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Solidarity appraisal, meaning, and markers of welfare in frontline workers in the UK and Ireland during the Covid-19 pandemic



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ABSTRACT

Throughout the Covid-19 pandemic, frontline workers have carried out essential roles to keep society going, while the public have been called to minimise the infection rate to limit the burden on frontline workers. In this sense, navigating Covid-19 has necessitated interdependence between frontline workers and key stakeholder groups (such as their colleagues, organisations, their government, and the public). Reports suggest that frontline workers have perceived varying degrees of solidarity with others throughout the pandemic, yet the influence of perceived solidarity on psychological welfare has received limited empirical or theoretical attention. The aim of the present study was to test the importance of perceived solidarity (or *solidarity appraisal*) by assessing the relationship between perceptions of solidarity and psychological welfare in frontline workers — across all sectors — during Covid-19, and explore the role of a potential mechanism (i.e., meaning in life) for explaining this relationship. To assess this proposed model, we used cross-sectional and longitudinal data from a project tracking a cohort of frontline workers in the UK and Ireland since March 2020. Participants were surveyed at baseline (T1), at six months (T2), and 12 months (T3). At T3, participants ($N = 414$) reported their perceived solidarity (with colleagues, organisations, government, and public) along with a range of psychological welfare measures. Overall, frontline workers' levels of meaning in life dropped significantly over time. Lower levels of perceived solidarity were predictive of poorer wellbeing, and higher anxiety, burnout, post-traumatic stress symptoms, and somatic stress symptoms, and these relationships were mediated by the presence of meaning in life. These findings suggest that perceived solidarity with interdependent social groups may imbue life with meaning, which can in turn have a positive influence on psychological welfare in chronic and cumulatively stressful occupational settings.

1. Introduction

1.1. The context of frontline working during the Covid-19 pandemic

Occupational stress is associated with a variety of psychological and physical health and wellbeing outcomes both in the short term and the longer term (Darr and Johns, 2008; Siegrist and Li, 2016). More specifically, work stress outcomes such as burnout have been shown to have impacts on health in longitudinal studies, encompassing mental health outcomes as well as physical conditions such as cardiovascular disease, musculoskeletal pain, fatigue, and overall number of physical health complaints (Kim et al., 2011; Leone et al., 2009; Melamed, 2009; Toppinen-Tanner et al., 2009). The Covid-19 pandemic constitutes a very specific and stressful work context for many, particularly those in frontline or “essential worker” roles. The frontline of the Covid-19

pandemic has encompassed many different roles, including those in healthcare and social care, but also many other roles that had previously never expected to be a “frontline” against an infectious disease such as retail and supply-chain workers. These essential roles faced a variety of novel stressors associated with the pandemic: the risk of infection, the (in)ability to source protective equipment, the designation of essential worker status (and the potential pressure that may entail), the emergence of needing to intervene with public behaviour to ensure safety, and an accelerated and relentless pace of work (including in the times of peak infections and during panic buying) (Gwynn, 2021; Northington et al., 2021; Rodríguez-Rey et al., 2020; The Lancet, 2020). Recent research that has sought to understand how frontliners have fared during this time has highlighted the emergence of burnout, anxiety, psychological distress, and even post-traumatic stress symptoms (De Boni et al., 2020; Giorgi et al., 2020; Porter et al., 2021; Sumner and Kinsella, 2021a).

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Whilst different sectors of the frontline have some unique concerns and troubles, they are largely similar in their experiences of trauma, stress, and with their experiences of the impact the pandemic has had on their welfare (Kinsella et al., 2021). While findings have consistently demonstrated the negative psychological consequences of working on the frontline, fewer studies have considered which specific social-psychological factors may be protective or harmful to those working in highly challenging circumstances over time.

The context of frontline working in a pandemic, regardless of the role or sector, comes with it an interdependence with the public. As the public, we rely heavily on our frontline workers to care for us and our loved ones, or to ensure that our society keeps going. Similarly, frontline workers rely on the public, most importantly to adhere to guidance that will support the minimisation of community infection. For healthcare workers, this means less risk of capacity overload, meaning that they can apportion the appropriate time and attention to their patients. For other workers, such as those in retail, it means that they can continue their work in safety without very high risk of coming to harm themselves. Social Exchange Theory (SET) positions this interdependent relationship well, with reciprocity and mutual trust forming the grounds of the psychological contract between parties (Cropanzano and Mitchell, 2005). The foundation of SET sought to understand the basis of social behaviour, where mutual cooperation is facilitated by the knowledge of reciprocity, and has been applied to understand the social processes that underpin working behaviour (Cropanzano and Mitchell, 2005). Social exchange in the work setting has been highlighted as being a relevant factor for occupational welfare outcomes such as burnout (Petrou et al., 2011; Schaufeli et al., 1996). Specifically, reciprocity is a key factor within the occupational context that appears to factor into burnout in a variety of settings (Bakker et al., 2000; Petrou et al., 2011; Rose et al., 2010; van Horn et al., 1999). Until recently, this social exchange has been limited to relationships that exist within the occupational setting, such as between colleagues and organisational hierarchies, or between colleagues and clientele (Buunk and Schaufeli, 1993; Schaufeli et al., 1996). Social exchange in the context of frontline workers during the pandemic typically involves symbolic or conceptual resources, such as effort, consideration, and support. We position this *symbolic* reciprocity as solidarity, and alongside it the process by which its presence is determined by those that require it, *solidarity appraisal* (Sumner and Kinsella, 2021b).

1.2. The importance of solidarity and meaning

Solidarity appraisal first emerged as a concept as a result of our work on the CV19 Heroes project,¹ which was established to track the welfare of frontline workers of any and all sectors in the UK and Republic of Ireland in March 2020.² The importance of solidarity across all sectors of frontline working first became apparent through qualitative explorations of frontline workers' experiences during the summer of 2020 (Kinsella et al., 2021). Specifically, participants across all sectors (not limited to healthcare) often cited feeling that the government and the public were not working "with" them, most notably through representations in the media of pandemic denial, rule breaking, and inconsistency of messaging (Kinsella et al., 2021; Sumner and Kinsella, 2021b). Solidarity, in this sense, is distinct from social support, which is more typically defined as an individual having access to practical, tangible, or emotional support from others (Cohen and Wills, 1985). The ability for societal tone and solidarity sentiment to be set by leadership has been highlighted in analyses comparing the approaches of governments across the world during the pandemic (de Blasio and Selva, 2020; Forester and McKibbin, 2020; Mintrom & O'Connor, 2020). Indeed, solidarity can be established and

modified by discourses in political leadership (de Blasio and Selva, 2020; Forester and McKibbin, 2020), and can therefore be a target for harm mitigation or intervention in the disaster context.

The concept of meaning in life is a fundamentally important factor for wellbeing (Steger, 2009), in buffering against occupational burnout (Krok, 2016), and for the development of posttraumatic growth (Zeligman et al., 2019). Meaning in life was shown to be an important predictor of welfare outcomes (resilience, burnout, and wellbeing) in the first surge of the pandemic (Sumner and Kinsella, 2021a). In subsequent qualitative work, frontline workers highlighted the impact that declining solidarity observed in public and political actions and rhetoric was having on their sense of meaning in their lives and their work (Kinsella et al., 2021; Sumner and Kinsella, 2021b), potentially degrading this important protective factor. Taken together, this would suggest that potential impact on meaning can not only have a general impact on wellbeing, but may well be important in the context of working through the pandemic, where frontline workers are highly vulnerable to burnout and trauma (Giorgi et al., 2020). The conceptual literature surrounding meaning in life outlines two key principles: the presence of meaning and the search for meaning (Steger, 2009). The ability to find meaning in life through work, particularly work that is conceptualised as supporting the greater good, is well understood (Steger and Dik, 2010). Finding meaning in one's work has been associated with a variety of health and wellbeing outcomes, as well as positive work-related outcomes (Allan et al., 2019; Arnold and Walsh, 2015; Krok, 2016). Moreover, an appreciation of one's occupational role is also protective of worker wellbeing, protecting workers from burnout (Kalimo et al., 2003) and buffering against occupational stressors (Bakker et al., 2008). One of the more positive findings from the pandemic so far has been the emergence of appreciation and validation of the importance of previously under-appreciated roles in societies (Kinsella et al., 2021; Rodríguez-Rey et al., 2020), providing not just personal meaning for workers, but also an external and objective appraisal of their work and role as having meaning. As research has highlighted meaning to increase through external recognition of role importance, it is also possible that meaning (certainly that which is derived through work) may be negatively impacted by external factors also. In prior longitudinal analyses, meaning in life has been demonstrated to be reasonably stable at least within a 12 month period during relatively normal circumstances (Steger and Kashdan, 2007). However, the pandemic context may be causing frontline workers to lose this sense of meaning (Kinsella et al., 2021; Sumner and Kinsella, 2021b).

1.3. The present research

To summarise, existing frameworks of burnout and occupational stress place importance on interpersonal processes and symbolic support, however the consideration of these has been thus far contained within the context of the workplace (Petrou et al., 2011; Schaufeli et al., 1996; van Knippenberg et al., 2007). In the context of a global pandemic, broader social exchange of effort or sentiment may also provide both physical means of support (by lessening the infection rate) and moral support for those whose role outcomes are interdependent with the actions of society (Foran et al., 2021). Prior work has highlighted that societal solidarity is appraised by frontline workers and is relevant to their experiences of stress, trauma, and burnout, as well as their experience of meaning in life (Kinsella et al., 2021; Sumner and Kinsella, 2021b). In order to provide an empirical basis for solidarity appraisal, and to understand its associations with meaning and worker welfare, the present study had four aims. First, we sought to evaluate perceptions of solidarity in frontline workers, encompassing workers from health and social care, but also those from other roles such as essential retail, civil defence, education, public transport, and supply chains. Second, we aimed to examine the relationship between perceptions of solidarity and key outcomes of worker welfare. Third, we sought to assess changes to meaning in life over time (spanning a 12-month timeframe). Fourth, we aimed to understand whether perceptions of solidarity have a mediatory

¹ www.cv19heroes.com.

² <https://osf.io/nm83c/registrations>.

relationship with these outcomes via their relationship with presence of meaning in life. Based on the evidence reviewed, we hypothesised that perceptions of solidarity would be related to outcomes of welfare, that presence of meaning in life would have declined over time, and that the relationships between perceived solidarity and key welfare outcomes would be mediated by presence of meaning in life.

2. Method

2.1. Participants

The present study utilised data from the longitudinal dataset of the CV19 Heroes project. A cohort of frontline workers within the UK and Ireland were recruited from March 2020 (Cohort 1) via online advertising, with the inclusion criteria of being designated an essential frontline worker, and being over 18 years old at study entry. At study onset, participants were invited to opt-in to further surveying and project participation. Participants were surveyed at baseline (T1, $N = 1305$), at six months (T2, $N = 297$), and at 12 months (T3, $N = 299$). In an attempt to add greater occupational and racial diversity to the baseline cohort, an additional cohort (Cohort 2) of frontline workers with the same criteria were recruited at six months into the study (October 2020: T2, $N = 395$), and were resurveyed at 12 months (T3, $N = 135$). Fig. 1 provides a schematic of the survey and study entry process of the project. Participants were provided with opportunities to unsubscribe from further re-survey points should they wish, and were asked to provide their own anonymous identifiers for data linkage. All questions were voluntary, however total scale calculations were only made with complete data.

2.2. Measures

2.2.1. Demographic variables

All participants provided demographic data at their first survey point of their participation. Participants were surveyed for their country of residence, age, occupation sector (health and social care, supply chain, emergency services, or other), gender, and marital status.

2.2.2. Psychological variables

2.2.2.1. Solidarity appraisal. To assess subjective perceptions of solidarity, participants were asked: “To what extent do you feel the following groups have been working in solidarity with you towards beating Covid-19?”, and were provided with a one (“not at all”) to 10 (“very much so”) scale to make their rating. Participants were asked to make these ratings with reference to: “my colleagues”, “my organisation”, “my country’s government”, and “the general public”. This measure was developed and measured at T3 (March–April 2021) due to the emergence and development of solidarity appraisal after our T2 survey in October 2020.

Participants were able to decline providing an answer to these items as no items on the surveys were compulsory.

2.2.2.2. Meaning in life. At each time point, participants completed the Meaning in Life Questionnaire (MLQ; Steger et al., 2006) that indexes both presence of (MLQ-P), and search for (MLQ-S), meaning in life. This 10-item scale has two total subscale scores of five to 35 for each dimension, with larger scores denoting larger incidence of either presence or search. Examples of items on the scale are: “I have discovered a satisfying life purpose” (for presence of meaning), and “I am seeking a purpose or mission for my life” (for search for meaning). Each subscale exhibited a good level of internal consistency at each of the sampling points (T1: MLQ-P $\alpha = .87$, MLQ-S $\alpha = 0.90$; T2 Cohort 1: MLQ-P $\alpha = .89$, MLQ-S $\alpha = 0.93$; T2 Cohort 2: MLQ-P $\alpha = .85$, MLQ-S $\alpha = 0.89$; T3 Cohorts 1 and 2: MLQ-P $\alpha = .90$, MLQ-S $\alpha = 0.91$).

2.2.3. Frontline worker welfare

At T3, indicators of worker welfare were captured using several validated scales. Due to the longitudinal element of the study, and the ethical requirement to minimise participant burden, scales were chosen based on their validity in similar samples and (if possible) their brevity. These measures cover a variety of mental and physical health outcomes, and are referred to collectively herein as “welfare”.

2.2.3.1. Burnout. To measure burnout, the Bergen Burnout Inventory was used (BBI; Salmela-Aro et al., 2011). This measure comprises the three sub-dimensions of burnout (cynicism, inadequacy, and exhaustion), and can be used in total or in each of its subdimensions. For the purposes of this study, the total scoring (the mean of all items) for the scale was used, with higher scores (range 0–6) denoting higher total burnout. The BBI is a nine-item scale that asks participants to rate their agreement with statements in line with their experiences during the past month. Scale items include “I frequently question the value of my work” (for the burnout dimension of inadequacy), “I feel that I have gradually less to give” (for cynicism), and “I often sleep poorly because of the circumstances at work” (for exhaustion). The BBI showed excellent internal consistency (total scale $\alpha = .90$; cynicism $\alpha = 0.85$; inadequacy $\alpha = 0.74$; exhaustion $\alpha = 0.74$).

2.2.3.2. Posttraumatic stress. Levels of post-traumatic stress were measured using the PTSD-8, initially developed as a short screening instrument for post-traumatic stress disorder (Hansen et al., 2010). The scale was used here as an indicator of post-traumatic stress levels rather than clinically diagnostic PTSD, as has been done in other related research examining post-traumatic stress symptoms in frontline workers (e.g. Blekas et al., 2020; Zandifar et al., 2020). The scale can indicate presence of PTSD, provided that participants score above three on any item within the each of the symptom clusters (intrusion, avoidance, hypervigilance). Participants are asked to indicate how much each of the listed symptoms might be bothering them since their trauma, which was defined in the survey instructions as “since being involved in frontline working during the Covid-19 pandemic”. Examples of these symptoms include: “Feelings as though the event is happening again”, “Avoiding thoughts or feelings associated with the event”, and “Sudden emotional or physical reactions when reminded of the event”, with higher scores (range 8–32) denoting higher levels of post-traumatic stress. The scale exhibited good internal consistency ($\alpha = 0.93$).

2.2.3.3. Anxiety. Levels of anxiety were measured using the seven-item Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006), which has been validated for use in the general population (Löwe et al., 2008). Participants are asked to indicate the frequency of their experience of seven anxiety-related problems in the prior two weeks, including “Worrying too much about different things”, and “Feeling afraid, as if something awful might happen”, with higher scores denoting higher

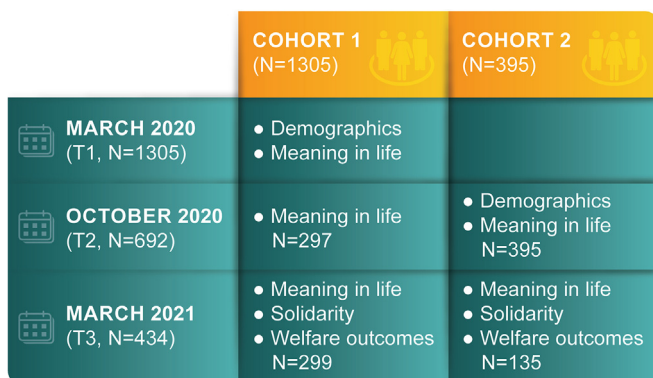


Fig. 1. Process of participant recruitment and data collection.

presence of anxiety symptoms. The scale scores from zero to 21, and has symptomology cut-offs (≥ 5 for mild, ≥ 10 for moderate, and ≥ 15 for severe anxiety symptoms). The internal consistency for this scale was also good ($\alpha = 0.93$).

2.2.3.4. Wellbeing. To assess overall wellbeing, the short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS; Tennant et al., 2007) was used. The questionnaire asks participants to rate their experience of several feelings and thoughts within the last week, including “I’ve been dealing with problems well” and “I’ve been thinking clearly”. For this scale, higher scores (range 7–40) indicate higher wellbeing, and good internal consistency was observed ($\alpha = 0.88$).

2.2.3.5. Somatic stress symptoms. Finally, participants’ levels of physical health symptoms associated with somatic stress were assessed. The Somatic Symptom Scale-8 (SSS-8) was selected to provide a brief but comprehensive scale to assess physical health symptoms associated with stress that has been validated in general population samples (Gierk et al., 2014). The scale asks the respondent to indicate whether they have been bothered by any symptoms associated with somatised stress (i.e., gastrointestinal, pain, fatigue, and cardiovascular symptoms) within the last seven days, including: “Pain in your arms, legs, or joints”, “Trouble sleeping”, and “Chest pain or shortness of breath”. The scale scores from zero to 32, with higher scores indicating higher incidence of physical symptoms. Once more, for this scale higher scores denote higher incidence of somatic stress symptoms, and the scale provided good internal consistency ($\alpha = 0.82$).

2.3. Procedure

Participants were recruited via snowball sampling through social and news media advertising, and word-of-mouth (for further details please see: Sumner and Kinsella, 2021a). Those participants that indicated they would be willing to be contacted for further surveying provided a self-generated anonymous identifier for data linkage, and a contact email address. For the purposes of re-surveying, participants were contacted with the link for the resurvey, a reminder of their self-generated identifier, and contact details of the research team in case of questions or the need for technical assistance. At re-survey points, participants were initially contacted to take part, and were provided with two follow-up reminder emails a week apart if they had not completed their survey. Any remaining participants that had not completed their survey after the second and final reminder were not contacted again. Participants were provided with “unsubscribe” links and information at each of the survey invitation points. To provide participants with their right to withdraw during their survey, any responses of potential participants that did not complete the survey in full were not recorded. For any participants that might have wished to withdraw after they had submitted their survey responses, contact details were provided. The study was reviewed and ethically approved by the University of Gloucestershire School of Natural and Social Sciences Research Ethics Panel (NSS/2003/003).

2.4. Analysis

To assess whether measures of solidarity differed across occupational sectors, one-way ANOVAs were used. To assess relationships between perceptions of solidarity and key welfare outcomes, Pearson ρ correlations were used with two-tailed significance. To assess potential changes to measures of meaning in life over time, two repeated-measures ANOVAs (MLQ-P, MLQ-S) were used. Bootstrapping conditional process methods (Hayes, 2009) were used to determine whether the effect of each measure of solidarity on each measure of welfare might be accounted for by the effect of each measure of solidarity on meaning in life (MLQ-P). All analyses were conducted using SPSS version 25, and the mediation analyses were carried out using the custom macro PROCESS v3 (Hayes, 2013).

3. Results

3.1. The sample

The only analyses requiring each time point were for assessed changes in meaning in life, and for these analyses, 182 participants had fully linked data from each time point (T1-T3). For the rest of the analyses, T3 data were used as this was the only point where perceptions of solidarity have been assessed ($N = 434$). As data were being collected on participants’ occupational changes, 20 participants were ultimately removed from T3 analyses after indicating that they had changed their role significantly, and were no longer actively working in a frontline role. These participants were removed as their exit from those roles may have contributed uniquely to their health and wellbeing status.

The final working sample ($N = 414$) had mean age of 45.2 years (± 10.42), were predominantly women ($N = 349$, 89.5%), based in the UK ($N = 268$, 68.0%), from occupations in health and social care ($N = 351$, 89.1%), were mostly from white backgrounds ($N = 378$, 95.9%), and were married or in civil partnerships ($N = 209$, 53.2%). Compared with the original cohort of participants (reported in: Sumner and Kinsella, 2021a), the sample for the present analyses had suffered significant attrition, however its demographics were largely similar. The original cohort ($N = 1305$) had a mean age of 34.4 years (± 10.89), were predominantly female (86.7%), based in the UK (66.6%), from occupations in health and social care (79.9%), were mostly from white backgrounds (91.6%), and were married or in partnerships (66.1%).

Participants rated perceived solidarity from their colleagues (7.6 ± 2.80) and their organisations (6.7 ± 3.02) higher than that from their country’s government (5.0 ± 2.89) or the public (4.5 ± 2.26). The participants scored median levels of burnout (mean total 3.6 ± 1.16), have middling levels of PTSD symptoms (17.4 ± 6.65), although 75.4% ($N = 312$) qualify as having PTSD symptomology. Levels of anxiety averaged within the “mild” category (8.9 ± 6.09), but participants were present in each of the categories defined by the scale. Wellbeing (22.0 ± 5.19) was below general population norms (Fat et al., 2017). For somatic stress symptoms, the participants scored within the mid-range of the scale (12.2 ± 5.19). A descriptive overview of the sample is presented in Table 1.

3.2. Solidarity and welfare outcomes

To assess relationships between measures of perceived solidarity and welfare outcomes, two-tailed Pearson ρ correlations were used. These tests indicate that no measures of solidarity were associated with the search for meaning in life at T3. For presence of meaning in life, each measure of solidarity was positively associated. For burnout and levels of PTSD, solidarity from organisation, government, and the public were negatively associated. For anxiety, solidarity from organisation and the public were negatively associated. Each measure of solidarity positively related to wellbeing. For somatic stress symptoms, only perceived solidarity from the public was associated. These can be seen in Table 2.

3.3. Meaning in life

To assess changes to reported levels of meaning in life (MLQ-P, MLQ-S) over time (T1-T3), repeated measures ANOVAs were run. For presence of meaning in life (MLQ-P), significant reductions over time were observed ($F_{(2, 364)} = 7.47$, $p = .001$, $\eta^2 = 0.039$). Here, presence of meaning significantly reduced between T1 and T2 (mean difference = 1.13, SE = 0.471, $p = .017$), and T1 and T3 (mean difference = 1.70, SE = 0.431, $p < .001$), but not T2 and T3 (mean difference = 0.57, SE = 0.439, $p = .197$). For search for meaning in life (MLQ-S), there were no significant changes over the three time periods ($F_{(2, 370)} = 0.61$, $p = .546$). These findings indicate that whilst frontline workers’ levels of presence of meaning fell over time (most notably between onset of the pandemic and at 6 months), this was not met by a corresponding increase in search for meaning.

Table 1
Demographic and psychological overview of the frontline worker sample.

		Mean	SD	N	%	
Age		45.2	10.42			
Gender	Female (trans inclusive)			349	89.5	
	Male (trans inclusive)			40	10.3	
	Other (and declined to state)			1	0.3	
Country	UK			268	68.0	
	RoI			126	32.0	
Occupational sector	Health and social care			351	89.1	
	Supply chain			18	4.6	
	Other emergency services			9	2.3	
	Other frontline key worker			16	4.1	
Ethnicity	White background			378	95.9	
	Mixed background			2	0.5	
	Asian background			8	2.0	
	Prefer not to say			6	1.5	
Partnership status	Single			78	19.8	
	Married/Civil partnership			209	53.2	
	Co-habiting			61	15.5	
	Separated/divorced			38	9.7	
	Widowed			7	1.8	
Perceived solidarity (T3)	Colleagues	7.6	2.80			
	Organisation	6.7	3.02			
	Government	5.0	2.89			
	Public	4.5	2.26			
Meaning in Life	T1	Presence (MLQ-P)	27.1	5.95		
		Search (MLQ-S)	18.4	8.05		
	T2	Presence (MLQ-P)	25.4	6.43		
		Search (MLQ-S)	18.9	8.02		
	T3	Presence (MLQ-P)	25.1	6.78		
		Search (MLQ-S)	19.2	7.71		
Burnout (T3: BBI, total mean)		3.6	1.16			
PTSD (T3: PTSD-8)	Total	17.4	6.65			
	PTSD indicated			312	75.4	
Anxiety (T3: GAD-7)	Total Categories	Minimal	8.9	6.09	111	27.4
		Mild			127	31.4
		Moderate			82	20.2
		Severe			85	21.0
Wellbeing (T3: SWEMWBS)	Total	22.0	5.19			
	Metric	20.5	4.12			
Somatic stress symptoms (T3: SSS-8)		12.2	7.02			

3.4. Solidarity, presence of meaning, and frontline worker welfare

As the levels of search for meaning in life (MLQ-S) did not significantly decline over time, the mediation models fit to assess the relationship of perceived solidarity to markers of welfare used only presence of meaning in life (MLQ-P) assessed at T3. For each outcome, four models were fit with each metric of solidarity serving as independent variable. A

Table 2
Correlations between measures of perceived solidarity and welfare outcomes in frontline workers.

	Meaning in Life (T3)		Burnout	PTSD	Anxiety	Wellbeing	Somatic stress symptoms
	Presence	Search					
Colleagues	.159**	-.037	-.036	-.095	-.078	.162**	.001
Organisation	.195***	.008	-.184***	-.207***	-.132**	.231***	-.071
Government	.109*	.064	-.098*	-.101*	-.020	.143**	-.002
Public	.217***	.023	-.112*	-.172***	-.162**	.258***	-.133**

*p < .05.
**p < .01.
***p < .001.

representation of these models is provided in Fig. 2. Each model was fit using 5000 bootstrap samples to provide bias-corrected confidence intervals, and is reported with direct and indirect effects to illustrate where full or partial mediation exists in Table 3. As can be seen, the models regressing measures of perceived solidarity for anxiety (GAD-7: c, i-iv) and somatic stress symptoms (SSS-8: e, i-iv) are fully mediated by meaning. For the models examining burnout (BBI: a), PTSD (PTSD-8: b), and wellbeing (SWEMWBS: d), both perceived solidarity from colleagues (i) and government (iii) provided full mediation, whereas perceived solidarity from organisation (ii) and public (iv) provided partial mediation. Viewed from the perspective of perceived solidarity, that of colleagues (i) and of government (iii) provide full mediation for each welfare outcome (models a to e).

4. Discussion

The present study sought to evaluate the associations of solidarity appraisal with markers of physical and mental health in a cohort of frontline workers from the UK and Ireland during the Covid-19 pandemic. The first aim of the study was to evaluate perceptions of solidarity in frontline workers. To this end, we found that 12 months into the pandemic, our sample of frontline workers rated solidarity from their colleagues and organisations more highly than that from their country's government and the public. This finding is consistent with qualitative work conducted during the pandemic which suggested that behavioural or symbolic solidarity from both the government and public over time had dropped since the start of the pandemic and initial "lockdown" (Kinsella et al., 2021; Kinsella and Sumner, 2021). Secondly, we set out to understand whether these appraisals of solidarity were associated with markers of frontline worker welfare. Zero-order correlations provided mixed results, with only wellbeing being significantly associated with each type of perceived solidarity. Our third aim was to assess changes in meaning over time. This finding corroborates prior qualitative findings (Kinsella et al., 2021; Sumner and Kinsella, 2021b), which suggested that frontline workers were experiencing greater levels of meaninglessness through later phases of the pandemic. Using the available longitudinal data, we have observed that participants' meaning has reduced over time, but this was restricted to presence of meaning in life and not search for meaning. Our fourth aim was to understand whether meaning may provide a mediatory pathway in associations between appraisals of solidarity and welfare outcomes. It was found that each type of perceived solidarity was associated significantly with each outcome of frontline worker welfare, and this was either fully or partially explained by a mediatory pathway through presence of meaning in life. This finding is novel, and not only provides a potential mechanism by which solidarity appraisal may be impacting worker welfare, but also a stark warning for the deep and personal impact that broader social solidarity (or lack thereof) can have on individuals in high-stress, high-stakes work.

The changes in meaning in life over time are interesting to note for the context of understanding occupational stress and coping. Previous assessments of meaning in life over similar timescales to those herein indicate that both measures are reasonably stable (Steger and Kashdan, 2007) in "normal" conditions, so it is of concern that we have observed

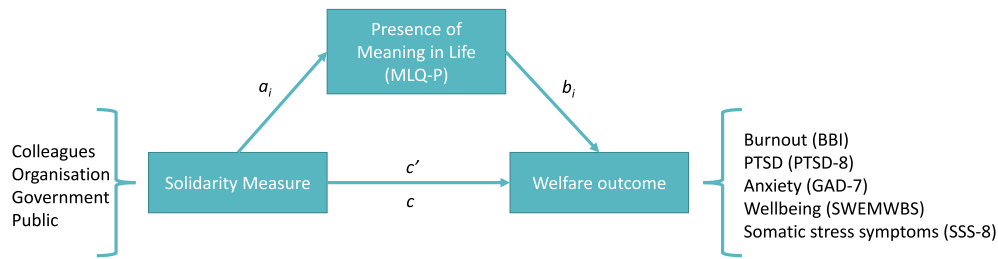


Fig. 2. Model representation of mediation models testing the indirect effect of measures of perceived solidarity on frontline worker welfare via presence of meaning in life.

Table 3

Mediation analyses of perceptions of solidarity (i to iv) on frontline worker welfare (a to e) via presence of meaning in life.

a. Burnout (BBI), N = 411									
	Direct effect (c')				Indirect effect (c)				Mediation type
	b	SE	LLCI	ULCI	b	SE	LLCI	ULCI	
i. Colleagues	0.01	0.02	-.029	.050	-0.03	0.01	-.051	-.012	Full
ii. Organisation	-0.05	0.02	-.088	-.015	-0.03	0.01	-.051	-.015	Partial
iii. Government	-0.03	0.02	-.070	.005	-0.02	0.01	-.039	-.002	Full
iv. Public	-0.08	0.03	-.128	-.023	-0.05	0.01	-.074	-.027	Partial
b. PTSD (PTSD-8), N = 411									
	Direct effect (c')				Indirect effect (c)				Mediation type
	b	SE	LLCI	ULCI	b	SE	LLCI	ULCI	
i. Colleagues	-0.14	0.11	-.364	.082	-0.11	0.04	-.201	-.043	Full
ii. Organisation	-0.39	0.10	-.594	-.185	-0.12	0.04	-.201	-.050	Partial
iii. Government	-0.20	0.11	-.417	.009	-0.08	0.04	-.149	-.009	Full
iv. Public	-0.40	0.14	-.676	-.124	-0.18	-0.05	-.284	-.080	Partial
c. Anxiety (GAD-7), N = 405									
	Direct effect (c')				Indirect effect (c)				Mediation type
	b	SE	LLCI	ULCI	b	SE	LLCI	ULCI	
i. Colleagues	-0.02	0.10	-.221	.174	-0.15	0.05	-.246	-.055	Full
ii. Organisation	-0.10	0.09	-.286	.082	0.17	0.05	-.264	-.078	Full
iii. Government	0.06	0.10	-.134	.244	-0.10	0.05	-.191	-.010	Full
iv. Public	-0.21	0.13	-.450	.040	-0.23	0.06	-.359	-.111	Full
d. Wellbeing (SWEMWBS), N = 411									
	Direct effect (c')				Indirect effect (c)				Mediation type
	b	SE	LLCI	ULCI	b	SE	LLCI	ULCI	
i. Colleagues	0.09	0.07	-.040	.232	0.19	0.06	.071	.307	Full
ii. Organisation	0.15	0.06	.022	.275	0.21	0.06	.099	.329	Partial
iii. Government	0.09	0.07	-.045	.216	0.12	0.06	.015	.241	Full
iv. Public	0.22	0.09	.051	.388	0.31	0.08	.163	.463	Partial
e. Somatic stress symptoms (SSS-8), N = 401									
	Direct effect (c')				Indirect effect (c)				Mediation type
	b	SE	LLCI	ULCI	b	SE	LLCI	ULCI	
i. Colleagues	0.13	0.12	-.107	.376	-0.13	0.05	-.299	.052	Full
ii. Organisation	-0.03	0.11	-.249	.199	-0.14	0.05	-.243	-.061	Full
iii. Government	0.08	0.12	-.151	.308	-0.08	0.04	-.166	-.007	Full
iv. Public	-0.21	0.15	-.513	.087	-0.21	0.06	-.328	-.099	Full

presence of meaning in life decline for these essential workers. In related work that has assessed meaningful work, a meta-analysis has found that this is associated with a broad array of occupational and personal factors such as job satisfaction, work performance, organisational withdrawal intentions, and general health and affect (Allan et al., 2019). Further, meaning in life, in general terms, is robustly associated with health and wellbeing (Czekierda et al., 2017; Steger, 2009) including during the pandemic (Nelson-Coffey et al., 2021), and has been noted as being a protective factor in measures of resilience, burnout, and wellbeing in our prior work from this project (Sumner and Kinsella, 2021a) and elsewhere in other populations (Zika and Chamberlain, 1992), also when related to meaning derived from work (Grouden and Jose, 2015).

Importantly, the present work has uncovered that the loss of meaning has not been responded to with an increased search for meaning in these participants, which is counter to prior understandings of the balance between these two facets (Steger et al., 2008). This finding is difficult to

explain, and will likely require further assessments over time to see if and how a corresponding level of search for meaning in life may be initiated. It is possible that as the scale itself captures more active and engaged strategies for searching for meaning (Steger et al., 2006, 2008), that these workers may feel a need to search for meaning, but may not actively have engaged in those search strategies yet. The dynamic between presence and search is complicated, and has been discussed as being potentially beneficial to wellbeing either in terms of having more presence (and therefore feeling fulfilled), or having more search (and therefore being actively engaged in achieving fulfilment) (Steger et al., 2008). Here, we can see a loss of presence of meaning with no increase in search for meaning, which could be interpreted that these workers are experiencing complex and potentially harmful trajectories in their psychological welfare. However, there may be some disagreement with this interpretation where some regard search for meaning as being potentially a dysfunctional status which can occur when dissatisfied or frustrated with their

current position (Baumeister, 1991; Steger et al., 2008). It is possible here that these workers are simply too busy or too stressed to search for meaning, or that their decrease in presence of meaning may be impacting their overall affect. With poorer negative affect and higher levels of exhaustion, some workers may have given up on experiencing meaning in their lives (at least temporarily) as indicated in our prior qualitative work (Kinsella et al., 2021). Either way, the present findings demonstrate that both aspects of meaning (presence and search) can function independently of each other over time. Further research will need to understand the dynamics of how presence and search for meaning in life fluctuate and diverge or converge over time, particularly given the implications for psychological wellbeing.

The present research offers evidence to support the novel idea that meaning can provide a mechanism by which perceived solidarity may be associated with markers of welfare. With these analyses, we provide weight to the theory of solidarity appraisal by demonstrating that for two aspects of perceived solidarity (from colleagues and from the government), the relationship with each welfare outcome is completely explained by meaning. Similarly, the relationship between all types of solidarity and two welfare outcomes (anxiety and somatic stress symptoms) are entirely accounted for by the mediatory relationship with presence of meaning in life. Taken alongside the finding of decreased meaning over time, this supports the concept that broader social factors can influence the welfare of workers when they are engaged in work that requires an interdependence of effort to achieve key outcomes. This extends previous work on occupational stress and burnout, where social factors have previously been associated with wellbeing, but were considered within the context of the organisation (Maslach and Leiter, 2008). Previous work on burnout has highlighted the importance of reciprocity between colleagues and clients/customers (social) and also between employees and their organisations (organisational), with the thesis that the work context provides a forum for social exchange (Schaufeli et al., 1996). The premise of solidarity appraisal incorporates the concept of reciprocity, however, considers broader and deeper notions of both symbolic and enacted mutual goal-directed motivation. Externally situated control over work outcomes has previously been found to be impactful on worker burnout in helping roles, particularly with regard to customers/clients, line managers, or colleagues (Ben-Zur and Michael, 2007; Felton, 1998; Platt et al., 2012), but here we extend this to the broader realms of policymakers and the general public. Further, the aspect of motivation has previously been shown to be a critical factor in the experience of work burnout (Trépanier et al., 2020). It is possible that the reductions in meaning associated with perceptions of solidarity seen in the participants of this present study are undermining their own personal motivations towards their work, which has been supported by our extant qualitative findings from this project (Kinsella et al., 2021). The nascent theoretical developments of solidarity appraisal posit that any external entity or group with whom workers have interdependence in reaching shared goals (such as reaching the end of the pandemic, keeping shops stocked, or managing the influx of critically ill patients) may influence their experience of stress or burnout (Sumner and Kinsella, 2021b), which the findings herein support. Not only this, but the findings also demonstrate the extent to which solidarity may be important in preserving the welfare of the frontline, as each marker of welfare is impacted to a greater or lesser extent by the ability for lack of solidarity from key groups to impact meaning.

Changes in social solidarity with regard to the pandemic have been noted by other researchers, particularly with regard to institutional solidarity (Prainsack, 2020), which is supported herein by the full mediatory models for governmental solidarity and each of the markers of welfare of these participants. Solidarity appraisal (as measured by a Likert scale considering community and neighbourhood solidarity) has been found to be associated with wellbeing after the experience of acute critical incidents such as mass shootings (Hawdon et al., 2012), however this is the first assessment of solidarity and wellbeing in a continuing and dynamic critical context, where the factors that influence welfare change

radically and may ebb and flow with infection rate. Other work has considered how solidarity may be relevant to wellbeing much more broadly in the pandemic context (Chan, 2021), and given the present findings there is a clear need to investigate solidarity as an important predictor of health and wellbeing on a wider scale. There is a surprising paucity of research assessing how solidarity may be associated with health and wellbeing, and whilst the present findings are a first step towards this, further work (particularly longitudinally to track fluctuations in something as dynamic as a pandemic) is required.

4.1. Limitations and future directions

This study provides the first empirical assessment of solidarity appraisal in any occupational context, and supports our theoretically informed model that perceiving a lack of solidarity from interdependent social groups, in the context of stressful working conditions, negatively impacts workers' welfare by reducing the presence of meaning in life. Furthermore, these findings provide a novel and meaningful snapshot of the perspectives of frontline workers during the pandemic. Whilst the present study provides important information for the understanding of how frontline workers have experienced the pandemic, and how their welfare may be affected, there are limitations to our approach, which we discuss in detail.

Importantly, the lack of a solid psychometric assessment tool for perceived solidarity has meant that we have had to develop a means to capture solidarity appraisal quickly in order to avail of the opportunity to collect these data within the pandemic context. It was the intention of this study to allow participants to interpret solidarity as they chose in these early stages of this theoretical development, however further work in this is clearly warranted. It is also noted that the present sample are not very diverse, with the vast majority being white, female, and from health and social care roles. This lack of diversity will have relevance to the applicability of the findings, but also to the depth and conclusiveness of the findings as well. As an example, recent data from 2020 shows that white people make up to 79.2% of the NHS workforce (NHS Digital, 2020), which is a substantially lower proportion than that reported here. The sample has also suffered attrition over time. The project recruited 1700 participants through both cohorts, with 1013 agreeing to be contacted for further surveys. Each survey point has seen around a 30% return on participation per cohort, which further limits the generalisability and transferability of the findings as well as the capacity to understand more about differences between and within groups of these frontline workers. Given sufficient diversity within the sample, it may have been possible to conduct comparisons between employment sectors to understand more about whether different areas of frontline workers may appraise solidarity from key groups differently. This is particularly important given the inequities of social inclusion that are evident in the two countries from which these participants were recruited (e.g. Holtum, 2020; Humphreys, 2007; Marmot, 2020).

Whilst the present work and related prior work indicates that it is the lack of solidarity that has decreased meaning over time, without having measured solidarity throughout the course of this project we cannot truly determine if this is the case. Further, the mediation analysis being undertaken at one point in time limits the ability to understand directionality of the relationships observed, and so further work is required to understand causality. The project will continue to assess solidarity in an attempt to understand more about how these metrics change, and how the dynamics between measures of solidarity, meaning, and outcomes may fluctuate with the complex and changing landscape of the pandemic.

4.2. Recommendations

The findings here have immediate relevance for policymakers in that their actions and rhetoric may be protective if they are able to foster a sense of social solidarity with these workers. There has been some analysis on the rhetoric of leadership during the Covid-19 pandemic that

has found those that engage with the language of solidarity and unity have also seen good levels of adherence to non-pharmaceutical interventions from the public (Doogan et al., 2020; Foran et al., 2021). Further work has also demonstrated that leadership acting against the notion of solidarity has reduced adherence to guidance (Fancourt et al., 2020; Faulkner, 2020), thereby weakening frontline workers' perceptions of solidarity from their government and the public (Sumner and Kinsella, 2021b). There are also important implications for the regulators of news and social media with regard to the sharing or contextualising of social narratives. Whilst the sharing of important news is vital in such times, the way that it is delivered and the rhetoric that is used to present it may result in unhelpful moral narratives that likely contribute to feeling less "in it together" and more "on your own" (Basch et al., 2020; Prosser et al., 2020).

5. Conclusions

The present work set out to understand the role of solidarity appraisal on frontline worker welfare during a global pandemic. As part of a larger, ongoing project, the present findings not only support the thesis that perceived solidarity from key groups is associated with important markers of worker welfare, but also that these associations may be mechanistically determined by changes to meaning. Importantly, each of these markers (including presence of meaning in the work context) are not just critical to understanding how we can best support our critical frontline workers during the pandemic, but also to mitigate the potential for workforce attrition that may be seen because of the prolonged and distressing experiences of this work, which have been indicated by these participants in prior work (Kinsella et al., 2021). Here, we have found that broader social solidarity beyond the immediate dynamics of the workplace are important predictors of a variety of markers of health and wellbeing. The loss of meaning over time in this cohort is an observation that requires careful attention in order to protect and preserve these critical workers.

This is the first exploratory study to examine the role of solidarity appraisal on health and wellbeing during the pandemic. However, this model has relevance beyond the pandemic context and in other stressful occupational contexts where interdependence of action for shared goals is present (e.g., veterinarians that rely on cooperation and collaboration from animal owners and guardians). The findings add new information into the overall understanding of those factors that support or inhibit the welfare of critical workers in times of crisis. Here, we find that meaning in life for frontline workers has decreased over time, and that appraisals of solidarity from key interdependent social groups may be impacting welfare via this decreased protective element. In any crisis, the welfare of those sacrificing so much for the good of so many is of critical importance. The present work provides new information regarding the importance of solidarity and a means by which we can effect meaningful change to those on the frontline during any societal crisis: by acting and speaking in ways that result in a felt sense of solidarity among those who we are placing great demands upon.

Disclosure statement

No potential competing interest was reported by the authors.

Data availability statement

The data that support the findings of this study will be made openly available in The Open Science Framework at <https://osf.io/nm83c/> on completion of the project.

CRediT authorship contribution statement

Rachel C. Sumner: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Writing – original draft,

Writing – review & editing, Project administration. **Elaine L. Kinsella:** Conceptualization, Methodology, Validation, Investigation, Resources, Writing – review & editing, Project administration.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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