

Special Issue: Gerontology in a Time of Pandemic, Part II: Research Article

# Age Differences in Stress, Life Changes, and Social Ties During the COVID-19 Pandemic: Implications for Psychological Well-Being

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Received: July 20, 2020; Editorial Decision Date: December 7, 2020

**Decision Editor:** Suzanne Meeks, PhD, FGSA

## Abstract

**Background and Objectives:** Experiences of the coronavirus disease 2019 (COVID-19) pandemic and its implications for psychological well-being may vary widely across the adult life span. The present study examined age differences in pandemic-related stress and social ties, and links with psychological well-being.

**Research Design and Methods:** Participants included 645 adults (43% women) aged 18–97 ( $M = 50.8$ ;  $SD = 17.7$ ) from the May 2020 nationally representative Survey of Consumers. Participants reported the extent to which they felt stress related to the pandemic in the last month, the extent to which their lives had changed due to the pandemic, as well as social isolation, negative relationship quality, positive relationship quality, and frequency of depression, anxiety, and rumination in the past week.

**Results:** Results showed that older people reported less pandemic-related stress, less life change, less social isolation, and lower negative relationship quality than younger people. Greater pandemic-related stress, life change, social isolation, and negative relationship quality were associated with poorer psychological well-being. Poorer social ties (i.e., greater social isolation and negative quality) exacerbated the effects of the COVID-19 pandemic (stress, life change) on psychological well-being.

**Discussion and Implications:** Researchers have indicated that older adults may be more vulnerable to COVID-19 pandemic-related stress and social isolation, but this study indicates that young adults may be relatively more vulnerable. Because isolation and negative relationship quality appear to exacerbate the deleterious effects of the COVID-19 pandemic on psychological well-being, reducing social isolation and negative relations are potential targets for intervention.

**Keywords:** Relationship quality, Social isolation, Stress exacerbation

In January of 2020, the United States experienced the first case of coronavirus disease 2019 (COVID-19). Much of the United States was placed under a “shelter-in-place” order by the end of March/early April. The shelter-in-place order included mandates to stay home except for essential

trips and to have no contact with individuals outside of the household. During May of 2020, many states experienced a phased reopening. Overall, current national reports indicate that this has been an extremely stressful time for Americans who have been unemployed, forced to social

distance from family and friends, and worried about the effects of COVID-19, which has a high morbidity and mortality rate (National Opinion Research Center, 2020). The experience of stress and social ties during the pandemic may vary greatly by age group depending on life circumstances and vulnerabilities. Gerontological theories suggest that older individuals are better able to cope with stress and experience less conflict in their relationships than do younger people (Carstensen et al., 2003; Charles, 2010). It is unclear whether these theories apply during a pandemic in which older individuals are more vulnerable to contracting and dying from the virus (CDC COVID-19 Response Team, 2020) and may have experienced greater social isolation as individuals were advised to exercise extreme caution around older individuals (Brooke & Jackson, 2020).

The purpose of the present study is to examine a snapshot of the COVID-19 pandemic in the month of May in the United States in which much of the nation had experienced 2 months of the pandemic and its consequences. In particular, we examined whether there were age differences in COVID-19 pandemic-related stress, life change, and social ties including both social isolation and relationship quality. We also considered how stress and life changes associated with the COVID-19 outbreak, social isolation, and relationship quality may be differentially associated with psychological well-being. Further, we examined whether the link between pandemic-related stress, life change, and psychological well-being was exacerbated by greater social isolation and poorer-quality relationships.

## Theoretical Framework

This study is guided by three complementary theoretical perspectives: (a) Socioemotional Selectivity Theory (SST), (b) the Strength and Vulnerability Integration model (SAVI), and (c) the stress-exacerbation model. SST suggests that as individuals age, they experience a decrease in future time perspective and an increase in desire to maintain emotionally meaningful relationships (Carstensen et al., 1999; Charles & Carstensen, 2010). Accordingly, older individuals often report enhanced ability to regulate their own emotional reactions to interpersonal tensions and report that their relationships are less negative than do younger people. The SAVI model developed by Charles (2010) is based on SST but suggests that age-related improvements in emotion regulation may be diminished when older people are unable to prevent or minimize the experience of stress. Older adults also experience reduced physiological flexibility, which makes them more vulnerable to experiences of stress when they are unable to avoid it. Finally, the stress-exacerbation model (August et al., 2007) suggests that negative quality relations and social isolation increase the detrimental effects of stress on psychological well-being. As a whole, these frameworks suggest that older individuals will generally report less stress

and better-quality ties than younger people but these age patterns may be different during the COVID-19 pandemic due to the fact that stress is widespread and may be unavoidable. Finally, we predicted that consistent with the stress-exacerbation model, negative quality ties and social isolation will exacerbate the effects of pandemic-related stress and life change on psychological well-being.

## Age and Pandemic-Related Stress

Recent research on pandemic-related stress suggests that younger age groups may be experiencing more stress than older age groups. Young adults may be at risk due to already high rates of anxiety and depression and the closing of universities, moving back home, and reduction of peer interactions (Charles et al., 2021; Manhertz, 2020). In addition, younger adults experienced the highest rates of unemployment as a result of the pandemic (Kocchar, 2020). Further, a recent study regarding COVID-19 risk found that older individuals reported less perceived risk of contracting COVID-19 and better mental health compared to younger age groups (Bruine de Bruin, 2021). A report from the American Psychological Association (2020), however, showed that parents of young children may be more stressed than other groups.

Other studies of crises also suggest that young adults may report greater stress than older adults. Older adults tend to perceive events as less stressful than do younger people (Birditt et al., 2005; Neubauer et al., 2019). Studies of natural disasters have found that older adults perceive them as less stressful and are less negatively affected by them (Knight et al., 2000). This may be due to age-related improvements in emotion regulation as well as experience. Older adults tend to be better able to regulate emotional reactions to stress (Luong & Charles, 2014). Further, older adults have had more experience with public crises (e.g., having grown up during the polio outbreak, World War II, Kennedy assassination) and may weather such crises better—a concept referred to as inoculation (Eysenck, 1983). However, the pandemic is unique in many ways as it has had a significant impact on individuals' daily lives (e.g., job loss, lost lives) and ability to engage with loved ones (e.g., social distancing). Thus, it may not be comparable to other stressful events. Indeed, recent studies of older adults during COVID-19 suggested that older adults are finding the increased social distancing and restrictions on activities particularly challenging (Heid et al., 2020).

In addition to perceptions of stress, we also considered the extent to which individuals perceived their lives had changed due to the COVID-19 pandemic, and whether there are age differences in those perceptions. The same demographic shifts referenced earlier (closing of universities, increased social distancing, moving back home with parents, increased unemployment, and reduced income) may not only lead to greater stress among younger adults, but also greater perceptions that life has changed as a result

of the pandemic among younger adults compared to older adults (Charles et al., 2021; Kocchar, 2020; Manhertz, 2020). Further, older adults may already be retired and spend more time at home, and thus might perceive fewer life changes as a result of the pandemic compared to younger adults.

### Age, Social Isolation, and Relationship Quality

Some research suggests that older adults are more likely to experience perceived social isolation and loneliness than younger individuals (Berg-Weger & Morley, 2020). However, others suggest that older adults generally report less loneliness and that young adults and oldest old adults report the greatest loneliness and perceived isolation (Beam & Kim, 2020; Luhmann & Hawkey, 2016). Perceived social isolation is defined as the perceived discrepancy between actual and desired levels of social connection (Perlman & Peplau, 1982). During the COVID-19 pandemic, older people have been encouraged to distance themselves from other people and to shelter at home as much as possible, leading to concerns for greater feelings of social isolation among this group (Brooke & Jackson, 2020) and greater anxiety and depression among older individuals as a result (Armitage & Nellums, 2020). Researchers expressed concern over social isolation during the COVID-19 pandemic as prevalence rates suggest that up to one third of older adults are already lonely or socially isolated (Berg-Weger & Morley, 2020). Indeed, recent studies of the pandemic show that older adults are particularly concerned over reduced social interactions and loneliness (Heid et al., 2020; Whitehead & Torossian, 2020). However, because many older adults are often already alone due to widowhood and retirement, they may feel less socially isolated than younger individuals who may have experienced a sudden reduction in their social contact due to social distancing measures. Thus, this study considers two competing hypotheses with regard to the age differences in perceived social isolation. Older adults may report greater social isolation than younger adults because older individuals were instructed to be especially careful by socially distancing. In contrast, younger adults may report greater social isolation than older adults because they experienced greater reductions in social interactions (due to unemployment, school closing, etc.) as a result of the pandemic.

Older individuals typically report less negative quality and greater positive quality ties than younger individuals (Akiyama et al., 2003; Birditt et al., 2009). Negative quality ties include the extent to which social ties are critical, demanding, irritating, and or conflictual. Positive quality ties include the extent to which they are loving and emotionally supportive. It is unclear whether these age differences would be the same or different during a pandemic.

### Implications of Stress and Social Ties for Psychological Well-Being

Stress and social ties are highly associated with psychological well-being. A burgeoning literature shows that greater stress is associated with poorer psychological well-being (Juster et al., 2010; Thoits, 2010). Thus, we expected that greater pandemic-related stress would predict poorer psychological well-being. Additionally, loneliness and perceived social isolation are associated with greater poorer psychological well-being (Cacioppo & Cacioppo, 2014; Hawkey & Cacioppo, 2010; Ong et al., 2016). Individuals who have more negative quality relationships report poorer psychological well-being, and negative relationship quality is more highly associated with poor psychological well-being than positive relationship quality (Newsom et al., 2003; Rook, 2015).

Further, in line with the stress-exacerbation model (August et al., 2007), pandemic-related stress may be more highly associated with reduced psychological well-being among people who have poor-quality relationships (Birditt et al., 2015). For instance, Cranford (2004) found that stress was associated with increased depression among spouses who engaged in undermining (e.g., criticism, anger expression, thwarting goals), and that there were no buffering effects of positive relationship quality. Birditt and colleagues (2016) found that people who were more stressed and had more negative spousal relations had higher blood pressure. Similarly, Neff and Karney (2007) found that spouses who experience more stress and more marital conflict had poorer-quality marital ties. Social isolation and negative relationship quality may make it more difficult to cope with pandemic-related stress and lead to reduced psychological well-being. Thus, this study considered whether there were interactions between pandemic-related stress, pandemic-related life change, and social ties (negative relationship quality, positive relationship quality, and social isolation) predicting psychological well-being.

### Present Study

While researchers have examined age differences in perceived risk of contracting COVID-19, there have been no studies, to our knowledge, examining age differences in perceptions of pandemic-related stress, pandemic-related life change, social ties, or links between these factors and psychological well-being. The purpose of the present study is to examine, in a national sample of adults in the United States, whether there are age differences in the experience of pandemic-related stress, pandemic-related life change, and social ties and the implications of these experiences for psychological well-being. We predicted that (a) older individuals would report less pandemic-related stress, less pandemic-related life change, and better-quality ties than younger people; (b) greater pandemic-related stress, pandemic-related life change, social isolation, and poor-quality ties would

predict poorer psychological well-being; and (c) social isolation and poor-quality ties would exacerbate the association between pandemic-related stress, pandemic-related life change, and poor psychological well-being. Because of the conflicting research regarding age differences in social isolation, we considered two competing hypotheses. On the one hand, older individuals may report greater social isolation due to enhanced COVID-19 pandemic precautions. On the other hand, older individuals may report less social isolation than younger adults because they have not experienced the severe reductions in social ties like younger adults.

## Method

### Participants

Participants ( $N = 645$ ) were from the Surveys of Consumers in which a nationally representative sample of adults in the United States are asked to participate in a phone survey each month (University of Michigan, Surveys of Consumers). The data for this study are from the participants who completed the survey for the month of May. Our research team added items to the survey to understand stress related to the COVID-19 pandemic. Weights are provided to ensure the distributions are nationally representative. Participants included 43% women and 57% men. Participants ranged from ages 18 to 97 ( $M = 50.8$ ;  $SD = 17.7$ ). A total of 74% were non-Hispanic White, 11% were non-Hispanic Black, and 11% were Hispanic. Participants reported an average education of 14.6 years (range 1–17). Participants were from all regions of the country including 24% from the West, 22% from the Midwest, 17% from the Northeast, and 37% from the South.

## Measures

### Age

Age was assessed continuously.

### Pandemic-Related Stress

Participants were asked the extent to which they were stressed or worried about the COVID-19 and the answer options included: 0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, and 4 = very often.

### Pandemic-Related Life Change

Participants reported how much their life had changed due to COVID-19 with one item “How much has your life changed due to the coronavirus? Would you say to a great extent (0), somewhat (1), very little (2), or not at all (3)?” This item was recoded so that higher scores reflected greater life change.

## Social Isolation

Participants were asked how often they felt isolated from others in the past month on a scale including the following answers: 0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, and 4 = very often. This item was adapted from the three-item UCLA loneliness scale (Hughes et al., 2004).

## Relationship Quality

Participants were asked about the negative and positive aspects of their relationships with family and friends. Negative quality included three items: the extent to which their family and friends got on their nerves, made too many demands, and argued or disagreed with family and friends ( $\alpha = .71$ ). Positive quality included one item: the extent to which they could open up to their family and friends if they needed to talk about their worries. All items were rated on a five-point scale: 0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, and 4 = very often. These items are commonly used in the literature to assess negative and positive aspects of relationships (Almeida et al., 2002; Birditt et al., 2015).

## Poor Psychological Well-Being

Participants were asked to indicate whether during the past week they had experienced the following (yes = 1 or no = 0): Much of the time during the past week, (1) I felt depressed, (2) I feared the worst would happen, and (3) I was dwelling on my feelings and problems. These items were examined as a sum representing poor psychological well-being (Kuder–Richardson reliability = .69). The depression item is from the Center for Epidemiological Studies—Depression eight-item scale used in the Health and Retirement Study (HRS) (Kohout et al., 1993), the anxiety item is from the Beck Anxiety Inventory also used in the HRS (Beck et al., 1988), and the rumination item is from Kircanski and colleagues (2015). Although rumination can be conceptualized as an emotion regulation strategy, we included it as a facet of poor well-being as it is associated with greater depression and anxiety (McLaughlin & Nolen-Hoeksema, 2011; Spinhoven et al., 2018). We examined the reliability of a two-item scale that included only depression and anxiety and it was lower than the current three-item scale (Kuder–Richardson reliability = .59), suggesting that rumination is an important component of poor well-being.

## Covariates

Covariates included gender (men = 0 and women = 1), education (in years), income, race, marital status (married = 1 and not married = 0), and number of household members. Income was coded as annual household income divided by 1,000 (range = 5–500). Race was coded as non-Hispanic White = 1 and other = 0.



## Analysis Strategy

We first calculated descriptive statistics and correlations among pandemic-related stress, life change, social isolation, and relationship quality. Next, we estimated a series of multiple linear regressions first to examine whether there were age differences in pandemic-related stress, life change, social isolation, negative relationship quality, and positive relationship quality. These five models included age as the predictor along with gender, education, income, race, marital status, and number of household members as covariates. Next, we estimated a model with all five of the stress (pandemic-related stress and life change) and social tie variables (social isolation, negative quality, and positive quality) predicting poor psychological well-being. Finally, we tested interactions among pandemic-related stress, life change, and the social tie variables to examine whether social ties exacerbated the link between pandemic-related stress/life change and poor psychological well-being.

## Results

### Descriptives

A total of 71% of adults reported feeling stressed about the COVID-19 pandemic sometimes to very often (score of  $\geq 2$ ). A total of 78% of adults reported that their lives had changed due to the pandemic somewhat to a great extent (score of  $\geq 2$ ). A total of 62% of adults reported feeling socially isolated sometimes to very often, 20% reported negative relationship quality, and 89% reported positive relationship quality sometimes or very often. A total of 35% reported poor psychological well-being on at least one of the well-being items (Table 1).

Correlations among pandemic-related stress and social tie variables showed that social isolation ( $r = .42, p <$

.001) and negative relationship quality ( $r = .26, p < .001$ ) were associated with greater pandemic-related stress, but positive relationship quality was not ( $r = .03, p > .05$ ). Correlations among pandemic-related life change and social tie variables showed that social isolation ( $r = .28, p < .001$ ) and negative relationship quality ( $r = .17, p < .001$ ) were associated with greater pandemic-related life change, but positive relationship quality was not ( $r = .00, p > .05$ ).

### Age Differences in Pandemic-Related Stress, Pandemic-Related Life Change, and Social Ties

#### Pandemic-related stress

The next analysis examined whether there were age differences in reports of pandemic-related stress controlling for gender, education, income, race, marital status, and number of household members. Older respondents reported less pandemic-related stress than younger respondents (Table 2). Covariates associated with greater pandemic-related stress included gender, marital status, and race. Women, individuals who were not married, and racial/ethnic minority respondents reported greater pandemic-related stress than men, married individuals, and non-Hispanic White individuals.

#### Pandemic-related life change

This analysis examined whether there were age differences in reports of pandemic-related life change controlling for gender, education, income, race, marital status, and number of household members. Older participants reported less life change due to the pandemic than younger individuals (Table 2). Covariates associated with pandemic-related life change included gender with women reporting greater pandemic-related life change than men.

**Table 1.** Demographics of the Sample

Variable	M (SD)	% (n)	Range
Age	50.8 (17.7)		18–97
Education	14.6 (2.4)		1–17
Income	103.8 (93.4)		5–500
Household size	2.6 (1.5)		1–9
Female		43.4 (280)	
White		73.9 (463)	
Married		55.1 (355)	
Pandemic-related stress	2.2 (1.4)		0–4
Pandemic-related life change	2.2 (0.9)		0–3
Social isolation	2.0 (1.5)		0–4
Negative relationship quality	1.1 (0.9)		0–4
Positive relationship quality	3.1 (1.2)		0–4
Poor psychological well-being	0.6 (0.9)		0–3

*Note:* The data were weighted before calculating descriptive statistics. Stress, isolation, negative quality, and positive quality: 0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, and 4 = very often. Life change: 0 = not at all, 1 = very little, 2 = somewhat, and 3 = a great extent. Poor well-being included count of three dichotomous items: (1) I felt depressed, (2) I feared the worst would happen, and (3) I was dwelling on my feelings and problems.

**Table 2.** Results of Linear Regression Analyses Examining Pandemic-Related Stress, Life Change, and Social Ties as a Function of Age

Variable	Stress		Life change		Social isolation		Negative quality		Positive quality	
	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>	<i>b</i>	<i>SE</i>
Age	-0.01*	0.00	-0.00*	0.00	-0.01**	0.00	-0.01***	0.00	-0.00	0.00
Female	0.62***	0.12	0.20**	0.08	0.13	0.13	0.15	0.07	0.23*	0.10
Education	0.03	0.03	0.03	0.02	0.01	0.03	0.00	0.02	0.09**	0.03
Married	0.31*	0.14	0.02	0.09	0.08	0.16	-0.06	0.08	0.26*	0.12
White	-0.34*	0.15	0.14	0.10	0.17	0.17	0.02	0.09	0.13	0.13
Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00
Household size	-0.10	0.05	0.03	0.03	-0.05	0.05	0.15***	0.03	0.00	0.04
R <sup>2</sup>	.08		.04		.03		.16		.06	

Notes: *b* = unstandardized regression coefficient.

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

### Social isolation

Next, we examined whether there were age differences in reports of social isolation controlling for gender, education, income, race, marital status, and number of household members. Older respondents reported lower feelings of social isolation than younger respondents (Table 2). No covariates were associated with greater social isolation.

### Relationship quality

Models examined age differences in negative and positive relationship quality controlling for the same variables. As we hypothesized, older respondents reported lower negative quality than younger respondents (Table 2). Covariates associated with greater negative quality included household size; individuals in larger households reported greater negative relationship quality. The association between age and positive quality was not significant. As for the covariates, women, individuals with more education, and individuals who were married reported greater positive quality relationships.

### Implications of Pandemic-Related Stress, Life Change, and Social Ties for Poor Psychological Well-Being

Analyses examined whether pandemic-related stress, life change, social isolation, and relationship quality (positive and negative) predicted poor psychological well-being controlling for age, gender, education, income, race, marital status, and number of household members. As we hypothesized, greater pandemic-related stress, greater pandemic-related life change, greater social isolation, and greater negative relationship quality predicted poorer psychological well-being (Tables 3 and 4). There was not a significant association between positive relationship quality and psychological well-being. Covariates associated with poorer psychological well-being included education, marital status, and income. Individuals who were less educated,

not married, and had lower income reported poorer psychological well-being.

We then tested interactions between pandemic-related stress and each of the social tie variables predicting poor psychological well-being to examine whether social ties buffered or exacerbated stress. These models tested each interaction separately, controlling for the other social tie variables and demographics. There was a significant interaction between pandemic-related stress and social isolation predicting psychological well-being (Table 3; Figure 1). As we hypothesized, there was a greater positive association between greater pandemic-related stress and poorer psychological well-being ( $b = 0.36$ ,  $SE = 0.04$ ,  $p < .001$ ) among those who reported greater social isolation, compared to those with lower social isolation ( $b = 0.16$ ,  $SE = 0.04$ ,  $p < .001$ ).

As we hypothesized, there was also a significant interaction between pandemic-related stress and negative relationship quality predicting poor psychological well-being (Table 3; Figure 2). There was a greater positive association between greater pandemic-related stress and poorer psychological well-being ( $b = 0.32$ ,  $SE = 0.04$ ,  $p < .001$ ) among people with greater negative relationship quality compared to those with lower negative relationship quality ( $b = 0.20$ ,  $SE = 0.04$ ,  $p < .001$ ).

We then tested interactions between pandemic-related life change and each of the social tie variables predicting poor psychological well-being to examine whether social ties buffered or exacerbated the link between life change due to the pandemic and psychological well-being. There was a significant interaction between pandemic-related life change and social isolation predicting psychological well-being (Table 4; Figure 3). There was a significant positive association between greater pandemic-related life change and poorer psychological well-being ( $b = 0.28$ ,  $SE = 0.09$ ,  $p < .01$ ) among those who reported greater social isolation, but not among those reported lower social isolation ( $b = 0.05$ ,  $SE = 0.05$ ,  $p > .05$ ).

**Table 3.** Results of Linear Regression Analyses Examining Poor Psychological Well-Being as a Function of Pandemic-Related Stress, Social Ties, and Age

Variable	<i>b</i>	<i>SE</i>	<i>R</i> <sup>2</sup>
Step 1			
Pandemic-related stress	0.25***	0.03	.31
Social isolation	0.10***	0.03	
Negative quality	0.18***	0.05	
Positive quality	-0.03	0.03	
Age	0.00	0.00	
Female	0.02	0.07	
Education	-0.04*	0.02	
Married	-0.18*	0.08	
White	0.08	0.08	
Income	-0.00*	0.00	
Household size	0.01	0.03	
Step 2			
COVID-19 stress × Age	-0.00	0.00	.31
COVID-19 stress × Isolation	0.07***	0.02	.33
COVID-19 stress × Negative quality	0.07*	0.03	.31
COVID-19 stress × Positive quality	-0.02	0.02	.31

Notes: *b* = unstandardized regression coefficient. Two-way interactions were tested in separate models.  
\**p* < .05. \*\*\**p* < .001.

**Table 4.** Results of Linear Regressions Analyses Examining Poor Psychological Well-Being as a Function of Pandemic-Related Life Change, Social Ties, and Age

Variable	<i>b</i>	<i>SE</i>	<i>R</i> <sup>2</sup>
Step 1			
Life change	0.15**	0.05	.22
Social isolation	0.17***	0.03	
Negative quality	0.23***	0.05	
Positive quality	-0.02	0.04	
Age	0.00	0.00	
Female	0.12	0.07	
Education	-0.03*	0.02	
Married	-0.11	0.08	
White	-0.04	0.09	
Income	-0.00*	0.00	
Household size	-0.02	0.03	
Step 2			
Life change × Age	-0.00	0.00	.22
Life change × Isolation	0.08*	0.03	.23
Life change × Negative quality	0.06	0.05	.22
Life change × Positive quality	0.03	0.05	.22

Notes: *b* = unstandardized regression coefficient. Two-way interactions were tested in separate models.  
\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

**Post Hoc Models**

We first examined whether age differences in pandemic-related stress and social ties varied by demographics

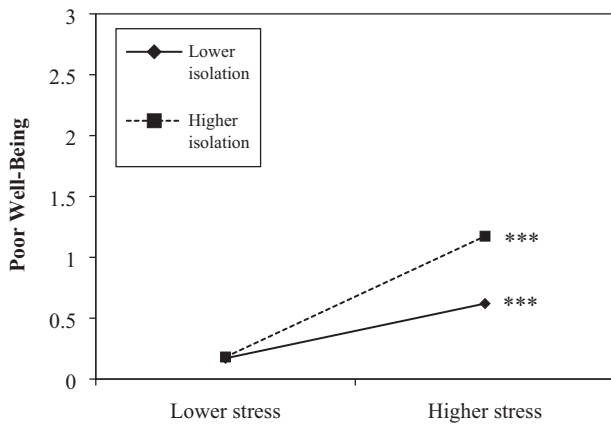
including gender, education, income, race, household size, and marital status. There was one significant interaction between age and education predicting positive relationship quality. There was a significant association between age and positive quality among those with higher education (*b* = -0.01, *SE* = 0.00, *p* < .05) but not among those with lower education (*b* = 0.00, *SE* = 0.01, *p* > .05). There were no other significant interactions, indicating that most age effects were consistent across demographics.

Recent research has suggested that younger adults are more detrimentally affected by COVID-19 pandemic-related disruptions, showing increased stress and negative affect (Knepple Carney et al., 2020). Thus, we also considered whether there were age differences in the effects of pandemic-related stress, life change, and social ties on psychological well-being by entering interactions with age. There was one significant interaction between age and negative quality predicting poor well-being. There was a significant positive association between negative quality and poor well-being among older adults (*b* = 0.28 *SE* = 0.07, *p* < .001) but not among younger adults (*b* = 0.09, *SE* = 0.06, *p* > .05). There were no other significant two-way or three-way interactions between social ties, pandemic-related stress, and age or social ties, pandemic-related life change, and age (Tables 3 and 4).

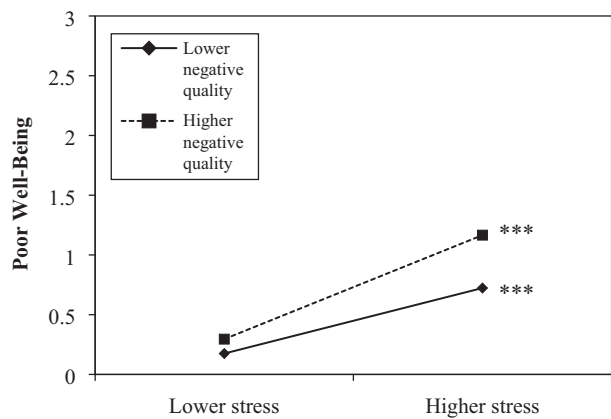
Because the public health measures and rates of COVID-19 infection vary widely by region, we conducted the analysis again controlling for region (West, Midwest, South, Northeast). Region significantly predicted pandemic-related stress. Respondents living in the Northeast reported more pandemic-related stress compared with respondents living in the West (*b* = 0.52, *SE* = 0.18, *p* < .01). When region was included in the model, the association between age and stress became marginal (*p* = .053). We estimated the model again with only the significant covariates (gender, education, and region) and the age effect was still significant. Life change and social ties did not vary by region and there were no other changes in any of the significant findings.

**Discussion**

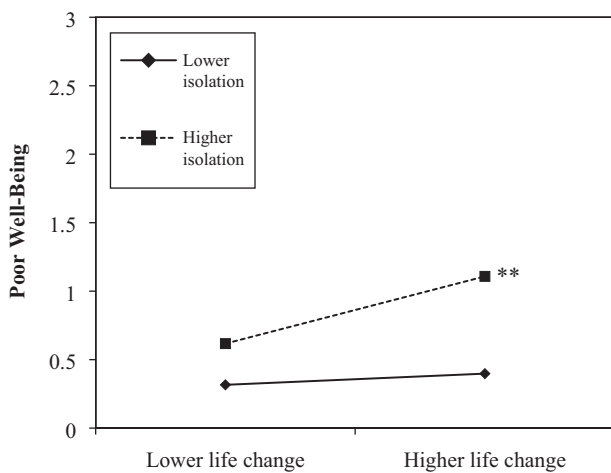
The purpose of this study was to examine age differences in pandemic-related stress, life change, and social ties and their associations with psychological well-being. Overall, the findings indicate that younger individuals appear to be experiencing the worst effects of the COVID-19 pandemic, reporting more pandemic-related stress, pandemic-related life change, social isolation, and poorer relationship quality than older adults. Further, greater pandemic-related stress, life changes, and poor social ties are associated with poorer psychological well-being. Poor social ties (greater social isolation and negative relationship quality) appear to exacerbate the effects of the COVID-19 pandemic irrespective of age. Thus, reducing negative relations and social isolation may be important targets of intervention during periods of extreme stress and upheaval among all age groups.



**Figure 1.** Interaction between social isolation and pandemic-related stress predicting poor psychological well-being. \*\*\* $p < .001$ .



**Figure 2.** Interaction between negative relationship quality and pandemic-related stress predicting poor psychological well-being. \*\*\* $p < .001$ .



**Figure 3.** Interaction between pandemic-related life change and social isolation predicting poor well-being. \*\* $p < .01$ .

### Age Differences in Pandemic-Related Stress, Life Change, and Social Ties

Age differences emerged in reports of pandemic-related stress, life change, and social ties. In general, older individuals

reported less pandemic-related stress, less pandemic-related life change, less social isolation, and less negativity in relationships than younger individuals. The finding that older individuals reported less pandemic-related stress is consistent with the broader literature showing that older adults often perceive events as less stressful than younger people and that older adults are often better able to regulate their emotional responses to stressful events (Neubauer et al., 2019; Rook & Charles, 2017). The finding that older adults also reported less life change due to the COVID-19 pandemic may also explain their experience of less stress as older adults have not experienced same degree of upheaval compared to younger individuals in their employment, finances, and schooling, for example.

The findings are also consistent with research showing that older adults tend to be less negatively affected by natural disasters such as earthquakes compared to younger adults (Knight et al., 2000). Further, older adults have experienced other extreme events including 9/11, the Kennedy assassination, and the Vietnam War, whereas this is the first large-scale stressful event that younger adults may have experienced. Thus, it could be that older adults have experienced greater lifetime stress (simply due to more time being alive) and thus are more resilient. This finding is somewhat surprising, however, as older adults are more likely to be hospitalized and die from COVID-19 than younger adults (CDC COVID-19 Response Team, 2020). However, recent research shows that although older adults perceive COVID-19 to be more fatal, they perceive their risk of contracting the illness to be lower (Bruine de Bruin, 2021). It is also important to note that compared to other historical stressors, the COVID-19 pandemic is unique in many ways in that it has led to significant social role changes, social distancing, economic upheaval, death, and poor health of individuals and families beyond that of other events.

Young adults reported greater perceived social isolation than older individuals. This finding was somewhat surprising given the increased concern about social isolation among older adults during the COVID-19 pandemic (Brooke & Jackson, 2020). However, others have suggested that young adults may be particularly at risk for perceived social isolation and loneliness due to previous population trends (Beam & Kim, 2020). Young adults may report increased social isolation due to the impact of the COVID-19 pandemic including school closures, unemployment, and reduced social contact with peers. In contrast, among older adults, life may look much the same as it did before, especially among those who are retired, living alone, or widowed. Indeed, the Understanding America Study also revealed that young adults showed the highest levels of loneliness compared to other age groups (Miller, 2020). Greater social isolation was also associated with greater pandemic-related stress and greater perceptions of life change due to the COVID-19 pandemic, indicating that these trends in social isolation may be related to pandemic-related changes.

Younger individuals reported greater negative relationship quality than did older people (Birditt et al., 2009). This is consistent with research showing that older adults



report less conflict in their relationships and that they appraise such conflicts as less stressful (Birditt et al., 2005; Luong & Charles, 2014). Interestingly, this age difference is still occurring during the pandemic in which individuals are more stressed and may have more contact and report greater conflict. These findings may also reflect the increases in communal values that individuals experience as they age (Fung et al., 2016).

### Implications for Psychological Well-Being

Overall, greater pandemic-related stress, pandemic-related life change, social isolation, and negative relationship quality were associated with poorer psychological well-being, whereas positive quality ties were not associated with psychological well-being. This is consistent with the previous literature showing that negative aspects of relationships and social isolation/loneliness tend to be more predictive of psychological well-being than positive aspects of ties (Rook, 2015).

Further, this study showed that negative quality ties and social isolation exacerbate the effects of pandemic-related stress on poor psychological well-being and that these links do not vary by age. In particular, individuals reported greater links between pandemic-related stress and poor psychological well-being when they reported greater social isolation and negative relationship quality. This is in line with the stress-exacerbation model of negative ties and stress (August et al., 2007), which suggests that negative ties exacerbate the effects of stress on well-being. Further, these findings are consistent with previous literature showing that poor marital quality ties exacerbate chronic stress (Birditt et al., 2015; Neff & Karney, 2007) and that negative or ambivalent ties can exacerbate the effects of laboratory stressors (Carlisle et al., 2012; Uchino et al., 2001). It is possible that negative quality ties are less supportive or provide ineffective support when individuals are under stress. Similarly, when individuals are socially isolated, they may have access to fewer resources for coping with stress. Interestingly, positive quality ties did not exacerbate or buffer pandemic-related stress. Individuals reported high levels of positive relationship quality and thus there may not have been enough variability to find effects. Further, positive quality was assessed with a single item, which may have limited results. Indeed, previous studies show that some positive relationship qualities buffer stress whereas other positive qualities do not (Birditt & Antonucci 2008). Thus, negative quality ties and social isolation appear to be important potential targets for interventions aimed at reducing the negative effects of the COVID-19 pandemic on well-being. Scholars including Berg-Weger and Morley (2020) have emphasized the importance of developing interventions for reducing social isolation among older individuals during the pandemic using virtual and telehealth methods. The present study moves beyond this charge and indicates that reducing social isolation is

important for individuals across the adult life span and that negative quality ties are another key area for intervention. For example, virtual interventions to reduce social isolation among younger and older adults might be enhanced by incorporating strategies to manage negative aspects of social relationships.

Consistent with the stress-exacerbation model (August et al., 2007), individuals who reported greater pandemic-related life change had poorer psychological well-being when they reported greater social isolation and these links did not vary by age. Thus, in this case, it appears that social isolation exacerbates the effects of life change on poorer psychological well-being. This further indicates that social ties may be an important target for interventions aimed at ameliorating pandemic-related stress across the adult life span.

Interestingly, negative quality ties appeared to be especially harmful for well-being among older individuals compared to younger individuals. This finding is consistent with the SAVI model, which suggests that when older adults are not able to avoid negativity in their relationships, they experience poor well-being (Birditt et al., 2020; Charles, 2010).

### Limitations and Future Directions

Although this study has several strengths in that it has a large sample size and is nationally representative, there are limitations that should be addressed in future research. First, because of limits on survey length, the study has few items assessing psychological well-being, stress, and positive relationships. Future research should consider more extensive assessments of psychological well-being, stress, and positive relationship quality. For example, this study includes reports about stress during the last month (i.e., stress and life change), but stress is multidimensional (e.g., daily, chronic, types) and the dimensions that are relevant may vary between individuals. For example, we do not have information on how participants cope with stress or on their experiences of early-life stress, both of which can be associated with increased resilience or vulnerability (Daskalakis et al., 2013). However, studies often use single-item measures successfully (e.g., self-rated health; Idler & Benyamini, 1997) and the measures in this study were correlated in expected ways and had good reliability. Further, the data for this study are only from the month of May 2020 and do not include longitudinal data. Stress levels may have been higher right after the pandemic began than in May. Indeed, research using the Understanding America Study (2020) showed that stress levels were highest in April and declined by May. Further, we do not know if we would have found the same age effects before the pandemic and whether the age differences are consistent with prepandemic patterns. Psychological well-being is also positively skewed and may have a floor effect, which may affect the results.

The age effects in this study were relatively small and should be confirmed in future research. Unfortunately, we

also do not have information regarding the participants' physical health. We do not have specific information regarding the stay safe orders in participants' respective cities or states in this data; however, when controlling for region, we found the same effects with one exception; individuals in the Northeast reported greater pandemic-related stress than individuals in the West and the age effect became marginal when region was included. Future studies should consider these factors in greater depth.

Overall, this study shows that younger individuals are more at risk for pandemic-related stress, pandemic-related life change, and poor social ties than older individuals and that stress, life change, and social ties have important implications for psychological well-being across age groups. Further, social isolation and negative ties exacerbate the link between pandemic-related stress and poor psychological well-being. Thus, even though older individuals were more likely have complications and to die from the virus, older individuals appeared less negatively affected by the pandemic. These findings provide important areas for potential interventions as the pandemic currently shows no signs of abating.

## Funding

This work was supported by the National Institute on Aging (grant numbers R01 AG054371 to K. S. Birditt and K01 AG059829 to C. A. Polenick).

## Conflict of Interest

None declared.

## Acknowledgments

We would like to thank Drs. Richard Curtin and Tuba Suzer Gurtekin for their feedback and assistance with data collection efforts.

## References

- Akiyama, H., Antonucci, T., Takahashi, K., & Langfahl, E. S. (2003). Negative interactions in close relationships across the life span. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 58(2), P70–P79. doi:10.1093/geronb/58.2.p70
- Almeida, D. M., Wethington, E., & Kessler, R. C. (2002). The daily inventory of stressful events: An interview-based approach for measuring daily stressors. *Assessment*, 9(1), 41–55. doi:10.1177/1073191102091006
- American Psychological Association. (2020). *Stress in the time of COVID-19: Volume one*. <https://www.apa.org/news/press/releases/stress/2020/stress-in-america-covid.pdf>
- Armitage, R., & Nellums, L. B., (2020). COVID-19 and the consequences of isolating the elderly. *The Lancet Public Health*, 5(5), e256. doi:10.1016/S2468-2667(20)30061-X
- August, K. J., Rook, K. S., & Newsom, J. T. (2007). The joint effects of life stress and negative social exchanges on emotional distress. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 62(5), S304–S314. doi:10.1093/geronb/62.5.s304
- Beam, C. R., & Kim, A. J. (2020). Psychological sequelae of social isolation and loneliness might be a larger problem in young adults than older adults. *Psychological Trauma: Theory, Research, Practice and Policy*, 12(S1), S58–S60. doi:10.1037/tra0000774
- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, 56(6), 893–897. doi:10.1037//0022-006x.56.6.893
- Berg-Weger, M., & Morley, J. E. (2020). Loneliness and social isolation in older adults during the COVID-19 pandemic: Implications for gerontological social work. *Journal of Nutrition, Health, and Aging*, 24(5), 456–458. doi:10.1007/s12603-020-1366-8
- Birditt, K., & Antonucci, T. C. (2008). Life sustaining irritations? Relationship quality and mortality in the context of chronic illness. *Social Science & Medicine* (1982), 67(8), 1291–1299. doi:10.1016/j.socscimed.2008.06.029
- Birditt, K. S., Cichy, K. E., & Almeida, D. (2011). Age differences in exposure and reactivity to interpersonal tensions among black and white individuals across adulthood. *Race and Social Problems*, 3(3), 225–239. doi:10.1007/s12552-011-9058-y
- Birditt, K. S., Jackey, L. M., & Antonucci, T. C. (2009). Longitudinal patterns of negative relationship quality across adulthood. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 64(1), 55–64. doi:10.1093/geronb/gbn031
- Birditt, K. S., Nevitt, M. R., & Almeida, D. M. (2015). Daily interpersonal coping strategies: Implications for self-reported well-being and cortisol. *Journal of Social and Personal Relationships*, 32(5), 687–706. doi:10.1177/0265407514542726
- Birditt, K. S., Newton, N. J., Cranford, J. A., & Ryan, L. H. (2016). Stress and negative relationship quality among older couples: Implications for blood pressure. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 71(5), 775–785. doi:10.1093/geronb/gbv023
- Birditt, K. S., Sherman, C. W., Polenick, C. A., Becker, L., Webster, N. J., Ajrouch, K. J., & Antonucci, T. C. (2020). So close and yet so irritating: Negative relations and implications for well-being by age and closeness. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 75(2), 327–337. doi:10.1093/geronb/gby038
- Brooke, J., & Jackson, D. (2020). Older people and COVID-19: Isolation, risk and ageism. *Journal of Clinical Nursing*, 29(13–14), 2044–2046. doi:10.1111/jocn.15274
- Bruine de Bruin, W. (2021). Age differences in COVID-19 risk perceptions and mental health: Evidence from a national US survey conducted in March 2020. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 76(2), e24–e29. doi:10.1093/geronb/gbaa074
- Cacioppo, J. T., & Cacioppo, S. (2014). Social relationships and health: The toxic effects of perceived social isolation. *Social and Personality Psychology Compass*, 8(2), 58–72. doi:10.1111/spc3.12087

- Carlisle, M., Uchino, B. N., Sanbonmatsu, D. M., Smith, T. W., Cribbet, M. R., Birmingham, W., Light, K. C., & Vaughn, A. A. (2012). Subliminal activation of social ties moderates cardiovascular reactivity during acute stress. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, 31(2), 217–225. doi:10.1037/a0025187
- Carstensen, L. L., Fung, H. H., & Charles, S. T. (2003). Socioemotional Selectivity Theory and the regulation of emotion in the second half of life. *Motivation and Emotion*, 27(2), 103–123. doi:10.1023/A:1024569803230
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, 54(3), 165–181. doi:10.1037/0003-066X.54.3.165
- CDC COVID-19 Response Team. (2020). Severe outcomes among patients with coronavirus disease 2019 (COVID-19)—United States, February 12–March 16, 2020. *Morbidity and Mortality Weekly Report*, 69(12), 343–346. doi:10.15585/mmwr.mm6912e2
- Charles, N. E., Strong, S. J., Burns, L. C., Bullerjahn, M. R., & Serafine, K. M. (2021). Increased mood disorder symptoms, perceived stress, and alcohol use among college students during the COVID-19 pandemic. *Psychiatry Research*, 296, 113706. doi:10.1016/j.psychres.2021.113706
- Charles, S. T. (2010). Strength and Vulnerability Integration: A model of emotional well-being across adulthood. *Psychological Bulletin*, 136(6), 1068–1091. doi:10.1037/a0021232
- Charles, S. T., & Carstensen, L. L. (2010). Social and emotional aging. *Annual Review of Psychology*, 61, 383–409. doi:10.1146/annurev.psych.093008.100448
- Cranford, J. A. (2004). Stress-buffering or stress-exacerbation? Social support and social undermining as moderators of the relationship between perceived stress and depressive symptoms among married people. *Personal Relationships*, 11(1), 23–40. doi:10.1111/j.1475-6811.2004.00069.x
- Daskalakis, N. P., Bagot, R. C., Parker, K. J., Vinkers, C. H., & de Kloet, E. R. (2013). The three-hit concept of vulnerability and resilience: Toward understanding adaptation to early-life adversity outcome. *Psychoneuroendocrinology*, 38(9), 1858–1873. doi:10.1016/j.psyneuen.2013.06.008
- Eysenck, H. J. (1983). Stress, disease, and personality: The inoculation effect. In C. L. Cooper (Ed.), *Stress research* (pp. 121–146). Wiley.
- Fung, H. H., Ho, Y. W., Zhang, R., Zhang, X., Noels, K. A., & Tam, K.-P. (2016). Age differences in personal values: Universal or cultural specific? *Psychology and Aging*, 31(3), 274–286. doi:10.1037/pag0000082
- Hawkey, L. C., & Cacioppo, J. T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine*, 40(2), 218–227. doi:10.1007/s12160-010-9210-8
- Heid, A. R., Cartwright, F., Wilson-Genderson, M., & Pruchno, R. (2020). Challenges experienced by older people during the initial months of the COVID-19 pandemic. *The Gerontologist*, 61(1), 48–58. doi:10.1093/geront/gnaa138
- Hughes, M. E., Waite, L. J., Hawkey, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on Aging*, 26, 655–672. doi:10.1177/0164027504268574
- Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior*, 38(1), 21–37. doi:10.2307/2955359
- Juster, R. P., McEwen, B. S., & Lupien, S. J. (2010). Allostatic load biomarkers of chronic stress and impact on health and cognition. *Neuroscience and Biobehavioral Reviews*, 35(1), 2–16. doi:10.1016/j.neubiorev.2009.10.002
- Kircanski, K., Thompson, R. J., Sorenson, J., Sherdell, L., & Gotlib, I. H. (2015). Rumination and worry in daily life: Examining the naturalistic validity of theoretical constructs. *Clinical Psychological Science*, 3(6), 926–939. doi:10.1177/2167702614566603
- Knepple Carney, A., Graf, A. S., Hudson, G., & Wilson, E. (2020). Age moderates perceived COVID-19 disruption on well-being. *The Gerontologist*, 61(1), 30–35. doi:10.1093/geront/gnaa106
- Knight, B. G., Gatz, M., Heller, K., & Bengtson, V. L. (2000). Age and emotional response to the Northridge earthquake: A longitudinal analysis. *Psychology and Aging*, 15(4), 627–634. doi:10.1037//0882-7974.15.4.627
- Kocchar, R. (2020). *Unemployment rose higher in three months of COVID-19 than it did in two years of the Great Recession*. Pew Research Center. <https://pewrsr.ch/2UADTTZ>
- Kohout, F. J., Berkman, L. F., Evans, D. A., & Cornoni-Huntley, J. (1993). Two shorter forms of the CES-D (Center for Epidemiological Studies Depression) depression symptoms index. *Journal of Aging and Health*, 5(2), 179–193. doi:10.1177/089826439300500202
- Luhmann, M., & Hawkey, L. C. (2016). Age differences in loneliness from late adolescence to oldest old age. *Developmental Psychology*, 52(6), 943–959. doi:10.1037/dev0000117
- Luong, G., & Charles, S. T. (2014). Age differences in affective and cardiovascular responses to a negative social interaction: The role of goals, appraisals, and emotion regulation. *Developmental Psychology*, 50(7), 1919–1930. doi:10.1037/a0036621
- Manhertz, T. (2020). *Almost 3 million adults moved back home in wake of coronavirus*. Zillow. <https://www.zillow.com/research/coronavirus-adults-moving-home-27271/>
- McLaughlin, K. A., & Nolen-Hoeksema, S. (2011). Rumination as a transdiagnostic factor in depression and anxiety. *Behaviour Research and Therapy*, 49(3), 186–193. doi:10.1016/j.brat.2010.12.006
- Miller, J. (2020). *Anxiety and depression associated with COVID-19 peaked in early April—but then declined*. USC Dornsife College of Letters Arts and Sciences. <https://dornsife.usc.edu/news/stories/3229/anxiety-and-depression-linked-to-covid-19-peaked-in-april/>
- National Opinion Research Center. (2020). *Historic shifts in Americans happiness amid pandemic*. <https://www.norc.org/PDFs/COVID%20Response%20Tracking%20Study/Historic%20Shift%20in%20Americans%20Happiness%20Amid%20Pandemic.pdf>
- Neff, L. A., & Karney, B. R. (2007). Stress crossover in newlywed marriage: A longitudinal and dyadic perspective. *Journal of Marriage and Family*, 69, 594–607. doi:10.1111/j.1741-3737.2007.00394.x
- Neubauer, A. B., Smyth, J. M., & Sliwinski, M. J. (2019). Age differences in proactive coping with minor hassles in daily life. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 74(1), 7–16. doi:10.1093/geronb/gby061

- Newsom, J. T., Nishishiba, M., Morgan, D. L., & Rook, K. S. (2003). The relative importance of three domains of positive and negative social exchanges: A longitudinal model with comparable measures. *Psychology and Aging, 18*(4), 746–754. doi:10.1037/0882-7974.18.4.746
- Ong, A. D., Uchino, B. N., & Wethington, E. (2016). Loneliness and health in older adults: A mini-review and synthesis. *Gerontology, 62*(4), 443–449. doi:10.1159/000441651
- Perlman, D., & Peplau, L. (1982). Theoretical approaches to loneliness. In D. Perlman & L. A. Peplau (Eds.), *Loneliness: A sourcebook of current theory, research and therapy* (pp. 123–134). Wiley Interscience.
- Rook, K. S. (2015). Social networks in later life: Weighing positive and negative effects on health and well-being. *Current Directions in Psychological Science, 24*(1), 45–51. doi:10.1177/0963721414551364
- Rook, K. S., & Charles, S. T. (2017). Close social ties and health in later life: Strengths and vulnerabilities. *The American Psychologist, 72*(6), 567–577. doi:10.1037/amp0000104
- Spinhoven, P., van Hemert, A. M., & Penninx, B. W. (2018). Repetitive negative thinking as a predictor of depression and anxiety: A longitudinal cohort study. *Journal of Affective Disorders, 241*, 216–225. doi:10.1016/j.jad.2018.08.037
- Thoits, P. A. (2010). Stress and health: Major findings and policy implications. *Journal of Health and Social Behavior, 51*(suppl.), S41–S53. doi:10.1177/0022146510383499
- Uchino, B. N., Holt-Lunstad, J., Uno, D., & Flinders, J. B. (2001). Heterogeneity in the social networks of young and older adults: Prediction of mental health and cardiovascular reactivity during acute stress. *Journal of Behavioral Medicine, 24*(4), 361–382. doi:10.1023/a:1010634902498
- University of Michigan, Survey Research Center. (n.d.). *Surveys of Consumers*. <https://data.sca.isr.umich.edu/survey-info.php>
- Whitehead, B. R., & Torossian, E. (2020). Older adults' experience of the COVID-19 pandemic: A mixed-methods analysis of stresses and joys. *The Gerontologist, 61*(1), 36–47. doi:10.1093/geront/gnaa126