiety. This finding is noteworthy, considering current times can be characterized as highly uncertain and anxiety-provoking (Twenge & Joiner, 2020).

With respect to positive aspects of mental health, we found that psychological inflexibility moderated the relationship between social isolation and well-being, as did intolerance of uncertainty. Additionally, regulating emotion by means of suppression moderated the relationship between social isolation and progress toward values. Generally speaking, higher levels of social isolation were associated with lower levels of positive mental health outcomes, and this was the case across all levels (low, average, high) of each of the moderating variables (psychological inflexibility, intolerance of uncertainty, emotional suppression). Interestingly, the strengths of these moderated relationships was the inverse of those pertaining to negative outcomes described above, such that higher levels of inflexibility, intolerance, and suppression were related to weaker changes across the range of social isolation relative to those with lower levels of the moderators who exhibited stronger relationships.

Findings from the current study are consistent with much of the literature on social isolation, in which it has been shown to have a well-established relationship with depression (Challands et al., 2017; Cruwys et al., 2013; Levula et al., 2018; Santini et al., 2015; Taylor et al., 2018) and anxiety (Lee & Robbins, 1998; Liao, Weng, & West, 2016; Teo, Lerrigo, & Rogers, 2013). However, the potential of psychological flexibility to serve as a limiting factor to isolation-related depression has not yet been explored. The current findings also align with Waldeck et al. (2017), who found that ostracism predicted psychological distress, but those who had high levels of psychological flexibility had no increased distress related to ostracism. Waldeck, Bissell, and Tyndall (2020) also found that having low experiential avoidance mitigated the impact of ostracization. Regarding the potential of psychological flexibility to moderate the impact of COVID-19 conditions on mental health, our findings are consistent with those of Pakenham et al. (2020), who found that greater psychological flexibility (and lower psychological inflexibility) mitigated the impact of COVID-19 lockdown on depression



**Fig. 1.** Statistically significant moderation effects for distress. *Note.* Moderating effects of psychological inflexibility (Panel A) and intolerance of uncertainty (Panel B) on the relationships between social isolation and psychological distress. Values are based on model predictions. Subsequent simple slope analyses suggested the following levels of association at various levels of the moderators: Panel A—<sup>a</sup> high levels of inflexibility (1 SD above the mean)  $\beta = 0.40$ ,  $p < .001$  suggesting a stronger relationship; <sup>b</sup> average levels of inflexibility (mean)  $\beta = 0.30$ ,  $p < .001$ ; <sup>c</sup> low levels of inflexibility (1 SD below the mean)  $\beta = 0.19$ ,  $p = .007$  suggesting a weaker relationship; Panel B—<sup>d</sup> high intolerance of uncertainty (+1 SD)  $\beta = 0.43$ ,  $p < .001$  suggesting a stronger relationship; <sup>e</sup> average intolerance of uncertainty (mean)  $\beta = 0.31$ ,  $p < .001$ ; <sup>f</sup> low intolerance of uncertainty (–1 SD)  $\beta = 0.20$ ,  $p = .005$  suggesting a weaker relationship.

and anxiety (though they did not directly measure social isolation). Lastly, although intolerance of uncertainty is considered an aspect of anxiety (Carleton, 2016), it has yet to be explored as a factor that might impact anxiety related to social isolation.

It is important to note that while we found five significant primary moderation effects, not every variable that we identified as a potential moderator played a role in the relationship between social isolation and each mental health outcome we explored. Specifically, we did not observe moderating effects of emotional suppression on the relationships between social isolation and depression or anxiety, or social isolation and well-being. Neither psychological inflexibility nor intolerance of uncertainty moderated relationships with valued living.

In addition to the observed moderation effects, some main effects are worth noting. Perhaps most notably, age of participants predicted several important outcomes, whereby older age predicted less distress, less values obstruction, and greater well-being. Psychological inflexibility was found to predict greater values obstruction and less progress toward values. Intolerance of uncertainty also predicted values obstruction, as did greater social isolation. To our knowledge, no work has yet explored the relationships among intolerance of uncertainty or social isolation and values.

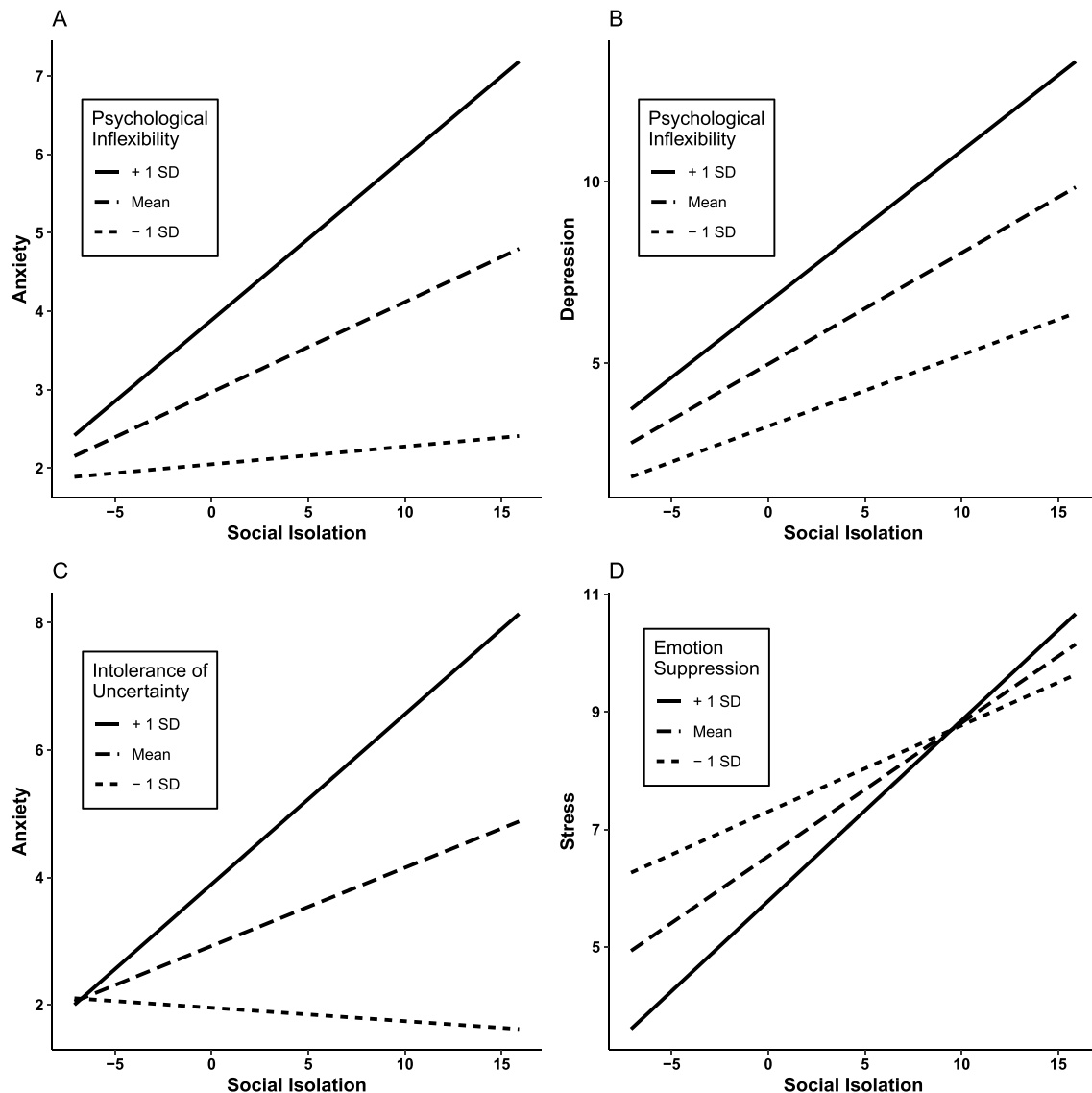
An interesting general pattern emerged among the moderated effects of social isolation on outcome measures in the context of the pandemic. When social isolation was low, undesirable outcomes were lower and comparable across all levels of the various moderator variables. However, with higher levels of social isolation, the degree to which outcomes worsened (i.e., slope of the effect) was steeper among those reporting high inflexibility and forms of experiential avoidance (i.e., intolerance of uncertainty). In short, greater psychological flexibility and acceptance of difficult thoughts and emotions appeared to act as a buffer against the negative effects of increased social isolation in the current pandemic. As

noted previously, the pattern held in the secondary moderation analyses of the DASS-21 subscales (depression, anxiety, stress) and further revealed what appeared to be a protective effect of increased psychological flexibility and tolerance of uncertainty on reported anxiety in the face of increased social isolation.

An orderly, though somewhat different pattern was observed with positive outcomes as well. In the case of well-being, low levels of social isolation were associated with higher levels of well-being, with those lowest in inflexibility and intolerance exhibiting the greatest well-being. With higher levels of social isolation, well-being was lower, regardless of one's level of psychological inflexibility or intolerance of uncertainty. However, the relationship (i.e., slope of the effect) was strongest among those with lower inflexibility and intolerance. A similar pattern was observed among the relationship between social isolation and progress toward values as moderated by emotional suppression, with the effect even more pronounced in this instance.

To summarize these findings, it was consistently observed that the moderated relationship between increased social isolation and increased negative mental health outcomes was stronger when psychological inflexibility and related constructs were higher and was weaker when inflexibility and avoidance were lower. However, as it pertains to positive mental health outcomes, the converse was consistently observed, whereby the moderated relationship between increased social isolation and decreased positive mental health outcomes was weaker when psychological inflexibility and related constructs were higher and stronger when inflexibility and avoidance were lower. It is not clear why the relationships moderated by psychological inflexibility, intolerance of uncertainty, and emotional suppression should be of inverted strengths when predicting negative versus positive mental health outcomes, yet the observed effect was clear and reliable.

One possible interpretation of this finding as it relates to positive



**Fig. 2.** Statistically significant secondary moderation effects for DASS-21 subscales. *Note.* Moderating effects of psychological inflexibility on the relationship between social isolation and anxiety (Panel A) and between social isolation and depression (Panel B). Moderating effects of intolerance of uncertainty on the relationship between social isolation and anxiety (Panel C). Moderating effects of emotion suppression on the relationship between social isolation and stress (Panel D). Values are based on model predictions. DASS-21 = Depression, Anxiety, and Stress Scales. Subsequent simple slope analyses suggested the following levels of association at various levels of the moderators: Panel A—<sup>a</sup> high levels of inflexibility (1 SD above the mean)  $\beta = 0.28$ ,  $p < .001$  suggesting a stronger relationship; <sup>b</sup> average levels of inflexibility (mean)  $\beta = 0.16$ ,  $p = .020$ ; <sup>c</sup> low levels of inflexibility (1 SD below the mean)  $\beta = 0.03$ ,  $p = .738$  suggesting a weaker relationship; Panel B—<sup>d</sup> high levels of inflexibility (1 SD above the mean)  $\beta = 0.47$ ,  $p < .001$  suggesting a stronger relationship; <sup>e</sup> average levels of inflexibility (mean)  $\beta = 0.35$ ,  $p < .001$ ; <sup>f</sup> low levels of inflexibility (1 SD below the mean)  $\beta = 0.22$ ,  $p = .003$  suggesting a weaker relationship; Panel C—<sup>g</sup> high levels of intolerance of uncertainty (1 SD above the mean)  $\beta = 0.36$ ,  $p < .001$  suggesting a stronger relationship; <sup>h</sup> average levels of intolerance (mean)  $\beta = 0.17$ ,  $p = .010$ ; <sup>i</sup> low levels of intolerance (1 SD below the mean)  $\beta = -0.03$ ,  $p = .741$  suggesting a weaker relationship; Panel D—<sup>j</sup> high levels of emotion suppression (1 SD above the mean)  $\beta = 0.34$ ,  $p < .001$  suggesting a stronger relationship; <sup>k</sup> average levels of suppression (mean)  $\beta = 0.25$ ,  $p < .001$ ; <sup>l</sup> low levels of suppression (1 SD below the mean)  $\beta = 0.16$ ,  $p = .035$  suggesting a weaker relationship.

mental health outcomes is that individuals with lower levels of the moderator variables (i.e., greater psychological flexibility and acceptance) are more sensitive to the impact of social isolation on positive aspects of mental health, such as well-being and progress toward values. Based on this interpretation, when social isolation is greatest, these individuals report greater decrements in positive outcomes. However, this interpretation also entails that as social isolation decreases (i.e., social connectedness increases), the benefits gained in terms of positive outcomes appear to be amplified by greater psychological flexibility and acceptance of difficult experiences and attenuated by inflexibility and

experiential avoidance.

Taken together, these findings suggest that psychological *flexibility*, inclusive of *acceptance* of difficult psychological experiences, contributes to improved mental health functioning during the current pandemic in two ways: 1) it serves as a buffer against the detrimental impact of social isolation on negative outcomes, as indicated by the flatter slopes of the more flexible participants in Figs. 1 and 2, and 2) it appears to augment the beneficial effects of lower social isolation on positive outcomes, as indicated by the steeper slopes of the more flexible and accepting participants in Fig. 3. The former is consistent with extant



**Table 5**

Hierarchical linear regression analysis examining the moderating role of intolerance of uncertainty on the relationship between social isolation and distress.

Variable	B (SE)	95% BCa CI		β	R <sup>2</sup>	ΔR <sup>2</sup>
		LL	UL			
Step 3						
Intercept	<b>18.26</b> (1.33)	15.82	21.06	−0.05	.66	.01**
Age	<b>−0.09</b> (0.03)	−0.16	−0.03	−0.12		
Gender (Male)	0.32 (1.18)	−1.51	2.50	0.01		
Gender (Another gender)	1.80 (3.65)	−8.23	9.61	0.02		
Race (Nonwhite)	0.90 (1.46)	−2.37	4.26	0.02		
Social isolation	<b>0.70</b> (0.11)	0.93	0.43	0.31		
Psychological inflexibility	<b>0.51</b> (0.08)	0.34	0.66	0.37		
Emotion suppression	<b>−0.24</b> (0.10)	−0.43	−0.06	−0.10		
Intolerance of uncertainty	<b>0.26</b> (0.06)	0.14	0.42	0.21		
Social isolation x Intolerance of uncertainty	<b>0.03</b> (0.01)	0.05	0.01	0.12		

Note.  $N = 254$ . Bootstrap replications = 1188. Reference categories are female for gender and white for race. BCa CI = bias corrected and accelerated bootstrap confidence intervals (estimates are bold when BCa CI does not cross zero); LL = lower limit; UL = upper limit. Steps 1 and 2 are the same as in Table 4.

**Table 6**

Hierarchical linear regression analysis examining the moderating role of psychological inflexibility on the relationship between social isolation and well-being.

Variable	B (SE)	$\beta$	$R^2$	$\Delta R^2$
Step 1				
Intercept	30.00 (3.50)***	0.00	.16	.16***
Age	0.50 (0.08)***	0.37		
Gender (Male)	5.42 (3.19)	0.09		
Gender (Another gender)	−9.04 (9.99)	0.03		
Race (Nonwhite)	−3.18 (4.04)	−0.00		
Step 2				
Intercept	41.37 (2.85)***	0.00	.51	.35***
Age	0.20 (0.07)**	0.15		
Gender (Male)	5.09 (2.52)*	0.09		
Gender (Another gender)	5.75 (7.82)	0.03		
Race (Nonwhite)	−0.01 (3.12)	−0.00		
Social isolation	−1.62 (0.24)***	−0.40		
Psychological inflexibility	−0.72 (0.17)***	−0.29		
Emotion suppression	0.44 (0.22)*	0.10		
Intolerance of uncertainty	−0.20 (0.13)	−0.09		
Step 3				
Intercept	41.01 (2.84)***	−0.05	.52	.01*
Age	0.18 (0.07)*	0.13		
Gender (Male)	4.40 (2.52)	0.08		
Gender (Another gender)	4.42 (7.80)	0.03		
Race (Nonwhite)	0.69 (3.12)	0.01		
Social isolation	−1.74 (0.25)***	−0.43		
Psychological inflexibility	−0.82 (0.17)***	−0.33		
Emotion suppression	0.46 (0.22)*	0.10		
Intolerance of uncertainty	−0.16 (0.14)	−0.07		
Social isolation x Psychological inflexibility	0.04 (0.02)*	0.09		

Note.  $N = 254$ . Reference categories are female for gender and white for race. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

literature on psychological flexibility and acceptance; however, the latter is perhaps more intriguing and not as thoroughly demonstrated to date. A possible interpretation of this relationship is that individuals

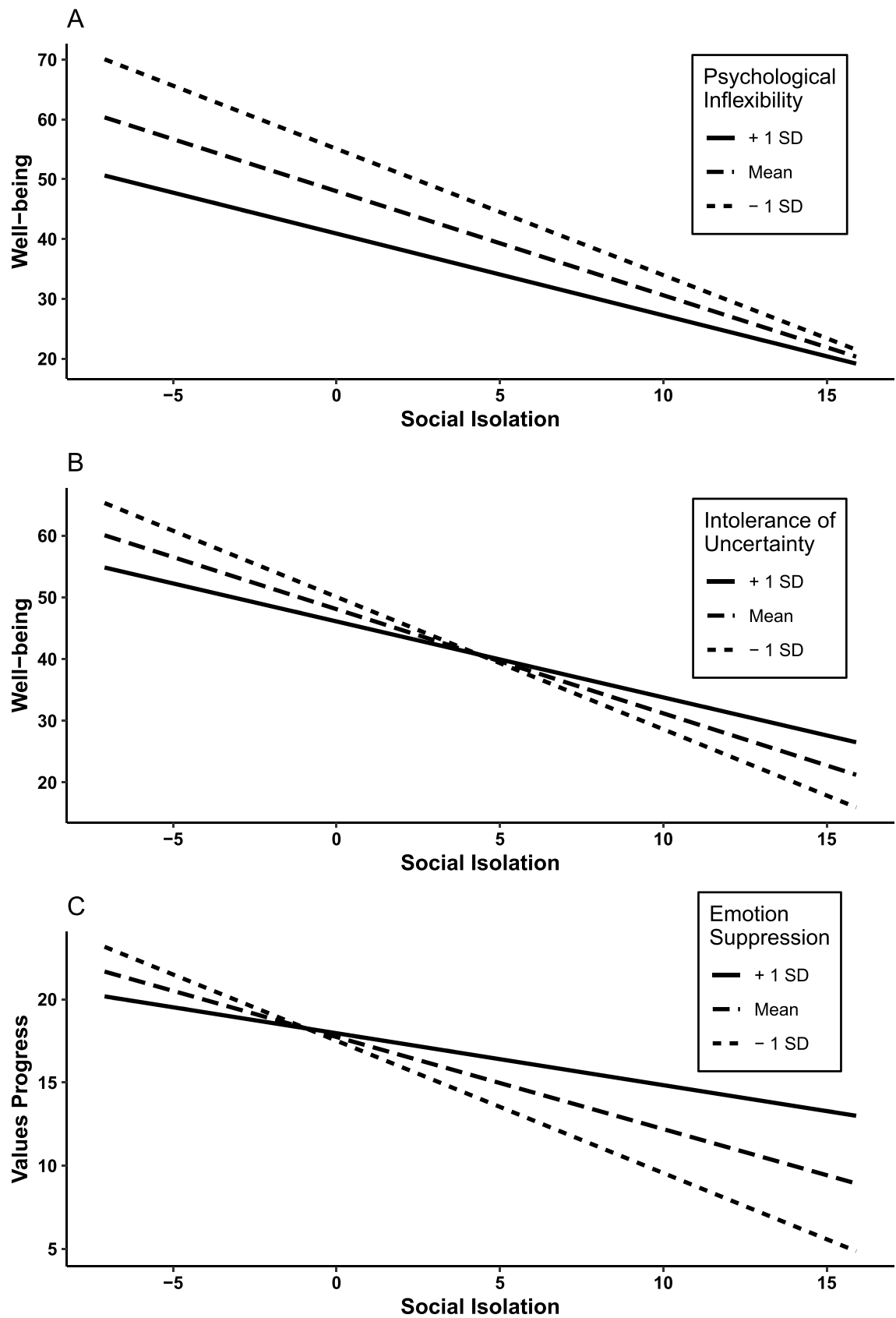
who are more psychologically flexible and accepting of their difficult experiences are better able to be present and engage with their environment, including whatever forms of social interaction are available in the challenging context of the pandemic, and therefore derive greater psychological benefits from such activities. Of course, as noted previously, the converse of this also suggests that when reported social isolation is very high and few forms of social interaction are available, these individuals may be more sensitive to the detrimental effects on well-being.

In practical terms, our results suggest that increasing psychological flexibility may prove to be a promising treatment target during the current pandemic. Treatment that focuses on one's relationship with distress, rather than on the content or intensity of the distress itself, provides readily accessible and manipulable variables on which to intervene in situations where directly changing outside circumstances, such as social isolation, or the psychological challenges that accompany these circumstances, may be difficult. The current pandemic provides a prime example of such a circumstance. However, other life circumstances, such as having recently moved to a new location, beginning a new job, or significant life transitions, can also impede the ability to establish and maintain social relationships. The process of developing meaningful relationships can be further challenged by psychological factors such as social anxiety, depression, trauma, and history of difficult social relationships (among others). These examples raise the question of how effectively social isolation can be targeted in every situation in order to promote greater well-being and address mental health concerns. In the case of the current pandemic, the fact that social distancing and shelter-in-place orders have been the primary tactics to address the crisis further complicates any strategy of directly targeting social isolation to produce better mental health outcomes. One potential strategy to address isolation concerns may be to increase social interaction through use of technology (e.g., video conference software, telephone, etc.), though existing research indicates that when both in-person and online social contact is available, in-person contact is associated with protective mental health outcomes (Teo et al., 2019), again drawing into question the ability to intervene directly on social isolation.

Collectively, these findings provide further support of the importance of developing patterns of responding that constitute psychological flexibility. While clients in formal psychotherapeutic settings may be more likely to encounter the opportunity to cultivate such skills, these findings highlight the need for the broader community to adopt such an approach to well-being as well. Although it is not generally possible to predict occurrences of global disease pandemics, these findings suggest ACT may help to moderate adverse effects of existing risk factors, such as social isolation, during both typical and unexpected life circumstances. It is also worth noting the current pandemic is not over, societies are only beginning to reopen, and with potential future waves of COVID-19 looming and no concrete timeline for when or if life will return to "normal," beginning to target psychological flexibility as soon as possible by way of non-academic and self-help resources could prove valuable for a great many individuals across the globe. Though it has yet to be determined whether the moderating relationships found in this study hold outside of current pandemic conditions, nor are our findings causal in nature, these findings do provide direct empirical support of the benefits of increased psychological flexibility in altering the relationships between social isolation and a variety of important outcomes during such extreme conditions, and they suggest a similar relationship may be present outside of exacerbating pandemic conditions.

### 3.1. Limitations

It is important to recognize that this study has several limitations. To begin, the demographic makeup of the current sample was not representative of the U.S. population. White participants were over-represented in this sample, while racial and ethnic minority



(caption on next page)

**Fig. 3.** Statistically significant moderation effects for well-being and values progress. *Note.* Moderating effects of psychological inflexibility (Panel A) and intolerance of uncertainty (Panel B) on the relationships between social isolation and well-being. Moderating effect of emotion suppression on the relationship between social isolation and values progress (Panel C). Values are based on model predictions. Subsequent simple slope analyses suggested the following levels of association at various levels of the moderators: Panel A—<sup>a</sup> high levels of inflexibility (1 SD above the mean)  $\beta = -0.33$ ,  $p < .001$  suggesting a weaker relationship; <sup>b</sup> average levels of inflexibility (mean)  $\beta = -0.43$ ,  $p < .001$ ; <sup>c</sup> low levels of inflexibility (1 SD below the mean)  $\beta = -0.52$ ,  $p < .001$  suggesting a stronger relationship; Panel B—<sup>d</sup> high intolerance of uncertainty (+1 SD)  $\beta = -0.30$ ,  $p < .001$  suggesting a weaker relationship; <sup>e</sup> average intolerance of uncertainty (mean)  $\beta = -0.41$ ,  $p < .001$ ; <sup>f</sup> low intolerance of uncertainty (−1 SD)  $\beta = -0.52$ ,  $p < .001$  suggesting a weaker relationship. Panel C—<sup>g</sup> high emotion suppression (+1 SD)  $\beta = -0.24$ ,  $p = .001$  suggesting a weaker relationship; <sup>h</sup> average emotion suppression (mean)  $\beta = -0.43$ ,  $p < .001$ ; <sup>i</sup> low emotion suppression (−1 SD)  $\beta = -0.62$ ,  $p < .001$  suggesting a weaker relationship.

**Table 7**

Hierarchical linear regression analysis examining the moderating role of intolerance of uncertainty on the relationship between social isolation and well-being.

Variable	B (SE)	B	R <sup>2</sup>	ΔR <sup>2</sup>
Step 3			.52	.01*
Intercept	41.51 (2.82)***	−0.05		
Age	0.17 (0.07)*	0.13		
Gender (Male)	4.51 (2.50)	0.08		
Gender (Another gender)	5.76 (7.74)	0.03		
Race (Nonwhite)	0.23 (3.10)	0.00		
Social isolation	−1.69 (0.24)***	−0.42		
Psychological inflexibility	−0.76 (0.17)***	−0.31		
Emotion suppression	0.46 (0.22)*	0.10		
Intolerance of uncertainty	−0.21 (0.13)	−0.09		
Social isolation x	0.05 (0.02)*	0.11		
Intolerance of uncertainty				

*Note.* N = 254. Reference categories are female for gender and white for race. Steps 1 and 2 are the same as in Table 6.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

**Table 8**

Hierarchical linear regression analysis examining the moderating role of emotional suppression on the relationship between social isolation and values progress.

Variable	B (SE)	β	R <sup>2</sup>	ΔR <sup>2</sup>
Step 1			.04	.04*
Intercept	15.70 (1.17)***	0.00		
Age	0.07 (0.03)*	0.17		
Gender (Male)	−0.77 (1.07)	−0.05		
Gender (Another gender)	−4.08 (3.34)	−0.08		
Race (Nonwhite)	1.30 (1.35)	0.06		
Step 2			.34	.30***
Intercept	18.95 (1.03)***	0.00		
Age	−0.02 (0.02)	−0.04		
Gender (Male)	−0.69 (0.91)	−0.04		
Gender (Another gender)	0.13 (2.83)	0.00		
Race (Nonwhite)	2.25 (1.13)	0.10		
Social isolation	−0.47 (0.09)***	−0.37		
Psychological inflexibility	−0.19 (0.06)***	−0.25		
Emotion suppression	0.05 (0.08)	0.04		
Intolerance of uncertainty	−0.06 (0.05)	−0.09		
Step 3			.38	.04***
Intercept	18.57 (1.00)***	−0.08		
Age	−0.02 (0.02)	−0.05		
Gender (Male)	−0.62 (0.88)	−0.04		
Gender (Another gender)	−0.42 (2.75)	−0.01		
Race (Nonwhite)	2.64 (1.10)*	0.12		
Social isolation	−0.55 (0.09)***	−0.44		
Psychological inflexibility	−0.21 (0.06)***	−0.27		
Emotion suppression	0.05 (0.08)	0.03		
Intolerance of uncertainty	−0.04 (0.05)	−0.06		
Social isolation x emotion	0.05 (0.01)***	0.19		
Suppression				

*Note.* N = 254. Reference categories are female for gender and white for race. Steps 1 and 2 are the same as in Table 4.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

**Table 9**

Hierarchical linear regression analysis examining main effects for values obstruction.

Variable	B (SE)	β	R <sup>2</sup>	ΔR <sup>2</sup>
Step 1			.18	.18***
Intercept	19.21 (1.17)***	0.00		
Age	−0.19 (0.03)***	−0.41		
Gender (Male)	−0.61 (1.07)	−0.03		
Gender (Another gender)	0.66 (3.33)	0.01		
Race (Nonwhite)	1.82 (1.35)	0.08		
Step 2			.57	.39***
Intercept	15.02 (0.90)***	0.00		
Age	−0.08 (0.02)***	−0.17		
Gender (Male)	−0.65 (0.80)	−0.03		
Gender (Another gender)	−3.57 (2.48)	−0.06		
Race (Nonwhite)	0.81 (0.99)	0.03		
Social isolation	0.33 (0.08)***	0.24		
Psychological inflexibility	0.27 (0.05)***	0.32		
Emotion suppression	0.07 (0.07)	0.05		
Intolerance of uncertainty	0.16 (0.04)***	0.21		

*Note.* N = 254. Reference categories are female for gender and white for race.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

participants were under-represented. In addition, participants were highly educated, with the vast majority having received some form of higher education, and they were generally high-earning. There was a higher proportion of females than any other gender. The demographic makeup of the sample was undoubtedly influenced by the snowball method of recruitment and may have resulted in the survey not being sensitive enough to minority groups or those experiencing economic difficulty during the pandemic. In addition, cross-sectional research designs are inherently limited in the extent to which they can describe a phenomenon, precluding conclusions about causal relationships. The measures used in this study have also not been validated for use in a pandemic, which may limit the generalizability of our findings.

Because we used a modified version of the AAQ-II with a restricted scale, our psychological inflexibility findings may have been attenuated, resulting in underestimations of the actual effects. Additionally, there have been recent concerns regarding the item sensitivity and construct validity of the AAQ-II (Ong et al., 2019; Rochefort et al., 2018; Tyndall et al., 2019). Finally, although measures were taken to exclude careless responses, we cannot be certain that every such case was detected and excluded from the dataset.

### 3.2. Future directions

This study provides several avenues for future research. Perhaps the most salient is to extend this research to a more demographically representative sample, thereby improving the generalizability of our findings. Specifically, research including more representative racial/ethnic, educational, and socio-economic samples are needed. Future research may also focus on examining whether the moderating effects of psychological inflexibility, intolerance of uncertainty, and emotional suppression on social isolation and mental health functioning are observed under experimental conditions, thus providing more information on the causal relationships between these variables. Also, given recent concerns related to the AAQ-II, a different measure of

psychological flexibility, such as the CompACT (Francis et al., 2016), may be considered.

Given the current crisis and continued social distancing measures that are in place across the globe, as well as the threat of future waves of infections, research on effective interventions to mitigate the detrimental effects of social isolation on mental health is imperative. Our findings suggest that interventions targeting psychological flexibility and acceptance, such as ACT, may be promising approaches to buffer against negative outcomes, as well as enhance the positive benefits of social connection during this difficult time. In the current environment of social distancing, telehealth and self-help options may be a necessary mode of delivery for any psychotherapy. ACT is beginning to develop a promising research base for its effective delivery via telehealth and self-help (see Brown et al., 2016; French et al., 2017; and Kelson et al., 2019 for recent reviews). Thus, it would be beneficial to study the effectiveness of ACT-based telehealth and self-help resources on outcomes related to social isolation. Given the sharp rise in social media usage due to social distancing protocols, it may also be important to examine its impact on social isolation and related outcomes as well.

#### 4. Conclusions

In summary, the current study found that the relationship between social isolation and increased psychological distress was mitigated by psychological flexibility and tolerance of uncertainty during the COVID-19 pandemic. These findings are consistent with the ACT-based account of psychological flexibility, in which willingness to experience distressing internal experiences, rather than attempting to control or push them away, leads to improved mental health functioning. Indeed, engaging in these behaviors predicted increased well-being and valued living. These findings are especially salient given the continuing social distancing response to COVID-19, and the resulting social isolation currently being experienced across the globe. Finally, these findings reveal a potential treatment target for that isolation, one that may be useful if social distancing becomes the new normal.

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