ORIGINAL RESEARCH

Marital Status Differences in Loneliness Among Older Americans During the COVID-19 Pandemic

Hui Liu[1] · Molly Copeland[2] · Gerald Nowak III[2] · William J. Chopik[3] · Jeewon Oh[4]

Abstract

Guided by the social integration perspective, we conducted one of the first population-based studies on marital status differences in loneliness during the COVID-19 pandemic among older Americans. Analysis of data from the 2020 National Health and Aging Trends Study COVID-19 supplement (n = 2861) suggested that, compared to their married counterparts, divorced and widowed older adults reported higher levels of loneliness during the pandemic, and divorced older adults also felt lonely more often when compared to before the pandemic. These marital status differences in pandemic loneliness cannot be explained by changes in social participation (e.g., working for pay, volunteering, attending religious services, or attending clubs, classes, or other organized activities) or changes in contact frequency with family and friends (via phone calls, emails/texts/social media messages, video calls, or in-person visits). No gender difference was found in the association between marital status and loneliness during the pandemic. These results, coupled with the growth of the unmarried older population, highlight that policymakers, health care providers, and researchers should think creatively about ways to reduce the loneliness gap between married and unmarried groups to promote healthy aging for all older adults, particularly in the face of emerging pandemics that may complicate strategies to improve population health in the future.

Keywords Loneliness · Marital status · COVID-19 pandemic · Social participation · Contact frequency · Gender

✉ Hui Liu
   liu3839@purdue.edu

1   Center on Aging and the Life Course and Department of Sociology, Purdue University, MSEE Room 308B, 501 Northwestern Avenue, West Lafayette, IN 47907, USA

2   Department of Sociology, Michigan State University, 509 E. Circle Drive, 317 Berkey Hall, East Lansing, MI 48824, USA

3   Department of Psychology, Michigan State University, 316 Physics Rd, East Lansing, MI 48824, USA

4   Department of Psychology, Syracuse University, 430 Huntington Hall, Syracuse, NY 13244, USA

One in five Americans feels lonely or socially isolated, with an even higher proportion among older Americans—representing an emerging public health concern in the U.S. (Chen & Feeley, 2014; de Jong Gierveld & Broese van Groenou, 2016; Palosky, 2018). Loneliness, distinct from social isolation, is the state of distress or discomfort that results from subjective or perceived deficiencies in social integration (e.g., via participation in social activities that provide interaction and connection with others) and can be experienced even in the context of large social networks (Tomaka et al., 2006). Loneliness is associated with serious health conditions, including increased risk of cognitive decline, depression, coronary heart disease, and mortality (Cacioppo et al., 2006, 2010; Chen & Feeley, 2014; Luo et al., 2012; Perissinotto et al., 2012; Rico-Uribe et al., 2018). Scholars argue that the need to socially distance during the COVID-19 pandemic has intensified America's loneliness epidemic, especially for older adults who have greater difficulty using new communication technologies to connect with others (Antonucci et al., 2017; Kemper & Lacal, 2004; Moore & Hancock, 2020). Yet, we know little about what social risk or protective factors are predictive of loneliness during the COVID-19 pandemic.

Research has consistently shown that, compared to being unmarried, being married is associated with better health outcomes, while divorce and widowhood are associated with a range of poorer health outcomes, including worse self-rated health, worse cardiovascular health, and higher risk of inflammation-related complications (Liu, 2009; Liu & Waite, 2014; Sbarra, 2009; Waite & Gallagher, 2001; Zhang & Hayward, 2006). However, there is little research on whether the experience of loneliness during the COVID-19 pandemic varies across marital status groups in the U.S. In this study, we examine marital status, one of the most often documented social factors related to individual health and well-being, as a potential protective social factor for loneliness among older Americans during the COVID-19 pandemic.

Using data from the National Health and Aging Trends Study (NHATS) COVID-19 supplement, we provide one of the first population-based studies on marital status differences in loneliness during the pandemic in the U.S. We address three major research questions: (a) Does loneliness during the COVID-19 pandemic vary by marital status among older adults in the U.S.? (b) Do differences in social participation and social contact frequency contribute to marital status differences in loneliness during the pandemic? and (c) Are there gender differences in these patterns? The rapidly growing number of unmarried older adults in the U.S. underscores the importance and relevance of this study. Currently, two out of five Americans aged 65–74 and one out of four Americans aged 75 and older have been divorced (Gurrentz & Mayol-Garcia, 2021). Our findings may help policy makers and practitioners identify vulnerable subpopulations to design effective intervention strategies and programs to reduce loneliness among older adults during the pandemic.

Background

COVID-19 is an infectious disease that threatens global public health. As of June 2022, the pandemic has led to more than 86 million confirmed infections and more than 1 million deaths in the U.S., with disproportionately higher risk of serious illness and

death for older adults (Centers for Disease Control & Prevention, 2022). The implementation of unprecedented social distancing and quarantine strategies to fight against the spread of the novel coronavirus has elevated social isolation and loneliness in the U.S. Emerging studies show that loneliness is highly prevalent during pandemics, especially among older adults (Palgi et al., 2020). Yet, less is known about which groups are more vulnerable than others for experiencing elevated levels of loneliness during the COVID-19 pandemic.

Marital Status and Loneliness: Previous Empirical Evidence

On average, married people tend to be less lonely than unmarried people (Coyle & Dugan, 2012; Hajek & König, 2020; Koropeckyj-Cox, 1998; Peters & Liefbroer, 1997; Steptoe et al., 2006; Štípková, 2021). Although most studies on loneliness combine different types of unmarried people into one homogenous group, primarily due to small sample sizes, recent studies point to the heterogeneity of unmarried groups, suggesting variation in loneliness among the unmarried. For example, previously married people, including divorced and widowed people, consistently report higher loneliness than those who are currently married (Dykstra & de Jong Gierveld, 2004; Essex & Nam, 1987; Koropeckyj-Cox, 1998; van Tilburg et al., 2015). Research further suggests that the death of a spouse (i.e., widowhood) creates much stronger emotional and psychological consequences, and thus more negative effects on health, than divorce (Prigerson et al., 2000; Pudrovska & Carr, 2008). Consistent with this view, a recent cross-sectional study in the Czech Republic found that widowed people reported higher levels of loneliness than divorced people (Štípková, 2021). Although informative, these previous studies did not examine whether such patterns persist in a time of health risk, social distancing, and general upheaval, such as the COVID-19 pandemic.

Loneliness has become an increasing public health concern around the world during the COVID-19 pandemic, especially in its early stages, as people are becoming more isolated than ever before. Google searches for "loneliness" increased significantly during the height of the pandemic (Brodeur et al., 2021). A study of college students in the Central Philippines found that 80% of the sample reported feeling moderately or severely lonely during the mandatory pandemic lockdown in 2020 (Labrague et al., 2021). Limited emerging studies have also identified marital status differences in loneliness during the pandemic. For example, a cross-sectional study in the U.K. found that divorced/separated people were more likely to feel lonely than married or cohabiting people during the pandemic (Groarke et al., 2020). Another cross-sectional study in South Korea found that singles—either living alone or living with family members—reported higher loneliness than their married counterparts (Lee et al., 2021). However, no previous studies have examined marital status differences in pandemic loneliness among the U.S. older population. More importantly, no studies have examined the potential mechanisms underlying marital status differences in loneliness during the pandemic, which we explore here.

A Theoretical Framework Linking Marital Status and Loneliness: The Social Integration Perspective

Although some studies suggest possible selection effects, suggesting that individuals who are less lonely or experiencing better mental health are more likely to get and stay married (Forthofer et al., 1996; Joung et al., 1998; Power et al., 1999), other researchers emphasize marriage as a fundamental social institution that has implications for individuals' health and well-being. One of the major theorized processes through which marriage shapes well-being is social integration. Social integration refers to "the extent to which individuals participate in a variety of social relationships, including engagement in social activities or relationships and a sense of communality and identification with one's social roles" (Holt-Lunstad & Lefler, 2019). This perspective posits that marriage, the most important social tie for many adults, reduces loneliness by providing social integration, particularly among older adults who often face disruption to social relationships, routines, and roles (Cornwell, 2012; Stevens & Westerhof, 2006).

In the social integration perspective, integration through objective social connections and forms of social participation is distinct from perceived loneliness and it is an important factor affecting loneliness among older adults. Greater connection and support from family and friends reduces loneliness for older adults (Chen & Feeley, 2014), and lacking social support and integration is also an important determinant of loneliness in single people (Dykstra, 1995). Some types of non-integration common among older adults, such as bereavement, living alone, or age-related loss of typical social roles, increase loneliness (Cornwell & Laumann, 2015; Finlay & Kobayashi, 2018; Kim et al., 2021). Older adults may then face a greater need for expanding social contacts and participation to reduce loneliness (Cornwell & Laumann, 2015).

Marriage provides beneficial integration at least partially through promoting social participation and contact. First, the marital relationship itself is a key source of support and companionship (Cornwell, 2012; Stevens & Westerhof, 2006). Spouses are often the primary and preferred source for providing emotional, cognitive, and social support that reduces loneliness. This is especially true among older adults, whose marriages show a stronger effect on well-being compared to other relationships (Chen & Feeley, 2014; Stevens & Westerhof, 2006). Second, married individuals often have more diverse social networks (Litwin & Shiovitz-Ezra, 2011) that typically overlap with their spouse's network, creating shared social ties and greater frequency of contact that can provide greater support and resources to benefit mental health and reduce loneliness (Cornwell, 2012; Kalmijn, 2003). Third, marriage may increase one's participation in social activities, including religious services (Litwin & Shiovitz-Ezra, 2011), volunteering (Musick & Wilson, 2003), and organized groups or clubs (Cornwell et al., 2008), as people are more likely to participate in such activities with a companion (e.g., a spouse). Marriage is also associated with greater engagement in paid work, especially for men, which provides both greater economic resources and another avenue of social participation (Moen & Flood, 2013). Overall, social participation is a vital source of support and integration that can provide material and psychosocial resources to benefit subjective mental health and reduce loneliness for married older adults (Li & Ferraro, 2005;

Musick & Wilson, 2003). In contrast, marital dissolution through either divorce or widowhood is linked with less contact with family and friends and perceptions of less support (Glaser et al., 2008).

However, the social integration processes of social participation and contact through marriage may have been modified in the context of the COVID-19 pandemic (Freedman et al., 2021). For example, the stricter "lockdowns" in heightened phases of the pandemic and social distancing measures may have limited people from benefitting from wider social networks or engaging in social activities. These restrictions may modify the potential social benefits for married people. While social distancing and lockdown practices shifted many activities to be virtual, older adults may have been less likely than younger groups to use virtual communication resources, and the extent to which virtual interactions provide integration, support, or high-quality relationships similar to in-person interactions remains unclear (Antonucci et al., 2017). Moreover, in-person visits with family and friends became challenging during the pandemic, especially in its early stages, due to the social distancing and stay-at-home policies, and older adults have more difficulties learning new communication technologies than their younger peers (Antonucci et al., 2017; Kemper & Lacal, 2004; Moore & Hancock, 2020). This might be especially challenging for unmarried older adults who usually have less access to supporting resources. Therefore, it is important to reexamine the marital status differences in loneliness during the COVID-19 pandemic as well as possible explanatory factors in this association.

Gender Differences

We expect that marital status differences in loneliness during the COVID-19 pandemic would vary by gender due to differential vulnerability and resilience to COVID-19 risks. Gender shapes social experiences in ways likely to influence pandemic loneliness and loneliness-related differences based on marital status. For example, women and men experience different levels of loneliness in general, although the empirical evidence is mixed: some studies suggest higher levels of loneliness among women than men (Barnett et al., 2020; Dahlberg et al., 2018); some suggest higher levels of loneliness among men than women (Borys & Perlman, 1985; Wiseman, et al., 1995); yet others suggest no gender differences in loneliness (Maes et al., 2019). In terms of marital status, men are more likely than women to be (re)married (Mouzon et al., 2020). Family and gender scholars also argue that men tend to receive more health-promoting benefits (e.g., social support, enlarged social networks) from marriage than women (Liu & Umberson, 2008; Liu & Waite, 2014; Simon, 2002; Williams & Umberson, 2004). This gap may stem from patterns of traditional marriages, in which wives are more likely to maintain social connections with family, to foster engagement in social activities, and to care for and emotionally support their spouse, while husbands are more likely to receive such benefits from their spouse (Simon, 2002)—all factors that may promote social integration and reduce feelings of loneliness for married men. Consistent with this view, some European studies found evidence for greater marital status differences in loneliness among men than women (Dykstra & de Jong Gierveld, 2004; Dykstra &

Fokkema, 2007). Taken together, we expect that marital status differences in loneliness during the COVID-19 pandemic will be greater for older men than for older women in the U.S.

Research Hypotheses

Together, this line of research suggests the following hypotheses:

Hypothesis 1 Married older adults report lower levels of loneliness during the COVID-19 pandemic than unmarried older adults.

Hypothesis 2 Marital status differences in loneliness during the COVID-19 pandemic are at least partially explained by changes in social participation and contact frequency from before to during the pandemic.

Hypothesis 3 Marital status differences in loneliness during the COVID-19 pandemic are generally greater for men than for women.

Data and Sample

The data were obtained from the National Health and Aging Trends Study (NHATS), a nationally representative survey that is jointly led by the Johns Hopkins University Bloomberg School of Public Health and the University of Michigan (Kasper & Freedman, 2021). The NHATS sample design is drawn from the Medicare enrollment file, with an oversample of persons at older ages and Black individuals. Since 2011, NHATS has gathered information on an annual basis through in-person interviews of Medicare beneficiaries aged 65 and older who live in communities, residential care, or nursing homes within the contiguous United States (i.e., excluding Alaska, Hawaii, and Puerto Rico) in order to foster research that will reduce disability, maximize health and independent functioning, and enhance quality of life at older ages. In 2011, 8245 respondents completed the initial (Round 1) interview (71% response rate). Respondents have been re-interviewed annually to document change over time, with annual attrition rates of 12–18%. In Round 5 (2015), 4,182 refreshment sample respondents were added to maintain representativeness of the older Medicare population (Kasper & Freedman, 2021).

From June through October of 2020, the NHATS administrated a COVID-19 supplemental questionnaire via mail to all sampled persons (SPs) who had previously participated in the 2019 round of data collection. For those who could not participate in the survey due to health issues, proxies filled out the questionnaire (about 8% of the sample). Of the 3,961 SPs and proxies who were eligible to participate, 3257 of these individuals filled out and returned the COVID-19 supplemental questionnaire. The current analysis is based on the cross-sectional sample of 2861 community-dwelling participants (1642 women and 1219 men) who completed the

COVID-19 supplemental questionnaire. We used multiple imputation (M = 20) with multivariate imputation by chained equations in STATA to impute missing values on all analytic variables (StataCorp, 2017).

Measures

Loneliness during the COVID-19 pandemic. Our dependent variables are two loneliness measures. The first was based on the question: "During the COVID-19 outbreak, in a typical week, how often have you felt lonely?" Responses included five categories: never, rarely, some days, most days, and every day, with higher coding indicating greater loneliness. Following this question, NHATS respondents were then asked: "Is this [feeling of loneliness] more often, less often, or about the same as a typical week before the COVID-19 outbreak started?" Response included three categories: more often, less often, or about the same (reference).

Marital status. Marital status was derived from the 2019 round of the NHATS survey, and included three categories: married (reference), divorced/separated, and widowed. We excluded respondents who were cohabiting (n = 52) or never married (n = 79) from the analysis due to small sample sizes. Our additional analysis (results available upon request) including the cohabiting and never married suggested no significant differences in loneliness of these two groups compared to the married.

Changes in social participation during the COVID-19 pandemic. The NHATS COVID-19 supplemental survey asked whether respondents have done any of the following activities either online or in person during the COVID-19 outbreak: (1) working for pay (or in a self-owned business); (2) volunteering; (3) attending religious services; (4) attending clubs, classes or other organized activities. For each of these activities, the response included: (a) yes, online; (b) yes, in person; and (c) no. NHATS Round 9 (i.e., 2019) included comparable binary yes/no measures on participation in the same activities prior to the pandemic.[1] To measure changes in social participation during the pandemic compared to pre-pandemic, we collapsed in-person and online participation during the pandemic so that each type of participation had a binary yes/no response, for consistency with pre-pandemic participation and to avoid small sample sizes. We compared these binary measures of participation prior

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[1] There are two ways to measure social participation before the pandemic in NHATS. First, the NHATS COVID-19 supplement asks questions regarding the social participation before the pandemic (*retrospective* measures). Second, NHATS Round 9 (2019) also provides information on social participation that can be compared to current measures (*prospective* measures). We have tested both ways of constructing the variables for participation changes during vs. before the pandemic. Specifically, we compared *prospective* and *retrospective* measures of pre-pandemic participation with pandemic participation in the COVID-19 supplement data. Both approaches (i.e., using either *prospective* or *retrospective* pre-pandemic participation measures) revealed similar results. Unfortunately, the retrospective measures have more missing values than the prospective measures, which resulted in convergence problems for some regression models in the multiple imputation. Therefore, we report the results using the prospective measures of participation changes in the paper (other results are available upon request). Indeed, prospective measures are theoretically more reliable and have fewer potential sources of bias than retrospective measures (Euser et al., 2009; Vandenbroucke, 2008).

to and during the pandemic to construct mutually exclusive categories of change in participation during the pandemic, as (1) ongoing participation (reference), (2) never participated, (3) stopped participating, and (4) started participating, for each of the four activities.

Changes in contact frequency during the COVID-19 pandemic. The NHATS COVID-19 supplemental survey asked how often respondents were in contact with family and friends not living with them by (1) "Phone calls", (2) "Emails, texts, or social media messages", (3) "Video Calls", and (4) "In person visits" in a typical week before and, separately, during the COVID-19 outbreak. For each of these connection questions, the response ranged from 1) never to (5) at least daily. We compared these measures of contact frequency before and during the pandemic to construct mutually exclusive categories of change in contact frequency during the pandemic, as, (1) remained the same (reference), (2) increased, (3) decreased, for each of the four types of contact.

Other covariates. We controlled for basic sociodemographic covariates including gender (0 = men, 1 = women), age (65–74 [reference], 75–84, and 85 +), race/ethnicity (non-Hispanic White [reference], non-Hispanic Black, Hispanic, and other), and education (less than high school [reference], high school degree or equivalent, some college, and college degree and above). We also included an indicator of whether a *proxy respondent* was used to complete the questionnaire (1 = yes, 0 = no). We further controlled for pre-pandemic depression and self-rated physical health (0 = poor to 4 = excellent) from Round 9 to help to adjust for baseline propensity for loneliness. Depression (range 0–3) was measured based on averaging scores of four items: "Over the last month, how often have you: (a) had little interest or pleasure in doing things; (b) felt down, depressed, or hopeless; (c) felt nervous, anxious, or on edge; (d) been unable to stop or control worrying?" (Kasper & Freedman, 2021). Response categories were: 0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day.

Statistical Analysis

We estimated two sets of regression models to understand marital status differences in the two loneliness outcomes. Specifically, we estimated ordinal logistic regression models to predict loneliness levels during the pandemic and multinomial logistic regression models to predict changes in loneliness comparing before vs. during the pandemic. For each loneliness outcome, we estimated three models. Model 1 examined marital status differences, controlling for basic demographic covariates, self-rated health in 2019, and depression in 2019. Model 2 added changes in social participation and contact frequency during the pandemic as additional controls. Model 3 added gender × marital status interaction terms to test potential gender differences in the associations of marital status with pandemic loneliness, controlling for all covariates. To better understand the possible mediating roles of changes in social participation and contact frequency, we also ran multinomial logistic regression models to estimate marital status differences in each change in social participation and type of contact frequency, and further conducted formal mediation testing using

the Karlson–Holm–Breen (KHB) method to examine whether social participation and contact frequency have significant mediating effects in the association between marital status and loneliness during the pandemic. The KHB method is useful for decomposing the total effect into the direct and indirect effects in non-linear probability models such as logistic models (Karlson et al., 2012). All analyses, except for KHB, were weighted and adjusted for clustering and stratification of complex sampling design using STATA 17 (Freedman et al., 2020; StataCorp, 2017). KHB analysis was not supported by STATA SVY (StataCorp, 2017).

Results

Table 1 shows descriptive statistics for all analyzed variables for the total sample as well as by marital status prior to imputation. In our sample, divorced (mean = 2.36) and widowed (mean = 2.36) respondents on average reported higher levels of loneliness during the pandemic than married (mean = 2.13) respondents. Compared to married respondents, divorced respondents were more likely to have never volunteered and more likely to have never attended religious services, clubs, classes or other organized activities both before and during the pandemic. Widowed respondents were less likely to work for pay both before and during the pandemic and more likely to experience no change in contact with family and friends using video calls or in-person visits compared to before the pandemic.

Table 2 shows estimated marital status differences in pandemic loneliness (Panel A) and change in loneliness before vs. during the pandemic (Panel B). Results in Model 1 of Panel A suggest that after all covariates are controlled, divorced (OR = 1.61, p < 0.001) and widowed (OR = 1.69, p < 0.001) respondents had higher odds of reporting greater loneliness during the pandemic than married respondents. When comparing the change in loneliness from before to during the pandemic (Panel B), divorced respondents (RRR = 1.45, p < 0.05, Model 1) were also more likely than married respondents to feel lonely more often.

Model 2 of Table 2 added additional controls for changes in participation and contact frequency during the pandemic. These results suggest that deceased frequency of in-person contact was related to both higher levels of pandemic loneliness (OR = 1.27, p < 0.05, Model 2 of Panel A) and higher odds of feeling lonely more often during the pandemic compared to before the pandemic (RRR = 1.95, p < 0.001, Model 2 of Panel B). Yet, decreased frequencies of other virtual contacts including phone calls, texts/emails/messages, and video calls were generally not related to either the levels (Panel A) or change (Panel B) of loneliness during the pandemic (Model 2). Older adults who never participated in paid work before or during the pandemic tended to feel lonely more often (i.e., less likely to feel lonely less often) compared to before the pandemic than those who continuously participated in paid work (RRR = 0.26, p < 0.01, Model 2 of Panel B). Interestingly, older adults who never participated in clubs or other group activities tended to feel lonely less often (i.e., less likely to feel lonely more often) compared to before the pandemic than those who continuously participated in these activities (RRR = 0.63, p < 0.05, Model 2 of Panel B). After adding social participation factors in Model 2, the significant

Table 1 Weighted Descriptive Statistics of Analytic Variables Prior to Imputation

Variables	Total N	%/Mean (SD)	Married %/Mean (SD)	Divorced %/Mean (SD)	Widowed %/Mean (SD)
Loneliness					
Pandemic loneliness (1–5)	2672	2.13 (1.00)	1.98 (0.94)	2.36*** (1.10)	2.36*** (1.02)
Loneliness change (%)	2631				
About the same (ref)	2016	74.94	77.29	66.39***	74.38
Less often	84	2.96	2.28	5.17	3.25
More often	531	22.10	20.43	28.43	22.37
Change in participation					
Worked for pay (%)	2650				
Always participated (ref)	223	11.15	12.01	14.06	7.62
Never participated	2205	79.24	78.40	74.44	83.75**
Stopped participating	177	8.00	7.71	10.17	7.49
Started participating	45	1.6	1.87	1.32	1.14
Volunteered (%)	2625				
Always participated (ref)	235	10.22	11.40	8.56	8.41
Never participated	1,822	67.42	65.27	72.41*	69.64
Stopped participating	512	19.96	20.68	16.45	20.22
Started participating	56	2.40	2.65	2.58	1.73
Attended religious services (%)	2611				
Always participated (ref)	894	33.03	35.02	21.35*	34.81
Never participated	971	40.61	39.49	56.18***	34.74
Stopped participating	661	23.56	22.53	20.54	27.56
Started participating	85	2.8	2.96	1.92	2.89
Attended clubs, classes, or other activities (%)	2625				
Always participated (ref)	325	14.21	15.33	12.33	12.65
Never participated	1434	52.74	51.00	60.79*	52.41
Stopped participating	784	29.54	29.70	23.09	32.65
Started participating	82	3.51	3.97	3.78	2.29
Change in contact frequency					
Phone contact (%)	2652				
No change (ref)	1905	71.75	70.90	69.71	74.91
Contact increased	276	10.41	10.58	10.51	9.96
Contact decreased	471	17.84	18.52	19.78	15.13
Email/text messages/social media contact (%)	2483				
No change (ref)	1924	77.83	77.63	75.03	79.88
Contact increased	180	6.71	5.83	10.27	6.79
Contact decreased	379	15.46	16.54	14.70	13.32
Video call contact (%)	2463				
No change (ref)	1921	76.46	74.72	75.52	81.17**
Contact increased	323	15.36	16.93	16.33	11.04

Table 1 (continued)

Variables	Total N	%/Mean (SD)	Married %/Mean (SD)	Divorced %/Mean (SD)	Widowed %/Mean (SD)
Contact decreased	219	8.18	8.35	8.15	7.79
In-person contact (%)	2590				
No change	1410	53.01	51.69	50.23	57.58*
Contact increased	201	6.89	6.64	8.29	6.68
Contact decreased	979	40.10	41.67	41.48	35.73
Covariates					
Participants' gender (%)	2861				
Men (ref)	1219	44.92	57.83	35.75***	20.82***
Women	1642	55.08	42.17	64.25***	79.18***
Participants' age (%)	2861				
65 to 74 (ref)	699	43.43	49.18	50.37	26.63***
75 to 84	1479	44.15	43.55	43.06	46.12
85 or older	683	12.42	7.27	6.57	27.26***
Participants' race/ethnicity (%)	2824				
White (ref)	2162	84.42	87.35	75.77***	82.60**
Black	477	6.29	3.83	13.30**	7.99
Hispanic	124	5.92	4.8	8.69	6.91
Other	61	3.37	4.02	2.24	2.51
Participants' education (%)	2826				
Less than HS diploma (ref)	401	10.81	8.71	14.20	13.68
High school diploma	938	31.24	28.31	28.26	39.50***
Some college to four-year degree	1033	40.47	42.17	42.69	35.39*
Master's, prof. degree, doctorate	454	17.49	20.81	14.86	11.43*
Depression 2019 (0-3)	2836	0.33 (0.50)	0.29 (0.44)	0.42*** (0.55)	0.38*** (0.55)
Self-rated health 2019 (0-4)	2860	2.42 (0.97)	2.49 (0.95)	2.24*** (0.96)	2.34*** (0.98)

***p < .001, **p < .01, *p < .05: T-tests for continuous variables and tests of proportions for categorical variables were conducted to compare married and specific unmarried groups

difference of the divorced and widowed compared to the married remains unchanged for both levels (Panel A) and change (Panel B) in loneliness (comparing Models 1 and 2). Results in Model 3 of Table 2 suggest no significant gender differences in the relationship between marital status and the two loneliness outcomes, although women in general reported higher levels of loneliness during the pandemic (Panel A), and also felt lonely more often when compared to before the pandemic (Panel B) than did men.

Table 3 shows regression results for estimated marital status differences in social participation and contact frequency during the pandemic, revealing a few significant patterns. First, compared to their married counterparts, divorced older adults were more likely to never attend religious service (RRR = 2.60, p < 0.001, Model

Table 2 Estimated Marital Status Differences in Pandemic Loneliness Outcomes (N = 2861)

	A. Loneliness during pandemic (ordinal logit)			B. Change in loneliness before vs. during the pandemic (multinomial logit)					
	Model 1	Model 2	Model 3	Model 1		Model 2		Model 3	
	OR (95% CI)	OR (95% CI)	OR (95% CI)	Less often RRR (95% CI)	More often RRR (95% CI)	Less often RRR (95% CI)	More often RRR (95% CI)	Less often RRR (95% CI)	More often RRR (95% CI)
Marital status (ref: married or cohabiting)									
Divorced	1.61*** (1.23–2.10)	1.62*** (1.25–2.10)	1.92** (1.26–2.91)	1.77 (0.72–4.37)	1.45* (1.04–2.02)	1.77 (0.76–4.09)	1.46* (1.04–2.06)	1.46 (0.45–4.64)	1.18 (0.56–2.50)
Widowed	1.69*** (1.37–2.08)	1.74*** (1.40–2.16)	2.21*** (1.46–3.33)	1.27 (0.62–2.57)	1.03 (0.75–1.42)	1.29 (0.64–2.61)	1.08 (0.78–1.49)	0.66 (0.18–2.35)	1.33 (0.71–2.49)
Women	1.78*** (1.48–2.15)	1.69*** (1.38–2.07)	1.89*** (1.50–2.38)	1.23 (0.64–2.38)	1.98*** (1.499–2.62)	1.24 (0.62–2.45)	1.77*** (1.31–2.39)	0.97 (0.38–2.52)	1.76** (1.19–2.61)
Change in participation (ref: ongoing participation)									
Worked for pay									
Never participated		1.25 (0.94–1.67)	1.25 (0.94–1.66)			0.26** (0.10 –0.68)	1.38 (0.89–2.14)	0.27** (0.10–0.71)	1.38 (0.89–2.15)
Stopped participating		1.40 (0.89–2.20)	1.39 (0.89–2.19)			0.77 (0.22–2.70)	1.47 (0.76–2.83)	0.78 (0.23–2.67)	1.49 (0.78–2.86)
Started participating		0.88 (0.41–1.92)	0.85 (0.38–1.89)			1.09 (0.20–5.79)	0.30 (0.06–1.56)	1.15 (0.21–6.18)	0.31 (0.06–1.60)
Volunteered									
Never participated		1.24 (0.96–1.61)	1.23 (0.96–1.60)			0.70 (0.27–1.86)	1.35 (0.82–2.23)	0.72 (0.27–1.93)	1.35 (0.81–2.23)
Stopped Participating		1.29 (0.89–1.88)	1.30 (0.89–1.88)			0.59 (0.16–2.18)	1.51 (0.87–2.63)	0.60 (0.16–2.20)	1.51 (0.87–2.63)

Table 2 (continued)

	A. Loneliness during pandemic (ordinal logit)			B. Change in loneliness before *vs.* during the pandemic (multinomial logit)					
	Model 1	Model 2	Model 3	Model 1		Model 2		Model 3	
				Less often	More often	Less often	More often	Less often	More often
	OR (95% CI)	OR (95% CI)	OR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)
Started Participating		0.85	0.85			0.32	1.54	0.33	1.56
		(0.45–1.61)	(0.45–1.61)			(0.04–2.84)	(0.57–4.17)	(0.04–2.83)	(0.58–4.22)
Attended religious services									
Never participated		0.99	0.99			0.96	0.93	0.96	0.93
		(0.79–1.24)	(0.79–1.24)			(0.47–1.98)	(0.68–1.27)	(0.47–1.97)	(0.68–1.28)
Stopped participating		1.04	1.04			0.92	0.83	0.92	0.82
		(0.78–1.40)	(0.78–1.40)			(0.36–2.37)	(0.58–1.18)	(0.36–2.31)	(0.57–1.18)
Started participating		1.21	1.21			1.39	1.03	1.37	1.03
		(0.63–2.31)	(0.63–2.33)			(0.26–7.56)	(0.48–2.21)	(0.25–7.34)	(0.48–2.21)
Attended clubs or other activities									
Never participated		0.91	0.91			1.62	0.63*	1.63	0.63*
		(0.65–1.28)	(0.65–1.28)			(0.49–5.38)	(0.40–0.98)	(0.49–5.40)	(0.40–0.99)
Stopped participating		0.86	0.85			3.00	0.69	3.02	0.68
		(0.63–1.16)	(0.63–1.15)			(0.95–9.45)	(0.46–1.01)	(0.96–9.53)	(0.46–1.01)
Started participating		0.85	0.86			1.21	0.61	1.18	0.61
		(0.42–1.74)	(0.42–1.76)			(0.14–10.41)	(0.25–1.49)	(0.14–10.03)	(0.25–1.50)
Change in contact frequency (ref: no change)									
Phone calls									

Table 2 (continued)

| | A. Loneliness during pandemic (ordinal logit) | | | B. Change in loneliness before vs. during the pandemic (multinomial logit) | | | | | |
| | Model 1 | Model 2 | Model 3 | Model 1 | | Model 2 | | Model 3 | |
	OR (95% CI)	OR (95% CI)	OR (95% CI)	Less often RRR (95% CI)	More often RRR (95% CI)	Less often RRR (95% CI)	More often RRR (95% CI)	Less often RRR (95% CI)	More often RRR (95% CI)
Contact increased	1.00	1.00 (0.69–1.45)	1.01 (0.69–1.46)			0.50 (0.16–1.59)	0.70 (0.44–1.13)	0.51 (0.16–1.60)	0.70 (0.44–1.12)
Contact decreased		1.09 (0.85–1.42)	1.09 (0.84–1.41)			0.84 (0.39–1.83)	1.21 (0.85–1.73)	0.85 (0.39–1.85)	1.21 (0.85–1.73)
Emails/texts/messages									
Contact increased		1.23 (0.83–1.83)	1.22 (0.82–1.81)			2.11 (0.69–6.43)	1.32 (0.76–2.31)	2.11 (0.70–6.37)	1.33 (0.77–2.30)
Contact decreased		1.08 (0.82–1.42)	1.07 (0.81–1.41)			2.00 (0.97–4.11)	0.88 (0.63–1.24)	2.02 (0.98–4.19)	0.88 (0.63–1.24)
Video calls									
Contact increased		1.18 (0.88–1.57)	1.17 (0.88–1.56)			0.77 (0.28–2.12)	1.47 (1.00–2.21)	0.79 (0.29–2.15)	(0.98–2.21)
Contact decreased		1.39 (1.00–1.94)	1.41* (1.02–1.97)			1.81 (0.83–3.95)	1.14 (0.71–1.84)	1.77 (0.81–3.88)	(0.71–1.84)
In-person visits									
Contact increased		1.00 (0.70–1.45)	1.01 (0.70–1.45)			0.94 (0.30–3.00)	1.09 (0.58–2.06)	0.94 (0.30–2.95)	1.09 (0.58–2.07)
Contact decreased		1.27* (1.03–1.56)	1.27* (1.04–1.564)			0.95 (0.54–1.69)	1.95*** (1.49–2.56)	0.95 (0.54–1.67)	1.95*** (1.49–2.57)

Table 2 (continued)

	A. Loneliness during pandemic (ordinal logit)			B. Change in loneliness before *vs.* during the pandemic (multinomial logit)					
	Model 1	Model 2	Model 3	Model 1		Model 2		Model 3	
				Less often	More often	Less often	More often	Less often	More often
	OR (95% CI)	OR (95% CI)	OR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)
Gender interactions									
Divorced X women			0.75					1.45	
			(0.41–1.37)					(0.29–7.20)	(0.54–3.33)
Widowed X women			0.71					2.46	
			(0.42–1.18)					(0.51–11.90)	(0.37–1.63)

All models controlled for demographic covariates, self-rated physical health in 2019, and depression in 2019.

Base category for Panel B is "about the same"

***p < .001, **p < .01, *p < .05; OR: Odds Ratios; RRR: Relative Risk Ratios.

3 of Panel A), but more likely to increase contact using emails/texts/messages during the pandemic (RRR = 1.82, p < 0.05, Model 6 of Panel B). Second, compared to their married counterparts, widowed older adults were less likely to increase contact using video calls (RRR = 0.58, p < 0.05, Model 7 of Panel B) during the pandemic. The KHB formal mediating analysis (Table 4) suggested that none of the social participation and contact frequency factors had a significant mediating effect in the relationship between marital status and loneliness, indicated by the non-significant indirect effects in Table 4.

Discussion

Loneliness has been increasingly recognized as a common concern for older Americans (Cacioppo et al., 2010; Chen & Feeley, 2014), which was exacerbated by the COVID-19 pandemic (Krendl & Perry, 2021). However, it is unclear whether loneliness is more prevalent among certain social groups (e.g., marital status groups) than others during the pandemic, or whether any differences are due to differences in social participation and contact. This study is one of the first to use nationally representative data to examine marital status as a potential social risk/protective factor for loneliness during the COVID-19 pandemic among U.S. older adults. Guided by the social integration perspective, we advance this literature by testing a range of social participation factors as key potential mechanisms underlying the marital status differences in loneliness during the pandemic, with attention to gender differences in this link.

First, we found that compared to their married counterparts, divorced and widowed older adults reported higher levels of loneliness during the pandemic, and divorced older adults also felt lonely more often compared to before the pandemic. These findings are consistent with our hypothesis (Hypothesis 1) as well as the general literature suggesting that married people enjoy better health and well-being than unmarried people (Groarke et al., 2020; Lee et al., 2021; Liu & Umberson, 2008). This is one of the first studies to show that the "marital advantage" extends to loneliness during the COVID-19 pandemic, despite the possibility that social integration processes related to marriage may have been modified during the social distancing measures of the COVID-19 pandemic (Freedman et al., 2021).

We also move beyond previous literature to test changes from before to during the pandemic in social participation and contact frequency as potential mechanisms linking marital status to loneliness. We found some evidence for marital status differences in social participation and contact changes during the pandemic. Specifically, compared to their married peers, divorced older adults were less likely to attend religious services both before and during the pandemic, but they were more likely to increase their contact with friends and family by emails/texts/messages during the pandemic compared to before the pandemic. One possibility is that divorced older adults may have adjusted to the life of lacking a spouse and may have been accustomed to such kinds of communication techniques before the pandemic, which may help protect them from pandemic disruptions. Divorced older adults may rely more heavily on contact with others outside of the household via virtual means. This

Table 3 Estimated Marital Status Differences in Changes in Social Participation and Contact Frequency from Before to During the Pandemic (N=2861)

A. change in participation (Multinomial Logit, Base category = ongoing participation)

Model 1: Worked for Pay / Model 3: Attended religious services

	Never participated RRR	95% CI	Stopped participating RRR	95% CI	Started participating RRR	95% CI
Marital Status (ref: married)						
Model 1: Worked for Pay						
Divorced	0.62	0.38–1.01	0.99	0.51–1.92	0.49	0.08–2.88
Widowed	0.88	0.54–1.44	1.15	0.62–2.13	0.70	0.22–2.23
Marital Status (ref: married)						
Model 3: Attended religious services						
Divorced	2.60***	1.68–4.03	1.40	0.92–2.11	0.92	0.38–2.22
Widowed	1.20	0.90–1.60	1.10	0.82–1.48	0.82	0.40–1.70

Model 2: Volunteered / Model 4: Attended clubs or other activities

	Never participated RRR	95% CI	Stopped participating RRR	95% CI	Never participated RRR	95% CI
Model 2: Volunteered						
Divorced	1.26	0.82–1.94	0.96	0.52–1.76	1.27	0.45–3.58
Widowed	1.14	0.73–1.78	1.06	0.68–1.65	0.80	0.29–2.21
Model 4: Attended clubs or other activities						
Divorced	1.37	0.84–2.23	0.89	0.54–1.48	1.22	0.53–2.79
Widowed	0.95	0.63–1.43	0.95	0.59–1.52	0.74	0.33–1.66

B. Change in contact frequency (Multinomial Logit, base category = no change)

Model 5: Phone calls / Model 7: Video calls

	Contact increased RRR	95% CI	Contact decreased RRR	95% CI
Marital status (ref: married)				
Model 5: Phone calls				
Divorced	1.06	0.66–1.70	1.10	0.79–1.54
Widowed	1.01	0.65–1.58	0.79	0.55–1.15
Marital status (ref: married)				
Model 7: Video calls				
Divorced	0.88	0.55–1.41	0.84	0.53–1.33
Widowed	0.58*	0.38–0.89	0.71	0.46–1.10

Model 6: Emails/texts/messages / Model 8: In-person visits

	Contact increased RRR	95% CI	Contact decreased RRR	95% CI
Model 6: Emails/texts/messages				
Divorced	1.82*	1.05–3.14	0.90	0.56–1.47
Widowed	1.15	0.64–2.06	0.75	0.49–1.14
Model 8: In-person visits				
Divorced	1.22	0.69–2.18	0.98	0.71–1.36
Widowed	0.80	0.51–1.26	0.78	0.61–1.00

All models controlled for demographic covariates, self-rated physical health in 2019, and depression in 2019

***$p < .001$, **$p < .01$, *$p < .05$; OR: Odds Ratios; RRR: Relative Risk Ratios

Table 4 KHB Analysis for Pandemic Loneliness Outcomes

	A. Loneliness during the pandemic (ordinal logit)		B. Change in loneliness before vs. during the pandemic (multinomial logit)			
	Divorced	Widowed	Less often		More often	
			Divorced	Widowed	Divorced	Widowed
Change in participation (ref: ongoing participation)						
Worked for pay						
Total effects	0.37**	0.39***	0.12	− 0.30	0.22	− 0.18
Direct effects	0.37**	0.38***	0.10	− 0.31	0.23	− 0.18
Indirect effects	− 0.00	0.00	0.03	0.01	− 0.01	− 0.00
Volunteered						
Total effects	0.37**	0.39***	0.10	− 0.32	0.23	− 0.17
Direct effects	0.37**	0.38***	0.10	− 0.31	0.23	− 0.18
Indirect effects	− 0.00	0.01	− 0.00	− 0.01	− 0.00	0.01
Attended religious services						
Total effects	0.37**	0.38***	0.14	− 0.31	0.22	− 0.18
Direct effects	0.37**	0.38***	0.10	− 0.31	0.23	− 0.18
Indirect effects	− 0.01	− 0.00	0.04	0.01	− 0.01	− 0.00
Attended clubs or other activities						
Total effects	0.37**	0.39***	0.08	− 0.24	0.21	− 0.17
Direct effects	0.37**	0.38***	0.10	− 0.31	0.23	− 0.18
Indirect effects	− 0.00	0.00	− 0.02	0.07	− 0.02	0.01
Change in contact frequency (ref: no change)						
Phone calls						
Total effects	0.37**	0.48***	− 0.12	− 0.38	0.32	− 0.02
Direct effects	0.37**	0.49***	− 0.13	− 0.38	0.32	− 0.02
Indirect effects	− 0.00	− 0.00	0.00	− 0.00	0.00	− 0.00
Emails/texts/messages contact/social media						
Total effects	0.38**	0.49***	− 0.11	− 0.39	0.33*	− 0.02
Direct effects	0.37**	0.49***	− 0.13	− 0.38	0.32	− 0.02
Indirect effects	0.01	0.00	0.01	− 0.02	0.01	0.01
Video calls						
Total effects	0.37**	0.48***	− 0.13	− 0.37	0.31	− 0.04
Direct effects	0.37**	0.49***	− 0.13	− 0.38	0.32	− 0.02
Indirect effects	− 0.00	− 0.00	0.00	0.01	− 0.01	− 0.01
In-person visits						
Total effects	0.37**	0.48***	− 0.13	− 0.37	0.32	− 0.04
Direct effects	0.37**	0.49***	− 0.13	− 0.38	0.32	− 0.02
Indirect effects	0.00	− 0.00	− 0.00	0.00	0.00	− 0.02

***$p < .001$, **$p < .01$, *$p < .05$. Analytic samples are unweighted. Marital status reference group is "married."

reliance on others likely increases contact compared to married adults who can rely upon a spouse, even in the face of the pandemic disruptions. In contrast, widowed older adults were less likely than their married peers to increase their contacts with friends and family using video calls. Because widowed adults are generally the oldest across all marital status groups, they may have more difficulties (e.g., to have someone to teach them) and challenges (e.g., cognitive ability) in learning new communication technologies. Future studies should explore the specific reasons behind these identified marital status differences in participation and communication during the pandemic.

Notably, virtual contacts including phone calls, texts/emails/messages and video calls, did little to reduce loneliness during the pandemic. One explanation is that older adults who felt lonely were more likely to engage in virtual contacts—suggesting a potential selection process. Alternatively, the integrative benefits of social contacts may not consistently translate to virtual environments for older adults. Future work should examine distinct effects of in-person and virtual social contacts, selection into in-person and virtual contacts during a pandemic, and/or psychological mechanisms that link different types of contacts to loneliness.

Further, we found no evidence that changes in social participation and contact frequency explain marital status differences in loneliness during the pandemic (inconsistent with Hypothesis 2). Although changes in social participation and contact provide the potential for interaction and integration, they do not necessarily explain the greater feelings of loneliness among divorced and widowed older adults. The lack of significant findings regarding changes in social participation and contact frequency in explaining marital status differences in loneliness suggests that these types of community, social, economic, and family connections are relatively accessible to people of all marital statuses. Indeed, unmarried individuals can pursue such opportunities without spouses, and participation and contact decisions can more directly stem from individual choices (rather than joint decisions or activities with a spouse). It is also likely that the social integration process of marriage via social participation and contact is modified in the context of the COVID-19 pandemic (Freedman et al., 2021). Because married individuals experience higher levels of social control or regulation than unmarried individuals (Idler et al., 2012), they may be more likely to follow preventative measures, including social distancing, during the pandemic. In this sense, social distancing and lockdown practices may limit married people from benefitting from wider social networks or engaging in social activities. The modified social integration process of marriage via social participation and contact that occurred during the pandemic may explain the unexpected nonsignificant role of social participation and contact in linking marital status to loneliness.

Finally, inconsistent with Hypothesis 3, we found no evidence for gender differences in loneliness during the pandemic across marital status groups. Previous research suggests that married men usually rely on their spouses to be their confidants, while married women have wider networks of friends and relatives as confidants (Williams & Umberson, 2004). Therefore, we had expected that having a spouse may be more important for men's social support networks than women's (Lee et al., 2001; Liu & Umberson, 2008). Yet, our results suggested no significant gendered patterns in the associations between marital status and loneliness during

the pandemic. It is likely that learned gender roles tend to diminish with age due to the biological and social changes that occur in old age overwhelming their influence (Carmel, 2019). Nevertheless, other specific pathways linking marital status and pandemic loneliness may vary by gender despite no gender difference in the overall association, so this question warrants future research.

This study has several limitations. First, our measure of loneliness is based on two single-item measures, one of which involved a retrospective assessment of loneliness prior to the pandemic compared to loneliness during the pandemic. The limited coverage of loneliness may have precluded our ability to fully capture the range and granularity of loneliness among older adults. Second, after changes in social participation and contact frequency were controlled, there were still sizable pandemic loneliness differences between the married and divorced or widowed groups. Future studies should investigate additional factors, including social support and relationship quality, and use more precise measures of social participation (e.g., frequency of attending social activities) that might explain the association between marital status and pandemic loneliness. Third, the current analysis did not test how the specific context of marital relationships, such as timing and duration of divorce and widowhood or relationship quality, mattered for pandemic loneliness. Studies suggest that marital history and quality may be more important than marital status per se in shaping individual health and well-being (Purol et al., 2021; Williams & Umberson, 2004). Future studies should consider the history of marital relationships and transitions when studying pandemic-related outcomes. Fourth, the NHATS COVID-19 supplemental data were collected early in the COVID-19 pandemic prior to vaccine availability. Our findings may be limited to this particular stage of the pandemic. Future studies should investigate how social participation and loneliness change across marital status groups as the COVID-19 pandemic goes through different stages and more data become available. Finally, although we built our research hypotheses based on causal implications from previous studies, our analyses document general associations rather than structured designs from which we can infer causality. Therefore, we cannot rule out reverse causation (i.e., loneliness may affect subsequent marital status) or a possible marriage selection effect (i.e., people who had lower levels of loneliness may be more likely to get and stay married or participate in social activities).

Conclusion and Policy Implications

The COVID-19 pandemic continues to exacerbate the loneliness epidemic in the U.S., especially among older adults who are most vulnerable. This study makes important contributions to the general marriage and health literature by extending prior research to loneliness during the COVID-19 pandemic. The results, which are based on a nationally representative sample of U.S. older adults, suggest that being divorced or widowed in later life is a risk factor for elevated loneliness during the pandemic. Although there is literature which suggests that, relative to unmarried people, married individuals may experience greater integration within religious and spiritual practices as well as greater participation in other social activities (of which

we found some evidence in the current study) (Mahoney et al., 1999; Thornton et al., 1992), the social activities and contact analyzed in the present study did not explain the elevated loneliness among divorced and widowed older adults relative to their married counterparts during the pandemic.

Given the significant changes in the family structure of older adults over the past few decades, our results have important policy implications. For instance, as people live longer and their marital histories become more complex, the number of divorced and widowed older adults in the U.S. continues to grow. In comparison to their married counterparts, divorced and widowed older adults are at significant disadvantages with respect to socioeconomic resources, health, and social integration (Lin & Brown, 2012)—which may make them more vulnerable to devastating consequences stemming from the COVID-19 pandemic. It is important to explore the specific pathways that contribute to increased loneliness for divorced and widowed older adults during the pandemic. We urge policymakers, health care providers, and researchers to think creatively about ways to reduce the loneliness gap between married and unmarried groups and promote healthy aging for all older adults, particularly in the face of emerging pandemics that may complicate future strategies to improve population health. Pinpointing the specific reasons for increased loneliness among certain subpopulations can enable us to provide recommendations for practical steps people can take to reduce loneliness. This knowledge will aid in the design and implementation of effective interventions that reduce the risks and negative consequences of loneliness during the current and future pandemics.

Declarations

Conflict of interest　The Authors declared that there is no conflict of interest.

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