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Are healthcare workers particularly vulnerable to loneliness? The role of social relationships and mental well-being during the COVID-19 pandemic

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ABSTRACT

Loneliness is a major public health issue with renewed prominence due to the COVID-19 pandemic and associated social restrictions. Healthcare workers (HCWs) may be at heightened risk, but research is lacking. We measured the prevalence of loneliness among HCWs during the pandemic in 2020 and examined pre-pandemic predictors and pandemic experiences associated with loneliness. HCWs at a designated COVID-19 hospital in Sydney, Australia completed an online survey examining health and well-being before and during the pandemic and changes to work, family and social experiences. Loneliness had negatively affected the well-being of 129 (39%) respondents (n = 330). Pre-pandemic factors predicting loneliness were younger age (<30 years compared to ≥50 years), having ever been told you had a mental health problem and living alone. These became non-significant when pandemic-related factors were added to the regression. Less contact with family and friends, increased conflict at home, and living alone or with family but not a partner, increased the odds of loneliness, while a sense of camaraderie with colleagues had the opposite effect. Psychological distress and poor mental health during the pandemic were also positively associated with loneliness. Efforts to promote congenial social contacts may be effective in averting loneliness among HCWs.

1. Introduction

Loneliness is increasingly recognised as a major public health concern affecting people across the globe (Holt-Lunstad, 2021; Smith and Lim, 2020). Loneliness, the subjective feeling of being socially isolated, is the perceived discrepancy between one’s social needs and what one receives from their social environment (Hawkley and Capitanio, 2015). It is not necessarily synonymous with being alone (Mushtaq et al., 2014) and has been described as the ‘psychological counterpart’ (Shankar et al., 2011) of the objective construct of social isolation. The association between loneliness and social isolation is weak to moderate (Shankar et al., 2011).

The public health impact of loneliness relates to its adverse physical and mental health consequences. The odds of death are 26% higher among those who report being lonely (Holt-Lunstad et al., 2015) and elevated morbidity associated with loneliness includes coronary heart disease, stroke, hypertension, chronic pain and obesity (Hawkley and Cacioppo, 2010; Wang et al., 2018). Loneliness is associated with a greater risk of detrimental health behaviours such as physical inactivity, smoking and alcohol abuse (Beutel et al., 2017; Hawkley and Cacioppo, 2010; Shankar et al., 2011). Loneliness is also related to adverse mental health outcomes, including depression, anxiety, suicidal ideation, parasuicide and suicide (Beutel et al., 2017; Hawkley and Cacioppo, 2010; Killgore et al., 2020; Mushtaq et al., 2014; Wang et al., 2018). Lonely people are more likely to be depressed (Fang et al., 2021; McQuaid et al., 2021; Repon et al., 2021), have anxiety (McQuaid et al., 2021; Repon et al., 2021), score higher on suicidal ideation (Killgore et al., 2020; McQuaid et al., 2021) and report higher psychological distress (De Sio et al., 2020, 2021). The relationship between loneliness and mental health is likely bidirectional (Bu et al., 2020; Wang et al., 2018). Impaired cognitive functioning and cognitive decline are predicted by loneliness, which increases the risk of dementia more than 2-fold (Hawkley and Cacioppo, 2010; Mushtaq et al., 2014).

Government-instigated efforts to mitigate the spread of COVID-19 have been enacted across the world and have included social distancing, self-isolation, and stay at home orders that restrict non-essential movement. The resultant social disconnection has raised concerns about ‘lockdown loneliness’ (Shah et al., 2020). Discussions about the effects of COVID-19 must acknowledge its current and future psychological impact including the increased loneliness that many have experienced (Cabello et al., 2021; Cowan., 2020; Fang et al., 2021; Holmes et al., 2020; Holt-Lunstad, 2021; Killgore et al., 2020). Elevated levels of loneliness during the pandemic are evident across the globe and

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have been reported among the general population (Bu et al., 2020; Cabello et al., 2021; Khan and Kadoya, 2021; Killgore et al., 2020; O’Sullivan et al., 2021; Pai and Vella, 2021; Tutzer et al., 2021) and healthcare workers (HCWs) (Cabello et al., 2021; De Sio et al., 2020, 2021; Repon et al., 2021). The combined prevalence of severe loneliness across 101 countries during the pandemic was 21%, compared to 6% prior to the pandemic (O’Sullivan et al., 2021). Loneliness in HCWs has variously been reported to be 10.4% in Italian doctors (De Sio et al., 2020), 53% in Spanish HCWs (Cabello et al., 2021), and 89% in Bangladeshi HCWs (Repon et al., 2021), suggesting it is a greater concern for those at the fore-front of responding to the pandemic, despite the adverse impact of unemployment on loneliness (Hoffart et al., 2020; O’Sullivan et al., 2021; Tutzer et al., 2021) not being experienced by HCWs as it was by many in the general population. In addition to living under the restrictions experienced by the general public, HCWs have additionally shouldered the burden of a heightened risk of infection due to: potential work exposure; fear of infecting the people they live with; lack of contact with family members and, in some instances, isolating from their family to limit potential spread; being shunned by the community, even family and friends; and abuse from members of the public, including acts of violence and aggression (Ananda-Rajah et al., 2020; Johnson, 2021; Cacioppo et al., 2014). The resulting negative cognitions and symptoms of depression communicate one’s need for support and connection (Cacioppo et al., 2014). The social neuroscience model of loneliness proposes that when these are absent, when one feels lonely or is isolated: there is an attentional bias towards social threats accompanied by elevated anxiety, hostility and social withdrawal; and increased symptoms of depression communicate one’s need for support and connection (Cacioppo et al., 2014). The resulting negative cognitions and behaviours can further exacerbate loneliness and are consistent with the observed association between loneliness and mental health (Hutton et al., 2021). Conversely, social support can reduce loneliness and facilitate positive responses to stress (Segrin and Passalacqua, 2010). It assists in dealing with uncertainty and difficulties both directly (e.g., through tangible assistance) and indirectly through implied care and concern for the recipient (Segrin and Passalacqua, 2010).

In evolutionary terms, social connections provide mutual protection and support (Cacioppo et al., 2014). The social neuroscience model of loneliness proposes that when these are absent, when one feels lonely or is isolated: there is an attentional bias towards social threats accompanied by elevated anxiety, hostility and social withdrawal; and increased symptoms of depression communicate one’s need for support and connection (Cacioppo et al., 2014). The resulting negative cognitions and behaviours can further exacerbate loneliness and are consistent with the observed association between loneliness and mental health (Hutton et al., 2021). Conversely, social support can reduce loneliness and facilitate positive responses to stress (Segrin and Passalacqua, 2010). It assists in dealing with uncertainty and difficulties both directly (e.g., through tangible assistance) and indirectly through implied care and concern for the recipient (Segrin and Passalacqua, 2010).

Much of the research examining loneliness during the COVID-19 pandemic has explored its role as a risk factor for depression, primarily in the older general population. Few studies have focused specifically on loneliness among HCWs. The outcome of interest (Cabello et al., 2021; Fang et al., 2021; Repon et al., 2021). By virtue of their work, HCWs are exposed to a range of psychosocial and other risks which can impact on their health and well-being, and which are further aggravated by infectious disease outbreaks (Franklin and Gkioulaka, 2021). The absence of information about loneliness and its effects among HCWs limits our ability to support them, especially during highly stressful situations. We aimed to 1. measure the prevalence of loneliness among HCWs at a hospital accepting known or suspected COVID-19 positive patients and 2. identify factors, existing prior to the pandemic or during its height in 2020, associated with loneliness in these workers who are vital to our immediate and ongoing response to the COVID-19 pandemic. We hypothesised that loneliness would be common among our HCWs, and that loneliness would be inversely related to both mental well-being and indicators of social support.

2. Methods

2.1. Setting and participants

We conducted a cross-sectional survey of staff working at a large tertiary teaching hospital in NSW, Australia (Stubbs et al., 2021). It is a designated isolation facility where some of the first COVID-19 patients in Australia were admitted. Facilities included a COVID-19 testing clinic, a dedicated COVID-19 ward, and a COVID-19 ward within the intensive care unit.

Staff whose primary responsibility was to address the organisation’s response to COVID-19 from mid-March to the end of May 2020, including those in departments caring for patients with suspected or confirmed COVID-19 (e.g. Emergency (ED), Intensive Care Unit (ICU), COVID-19 testing clinic, COVID-19 wards, Infection Control, Infectious Diseases, Respiratory Medicine, Oral Health, Cardiology, Geriatric Medicine, Ear Nose and Throat (ENT) and General Services), were targeted for participation.

2.2. Survey instrument

Basic demographic details (age, sex, usual living arrangements, highest educational qualification); health and wellbeing; health-related behaviours (physical activity, smoking, alcohol consumption and sleeping patterns); the impact of family/household and social circumstances on personal wellbeing; and workplace experiences during the pandemic were assessed using an online questionnaire developed in SurveyMonkey. Consent to participate was required before commencing the study questions.

The outcome measure of loneliness was contained within the family/household and social group of questions which retrospectively examined both the existence and impact of potential stressors, common during the pandemic (e.g. decreased household income, less contact with family and friends external to one’s household, changed living arrangements). Response options for each situation were: experienced and affected their well-being; experienced but did not affect their well-being; not experienced. For analysis we grouped experienced but not affected with not experienced responses and compared them to experienced and affected based on research indicating that it is the subjective perception rather than objective experience of COVID-19 that influences mental health (Cabello et al., 2021).

Self-rated general health and mental health were reported as excellent, very good, good, fair, poor, or very poor for three time periods: before the pandemic, during the height of the pandemic in 2020 and currently (assessed six or more months after the height). Current psychological distress was assessed using the 10 item Kessler Psychological Distress Scale (K10) (Kessler et al., 2002). Distress during the height of the pandemic was retrospectively assessed using the same scale.

Workplace experiences will be reported separately (Trinh et al., Under review).

The questionnaire concluded with the contact details for various support services, was anonymous, took approximately 15 min to complete and was available from November 3, 2020 to January 31, 2021.

2.3. Recruitment and distribution of study questionnaire

The heads of targeted departments were informed of the intended study and their support obtained. Initially, targeted staff were emailed an invitation to participate, accompanied by a link to the participant
information and consent forms and online questionnaire (n = 1234). This was supplemented by the distribution of hard copy versions of the questionnaire and promotional posters with a QR code link to the online questionnaire. Three weeks after the initial invitation, a reminder email was sent. Visits were made to the ED, ICU and COVID clinic to promote the study and distribute study flyers containing the QR code. The General Services department was visited on three occasions to support the participation of cleaning staff which may otherwise have been limited due to English literacy and computer access issues.

Targeted recruitment was augmented by promotion to all hospital staff. Flyers were distributed to staff in hospital common areas (near the food court and at lifts) and posters were placed in the lift areas. Online articles including the QR code and weblink to the questionnaire were published in the staff bulletin, newsletter and social network channel.

2.4. Data analysis

Loneliness among HCWs was determined by the question about feelings of loneliness that negatively affected well-being during the height of the pandemic. Respondents who did not experience loneliness or who were not affected by it were classified as not lonely. Responses to the other family/household and social questions were similarly classified.

Responses to the general health and mental health questions were converted to dichotomous variables to indicate good (good, very good or excellent) or poor (fair, poor or very poor) health. Scores on each question of the K10 were summed to provide a total score. Where there were only nine valid responses, the missing score was imputed using the mean of the nine valid scores; less than nine valid responses resulted in a missing total score (Centre for Epidemiology and Evidence, 2020). Total K10 scores of 22 or more indicated high psychological distress; scores of 10–21 were classified as low distress (Australian Bureau of Statistics, 2012; Centre for Epidemiology and Evidence, 2020).

The relationship between loneliness and demographic, health, family/household, social and work-related factors were assessed using Chi squared. Unadjusted odds ratios indicated the size of each factor’s relationship with loneliness. Multivariable logistic regression examined the association between pre-pandemic factors and loneliness, while controlling for other factors in the model (Model 1). Factors with p < 0.1 in univariate analysis were added to the multivariate model using a stepwise approach. Age and sex, and factors with p < 0.05 were retained in the final model. In Model 2, variables experienced during the height of the pandemic were added using the same method. Collinearity between variables in each model was assessed. Common method variance was assessed using Harman’s single factor test.

Data analysis was performed using SAS EG v8.3. The study was approved by the hospital’s Human Research Ethics Committee (2020/ETH01674).

3. Results

A total of 432 HCWs employed during the period of interest participated in the survey; of these 330 (76.4%) answered the question about loneliness and form the sample for this paper. Our sample was comparable to the hospital workforce in terms of sex (28.2% v 28.9% male); but not affected by it. The experience of a traumatic life event (self-destruction at home: 36.8% v 18.1%; less contact with family and friends: 87.9% v 85.7%) during the height of the pandemic was associated with loneliness, as measured by having ever been told by a health professional they had mental health problems (23.1%, p < 0.0001) and poor general health during the height of the pandemic (10.3%, p = 0.001).

Loneliness was more common among HCWs with high psychological distress (61.5%, p < 0.0001) and poor mental health (56.3%, p < 0.0001) during the height of the pandemic were more likely to be lonely, as were those with sleeping problems (23.1%, p < 0.0001) and poor general health during the height of the pandemic (10.3%, p = 0.001).

HCWs who reported that the experience of specific family/household and social circumstances during the height of the pandemic did not affect their well-being were not prevented from feeling lonely, but it was less likely that their well-being was negatively associated with loneliness (Supplementary Table 1). Being affected by less contact with family or friends (68.4%, p < 0.0001), increased conflict at home (34.1%, p < 0.0001), changed living arrangements (15.6%, p < 0.0001) and access to children or other dependents (8.5%, p = 0.004), and decreased household income (9.5%, p = 0.002) were each associated with an increased likelihood that loneliness affected well-being, compared to those who did not have the experience or were not affected by it. The experience of a traumatic life event (self-defined) during the height of the pandemic was also associated with increased loneliness (5.2%, p = 0.023).

3.3. Multivariate analysis for loneliness

Adjusted logistic regression analysis examined the relationship between pre-pandemic factors and loneliness, adjusting for age and sex and other significant variables (Model 1, Table 2). Predictors of loneliness were being younger than 30 years (41.5% v 50 years or older; adjusted odds ratio (aOR) = 3.3; 95% CI:1.53–7.08), having ever been told by a doctor or other health professional that you had a mental health problem (aOR = 2.5; 95% CI: 1.42–4.51) and living alone (compared to living with a partner; aOR = 2.5; 95% CI: 1.08–5.53).
Table 1
Respondent characteristics and factors associated with loneliness during the height of the pandemic.

| Variables                                      | All (n = 330) | Lonely (n = 129) | Rate per 100 | \( \chi^2 \) | p     | OR (95% CI) |
|------------------------------------------------|---------------|------------------|--------------|--------------|-------|-------------|
| **SEX**                                        |               |                  |              |              |       |             |
| Female                                         | 227 (71.8)    | 95 (77.2)        | 41.9         |              | ref   |             |
| Male                                           | 89 (28.2)     | 28 (22.8)        | 31.5         |              | ref   |             |
| **AGE (years)**                                |               |                  |              |              |       |             |
| 18–29                                          | 81 (24.5)     | 49 (40.2)        | 60.5         |              |       |             |
| 30–39                                          | 75 (22.8)     | 27 (21.1)        | 36.0         |              |       |             |
| 40–49                                          | 69 (21.9)     | 19 (15.0)        | 27.5         |              |       |             |
| 50+                                            | 90 (28.6)     | 27 (22.1)        | 30.0         |              | ref   |             |
| **Living arrangement**                         |               |                  |              |              |       |             |
| Partner with or without children or any other  | 199 (62.8)    | 62 (50.8)        | 31.2         |              |       |             |
| Family excluding a partner                     | 66 (20.8)     | 34 (27.9)        | 51.5         |              |       |             |
| Non-family                                      | 20 (6.3)      | 9 (7.4)          | 45.0         |              |       |             |
| Alone                                          | 32 (10.1)     | 17 (13.9)        | 53.1         |              |       |             |
| **Self-reported mental health – pre-pandemic** |               |                  |              |              |       |             |
| Good                                           | 293 (89.1)    | 106 (82.2)       | 36.2         |              | ref   |             |
| Poor                                           | 36 (10.9)     | 23 (17.8)        | 63.9         |              |       |             |
| Ever told had mental health problems           | 233 (76.1)    | 76 (66.1)        | 32.6         |              |       |             |
| Yes                                            | 73 (23.9)     | 50 (38.8)        | 67.5         |              |       |             |
| **Self-reported general health – pre-pandemic**|               |                  |              |              |       |             |
| Good                                           | 265 (81.3)    | 93 (72.7)        | 35.1         |              | ref   |             |
| Poor                                           | 61 (18.7)     | 35 (27.3)        | 57.4         |              |       |             |
| **DURING HEIGHT OF PANDEMIC**                  |               |                  |              |              |       |             |
| Psychological distress (K10) – during height of |               |                  |              |              |       |             |
| pandemic                                       | 213 (64.6)    | 50 (38.8)        | 23.5         |              | ref   |             |
| High                                           | 117 (35.5)    | 79 (61.2)        | 67.5         |              |       |             |
| Self-reported mental health – during height of | 180 (55.1)    | 37 (29.1)        | 20.6         |              | ref   |             |
| Good                                           | 147 (45.0)    | 90 (70.9)        | 61.2         |              |       |             |
| Poor                                           | 23 (7.0)      | 14 (10.9)        | 29.2         |              | ref   |             |
| Self-reported general health – during height of | 242 (74.7)    | 89 (69.5)        | 36.8         |              | ref   |             |
| Good                                           | 61 (18.7)     | 53 (39.5)        | 52.0         |              |       |             |
| Poor                                           | 230 (70.3)    | 72 (55.6)        | 34.7         |              | ref   |             |
| Alcohol consumption                            |               |                  |              |              |       |             |
| Same or less than usual                        | 224 (67.9)    | 76 (59.5)        | 40.3         |              | ref   |             |
| More than usual                                | 82 (24.5)     | 39 (30.5)        | 47.6         |              |       |             |
| 
| Sleep problems                                 |               |                  |              |              |       |             |
| No                                             | 187 (56.7)    | 52 (40.3)        | 27.8         |              | ref   |             |
| Yes                                            | 143 (43.3)    | 47 (35.7)        | 33.5         |              |       |             |
| Work in high exposure area                     |               |                  |              |              |       |             |
| No                                             | 193 (59.9)    | 72 (56.7)        | 37.3         |              | ref   |             |
| Yes                                            | 129 (40.1)    | 55 (43.3)        | 42.6         |              |       |             |
| Work role                                      |               |                  |              |              |       |             |
| Dr/nurse/allied health                         | 207 (64.1)    | 92 (71.9)        | 44.4         |              |       |             |
| Other                                          | 116 (35.9)    | 36 (28.1)        | 31.0         |              | ref   |             |
| Felt a sense of camaraderie with fellow workers|               |                  |              |              |       |             |
| No                                             | 73 (22.6)     | 36 (28.4)        | 49.3         |              | ref   |             |
| Yes                                            | 250 (77.4)    | 91 (71.7)        | 36.4         |              |       |             |
| Aware of increased conflict between fellow     |               |                  |              |              |       |             |
| workers                                        | 213 (66.2)    | 74 (58.3)        | 34.7         |              | ref   |             |
| Yes                                            | 109 (33.9)    | 53 (41.7)        | 48.6         |              | ref   |             |
| Traumatic life event experienced during height of |               |                  |              |              |       |             |
| pandemic                                      | 266 (81.9)    | 96 (74.4)        | 36.1         |              |       |             |
| Yes                                            | 64 (18.1)     | 32 (25.6)        | 51.6         |              |       |             |

**During height of pandemic, well-being was negatively affected by:**

| Decreased household income                     | 267 (81.2)    | 94 (72.9)        | 35.2         |              | ref   |             |
| Changed access to children or other dependents | 62 (18.8)     | 35 (27.1)        | 56.5         |              |       |             |
| Changed living arrangements                    | 267 (81.4)    | 95 (73.6)        | 35.6         |              | ref   |             |
| Changed living arrangements                    | 61 (18.6)     | 34 (26.4)        | 55.7         |              | ref   |             |
| Increased conflict at home                     | 294 (89.1)    | 104 (80.6)       | 35.4         |              | ref   |             |
| Increased conflict at home                     | 36 (10.9)     | 25 (19.4)        | 69.4         |              | ref   |             |
| Increased conflict at home                     | 267 (81.9)    | 85 (66.4)        | 31.8         |              | ref   |             |
| Increased conflict at home                     | 59 (18.1)     | 43 (33.6)        | 72.9         |              |       |             |

(continued on next page)
Variables related to the height of the pandemic were added in Model 2 (Table 2). Adjusting for the covariates social interactions, living arrangements and mental well-being showed these were significantly associated with loneliness. Having less contact with family and friends (aOR = 10.4, 95% CI: 4.64–23.46) and increased conflict at home (aOR = 8.9, 95% CI: 3.25–24.51) had the strongest relationship with HCWs' loneliness. Living alone (aOR = 6.1, 95% CI: 1.85–19.95) or with family, but not a partner (aOR = 4.6, 95% CI: 1.69–12.25) was detrimental, compared to living with a partner. The odds of loneliness were approximately three times higher for those who had high psychological distress (aOR = 3.4, 95% CI: 1.53–7.60) or poor mental health (aOR = 2.9, 95% CI: 1.36–6.39) during the height of the pandemic. Having a sense of camaraderie with workmates reduced the odds of loneliness (aOR = 0.42, 95% CI: 0.19–0.92). Correlation between variables in the final model did not reach 0.5, and in most cases was much lower; variance inflation factors were all below 2. Harman's single factor test estimated the common method variance to be 33.3%, indicating that this type of bias was not a concern.

### Table 2

**Odds of loneliness, adjusted for pre-pandemic and pandemic factors.**

| Variables                                      | All (n = 330) | Lonely (n = 129) |
|------------------------------------------------|---------------|-----------------|
|                                                | n (%)         | Rate per 100    | χ²   | p     | OR (95% CI) |
| **Less contact with family or friends**        |               |                 |      |       |             |
| No                                             | 145 (43.9)    | 17 (13.2)       | 11.7 |       | ref         |
| Yes                                            | 185 (56.1)    | 112 (86.8)      | 60.5 |       | 11.55 (6.43–20.75) |

OR: odds ratio; CI: confidence interval.

aOR: adjusted odds ratio; CI: confidence interval.

* Maximum sample size, n may be smaller for some cross tabulations.

** Defined as working in the emergency department, intensive care unit, infectious diseases, or COVID-19 ward or clinic.

† Includes cleaners, administration workers, researchers, oral health workers, and others.

* Z statistic from Cochran-Armitage trend test.

**Discussion**

Our study of a sample of HCWs from a designated COVID-19 hospital in Australia demonstrated that indicators of social support from within and external to home had strong relationships with loneliness, surpassing those of mental well-being. The predictive value of measures of pre-existing mental health were negated after adjusting for mental well-being during the pandemic.

Although not universal (Beutel et al., 2021; Luchetti et al., 2020), loneliness has increased as a result of the pandemic (Khan and Kadoya, 2021; Tutzer et al., 2021), with its requirements for altered social relationships and measures to combat infection creating feelings of loneliness in an otherwise stable population (Khan and Kadoya, 2021). Loneliness and its consequences are borne by a sizable proportion of HCWs. Three in every five of our HCWs experienced loneliness during the height of the COVID-19 pandemic, the majority of whom considered it had negatively affected their well-being. Although not directly comparable due to survey differences, loneliness in our HCWs was much higher than the 22% reported for the Australian public in that period (Australian Bureau of Statistics, 2020) and from population studies in other countries (Groarke et al., 2020; Li and Wang, 2020; O'Sullivan et al., 2021; Tutzer et al., 2021). Higher levels of loneliness amongst HCWs during the COVID-19 pandemic are not unique to Australia (Cabello et al., 2021; Kotera et al., 2021; Murata et al., 2021) and may be linked to their perceived increased risk of infection (Hawley and Cacioppo, 2010; Wang et al., 2021), and the discrimination, stigmatization and isolation HCWs experienced (Hong et al., 2021; Vera San Juan et al., 2020; Shreffler et al., 2020).

Less contact with family and friends who do not live in the same house and living alone or with people other than a spouse/partner, could translate into a reduction in the potential benefits of social support and increased loneliness identified in this study. The protective value of being married or living with a partner against loneliness is well documented – both in non-pandemic times and during the pandemic (Beutel et al., 2017, 2021; Groarke et al., 2020; Hoffart et al., 2020; Li and Wang, 2020; McQuaid et al., 2021). Social contact, perceived social support, and having people you trust and feel close to, who help you feel safe, secure and happy can also protect against loneliness (Bu et al., 2020; Fang et al., 2021; Groarke et al., 2020; Guan, 2021; Macdonald and Hülür, 2021). The benefits of physical contact with family and friends (Hoffart et al., 2021) were diminished for our HCWs – 43% had a change in access to children and other dependents, and 29% had changed living...
arrangements. Other sources of pandemic-induced instability in the home environment, namely decreased household income and increased conflict were also associated with HCWs’ loneliness, the latter finding consistent with family conflict exacerbating the psychological consequences of the COVID-19 pandemic (Behar-Zusman et al., 2020).

Addressing loneliness is likely to be more complicated than simply increasing social connections (Smith and Lim, 2020). Loneliness is not only affected by social network size (Macdonald and Hüllr, 2021; Rumas et al., 2021; Segrin and Passalacqua, 2010) and the frequency (Guan, 2021; Macdonald and Hüllr, 2021) and type (in-person or remote) (Groarke et al., 2020; Hoffart et al., 2021; Rumas et al., 2021) of contact, but perceived closeness and quality of relationships (Bu et al., 2020; Groarke et al., 2020) are also influential. Fulfilment of personal needs may be the critical component: satisfaction with the frequency of contact (Macdonald and Hüllr, 2021) and empathy focused phone calls (Kahlon et al., 2021) can protect against loneliness, while greater dissatisfaction with, but not frequency of video calls, has been found to increase the odds of loneliness (O’Sullivan et al., 2021). Identifying individual preferences and engineering social interactions accordingly may be an effective strategy for preventing loneliness.

Our study is one of the few during this pandemic to examine the relationship between workplace factors and loneliness among HCWs. Those most likely to be at the forefront of directly caring for and interacting with patients, including doctors, nurses and allied health professionals, were more likely to be lonely than were other HCWs. Interestingly however, the rate of loneliness among workers in high exposure areas was no different to that of HCWs in other areas, despite being primarily composed of doctors, nurses and allied health professionals. Working in high-risk settings during the SARS outbreak was similarly not associated with adverse psychological outcomes (Maunder et al., 2003, 2006), but during the current pandemic others have reported that workers with a greater likelihood of contact with COVID-19 patients have higher loneliness scores (Fang et al., 2021). The increased interaction our workers in high risk areas experienced as they received infection control training, collaborated with colleagues to minimise the risk of transmission and received ongoing offers for wellness support (K.Vashey, personal communication), and risk perception (Wang et al., 2021) may have ameliorated the otherwise detrimental effects of working in these areas (Maunder et al., 2003, 2006; Speroni et al., 2015).

Prioritising high-risk situations as the target of protective measures might have contributed to counterbalancing factors associated with loneliness. It is plausible that effective workplace responses and the implementation of strategies to decrease perceived risk may psychologically outcomes in stressful situations.

Less experienced HCWs were more likely to be lonely than those working for ten or more years. Experience is likely to provide opportunities to develop defence mechanisms and coping skills (Shaw et al., 2013) and to have worked during previous outbreaks. The inverse association between years of experience and loneliness was no longer significant after adjusting for age and other variables.

The social support provided by work colleagues can be protective against loneliness (Rogers et al., 2016), and the experiences of the COVID-19 pandemic and previous infectious disease outbreaks reveal that a sense of camaraderie with work colleagues and feeling that one is not facing a crisis alone are crucial for maintaining well-being (Kim, 2018; Maunder et al., 2003; Sun et al., 2020). Loneliness in our HCWs was associated with increased workplace conflict, while a sense of camaraderie and common purpose with fellow workers had the opposite result. However, after adjusting for other factors only camaraderie remained significant, while the negative relationships between loneliness and less contact with family and friends, and conflict at home were maintained or strengthened. Our results indicate that, even in a health-care setting where teamwork is essential, relationships with family and friends may be key to protecting against loneliness, surpassing the influence of workplace interactions.

The pandemic’s detrimental impact on HCW’s mental well-being (Stubbs et al., 2021), has heightened their risk of loneliness. The previously reported inverse relationship between loneliness and mental well-being (Beutel et al., 2017; Mustaq et al., 2014), also evident during the current pandemic (Cabello et al., 2021; De Sio et al., 2020, 2021; Pang et al., 2021; Groarke et al., 2020; Hoffart et al., 2020; O’Sullivan et al., 2021), was further supported by our findings, irrespective of assessment method — a validated 10-item scale measuring psychological distress, self-report to a single question about mental health or a health professional advising they have mental health problems — and whether mental well-being related to the height of the pandemic or prior to its onset. Other factors related to well-being, notably sleep problems, traumatic life events and workplace conflict, were also significantly associated with loneliness. A significant relationship between loneliness and both psychological distress and self-reported mental health experienced during the height of the pandemic persisted after adjusting for other factors. Pre-pandemic mental health was no longer significantly associated with loneliness which, although our study design could not establish a causal relationship, suggests that loneliness was primarily a response to the pandemic, not a direct consequence of pre-existing problems.

Maintaining mental well-being in a crisis may protect HCWs from loneliness; conversely, preventing loneliness may protect against poor outcomes in terms of mental well-being. Adjusting for social support — specifically contact with family and friends, living arrangements and increased conflict at home — reduced the association between mental well-being and loneliness, contrary to the suggestion that social support may be insufficient to protect against loneliness in the face of higher levels of anxiety and depression in the context of the COVID-19 pandemic (Bu et al., 2020). Variations in how social support and mental health are measured are important considerations in evaluating the role of social support on the interplay between mental well-being and loneliness, but do not disavow the potential for interventions optimising social support to both promote mental well-being and avert loneliness.

Healthcare systems can play a role in protecting their staff from the adverse effects of crisis situations such as the current pandemic. Our results indicate the benefits of fostering a culture of teamwork and shared purpose. Making staff aware of the value of maintaining positive relationships outside the workplace environment and, where possible, facilitating such relationships may help to safeguard against loneliness and other mental health concerns. Evidence-based strategies that support and strengthen mental well-being as HCWs experience the realities of working during such circumstances will also be beneficial.

Interpreting our results should be undertaken in light of the study’s limitations. Our initial recruitment targeted specific departments to encourage participation by those most involved in the pandemic response and was then extended to the wider hospital. The result was an increase in our sample size and a broader range of participating departments but the inability to calculate a response rate. Although the proportion of male respondents corresponded to that of the hospital’s workforce, there were fewer clinicians and more experienced workers. Clinicians generally have less available work time to access computers for tasks not directly related to patient care (compared to people in desk-based roles) and the heightened stresses of their role may have diminished their motivation to participate in voluntary activities. Conversely, workers with greater experience are potentially in more senior roles that may allow greater work flexibility and motivation to participate in such investigations. We found that clinicians and less experienced workers were more likely to be lonely, suggesting that the results from our sample may under-estimate loneliness among all HCWs. Variations such as loneliness, mental well-being and family/household and social circumstances during the height of the pandemic, were assessed retrospectively and therefore susceptible to recall error. In particular, mental well-being at the time of questionnaire completion may have biased recall. Loneliness was assessed via a single question, with respondents indicating whether their well-being had been affected by feelings of loneliness. Although different aspects of loneliness were not measured, incorporating the existence and impact of loneliness facilitated a more holistic
appraisal of loneliness. Our cross-sectional data precluded conclusions regarding causality of loneliness. Australia did not experience the high case numbers reported by other countries during the first wave of the pandemic in 2020. Nonetheless, the psychological well-being of HCWs at this and other Australian hospitals was similarly impacted (Dobson et al., 2021; Holton et al., 2021; Stubbs et al., 2021), indicating that our results are applicable to other settings in Australia and overseas.

5. Conclusion

Loneliness in HCWs is a legitimate concern, negatively impacting their well-being during a health crisis. Contact with family and friends, the support provided by living with one’s partner and a sense of camaraderie with colleagues were associated with mental well-being and indicate potential avenues to ameliorate the adverse consequences of loneliness. Promoting the health and wellbeing of HCWs is an essential component of our response to any health crisis.

Author contributions

J. Stubbs: conceptualization, methodology, formal analysis, writing – original draft, review & editing. H. Achat: conceptualization, methodology, supervision, writing – review & editing. All authors approved the final version of the manuscript.

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Declaration of competing interest

The authors declare that there is no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.psycom.2022.100050.

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Author contributions

J. Stubbs: conceptualization, methodology, formal analysis, writing – original draft, review & editing. H. Achat: conceptualization, methodology, supervision, writing – review & editing. All authors approved the final version of the manuscript.

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