


Characteristics Associated With Loneliness and Coping Skills Utilization During the COVID-19 Pandemic

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Abstract

Although stay-at-home orders and physical distancing measures are vital to managing the COVID-19 outbreak, there is concern these limitations on in-person contact may increase feelings of loneliness. The present study examined loneliness in relation to living situation, psychiatric symptoms, and coping skills utilization during the COVID-19 pandemic. The aim was to identify demographic and psychological factors that may contribute to greater feelings of loneliness. A sample of 125 adults (18 years and older) completed measures on loneliness, psychiatric symptoms, and coping skills in September 2020. Multiple regression analysis indicated living situation moderates the relationship between hours spent having remote conversations and loneliness. Remote conversation hours were associated with decreased loneliness in those living alone but was not associated with loneliness in those living with others. Multivariate regression analysis indicated that substance use and self-blame were associated with increased loneliness whereas the use of emotional support to cope with pandemic-related stress was associated with decreased loneliness. The current study highlights the importance of finding alternative ways to remain socially connected, particularly for those living alone. Increasing access to videoconferencing technology and promoting help-seeking behaviors may be a promising approach to manage loneliness during times of increased social isolation.

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Keywords

Loneliness, COVID-19, coping skills, anxiety, depression, stress

Introduction

Early epidemiology reports suggested that infections of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the resulting coronavirus disease (COVID-19) are primarily transmitted through respiratory droplets (WHO, 2020). In an effort to curb the spread of COVID-19, millions of people across the United States were directed to stay at home in March 2020. The Centers for Disease Control and Prevention (CDC) continues to recommend minimizing close face-to-face contact and maintaining at least six feet distance from others (CDC, 2021). Although these measures are vital to managing the outbreak and preventing the healthcare system from being overwhelmed, there is concern that limitations on social gatherings and reduction of in-person contact could increase feelings of loneliness (Holmes et al., 2020).

Loneliness is defined as a painful experience that occurs when a person perceives a deficit in their social needs or social relationships (Perlman & Peplau, 1981). A meta-analytic review by Holt-Lunstad et al. (2015) found that loneliness is associated with a 26% increased risk of mortality, which is comparable to other well-established risk factors such as obesity, substance abuse, and poor access to health care. Recent studies examining loneliness as a predictor of physical and mental health provide insight into pathways by which loneliness may increase risk for mortality. Namely, loneliness is a predictor of chronic conditions such as hypertension and heart disease (Hawkley et al., 2010; Momtaz et al., 2012; Valtorta et al., 2016) and is a risk factor for suicidal ideation and behavior (McClelland et al., 2020; Schinka et al., 2012; Stravynski & Boyer, 2001; Teo et al., 2018). Moreover, loneliness predicts depressive symptoms, self-rated physical health, and functional limitations even when accounting for health behaviors such as smoking and physical activity (Luo et al., 2012). Taken together, these studies suggest that loneliness in and of itself may influence health outcomes and is undoubtedly a significant stressor that is detrimental to overall health and well-being.

A large-scale survey conducted during COVID-19 identified having a job and living with a partner as protective factors against loneliness (Li & Wang, 2020). Being employed and living with others provides a consistent and regular social environment. However, the COVID-19 pandemic has led to disruptions in daily social interactions and restrictions on in-person social engagement, making it difficult for many to maintain an active social life. Of further concern, loneliness may also contribute to poor management of stress. Those who feel disconnected from others or unfulfilled with their relationships may lack the social support that is known to buffer against stress (Hostinar et al., 2014). To cope with loneliness, people may engage in negative health behaviors such as stress eating and diminished physical activity (Hawkley et al., 2009; Levine, 2012). Simultaneously, maladaptive coping behaviors and feelings of emotional distress may lead to self-defeating beliefs and self-isolation, trapping people in a

vicious cycle of loneliness. During a time when illness anxiety and public health recommendations have caused disruptions to social interactions, it is imperative to identify ways to combat the deleterious impact of loneliness.

The perceived quality of social connections is a key aspect of loneliness (Perلمان & Peplau, 1981). Importantly, people can feel disconnected when surrounded by others and connected when physically alone. This may explain why there have been conflicting findings around changes in loneliness since the implementation of COVID-19 quarantine measures. A cross-sectional study conducted in April 2020 following widespread shutdown and calls to stay at home indicated a surge in self-reported loneliness (Killgore, Cloonan, Taylor, & Dailey, 2020). In later studies conducted in May and June 2020, Killgore and colleagues (Killgore, Cloonan, Taylor, Miller, & Dailey, 2020) continued to find increases in overall loneliness scores despite re-opening in some communities; those who were sheltering in place also reported greater levels of loneliness than those who were not. Luchetti et al. (2020), on the other hand, found no difference in loneliness in the month before and after most stay-at-home policies were implemented. Over the study period, participants reported more perceived support, suggesting that they maintained social connection despite restrictions on in-person gatherings. Thus, receiving emotional support and finding alternative ways to maintain connection can help individuals protect against loneliness. Investigating other factors that could contribute to actual and subjective social connection during this time could be helpful in improving interventions to mitigate feelings of loneliness.

Since sustained feelings of loneliness may contribute to emotional problems, tracking and reducing the risk of loneliness remains an important priority as the situation around COVID-19 continues to evolve. The objective of the study was to investigate the prevalence of loneliness and coping behaviors 6 months after most states and cities in the United States implemented quarantine measures. We examined the differences in levels of loneliness across different sociodemographic variables. As stay-at-home orders have discouraged in-person social interactions and almost twice as many employees are working from home (Wong, 2020), we assessed the role of living situation as a moderating variable in the relationship between loneliness and hours spent having remote (i.e. phone, text, video chat) and in-person conversations. We also explored the relationship between loneliness and coping skills utilization in response to the COVID-19 pandemic.

Method

Participants

As part of a larger investigation on anxiety during the COVID-19 pandemic, a total of 498 participants were recruited through an extension of Amazon's Mechanical Turk (mTurk), CloudResearch, an online crowdsourcing marketplace which allows researchers to pay participants to complete "Human Intelligence Tasks" (HITs). Data collected from MTurk are of similar quality to traditional or other internet samples

(Behrend et al., 2011; Casler et al., 2013; Shapiro et al., 2013). Data were collected in September 2020, six months after COVID-19 was declared a pandemic and social distancing polices were enacted across many states. Eligibility was restricted to adult (18 years or older) United States residents who had at least a 99% approval rate from previous HITs (indicating a history of compliance with task instructions from previous study participation) and reported significant anxiety symptoms (score of 8 or above on the Overall Anxiety Severity and Impairment Scale). Of the 498 participants initially screened, 242 reported a score of 8 or above on the OASIS and were invited to complete our survey. Based on recommendations to ensure data integrity (Berinsky et al., 2014), we used three validity questions as attention checks throughout the survey that asked participants to accurately follow simple instructions: 1) “If you are paying attention, please select ‘other’ and type ‘Green’ in the blank text box,” 2) “To show that you have read this much, please ignore the question below, and select other as your response, and type “yes” into the box that appears,” and 3) “To show that you’ve read this much, please ignore the question and select happy.” Of the total 186 participants who completed the survey, 60 participants failed to pass one or more of the attention checks and were excluded from the final sample. One additional participant was excluded because of inconsistent responses on self-reported psychiatric diagnoses and scores on related measures. One hundred 25 participants were included in the final sample.

Measures

COVID-19 questionnaire. This measure was used to capture basic demographic information (e.g., age, race/ethnicity, employment status, living situation) as well as COVID-19 specific descriptive data (e.g., local COVID-19 restrictions) to contextualize the sample. For this investigation, participants were asked to estimate the amount of time they spent having remote conversations with family and friends over the past week.

Overall anxiety severity and impairment scale (OASIS). A brief five-item measure assessing anxiety symptoms (Norman et al., 2006). An OASIS cut score of 8 has shown to discriminate between those with anxiety disorders and those without (Norman et al., 2011). The OASIS has demonstrated good internal consistency, test-retest reliability, and convergent and discriminant validity in previous studies (Campbell-Sills et al., 2009; Norman et al., 2011). The OASIS demonstrated good internal consistency in our sample ($\alpha = .85$).

UCLA loneliness scale – version 3. A 20-item self-report measure that assesses one’s subjective feelings of loneliness as well as feelings of social isolation (Russell, 1996). The UCLA Loneliness Scale – Version 3 has demonstrated good internal consistency, test-retest reliability, and convergent and construct validity in previous studies (Russell, 1996; Vassar & Crosby, 2008) and has also demonstrated excellent internal consistency in our sample ($\alpha = .94$).

Depression, anxiety, stress scale – short form (DASS). A 21-item self-report measure that assesses depression, anxiety, and stress (Lovibond & Lovibond, 1995). The DASS has good internal consistency and test-retest reliability as well as adequate convergent and discriminant validity (Brown et al., 1997; Henry & Crawford, 2005; Lovibond & Lovibond, 1995). The DASS anxiety ($\alpha = .86$) and stress ($\alpha = .87$) scales demonstrated good internal consistency while the depression scale demonstrated excellent reliability in our sample ($\alpha = .92$).

Brief COPE. A 28-item self-report measure that assesses a broad range of coping responses (Carver, 1997). It is comprised of 14 scales that each have two questions with a specific conceptual focus. The measure is intended to provide a flexible way to identify coping responses that may be adaptive or problematic. The Brief COPE demonstrates acceptable internal consistency, test-retest reliability, and convergent validity in multiple populations (Carver, 1997; Cooper et al., 2008; Hagan et al., 2017). The internal consistency reliability varied for each scale in our sample, with 11 out of 14 being at or above the acceptable range; active coping ($\alpha = .84$), planning ($\alpha = .79$), positive reframing ($\alpha = .87$), acceptance ($\alpha = .76$), humor ($\alpha = .91$), religion ($\alpha = .88$), using emotional support ($\alpha = .92$), using instrumental support ($\alpha = .89$), venting ($\alpha = .61$), self-distraction ($\alpha = .52$), denial ($\alpha = .85$), substance use ($\alpha = .97$), behavioral disengagement ($\alpha = .81$), and self-blame ($\alpha = .63$).

Procedures

All study procedures were approved by the local Institutional Review Board. Participants read an online consent form and confirmed their consent prior to beginning the screener survey. Participants that passed the screener were asked to complete a larger battery of study measures. Participants were paid \$0.05 for completion of the screener and \$5.00 for completion of the survey.

Data analysis

Data analysis was performed using R version 4.0.3 (R Core Team, 2020). Descriptive statistics were used to characterize the sample. Independent *t*-tests were conducted to compare differences in loneliness by sex, living situation, employment, and marital status. Pearson correlation coefficients were used to assess the relationship between psychiatric symptoms, loneliness, and remote conversation hours. Next, following a check for violation of normality assumptions, regression analyses were performed to test the moderating role of living situation on the relation between remote (virtual) conversation hours and loneliness. Continuous predictors were mean centered prior to model entry. Analyses were conducted using the *jtools* (v2.1.2; Long, 2020), *interactions* (v1.1.3; Long, 2019), and *lmSupport* (v2.9.13; Curtin, 2018) packages. Hours of remote conversation was entered as the predictor and living situation was entered as the moderator. Depression, anxiety, and stress were entered as model covariates since

these variables are known to be associated with loneliness. Significant effects were plotted using a graphical and statistical probing procedure and simple slope analysis was used to calculate model-based estimates of the relationship between conversation and loneliness.

To examine the relationship between loneliness and specific coping skills, Pearson correlation coefficients were used with a Bonferroni adjusted alpha level of $p = 0.003$ to correct for multiple comparisons. Multiple regression analyses were then conducted to assess the relationship between loneliness, specific coping skills, and living situation.

Results

Sample characteristics

The mean age of our participants was 37.8 years ($SD = 10.6$). The sample was primarily White/European ($n = 104$, 83.2%), female ($n = 73$, 58.4%), well-educated ($n = 74$, 59.2%, at least a bachelor's degree), married/in a romantic relationship ($n = 74$, 59.2%), employed ($n = 93$, 74.4%), and living with others ($n = 103$, 82.4%). Of the 82.4% of participants that indicated they were living with others, 3% ($n = 3$) were living with friends/housemates, 21% ($n = 22$) were living with parents, 64% ($n = 65$) were living with a spouse/partner, and 12% ($n = 11$) were living with other relatives. Regarding COVID-19 guidelines in place at their location at the time of survey completion: 2.4% ($n = 3$) reported no restrictions (functioning similar to pre-COVID-19), 14.4% ($n = 18$) reported lenient restrictions (face coverings not required, most non-essential businesses open, most public gatherings allowed), 61.6% ($n = 77$) reported moderate restrictions (face coverings recommended, some non-essential businesses open, moderate public gatherings allowed), 18.4% ($n = 23$) reported strict restrictions (face coverings required, non-essential businesses closed, no public gatherings), and 3.2% ($n = 4$) were unsure about what restrictions were in place. Table 1 includes descriptive information and intercorrelations among study variables. There was no significant association between age and loneliness ($r [120] = -0.03$, $p = 0.7$) and reported levels of loneliness did not differ significantly between males ($n = 50$, $M = 54.9$, $SD = 11.7$) and females ($n = 71$, $M = 51.5$, $SD = 13.4$), $t (119) = -1.4$, $p = 0.15$. There was no significant difference in reported levels of loneliness between those who lived alone ($n = 22$, $M = 57.3$, $SD = 11.6$) and those who lived with others ($n = 101$, $M = 52.1$, $SD = 12.9$), $t (121) = -1.73$, $p = 0.09$, however there was a significant difference in reported levels of loneliness between those who were partnered ($n = 74$, $M = 50.5$, $SD = 11.2$) and those who were single ($n = 50$, $M = 56.5$, $SD = 14.3$), $t (120) = -2.62$, $p < 0.01$. Those who were unemployed/retired ($n = 31$, $M = 56.8$, $SD = 11.2$) did not report higher levels of loneliness than those who were employed ($n = 92$, $M = 51.8$, $SD = 13.1$), $t (121) = -1.91$, $p = 0.06$.

Table 1. Descriptive and intercorrelations between study variables.

	Loneliness	Remote hours	Depression	Anxiety	Stress
Loneliness					
Remote hours	0.01				
Depression	0.53*	0.03			
Anxiety	0.26*	0.31*	0.52*		
Stress	0.32*	0.19*	0.61*	0.76*	
Mean (SD)	53.02 (12.81)	7.23 (9.85)	19.82 (11.32)	12.57 (9.55)	18.50 (9.39)
N	123	125	123	122	117

* p -value < 0.05.

Loneliness and living situation

Results from the multiple regression predicting loneliness are displayed in Table 2. The overall model was significant ($F [6, 104]=8.033, p < 0.0001$) and accounted for 27.7% of the variance in loneliness ($f^2 = 0.38$, large effect). There was a significant positive association between depression and loneliness ($b = 0.56, p < 0.01$). Results indicated that the main effects of hours of remote conversation and living situation were non-significant, however, there was a significant interaction between hours of remote conversation and living situation that accounted for 4.7% of the variance in loneliness, $F (3, 119) = 3.029, p = 0.03, f^2 = 0.05$, indicating small to medium effect size. Figure 1 illustrates the model-based estimations “simple slopes” (regression lines) which shows the relationship between hours of remote conversation and loneliness based living alone versus living with others. These analyses indicated that for individuals who lived with others there was a non-significant relationship between loneliness and remote conversation ($b = 0.08, t = 0.69, p = 0.49$). However, for those living alone there was a significant (negative) association between amount of remote conversation and loneliness ($b = -3.0, t = -2.33, p = 0.02$).

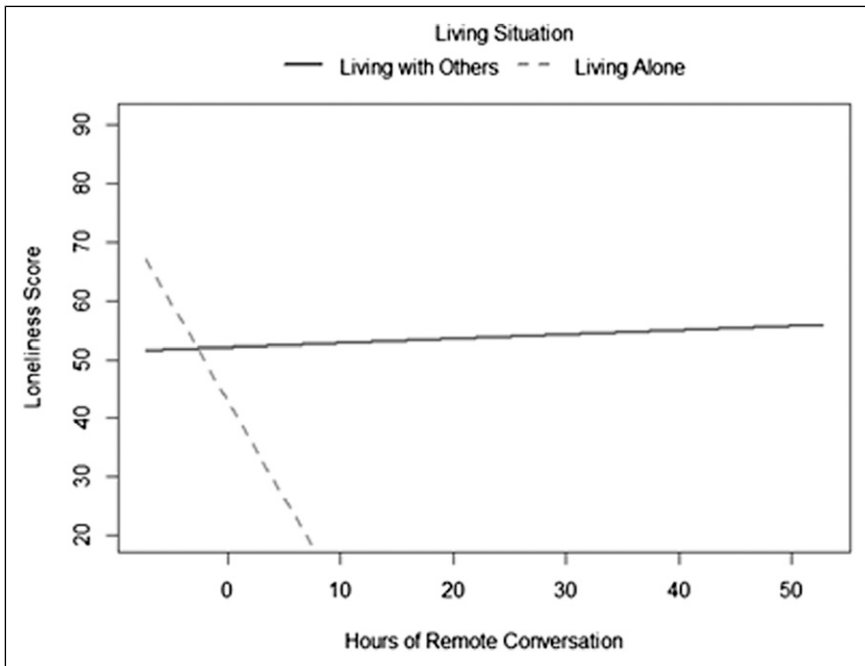
Coping skills, loneliness, and mental health

We conducted Pearson correlation to assess the relationship between loneliness and Brief COPE subscales using a Bonferroni adjusted alpha level of 0.003. Results suggest that the use of substances ($r [121] = 0.29, p = 0.001$), behavioral disengagement ($r [121] = 0.32, p < 0.0001$), and self-blame ($r [121] = 0.27, p = 0.002$) to cope with the COVID-19 pandemic was associated with increased loneliness while use of emotional support ($r [121] = -0.42, p < 0.0001$) and instrumental support ($r [121] = -0.30, p < 0.001$) were associated with decreased loneliness. The other coping behaviors assessed – self-distraction, active coping, denial, venting, positive reframing, planning, humor, acceptance, and religion – were not significantly associated with loneliness after correcting for multiple comparisons.

Table 2. Multiple regression predicting loneliness.

Predictors	β	95% CI ¹	p-value	sr ²
Remote	0.08	-0.15, 0.32	0.50	0.00
Living situation				
Living alone	—	—		
Living with others	-9.87	-22.14, 2.40	0.11	0.02
Depressive symptoms	0.56	0.32, 0.80	<0.001	0.15
Anxiety symptoms	-0.11	-0.48, 0.26	0.60	0.00
Stress symptoms	0.10	-0.28, 0.47	0.61	0.00
Remote * living situation				
Remote * living alone	-3.05	-5.60, -0.50	0.02	0.04

¹CI = Confidence Interval.

**Figure 1.** Simple slope analysis.

Coping skills that were identified as significant in univariate analyses were entered into a multivariate model predicting loneliness (see Table 3). The overall model was significant ($F [5,117] = 12.6, p < .0001$) and accounted for 32.2% of the variance in loneliness ($f^2 = 0.48$, large effect). Results indicate that only substance use, self-blame,

Table 3. Coping Skills Predicting Loneliness.

Predictors	β	95% CI ¹	p-value	sr ²
Substance use	1.11	0.04, 2.18	0.04	0.02
Behavioral disengagement	1.03	-0.36, 2.43	0.15	0.01
Self-blame	1.73	0.10, 3.36	0.04	0.02
Emotional support	-2.32	-3.97, -0.66	0.007	0.04
Instrumental support	-1.13	-2.95, 0.68	0.22	0.00

¹CI = Confidence Interval.

and emotional support remained significant predictors of loneliness ($p < 0.05$). Next, five separate multiple regression models were used to assess the relationship between living situation, individual coping skills (substance use, behavioral disengagement, self-blame, emotional support, and instrumental support), and loneliness. In each of the five models there was a significant main effect for the coping strategy; however, the main effect for living situation and a test for potential interaction between coping and living situation were non-significant.

Discussion

The purpose of this study was to examine loneliness in relation to coping skills utilization, psychiatric symptoms, and living situation during the COVID-19 pandemic in a sample of participants with heightened anxiety. Research across various countries has indicated symptoms of depression, anxiety, and stress have been prevalent during COVID-19 pandemic (Shah et al., 2021; Verma & Mishra, 2020; Vujčić et al., 2021). Similarly, our sample showed, on average, moderate levels of depression and anxiety and mild to moderate levels of stress. Additionally, we found that spending more hours having remote conversations was associated with decreases in loneliness for those living alone but not for those living with others. Our results also suggest that substance use, self-blame, and emotional support to cope were primary factors influencing levels of loneliness during the pandemic.

In regards to coping with pandemic-related stress, the use of substances, behavioral disengagement, and self-blame were associated with higher levels of loneliness while seeking emotional support and advice from others were associated with lower levels of loneliness. However, when considering these specific coping behaviors together, only substance use, self-blame, and emotional support remained significant predictors of loneliness during the COVID-19 pandemic. Several studies have reported an increase in substance use during the COVID-19 pandemic (Czeisler et al., 2020; Dumas et al., 2020; Sun et al., 2020), which is not surprising given research suggesting individuals often use substances to avoid or numb painful feelings or to cope with times of increased stress (Levin et al., 2012; Sinha, 2001). The pandemic has strained social relationships and increased social isolation (Philpot et al., 2021; Quintana et al., 2021).

Substance use is likely to compound these effects as it can disrupt relationships or further isolate an individual, resulting in stronger feelings of loneliness (Åkerlind & Hörnquist, 1992; Ingram et al., 2020). Self-blame was also linked with higher levels of loneliness in this investigation. Feelings of self-blame have been associated with increased depressive symptoms and social withdrawal (Zahn et al., 2015; Zimmer-Gembeck et al., 2016) which can contribute to social isolation and loneliness. In contrast, emotional support was the only coping skill identified in our study to have a negative association with loneliness. Receiving expressions of care and concern from others may mitigate feelings of loneliness. Social support has repeatedly been linked to psychological well-being and found to mediate the relationship between stress and loneliness (Cobb, 1976; Harandi et al., 2017; Kwag et al., 2011; Ozbay et al., 2007). Overall, these findings are consistent with prior research that indicate coping using an emotion-focused approach (i.e., avoidance and focusing on emotions) is associated with higher levels of loneliness while coping using a problem-focused approach (i.e. taking action to seek social support) is associated with lower levels of loneliness (Deckx et al., 2018).

Neither hours of remote conversation nor living situation were associated with levels of loneliness when considered as separate factors in our sample. However, when examining the interaction between the two factors, we found that those living alone had lower levels of loneliness if they spent more hours having remote conversations. That is to say, individuals who are physically isolated may feel less lonely when they are able to socially connect. This was not the case for those living with others. If individuals already had access to in-person social interactions, spending additional time connecting to others in alternative ways was not related to their levels of loneliness. Taken together, these results support the notion that loneliness is a *perception* of disconnection and not merely the state of being alone. Indeed, research defines loneliness as the discrepancy between the relationships one desires and one has (Perlman, 2004). Feelings of loneliness cannot be fully mitigated by simply having contact with others but having contact with others is necessary to experience the potential benefits of social support (i.e., feelings of connection). Identifying levels of and access to social contacts could be useful in personalizing interventions aimed at reducing loneliness. Finally, there was no significant association between coping skills and living situation in predicting loneliness. This suggests that regardless of whether someone is living with others, the use of specific coping behaviors in response to pandemic related stress may exacerbate or lessen feelings of loneliness. In summary, increasing social interactions during stay-at-home orders may serve as an important buffer against loneliness, particularly for those living alone, but only to a certain extent. Increasing emotional support and decreasing substance use and self-blame is paramount to addressing loneliness during COVID-19.

Our findings also highlight the need to consider alternative methods for managing loneliness beyond increasing social interaction. A recent study assessing the use of a smart phone based mindfulness training application offers a promising approach to reducing loneliness (Lindsay et al., 2019). Mindfulness reflects the ability to be

intensely aware of the present and to accept thoughts and emotions without reacting to them. Thus, using mindfulness skills when experiencing loneliness may allow individuals to remain nonreactive to distress (Brown et al., 2007). Responding to feelings of disconnection in an equanimous manner may prevent individuals from engaging in behaviors that could lead to further social disengagement such as avoidance, substance use and self-blame. This is a fruitful area for further research particularly during times like the COVID-19 pandemic where susceptibility to loneliness is increased.

These results should be interpreted within the context of study limitations. A disproportionately large number of participants in our sample self-reported as non-Hispanic/Latinx White which limits the generalizability of these results to diverse populations. Additionally, our sample consists of individuals with heightened levels of anxiety and thus, findings may not be generalizable to individuals without elevated levels of anxiety. The cross-sectional design did not allow investigation of causal relationships between loneliness, coping skills, and psychiatric symptoms. We also did not capture data prior to the implementation of stay-at-home orders and therefore are unable to observe changes in loneliness, coping skills, and psychiatric symptoms over the course of the pandemic. Nonetheless, this study provides preliminary data for future multimethod investigations to assess the long-term interaction between loneliness, coping skills, and mental health. Given restrictions on in-person activities during this time, online recruitment was a feasible way to obtain data and to assess the impact of COVID-19 pandemic on mental well-being across the United States. However, it is important to consider that a population without internet access or barriers to access (such as unfamiliarity with technology) may be experiencing amplified levels of loneliness. Based on our findings, we would expect that individuals both living alone *and* with limited access to technology would be at highest risk for experiencing loneliness.

Given the ongoing restrictions on social gatherings and the association between loneliness and elevated mortality (Holt-Lunstad et al., 2015), research on minimizing feelings of social disconnection is imperative. Future research is needed to determine whether disseminating interventions based on existing levels of social contact (e.g., increasing contact with others vs. mindfulness training) could offer greater reductions in feelings of loneliness. Video conferencing technology has been critical for communication and social interactions during the pandemic. Our findings suggest that increasing access to these services and promoting help-seeking behaviors, such as seeking emotional support, could be a promising approach to buffer against loneliness and negative mental health outcomes.

Data Sharing Statement

The data that support the findings of this study are available on request from the corresponding author.

Declaration of Conflicting Interests

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References

- Åkerlind, I., & Hörnquist, J. O. (1992). Loneliness and alcohol abuse: A review of evidences of an interplay. *Social Science & Medicine*, *34*(4), 405–414. [https://doi.org/10.1016/0277-9536\(92\)90300-F](https://doi.org/10.1016/0277-9536(92)90300-F)
- Behrend, T. S., Sharek, D. J., Meade, A. W., & Wiebe, E. N. (2011). The viability of crowd-sourcing for survey research. *Behavior Research Methods*, *43*, 800–813. <https://doi.org/10.3758/s13428-011-0081-0>
- Berinsky, A. J., Margolis, M. F., & Sances, M. W. (2014). Separating the shirkers from the workers? Making sure respondents pay attention on self-administered surveys. *American Journal of Political Science*, *58*(3), 739–753. <https://doi.org/10.1111/ajps.12081>
- Brown, K. W., Ryan, R. M., & Creswell, J. D. (2007). Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological Inquiry*, *18*(4), 211–237. <https://doi.org/10.1080/10478400701598298>
- Brown, T. A., Chorpita, B. F., Korotitsch, W., & Barlow, D. H. (1997). Psychometric properties of the depression anxiety stress scales (DASS) in clinical samples. *Behaviour Research and Therapy*, *35*(1), 79–89. [https://doi.org/10.1016/S0005-7967\(96\)00068-X](https://doi.org/10.1016/S0005-7967(96)00068-X)
- Campbell-Sills, L., Norman, S. B., Craske, M. G., Sullivan, G., Lang, A. J., Chavira, D. A., Bystritsky, A., Sherbourne, C., Roy-Byrne, P., & Stein, M. B. (2009). Validation of a brief measure of anxiety-related severity and impairment: The Overall Anxiety Severity and Impairment Scale (OASIS). *Journal of Affective Disorders*, *112*(1-3), 92–101. <https://doi.org/10.1016/j.jad.2008.03.014>
- Carver, C. S. (1997). You want to measure coping but your protocol' too long: Consider the brief cope. *International Journal of Behavioral Medicine*, *4*(1), 92–100. https://doi.org/10.1207/s15327558ijbm0401_6
- Casler, K., Bickel, L., & Hackett, E. (2013). Separate but equal? A comparison of participants and data gathered via Amazon's MTurk, social media, and face-to-face behavioral testing. *Computers in Human Behavior*, *29*(6), 2156–2160. <https://doi.org/10.1016/J.CHB.2013.05.009>

- Center for Disease and Control Prevention (2021 August 13). *Social distancing*. Center for Disease and Control Prevention. <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html>
- Cobb, S. (1976). Social support as a moderator of life stress. *Psychosomatic Medicine*, 38(5), 300–314. <https://doi.org/10.1097/00006842-197609000-00003>
- Cooper, C., Katona, C., & Livingston, G. (2008). Validity and reliability of the brief COPE in carers of people with dementia. *Journal of Nervous & Mental Disease*, 196(11), 838–843. <https://doi.org/10.1097/NMD.0B013E31818B504C>
- Curtin, J. (2018). *lmSupport: Support for linear models*. R package version 2.9.13 <https://CRAN.R-project.org/package=lmSupport>
- Czeisler, M. É., Lane, R. I., Petrosky, E., Wiley, J. F., Christensen, A., Njai, R., Weaver, M. D., Robbins, R., Facer-Childs, E. R., Barger, L. K., Czeisler, C. A., Howard, M. E., & Rajaratnam, S. M. W. (2020). Mental health, substance use, and suicidal ideation during the COVID-19 pandemic - United States, June 24–30, 2020. *MMWR. Morbidity and Mortality Weekly Report*, 69(32), 1049–1057. <https://doi.org/10.15585/mmwr.mm6932a1>
- Deckx, L., Van Den Akker, M., Buntinx, F., & Van Driel, M. (2018). A systematic literature review on the association between loneliness and coping strategies. *Psychology, Health & Medicine*, 23(8), 899–916. <https://doi.org/10.1080/13548506.2018.1446096>
- Dumas, T. M., Ellis, W., & Litt, D. M. (2020). What does adolescent substance use look like during the COVID-19 Pandemic? Examining changes in frequency, social contexts, and pandemic-related predictors. *Journal of Adolescent Health*, 67(3), 354–361. <https://doi.org/10.1016/j.jadohealth.2020.06.018>
- Fasihi Harandi, T., Mohammad Taghinasab, M., & Dehghan Nayeri, T. (2017). The correlation of social support with mental health: A meta-analysis. *Electronic Physician*, 9(9), 5212–5222. <https://doi.org/10.19082/5212>
- Hagan, T. L., Fishbein, J. N., Nipp, R. D., Jacobs, J. M., Traeger, L., Irwin, K. E., Pirl, W. F., Greer, J. A., Park, E. R., Jackson, V. A., & Temel, J. S. (2017). Coping in patients with incurable lung and gastrointestinal cancers: A validation study of the brief COPE. *Journal of Pain and Symptom Management*, 53(1), 131–138. <https://doi.org/10.1016/J.JPAINSYMMAN.2016.06.005>
- Hawkey, L. C., Thisted, R. A., & Cacioppo, J. T. (2009). Loneliness predicts reduced physical activity: Cross-sectional & longitudinal analyses. *Health Psychology*, 28(3), 354–363. <https://doi.org/10.1037/a0014400>
- Hawkey, L. C., Thisted, R. A., Masi, C. M., & Cacioppo, J. T. (2010). Loneliness predicts increased blood pressure: 5-year cross-lagged analyses in middle-aged and older adults. *Psychology and Aging*, 25(1), 132–141. <https://doi.org/10.1037/a0017805>
- Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *The British Journal of Clinical Psychology*, 44(Pt 2), 227–239. <https://doi.org/10.1348/014466505X29657>
- Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Cohen Silver, R., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A. K., Shafran, R., Sweeney, A., Worthman, C. M., Yardley, L.,

- Cowan, K., Cope, C., Hotopf, M., & Bullmore, E. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *The Lancet Psychiatry*, 7(6), 547–560. [https://doi.org/10.1016/S2215-0366\(20\)30168-1](https://doi.org/10.1016/S2215-0366(20)30168-1)
- Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality. *Perspectives on Psychological Science*, 10(2), 227–237. <https://doi.org/10.1177/1745691614568352>
- Hostinar, C. E., Sullivan, R. M., & Gunnar, M. R. (2014). Psychobiological mechanisms underlying the social buffering of the hypothalamic-pituitary-adrenocortical axis: A review of animal models and human studies across development. *Psychological Bulletin*, 140(1), 256–282. <https://doi.org/10.1037/a0032671>
- Ingram, I., Kelly, P. J., Deane, F. P., Baker, A. L., Goh, M. C. W., Raftery, D. K., & Dingle, G. A. (2020). Loneliness among people with substance use problems: A narrative systematic review. *Drug and Alcohol Review*, 39(5), 447–483. <https://doi.org/10.1111/DAR.13064>
- Killgore, W. D. S., Cloonan, S. A., Taylor, E. C., & Dailey, N. S. (2020). Loneliness: A signature mental health concern in the era of COVID-19. *Psychiatry Research*, 290, 113117. <https://doi.org/10.1016/j.psychres.2020.113117>
- Killgore, W. D. S., Cloonan, S. A., Taylor, E. C., Miller, M. A., & Dailey, N. S. (2020). Three months of loneliness during the COVID-19 lockdown. *Psychiatry Research*, 293, 113392. <https://doi.org/10.1016/j.psychres.2020.113392>
- Kwag, K. H., Martin, P., Russell, D., Franke, W., & Kohut, M. (2011). The impact of perceived stress, social support, and home-based physical activity on mental health among older adults. *The International Journal of Aging and Human Development*, 72(2), 137–154. <https://doi.org/10.2190/AG.72.2.C>
- Levin, M. E., Lillis, J., Seeley, J., Hayes, S. C., Pistorello, J., & Biglan, A. (2012). Exploring the relationship between experiential avoidance, alcohol use disorders, and alcohol-related problems among first-year college students. *Journal of American College Health*, 60(6), 443–448. <https://doi.org/10.1080/07448481.2012.673522>
- Levine, M. P. (2012). Loneliness and eating disorders. *The Journal of Psychology*, 146(1–2), 243–257. <https://doi.org/10.1080/00223980.2011.606435>
- Li, L. Z., & Wang, S. (2020). Prevalence and predictors of general psychiatric disorders and loneliness during COVID-19 in the United Kingdom. *Psychiatry Research*, 291, 113267. <https://doi.org/10.1016/j.psychres.2020.113267>
- Lindsay, E. K., Young, S., Brown, K. W., Smyth, J. M., & Creswell, J. D. (2019). Mindfulness training reduces loneliness and increases social contact in a randomized controlled trial. *Proceedings of the National Academy of Sciences*, 116(9), 3488–3493. <https://doi.org/10.1073/pnas.1813588116>
- Long, J. A. (2019). Interactions: Comprehensive, User-Friendly Toolkit for Probing Interactions. R package version 1.1.0, <https://cran.r-project.org/package=interactions>.
- Long, J. A. (2020). jtools: Analysis and Presentation of Social Scientific Data. R package version 2.2.0, <https://cran.r-project.org/package=jtools>.
- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the beck depression and

- anxiety inventories. *Behaviour Research and Therapy*, 33(3), 335–343. [https://doi.org/10.1016/0005-7967\(94\)00075-U](https://doi.org/10.1016/0005-7967(94)00075-U)
- Luchetti, M., Lee, J. H., Aschwanden, D., Sesker, A., Strickhouser, J. E., Terracciano, A., & Sutin, A. R. (2020). The trajectory of loneliness in response to COVID-19. *American Psychologist*, 75(7), 897–908. <https://doi.org/10.1037/amp0000690>
- Luo, Y., Hawkey, L. C., Waite, L. J., & Cacioppo, J. T. (2012). Loneliness, health, and mortality in old age: A national longitudinal study. *Social Science & Medicine*, 74(6), 907–914. <https://doi.org/10.1016/j.socscimed.2011.11.028>. Loneliness
- McClelland, H., Evans, J. J., Nowland, R., Ferguson, E., & O'Connor, R. C. (2020). Loneliness as a predictor of suicidal ideation and behaviour: A systematic review and meta-analysis of prospective studies. *Journal of Affective Disorders*, 274, 880–896. <https://doi.org/10.1016/j.jad.2020.05.004>
- Momtaz, Y. A., Hamid, T. A., Yusoff, S., Ibrahim, R., Chai, S. T., Yahaya, N., & Abdullah, S. S. (2012). Loneliness as a risk factor for hypertension in later life. *Journal of Aging and Health*, 24(4), 696–710. <https://doi.org/10.1177/0898264311431305>
- Norman, S. B., Campbell-Sills, L., Hitchcock, C. A., & Sullivan, S., Rochlin, A., Wilkins, K. C., & Stein, M. B. (2011). Psychometrics of a brief measure of anxiety to detect severity and impairment: The overall anxiety severity and impairment scale (OASIS). *Journal of Psychiatric Research*, 45(2), 262–268. <https://doi.org/10.1016/j.jpsychires.2010.06.011>
- Norman, S. B., Hami Cissell, S., Means-Christensen, A. J., & Stein, M. B. (2006). Development and validation of an Overall Anxiety Severity and Impairment Scale (OASIS). *Depression and Anxiety*, 23(4), 245–249. <https://doi.org/10.1002/da.20182>
- Ozbay, F., Johnson, D. C., Dimoulas, E., Morgan, C. A. III, Charney, D., & Southwick, S. (2007). Social support and resilience to stress: From neurobiology to clinical practice. *Psychiatry (Edgmont)*, 4(5), 35–40.
- Perlman, D. (2004). European and Canadian studies of loneliness among seniors. *Canadian Journal on Aging*, 23(2), 477–493. <https://doi.org/10.1353/cja.2004.0025>
- Perlman, D., & Peplau, L. A. (1981). *Toward a social psychology of loneliness*. Academic Press.
- Philpot, L. M., Ramar, P., Roellinger, D. L., Barry, B. A., Sharma, P., & Ebbert, J. O. (2021). Changes in social relationships during an initial “stay-at-home” phase of the COVID-19 pandemic: A longitudinal survey study in the U.S. *Social Science & Medicine*, 274, 113779. <https://doi.org/10.1016/j.socscimed.2021.113779>
- Quintana, A., Lazer, D., Perlis, R. H., Ognyanova, K., Baum, M., Chwe, H., & Uslu, A. (2021 July 8). *The COVID states project #55: Social isolation during the COVID-19 pandemic*. <https://doi.org/10.31219/osf.io/pfxnv>
- R Core Team. (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Russell, D. W. (1996). UCLA loneliness scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, 66(1), 20–40. https://doi.org/10.1207/s15327752jpa6601_2
- Schinka, K. C., Van Dulmen, M. H., Bossarte, R., & Swahn, M. (2012). Association between loneliness and suicidality during middle childhood and adolescence: Longitudinal effects

- and the role of demographic characteristics. *The Journal of Psychology*, 146(1–2), 105–118. <https://doi.org/10.1080/00223980.2011.584084>
- Shah, S. M. A., Mohammad, D., Qureshi, M. F. H., Abbas, M. Z., & Aleem, S. (2021). Prevalence, psychological responses and associated correlates of depression, anxiety and stress in a global population, during the coronavirus disease (COVID-19) pandemic. *Community Mental Health Journal*, 57(1), 101–110. <https://doi.org/10.1007/S10597-020-00728-Y/TABLES/2>
- Shapiro, D. N., Chandler, J., & Mueller, P. A. (2013). Using mechanical turk to study clinical populations. *Clinical Psychological Science*, 1(2), 213–220. <https://doi.org/10.1177/2167702612469015>
- Sinha, R. (2001). How does stress increase risk of drug abuse and relapse? *Psychopharmacology*, 158(4), 343–359. <https://doi.org/10.1007/s002130100917>
- Stravynski, A., & Boyer, R. (2001). Loneliness in relation to suicide ideation and parasuicide: A population-wide study. *Suicide and Life-Threatening Behavior*, 31(1), 32–40. <https://doi.org/10.1521/suli.31.1.32.21312>
- Sun, Y., Li, Y., Bao, Y., Meng, S., Sun, Y., Schumann, G., Kosten, T., Strang, J., Lu, L., & Shi, J. (2020). Brief report: Increased addictive internet and substance use behavior during the COVID-19 pandemic in China. *The American Journal on Addictions*, 29(4), 268–270. <https://doi.org/10.1111/ajad.13066>
- Teo, A. R., Marsh, H. E., Forsberg, C. W., Nicolaidis, C., Chen, J. I., Newsom, J., Saha, S., & Dobscha, S. K. (2018). Loneliness is closely associated with depression outcomes and suicidal ideation among military veterans in primary care. *Journal of Affective Disorders*, 230, 42–49. <https://doi.org/10.1016/j.jad.2018.01.003>
- Valtorta, N. K., Kanaan, M., Gilbody, S., Ronzi, S., & Hanratty, B. (2016). Loneliness and social isolation as risk factors for coronary heart disease and stroke: Systematic review and meta-analysis of longitudinal observational studies. *Heart*, 102(13), 1009–1016. <https://doi.org/10.1136/heartjnl-2015-308790>
- Vassar, M., & Crosby, J. W. (2008). A reliability generalization study of coefficient alpha for the UCLA loneliness scale. *Journal of Personality Assessment*, 90(6), 601–607. <https://doi.org/10.1080/00223890802388624>
- Verma, S., & Mishra, A. (2020). Depression, anxiety, and stress and socio-demographic correlates among general Indian public during COVID-19. *International Journal of Social Psychiatry*, 66(8), 756–762. <https://doi.org/10.1177/0020764020934508>
- Vujčić, I., Safiye, T., Milikić, B., Popović, E., Dubljanin, D., Dubljanin, E., Dubljanin, J., & Čabarkapa, M. (2021). Coronavirus Disease 2019 (COVID-19) epidemic and mental health status in the general adult population of Serbia: A cross-sectional study. *International Journal of Environmental Research and Public Health*, 18(4), 1957. <https://doi.org/10.3390/IJERPH18041957>
- Wong, M. (2020 June). *Stanford research provides a snapshot of a new working-from-home economy*. Stanford News. <https://news.stanford.edu/2020/06/29/snapshot-new-working-home-economy/>

- World Health Organization (2020 February). *Report of the WHO-China joint mission on coronavirus Disease 2019 (COVID-19)*. World Health Organization. <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>
- Zahn, R., Lythe, K. E., Gethin, J. A., Green, S., Deakin, J. F. W., Young, A. H., & Moll, J. (2015). The role of self-blame and worthlessness in the psychopathology of major depressive disorder. *Journal of Affective Disorders, 186*, 337–341. DOI: <https://doi.org/10.1016/J.JAD.2015.08.001>.
- Zimmer-Gembeck, M. J., Nesdale, D., Webb, H. J., Khatibi, M., & Downey, G. (2016). A longitudinal rejection sensitivity model of depression and aggression: Unique roles of anxiety, anger, blame, withdrawal and retribution. *Journal of Abnormal Child Psychology, 44*(44(77)), 1291–1307. <https://doi.org/10.1007/S10802-016-0127-Y>.

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