



**Psychological trauma: understanding risk, building
resilience during a public health crisis**

Journal:	<i>Mental Health and Social Inclusion</i>
Manuscript ID	MHSI-07-2026-0265
Manuscript Type:	Research article (for editor review)
Keywords:	Pandemic, COVID-19, Moral Injury, Resilience, Frontline workers



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ABSTRACT

Purpose: COVID-19 was a global outbreak with long-term consequences. This paper considers protective and vulnerability factors of psychological trauma and moral injury in frontline workers and their families during public health crises (COVID-19), and how resilience can mitigate impact. **Design/methodology/approach:** Study one included interviews with twenty-one family members of frontline workers and eleven frontline workers. Study two determined the severity of psychological trauma and moral injury, as well as the role resilience in two hundred and three participants (Frontline workers, $n = 98$; Families, $n = 105$). **Findings:** Thematic analysis of study one highlighted several promotive and protective factors of psychological trauma, moral injury and resilience. Study two explored this in more detail in frontline workers and their families, noting that they experienced moderate levels of moral injury and psychological trauma. Moderate levels of resilience emerged, positively predicted by subjective wellbeing. Moral injury was found to have a causal effect on psychological trauma via resilience. **Originality/value:** Findings culminated in the development of a conceptual model - the *Health Crisis Impact Model (HCIM)*, which proposes a two-way inter-connected pathway, identifying the impact of stressors specific to public health crises on frontline workers and their families, as well as the protective factors of resilience and how these can promote the development of resilience.

Paper type: Research paper

Key words: Pandemic; COVID-19; Moral Injury; Resilience; Frontline workers;

INTRODUCTION

The COVID-19 pandemic and resulting public health crisis created significant strain on frontline services (Olapegba et al., 2022; WHO, 2023). Healthcare workers, who were

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3 already more vulnerable to developing compassion fatigue, burnout and psychological
4 trauma (Kumar, 2016), were placed in a position of immense and unprecedented pressures
5 (BMA, 2023; Nikita & Chaudhuri, 2022). This included fear arising from the dangers of
6 contracting and transmitting COVID-19, as well as relentless attempts to manage risk in the
7 context of limited medical supplies and equipment (BMA, 2023; Greenberg et al., 2020;
8 Nikita & Chaudhuri, 2022), with little opportunity to recover from long working hours and
9 workload pressures. The adoption of less than adequate coping strategies arguably emerged
10 (e.g. Hoffart et al., 2022, Pilch et al., 2021). Whilst this could be attributed to psychological
11 distress and the consequent efforts to manage, there would also appear to be overlap with
12 moral indiscretions that can naturally arise during a health crisis. Frontline workers are in a
13 particularly challenging position in relation to experiences that may instigate moral
14 transgressions, moral distress and injury (e.g., Webb et al., 2023), where they are left to
15 make choices that impact on patient care. This can place a burden on the frontline worker of
16 having to make a judgement that goes against their moral standards, leading to perceptions
17 of personal failure (French et al., 2022; Rushton et al., 2022).

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19 Thus, there are several components to consider when trying to gain a comprehensive
20 understanding of the impact of working on the frontline during public health crises; it is
21 important to consider factors that may ameliorate the development of psychological trauma
22 and distress in particular (Luthar et al., 2000), since this is a comparatively under-
23 researched area compared to risk factors. For instance, the ability to access protective
24 factors such as social support through the usual means can be reduced during a public
25 health crisis as a result of social movement restrictions, thus narrowing the support
26 available to those residing within the same household (Das et al., 2021). During crises,
27 frontline workers may therefore increasingly rely on family members for the support,
28 placing emotional and psychological demands on them (Das et al., 2021). Whilst such
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support can buffer stress and reduce burnout (Tselebis et al., 2020), this may also lead to vicarious distress and emotion contagion within family units (Feng et al., 2020; Figley & Kiser, 2013).

There is undoubtedly a need to explore this area in more detail and to draw on relevant theory. Theories relating to the development of psychological trauma may have particular value in elucidating how trauma can develop during a public health crisis. *Cognitive Appraisal Theory*, for example, asserts that an individual's appraisal of an event influences their interpretation and subsequent response (Lazarus, 1966; Lazarus & Folkman, 1984). This highlights *how* individuals evaluate their experiences and the ensuing psychological outcomes they experience while working on the frontline. However, this theory fails to consider the role of emotions on the cognitive appraisal of traumatic events (Moors & Scherer, 2013; Moors, 2014), which is a significant omission. The *Cognitive Appraisal Theory of Emotion* (Moors, 2013, 2014) can thus have some value in helping to explain how emotions may remain after a traumatic event. This theory proposes that emotions can be derived and differentiated by the appraisal of an event or stimulus, with the appraisal of one's ability to cope influencing the emotional reaction to an event (Moors, 2013, 2014). This theory also recognises that emotions can initiate appraisals, which then lead to changes in behavioural and physiological responses (Moors, 2013, 2104; Roseman & Smith, 2001). For example, an individual may hear a loud noise and experience fear; this is then followed by a cognitive appraisal and subsequent behavioural action (Moors, 2020).

Whilst accepting that cognitions and emotions are important, there are aspects of the work environment that are neglected and require consideration. For example, frontline workers are exposed to increased job placed demands during a pandemic. This arguably influences how they react to traumatic experiences, suggesting that factors beyond appraisal may be important. *The Jobs Demands-Resources Model* (Bakker et al., 2003; Demerouti et al.,

2001), for example, maintains that an increase in workplace demands (e.g., workloads, emotional labour) can augment susceptibility to burnout, compassion fatigue and psychological trauma. This highlights factors that may promote the development of psychological trauma and moral injury in the workplace, providing an understanding as to how an increase in job-demands may impact frontline workers during public health crises. Further, the disconnect in job-demands, such as that between staff and higher management, alongside increased workloads and limited equipment, can then impact on the levels of moral distress (Zerach & Levi-Belz, 2022).

However, and as noted earlier, the impact is not just on the frontline worker, but their families, with the latter a markedly neglected component in research. Additional theories may therefore be applied, and those that consider the burdening impact on the families of frontline workers. For instance, families typically share a strong emotional connection that can create susceptibilities to developing psychological trauma through emotional contagion (Figley & Kiser, 2013). *Emotional Contagion Theory* (Hatfield et al., 1992; Hatfield et al., 2014) refers to a subliminal transference of emotions that occurs within a group and results in emotions being shared and mimicked. Within families, it is possible that shared emotional bonds may influence the subliminal transference of emotions, resulting in the whole group then sharing an emotional reaction (Figley & Kiser, 2013). During a public health crisis, such as COVID-19, if frontline workers experienced distress in the workplace, families may then become emotionally contaminated as a result of providing care to their loved ones.

Thus, the current research aims to address this neglected area of study by considering the impact of a pandemic on frontline workers and their families. The research achieves this through two connected studies employing mixed methods and capturing the experiences of frontline workers and their families. Study one focuses on the psychological impacts, moral

injury and the role of protective factors in ameliorating psychological distress. Study two builds on these findings by exploring in more detail the severity of psychological trauma and moral injury, as well as the role of resilience in a larger sample.

STUDY ONE

PART A: Families of frontline workers

Participants

Adults who had at least one family member working on the frontline during the COVID-19 pandemic took part during the third COVID-19 national lockdown in the UK.

Twenty-one participants were recruited online using social media (Facebook and LinkedIn), from an initial interested sample of thirty-one. Ninety percent identified as female ($n = 19$) and 10% identified as male ($n = 2$), with ages ranging from 21 to 66 years (mean age of 36).

Participants reported twenty-six frontline occupations, including Health and Social care (31%), Judicial (27%), Education and Childcare (14%), Food and Retail (12%), Funerary (8%) and Building and Logistics (8%). Sixty-one percent reported they were frontline workers themselves ($n = 13$).

Procedure

Ethical approval was granted by an Ethics Committee. Recruitment occurred online. The interview schedule contained twenty-eight questions developed in response to an earlier systematic review that was undertaken. Interviews were conducted via Microsoft Teams, lasting 46 minutes on average (longest 2 hours and 32 minutes). Interviews were transcribed verbatim and anonymised to remove any identifiable characteristics.

Part A: Results

Thematic Analysis (Braun & Clarke, 2006, 2013) was utilised. A second researcher independent to the study was employed to ensure inter-rater reliability of resulting themes. Seven main themes emerged as follows:

Theme One: Elevated stress, including aggravation of pre-existing challenges.

Participants experienced significant stress as a direct result of changes to their daily lives due to the pandemic. The reduction in social movements created new problems families had not faced before. Pre-existing difficulties and stress before the onset of the pandemic was amplified. This theme incorporated three subordinate themes: 1.) *Subordinate One:*

Uncertainty about the future. The pandemic instigated new and significant stress due to uncertainty about the future. Families reported the stress of not knowing when it would end, or when restrictions would be lifted. For example: “I cope by fixing things. I couldn’t fix COVID, and all I could do was wait. The not knowing when it would end was very stressful” [Participant E]; 2.) *Subordinate Two: Unfamiliarity with home working and schooling.*

For parents, the role of educator created negative affect due to feelings of inadequacy, a perceived inability to teach, and time constraints due to concurrent homeworking. This then reduced their ability to support their wellbeing, resulting in a perceived reduction in resilience., e.g. “Constantly, constantly stressed and constantly worrying, which is not sort of what I’m like generally. I was over thinking and over worrying” [Participant A]; 3.)

Subordinate Three: Difficult and challenging life events. The pandemic altered and amplified pre-existing challenges during times of difficulty, creating additional stress. For example, imposed lockdowns intended to limit social movement also led to normal services, such as funeral care and post-natal care, being reduced, e.g., “All of the post-natal care stopped and then we had none. I had a very traumatic birth, so the fact that then my child wasn’t being weighed at all, and no one seemed to care that my child wasn’t being weighed, was very, very stressful” [Participant U].

Theme Two: Enhancing wellbeing by using time productively.

In response to the national lockdowns, participants reported the additional time spent at home enabled them to explore their interests. A range of hobbies were disclosed, where engagement

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was helpful in reducing stress and improving mental health. Families reported using their time productively, enabling the allowance of creativity, and completing enjoyable tasks. This further boosted self-esteem and increased motivation. For example, “I brought tranquility into my home. I started meditating more. I started doing more yoga. I just started doing more grounding and more lavender baths. I just started being a lot more mindful” [Participant L].

Theme Three: Unhelpful coping emerging due to restrictions. Participants reported elevated levels of stress and a reduced ability to rely on previous effective coping strategies. In response, families adopted unhelpful strategies to alleviate the stress. For instance, “I won't lie about some very unhelpful coping strategies. I've been drinking a lot more wine than I should and comfort eating all the wrong things, and you know, sort of trying to ignore problems, I suppose” [Participant E].

Theme Four: Connecting with nature to improve wellbeing. Participants enjoyed spending time connecting with nature during the pandemic. The calming and peaceful environment of nature led to a reported reduction of the physiological and psychological consequences of stress. While in nature, family units seemingly benefited from a decrease in arousal, promoting stress recovery and improving hedonic wellbeing. The emotional bonds and susceptibility to contagion of emotions encouraged the shared absorption of the stress-reducing properties of nature. For example, “So, my partner often will say let's go for a walk. Especially at the weekend and we will get out for an hour. I'm often, at first, make out like I really can't be bothered and sort of say no. But my partner will say come on, the fresh air will do us all good and it does” [Participant E].

Theme Five: Fear of transmission of the virus. Fear developed in response to transmission and contagion, and was amplified at the beginning of the pandemic due to the unknown. This theme incorporated four subordinate themes as follows; 1.) *Subordinate One: Fear of catching COVID-19.* Families experienced severe fear of catching the virus and passing it to

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3 their loved ones. For example, “I’ve been more worried about picking it up myself and
4 passing it on to them than I have been the other way around. It’s that guilt complex, isn’t it?
5 It’s that you don’t want to be the one who’s hurt somebody, ultimately” [Participant E]; 2.)

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10 *Subordinate Two: Taking evasive action to minimise transmission risk.*

11 Families took evasive steps to minimise the risk of the transmission and to manage intense
12 feelings of fear. They would take extreme actions to ensure transmission control (e.g.,
13 removing clothes before entering the home, quarantining packages, altering normal physical
14 acts of affection), and strictly following government guidance. For example, “Before I let my
15 partner put anything down, everything they wore went to wash and my partner would go for a
16 shower. My partner couldn’t touch the kids, it was like no kisses. Only air kisses. I was like
17 pretty obsessed” [Participant G]; 3.) *Subordinate Three: Fear as a contagion.* High levels of
18 fear about the pandemic spread throughout the family unit. The fear was felt by one
19 individual and, through emotional contagion, resulted in a shared emotional response,
20 exacerbated by the media, economic insecurity and daily UK Government briefings that
21 reported infection and death rates. This resulted in family members utilising the same
22 strategies to reduce transmission, for instance: “There’s been times when we’re not
23 comfortable having physical contact with each other because we don’t want to expose or put
24 each other at risk. There’s been times when they’ve been wearing a mask indoors, we were
25 just that fearful” [Participant L]; 4.) *Subordinate Four: Fear of not being able to get essential*
26 *goods.* Participants reported intense levels of fear towards obtaining essential goods, leading
27 to ‘panic buying’ and stock piling necessary goods required to survive, e.g., “*It did scare me*
28 *though. I remember when I got up early one morning to go to Tesco’s to get, you know, to*
29 *panic buy essentially like the rest of the country. When I saw all of the empty shelves that*
30 *really scared me*” [Participant B].

Theme Six: Psychological cost of caring. Families reported distress from witnessing and/or hearing the distress from frontline workers during the pandemic, creating adverse effects. This theme comprised three subordinate themes; 1.) *Subordinate One: Sharing the distress of family members.* Families reported that they knew their loved ones were experiencing trauma at work and enduring distress, with one participant stating, “My parent has come back saying the number of bodies that were at the Mortuary was unbelievable. There was just tags and tags and tags of names at the Mortuary. So, I think the amount of death they saw impacted them” [Participant K]; 2.) *Subordinate Two: Managing and reacting to the distress of family members.* The inability to ease the distress of the frontline worker and the fear for their safety at work was vicariously experienced by the family. Overall, the role of providing social support, alongside the emotional bonds connecting families, contributed to a psychological cost of caring, e.g., “You feel pretty helpless because there's not a lot you can do to help really. Especially, when my child was feeling like they were going to kill us. They were also saying they were ready to die as well, which isn't a nice thing for your child to say or for you to hear from your child. My child said, “I've prepared myself! I am ready to die because doctors are dying, and I'll probably die!”. It was pretty traumatic for all of us at the time” [Participant S]; 3.) *Subordinate Three: Feeling unable to support.* Families also reported frontline workers not disclosing their experiences at work to them amplifying the psychological cost of caring, increasing distress in response to feeling unable to support their loved one. One participant noted, “My child actually said, ‘I've lost count of the people I've held a telephone to their ear for, while they spoke to the relatives, before we put them on a ventilator’. They then said, ‘At work we often heard later, a couple of days later, if I've gone on the intensive care unit that they have then died’” [Participant A].

Theme Seven: Benefits and negatives of online communication. Gaining online social support from wider social groups helped ease discomfort and isolation endured by the families during

the pandemic, such as allowing participants to feel connected to others and promoting healthy emotional states. This theme comprises three subordinate themes; 1.) *Subordinate Theme One: Easing discomfort through online contact*. Online communication acted as an outlet for distress and was an effective tool to cope with stress. One participant recounted, “So on a call, even just someone saying I know exactly how you feel. I feel the same way. Or, you know, that your feelings are legitimate. I found that very helpful” [Participant U]; 2.) *Subordinate Theme Two: Achieving social support and connecting through online communication*. Families were affected by social isolation from wider support networks. This significantly impacted the family unit’s perception of being able to provide and receive social support from others, especially in those who relied on wider social networks, and particularly pertinent in elderly relatives, i.e., “There is an old couple who live next door and their family had come to see them. They were stood at the end of the garden talking to them. It just makes you want to well up. I’m sure all they wanted was to have a hug” [Participant O]; 3.) *Subordinate Theme Three: Reduced intimacy online*. Online communication lacked the full support attainable by face-to-face support. This included technical difficulties, difficulty reading body language and a loss of physical support, e.g., “I’m a very huggie person and it has been awful not to hug everybody. I know, when this is over, I’m going to hug everybody till it’s weird [Participant P].

PART B: The lived experiences of frontline workers

Participants

Eleven frontline workers out of a potential pool of twenty took part. They were recruited online using social media, during the third COVID-19 national lockdown in the UK. Ten percent identified as male ($n = 2$) and 90% identified as female ($n = 9$). Ages ranged from 21 to 64, with a mean age of 36. Health care occupations included Palliative Urgent Response Sister, IPC Consultant Nurse specialising in infection control (9%), Acute Consultant Doctor

specialising in infectious diseases (9%), Community Mental Health Nurse (9%), Occupational Therapist (9%), and Clinical Practitioner (9%). Social care roles reported included Residential Adult Health Care Workers (9%), Mental Health Support Workers (19%), Health Care Team Leader (9%), and Residential Child Health Care workers (18%).

Procedure

See Part A for procedure and ethics. The semi-structured interview schedule contained thirty questions and built on the findings from Part A. The interviews lasted an average of one hour fifteen minutes.

Results

Thematic Analysis was used as for Part A, with reliability being determined by a researcher independent to the author team. Ten themes emerged as follows:

Theme One: Elevated stress in the workplace. Participants reported substantial levels of stress as a direct result of working on the frontline during the COVID-19 pandemic. There were three subordinate themes; 1.) *Subordinate Theme One: Changes in practices causing stress.* Frontline workers reported experiencing elevated stress throughout the pandemic following changes to workplace responsibilities, workloads, and policies and procedures, e.g., “I think it's the guidelines change so frequently, and we don't know what we're doing from one minute to the next. That has been stressful in some respects” [Participant F]; 2.) *Subordinate Theme Two: Perceived competence negatively affected, causing stress.* Stress was also amplified among those who provided direct care to infected patients, with levels of competence impacted in response to a lack of knowledge about the virus e.g., “I've experienced an epidemic and the organization and management of that. But then it was completely different, I did feel very overwhelmed. It's just like all my experience didn't help me cope” [Participant B]; 3.) *Subordinate Theme Three: Elevated client distress impacting workers.* Frontline workers employed within social care roles reported the restrictions on movement created

significant stress for patients, with the working conditions and the fear expressed by patients being vicariously integrated by the frontline workers, e.g., “There was something pretty terrifying at that point about putting an oxygen mask on someone and telling them they had COVID, and you could see that absolute fear [Participant H].

Theme Two: Organisational support. A range of support was instigated by the organisations employing frontline workers to help mitigate stress during the pandemic, such as support groups, and counselling and wellbeing services. Yet, ninety-one percent of frontline workers reported they did not utilise these, as they felt they did not want or require additional support. Instead, it was peer and management support that was utilised to combat and reduce stress, and to promote group belonging, e.g., “They said to me that I got them through it. But they got me through it. It was that kind of comradery” [Participant G].

Theme Three: Fear of transmission. Extreme levels of fear were reported by all frontline workers, impacting their lives and altering behaviours. This theme comprises five subordinate themes; 1.) *Subordinate Theme One: Fear of what would happen.* Intense levels of fear were experienced about the contagion and transmission of the virus, with extreme fear towards the unknown at the beginning of the pandemic, e.g., “It was a fear of what this virus is and how it is going to affect us. The panic within the team I was managing was really, really difficult” [Participant F]; 2.) *Subordinate Theme Two: Adopting intense cleaning practices.* Intense cleaning practices were adopted to reduce and control transmission of the virus. This included changing clothes (e.g., before leaving work, before entering the home), repeated daily washing (e.g., hands and body), and washing and/or sanitising groceries, e.g., “I’d shower at work and take off all my scrubs and put them in a bag then I’d come home, and again, take off the clothes I’d worn in my car and shower” [Participant H]; 3.) *Subordinate Theme Three: Limiting social contact to manage fear.* The levels of fear led to frontline workers limiting contact with individuals outside the home despite lockdown measures lifting as time

progressed. This fear was exacerbated by the medical community sharing concerns, with one participant stating: “I had friends in London who are in hospital medicine and one friend was saying they are hiding it. They said there's a couple of Junior Doctors on ventilators in ICU in London” [Participant H]; 4.) *Subordinate Theme Four: Fear of transmitting to family members*. Intense levels of fear were experienced towards transmitting the virus to others, including family. This fear was exacerbated among those working in close proximity to infected patients, leading frontline workers to restrict their social movements to reduce transmission. One participant stated, “I was really scared of giving it to them. I was really scared. More than anything else. I just thought, how on Earth would I ever live with that?” [Participant H]; 5.) *Subordinate Theme Five: Learning to live with the fear*. The fear began to reduce as information concerning the virus became available, as well as availability of personal protective equipment, acceptance and the introduction of the vaccines. One participant recounted how, “As the time progressed that fear reduced. I would say that was isolated more to the first six months and then since then having learned more about the pandemic and actually gaining a more educated understanding of it” [Participant G].

Theme Four: Feeling betrayed and unsupported by leadership. Frontline workers perceived betrayal and a lack of support from leaders who were in senior positions, reporting a degree of distance from senior management in response to the enforced lockdown restrictions. They felt their leaders did not understand the hardships faced on the frontline, that patient safety was ignored, contributing toward the transmission of the virus, e.g., “....your executive teams are so far removed from clinical practice that they don't know what it's like. They were all working from home and just sending out your weekly newsletter around about how well we're doing. But we're witnessing it and they are not because they were all working from home” [Participant F].

Theme Five: Experiencing moral distress in the workplace. Frontline workers witnessed practices that felt morally objectionable and noted a range of morally injurious events. This included constraints on patient care (e.g., limited medical equipment), a disregard to the health and safety of others (e.g., staff not wearing PPE equipment properly), staff shortages, delayed treatments, limited clinical supervision and reduced levels of care leading to unethical practices, i.e., “I verified a death with a GP over the phone and I had to ask the families permission to do a video call. The patient had died in the home and then I had to ask the family if I could show the GP this person in the bed over WhatsApp. Show them the dead person on a video call so they could verify the death. It's just awful, it wasn't right”

[Participant B].

Theme Six: Promoting wellbeing through adopting internal and external coping strategies.

Frontline workers adopted several external and internal coping strategies that facilitated positive wellbeing, e.g., “I used to ring my friends quite a lot and talk with them through WhatsApp with the camera on. So, then it felt like I was meeting them in person because we're there seeing each other. I think that helped a lot because I think my friends were quite supportive and were always there to listen and share life with” [Participant I].

Theme Seven: Connecting with nature. All frontline workers reported engaging in nature was beneficial in reducing stress and promoting healthy mental health. One participant stated in regard to a beach, “When you hear the waves coming in, that really helps the brain, when you see the colour of the blue and that also helps. So doing activities like running really, really helps me” [Participant D].

Theme Eight: Supporting families. Frontline workers reported their families did not cope well throughout the enforced lockdowns. This included the restrictions to social movement, fear of infection, home schooling and ill health. This theme contains two subordinate themes;

1.) *Subordinate Theme One: The burden of caring for and worrying about their families.*

Frontline workers reported significant levels of fear, guilt and concern for the welfare of their families, resulting in an increased need to protect them, and added burden and worry. One participant reported how, “This parent was on the phone to me and would cry. They didn't know how much longer they could take it. I couldn't help, I didn't live close. I felt awful. So, I sent them care packages” [Participant A]; 2.) *Subordinate Two: Protecting their family from physical and psychological harm.* Frontline workers reported not disclosing their experiences at work to their loved ones, and neither did they frequently seek their support. They would feel their families would not understand the difficulties of frontline working and did not want to cause them any further fear or worry. One participant recounted, “I found myself telling them at the beginning because as you remember that's all we were talking about. Everybody in every household. Then I suddenly thought, oh, hang on a minute, this is actually scaring them. So, I stopped” [Participant H].

Theme Nine: Feeling resilient and/or able to take control of future actions. Frontline workers expressed feeling resilient, with an improving ability to cope with daily stress. In those who did not report an improvement in their levels of resilience, they felt they either had pre-existing high levels of resilience or noted a refusal to work on the frontline in another future pandemic, with one participant noting, “I don't think I could handle another lockdown, professionally. I might be able to handle it, but I don't want to handle it. I do not want to. I might be able to handle it, but I would choose not to. I would leave” [Participant B].

Theme Ten: Maladaptive coping adopted. A smaller group (18%) of frontline workers reported the use of maladaptive coping strategies to deal with the work and distress, such as alcohol consumption. One participant stated how, “I drunk a lot more alcohol. I go to sleep after two glasses of wine, so I got drunk” [Participant B].

STUDY TWO

NEGATIVE and positive impacts of a pandemic

This built on the findings of the earlier study by examining in more detail if the identified negative psychological impacts and positive impacts were experienced in a larger sample of frontline workers and their families during the COVID-19 pandemic.

Participants

Three hundred and forty-one participants consented to take part. Of these 138 were incomplete, resulting in a final sample of 203 participants. Of these, 82.3% identified as female ($n = 167$), 16.3% as male ($n = 33$), 1% as non-binary/third gender ($n = 2$), and the remainder preferred not to disclose ($n = 1$). Ages ranged from 18 to 74 years ($n = 203$), with a mean age of 31 ($SD = 10.33$). Just under half (48.3%) of the participants reported being a frontline worker ($n = 98$), with the remainder representing family members of frontline workers ($n = 105$). Of those who reported to be working on the front line, 42.9% were employed in the Health Care sector ($n = 42$), 24.5% in Social Care ($n = 24$), 19.4% in Education and Childcare ($n = 19$), 19.4% in Food and Retail ($n = 19$), 6.1% in Public services ($n = 6$), 3.1% in Public Safety and Security ($n = 3$), 3.1% in Transport, Utilities and Communication ($n = 3$), and 2% Local Government ($n = 2$). Sixty seven percent of participants reported to have a family member who was a frontline worker ($n = 136$), whereas 33% reported they did not ($n = 67$).

Procedure

Ethical approval and online recruitment replicated the earlier study. Questionnaires were completed via Qualtrics. Participants were presented with an information sheet and asked to provide consent prior to completing the questionnaires, with a debrief sheet provided at the end.

Measures

Participants were asked to complete the following measures while considering their lived experiences during the pandemic:

PTSD Checklist-Civilian Version (PCL-CV; Weathers et al., 1993): A 17-item measure, determining the presence and/or severity of psychological trauma on a 5-point Likert scale, corresponding to DSM-IV (APA, 2000) symptoms of Post Traumatic Stress Disorder (PTSD). Example items include, ‘Suddenly acting or feeling as if a stressful event were happening again?’ and ‘Repeated, disturbing dreams of a stressful experience from the past?’.

Vicarious Trauma Scale (Vrklevski & Franklin, 2008): An 8-item measure on a 7-point Likert scale, examining levels of vicarious stress from exposure to shared trauma (Vrklevski & Franklin, 2008). Example items include, ‘I find myself thinking about distressing material at home’ and ‘Sometimes I feel overwhelmed by the workload involved in my job and/or social support role.’

Moral Injury Events Scale (Nash et al., 2013): This 10-item measure investigates the degree to which an individual perceives a violation, by themselves or others, against deeply held beliefs and/or morals, on a 6-point Likert scale, measuring the levels of subjective distress (Nash et al., 2013). One item was removed (item 9, ‘I feel betrayed by others outside the U.S military who I once trusted’) as it was unsuitable for use with the current sample. Participants were asked to refer to their experiences during the COVID-19 pandemic. Example items include, ‘I saw things that were morally wrong’ and ‘I am troubled by having witnessed others immoral acts.’

Nature Relatedness Scale (NR-6) short version (Nisbet & Zelenski, 2013): A 6-item measure examining an individual relationship to nature, using a 5-point Likert scale, with participants focusing on identification to nature during COVID-19. Example items include, ‘I take notice of wildlife wherever I am’ and ‘I feel connected to all living things and the earth.’

Connectedness to Nature Scale (Mayer & McPherson, 2004): A 14-item measure assessing how connected individuals may feel to nature, such as emotional connection, on a 5-point

Likert scale. Example items include, ‘My personal welfare is independent of the natural world’ and ‘I often feel part of the ‘web of life.’

Brief COPE (Carver, 1997): This 28-item measure examines problem focused coping, emotional focused coping and avoidant coping, exploring how individuals cope with levels of stress (Carver, 1997), on a 4-point Likert scale. Example items include, ‘I’ve been praying or mediating’, and ‘I’ve been experiencing negative feelings’.

Brief Resilience Scale (Smith et al., 2008): A 6-item scale measuring resilience on a 5-point Likert scale, looking at how well individuals can recover following exposure to stress and/or adversity (Smith et al., 2008). Example items include, ‘I tend to bounce back quickly’, and ‘I usually come through difficult times with little trouble.’

BBC Subjective well-being scale (BBC-SWB; Pontin et al., 2013): This 24-item measure considers the level of subjective wellbeing an individual may possess on a 5-point Likert scale, examining a participant’s subjective experiences and perception towards their own quality of life (Pontin et al., 2013). Example items include, ‘Are you happy with your ability to work?’ and ‘Are you able to ask someone for help with a problem?’.

Interpersonal Support Evaluation List (ISEL; Cohen et al., 1985): A shortened version of the original 40-item ISEL comprises 12-items rated via a 4-point Likert scale. It explores how much social support can buffer against the effects of stress (Cohen et al., 1985). Example items include, ‘I feel there is no one I can share my most private worries and fears with’ and ‘If I were sick, I could easily find someone to help me with my daily chores.’

Results

Table 1 presents scores across all measures, along with scale reliability.

<Table 1 here>

PTSD, vicarious trauma and moral injury by gender, in families and frontline workers.

A series of MANOVAs were conducted. A significant difference was found with little to no levels of PTSD on the PTSD-CV and vicarious trauma $F(1, 33) = 14.55, p < 0.01$; Wilks' $\Lambda = 4.80$; $\eta^2 = .32$. Post hoc tests indicated that females reported increased levels of vicarious trauma in contrast to males ($M = 30.30, SD = 8.71$ compared to $M = 15.33, SD = 8.54$). A significant difference was also identified between frontline workers and families, with moderate levels of PTSD on the PTSD-CV and vicarious trauma $F(1, 93) = 9.66, p < 0.01$; Wilks' $\Lambda = .88$; $\eta^2 = .12$. Post hoc tests indicated that frontline workers reported increased levels of vicarious trauma in contrast to families ($M = 35.08, SD = 9.69$ compared to $M = 28.53, SD = 9.56$). There were no further differences.

Predictors and associations of resilience in frontline workers and families by gender.

Multiple Regressions were employed to identify if nature relatedness, connectiveness to nature, coping, subjective wellbeing and interpersonal support predicted levels of resilience.

The model of resilience in female frontline workers was significant, with the predictors explaining 21% of the variance ($R = .21, F(5,86) = 4.27, p < .05$). Of the unique predictors, increased subjective wellbeing positively predicted resilience ($\beta = .44, t(5, 86) = 4.12, p < .05$). However, nature relatedness ($\beta = .003, t(5, 86) = .03, p = .98$), coping ($\beta = -.10, t(5, 86) = -.93, p = .35$), connectiveness to nature ($\beta = -.003, t(5, 86) = -.02, p = .98$), and interpersonal support ($\beta = -.02, t(5, 86) = -.15, p = .88$) did not significantly contribute.

The Regression model was also significant for female family members ($R = .20, F(5,81) = 3.64, p < .05$), explaining 20% of the variance. Of the unique predictors, increased subjective wellbeing positively predicted resilience ($\beta = .46, t(5, 81) = 4.13, p < .05$). However, nature relatedness ($\beta = -.09, t(5, 81) = -.52, p = .60$), coping ($\beta = -.05, t(5, 81) = .48, p = .64$), connectiveness to nature ($\beta = -.04, t(5, 81) = -.27, p = .79$), and interpersonal support ($\beta = -.02, t(5, 81) = -.19, p = .85$) did not significantly contribute. For males, no

significant model of resilience was found in frontline workers ($R = .44$, $F(5,10) = 2.42$, $p = .21$) or in families ($R = .14$, $F(5,23) = 3.64$, $p = .17$).

A further Regression was conducted to identify if reported levels of PTSD, vicarious trauma and moral injury significantly predicted levels of resilience by gender (females/males) and by reported role (frontline workers/families). The resulting model was significant in female frontline workers, with the predictors explaining 12% of the variance in resilience ($R = .12$, $F(5,86) = 4.95$, $p < .05$). Of the unique predictors, levels of PTSD negatively predicted resilience ($\beta = -.32$, $t(5, 86) = -3.10$, $p < .05$). Vicarious trauma ($\beta = -.19$, $t(5, 86) = -1.80$, $p = .08$) and moral injury ($\beta = .03$, $t(5, 86) = .25$, $p = .81$) did not significantly contribute.

A significant model was also found in female family members ($R = .14$, $F(5,81) = 5.40$, $p < .05$), where the predictors explained 14% of the variance. PTSD negatively predicted resilience ($\beta = -.34$, $t(5, 81) = -3.20$, $p < .05$). However, vicarious trauma ($\beta = .05$, $t(5, 81) = .43$, $p = .67$) and moral injury ($\beta = .18$, $t(5, 81) = 1.63$, $p = .12$) did not significantly contribute. No significant models of resilience were found in male frontline workers ($R = -.19$, $F(5,10) = 53$, $p = .68$) or male family members ($R = .02$, $F(5,23) = 1.12$, $p = .36$).

Mediation analysis accounting for the relationship between moral injury, psychological trauma and/or vicarious trauma.

A series of mediation analyses were conducted using a bootstrapping estimation approach (Hoyle, 2014). The mediation analyses tested if resilience mediated the relationship between moral injury and psychological trauma (PTSD total scores), and moral injury and vicarious trauma. In the overall mediation model, the results presented a significant negative direct effect between moral injury and psychological trauma (unstandardised effect = $-.41$, 95% CI $[-.67, .15]$). After resilience was added to the model, a significant negative indirect effect of moral injury via resilience on psychological trauma was found (unstandardised effect = $-.09$, 95% CI $[-.19, .03]$). A significant negative direct effect was also found between moral injury

and psychological trauma (unstandardised effect = $-.32$, 95% CI $[-.58, -.07]$). A significant negative direct effect was also found *overall* in the first step between moral injury and vicarious trauma (unstandardised effect = $-.37$, 95% CI $[-.56, -.20]$). After resilience was added to the model a significant negative direct effect of moral injury on vicarious trauma remained (unstandardised effect = $-.36$, 95% CI $[-.54, -.18]$). No significant indirect effect of moral injury via resilience on vicarious trauma was found (unstandardised effect = $-.02$, 95% CI $[-.07, .01]$). Figure 1 presents the overall mediation analysis.

<Figure 1 here>

In the female mediation model, a significant negative direct effect was found between moral injury and psychological trauma in the first step (unstandardised effect = $-.35$, 95% CI $[-.64, -.06]$). After resilience was added into the model, a non-significant direct effect was found between moral injury and psychological trauma (unstandardised effect = $-.25$, 95% CI $[-.54, .02]$). Resilience was found to have a significant negative indirect effect on psychological trauma via moral injury (unstandardised effect = $-.09$, 95% CI $[-.20, -.01]$).

Thus, full mediation was found in females, whereby, the effects of moral injury on psychological trauma were mediated by resilience (see figure 2). A significant negative direct effect was also found between moral injury and vicarious trauma in females during the first step (unstandardised effect = $-.37$, 95% CI $[-.56, -.18]$). After resilience was added to the model, a significant negative direct effect was found between moral injury and vicarious trauma (unstandardised effect = $-.36$, 95% CI $[-.56, .17]$). A non-significant indirect effect was found between moral injury and vicarious trauma via resilience (unstandardised effect = $.004$, 95% CI $[-.05, -.01]$). No mediation of moral injury via resilience on psychological trauma and/or vicarious trauma was found in males.

<Insert Figure 2>

DISCUSSION

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3 The results demonstrated, unsurprisingly, that frontline workers experienced psychological
4 trauma, including vicarious trauma, and moral injury while providing essential public facing
5 services throughout the COVID-19 pandemic. These negative impacts extended to their
6 family members. Despite this however, frontline workers and their families developed
7 resilience, further promoted by engaging in wellbeing, seeking social support and spending
8 time in nature. These protective factors clearly assisted coping and enabled individual and
9 family resilience to develop.

10
11 Results further indicated that frontline workers may have experienced several vulnerability
12 factors that heightened exposure to psychological trauma in the workplace during COVID-19,
13 including proximity to infected patients, increased patient numbers, staff shortages, increased
14 workloads, limited PPE and unfamiliarity with the virus. Such factors appeared to have
15 elevated stress levels, a finding consistent with Hoffart et al (2022) and Pilch et al (2021).
16 Stress seems to have intensified the fear reported across studies, undermining self-efficacy
17 and heightening distress, potentially increasing susceptibility to burnout and compassion
18 fatigue. Stress and fear likely intensified pre-existing vulnerabilities among frontline workers,
19 contributing to heightened psychological trauma and underscoring the need for robust
20 organisational support to help manage heightened workplace demands (e.g., Bakker et al.,
21 2003; Demerouti et al., 2001).

22
23 However, and in relation to organisational support, findings suggest that whilst resources
24 were introduced to mitigate stress, these efforts were largely ineffective in addressing the
25 severity of psychological trauma, moral distress and burnout experienced by frontline
26 workers. This raises questions around the adequacy of models such as the Job Demands-
27 Resources Model (Bakker et al., 2003; Demerouti et al., 2001) in explaining stress responses
28 during crises of the magnitude seen with COVID-19. The model assumes that increased
29 resources can offset job demands but this would seem to not apply to the atypical context of a
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global pandemic. It is possible that the resources provided were based on assumptions drawn from past experiences rather than being tailored to the unique and evolving needs of the workforce during the pandemic. Indeed, it is perhaps the dynamic nature of a pandemic that is a crucial element that is not captured in these models, which are arguably based more on job-demands as a more static and controllable experience.

The findings further suggest that prolonged exposure to the COVID-19 pandemic significantly heightened levels of psychological trauma among frontline workers, aligning with previous research (e.g., Greenberg et al., 2020; Nikita & Chaudhuri, 2022). Distressing emotions, such as fear, appear to have interfered with and exacerbated frontline workers' cognitive appraisals of the events they encountered, intensifying their perception of threat and vulnerability. Linking this to the Cognitive Appraisal Theory of Emotions (Moors, 2013, 2014), such emotional responses, especially when sustained, can increase susceptibility to traumatic stress. This appeared especially evident among frontline workers who felt a strong sense of personal accountability for patient outcomes, which may have compounded feelings of distress, including inadequacy and emotional exhaustion.

Findings also highlight the prevalence of morally injurious experiences during the pandemic. Frontline workers were frequently exposed to ethically challenging situations, as well as witnessing or participating in practices that conflicted with their moral values. This seemingly induced distress among workers even in the absence of personal wrongdoing, thus aligning with the findings of French et al. (2022) and Rushton et al. (2022) who observed that moral dissonance can induce perceptions of personal failure while providing care to others. Further suggested by the current results are examples of pandemic-specific vulnerability factors aggravating moral injury, such as increased patient numbers, limited access to personal protective equipment, staff shortages, and a disconnect between workers and higher management. The literature identifying vulnerability factors for moral injury during public

health crises is notably limited. However, current findings show similarity to Zerach and Levi-Belz, (2022) in terms of the prevalence of reported disconnect between staff and higher management, the impact of increased workloads and limited equipment on levels of moral distress.

Yet, this study clearly notes that it is not just frontline workers who experienced distress; families of frontline workers were likely to have experienced psychological trauma, vicarious trauma and moral injury in response to their lived experiences, but also as a consequence of providing care to frontline worker family members. Consistent with the findings of Feng et al. (2020), family members within this study experienced extreme emotions, such as fear, culminating in increased levels of distress. Families were found to struggle to counteract the distress experienced and manage the emotional toll of the pandemic, leading to some unhelpful coping strategies, such as increased alcohol consumption and comfort-eating. Disruption to daily routines, heightened emotional states (e.g., fear, concern for safety, worry), reduced face-to-face support/contact and an intensification of any pre-existing stress may have collectively amplified the vulnerability of frontline workers' families, extending the burden of psychological distress and trauma to them. Indeed, difficulties with moral injury was also noted among family members. This illustrated a role for emotional contagion in promoting both moral injury and vicarious trauma among families. Strong emotional connections among families may have increased susceptibility to trauma, as distress experienced by frontline workers may have been mirrored and internalised by family members, thus offering support for the Emotional Contagion Theory (Hatfield, 1992; Hatfield et al., 2014). Although this purports a novel link between emotional contagion and vicarious trauma within the family unit, a connection not well captured within existing literature, it more importantly provides insight into how the wellbeing of a frontline workers' support system can become compromised during a public health crises. Thus, families may

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themselves become secondary sites of distress, absorbing and then subsequently amplifying the emotional burden of caregiving.

A key consideration, however, is the important role of protective factors in mitigating psychological trauma and moral injury among frontline workers. Workplace support arguably enabled individuals to share challenges, alleviate stress, and receive validation from peers. This, in turn, may have enhanced mood and increased a sense of resilience (Labrague et al., 2020). Consistent with the Cognitive Appraisal Theory (Lazarus, 1966; Lazarus & Folkman, 1984), such support likely facilitated more positive interpretations of stressful experiences, thereby reducing overall distress. Indeed, communication with social networks was also found to help reduce psychological distress by offering reassurance towards the loss of control over daily life and a means to release tension. Thus, it is possible this assisted in fostering resilience and reducing moral distress in frontline workers and their families. Beyond social support, spending time in nature emerged as another protective factor, promoting stress relief and mood enhancement. Through emotional contagion (Hatfield et al., 2014), these positive effects may have been shared within families, supporting collective recovery.

Based on these findings, a conceptual model of the impact of a global pandemic, such as COVID-19, is proposed - the Health Crisis Impact Model (HCIM). This model argues for a two-way interconnected pathway that attends to the vulnerability factors of *pandemic induced stress* and how this can occur in individuals and families. Furthermore, it highlights the development of the psychological cost of caring in families whilst also presenting the factors that can protect against stress and promote resilience in frontline workers and their families. This model is offered in Figure 3.

<Figure 3 here>

Limitations and conclusions

The studies utilised cross-sectional designs, with data collected at one time point and reliant on participant recall. Self-reported answers can of course be exaggerated, over-reported and/or participants may be reluctant to disclose. This may particularly be the case with a sample where disclosure of mental health challenges could be problematic in terms of fitness to practice (e.g., in a health care setting). In addition, there were no measures taken of social desirability or attempt to determine causality through a longitudinal design. Thus, the results obtained may not fully capture the experience accurately or fully represent those working on the frontline and/or their families.

Nevertheless, there are some broad conclusions that can be drawn. The findings suggest frontline workers and their families experienced psychological trauma, vicarious trauma and moral injury during the COVID-19 pandemic. In terms of vulnerability factors, workplace stressors, fear, unhelpful coping, compassion fatigue and pandemic specific stressors may have instigated vulnerabilities to developing psychological trauma and moral injury. Furthermore, families appear to have been emotionally contaminated when attempting to provide care to loved ones. This was further amplified by the shared emotional bonds in families that may have then exacerbated the risk of vicarious trauma and increased the psychological cost of caring. However, several protective factors appear to have aided in the mitigation and reduction of psychological trauma and moral injury, whilst also fostering resilience. This included factors such as spending time in nature, engaging in subjective well-being, seeking social support and enhancing coping.

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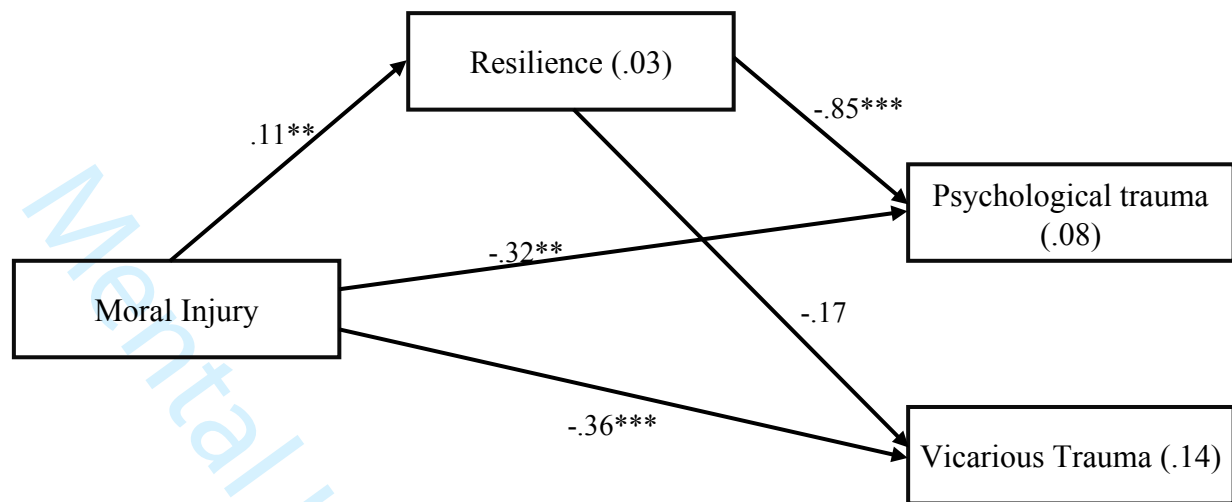


Figure 1.

Estimated overall mediation analysis with unstandardized path coefficients. R-Square values are presented in parentheses (nb. All endogenous variables are associated with errors, which for simplicity are not shown in this figure). ** = $p < .05$; *** $p < .001$

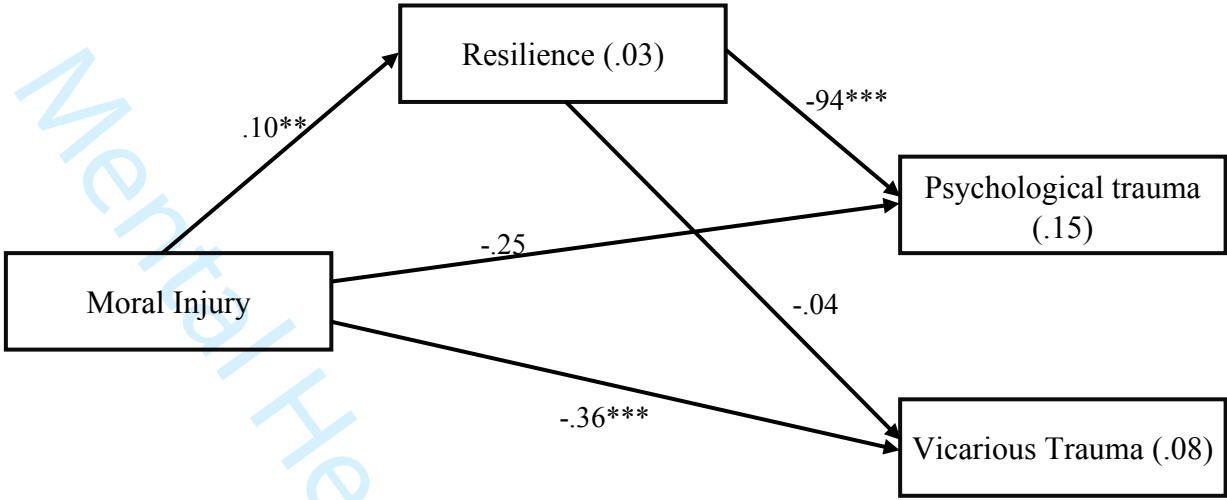


Figure 2: Females estimated mediation analysis with unstandardized path coefficients. R-Square values are presented in parentheses (nb. All endogenous variables are associated with errors, which for simplicity are not shown in this figure). ** = $p < .05$; *** $p < .001$

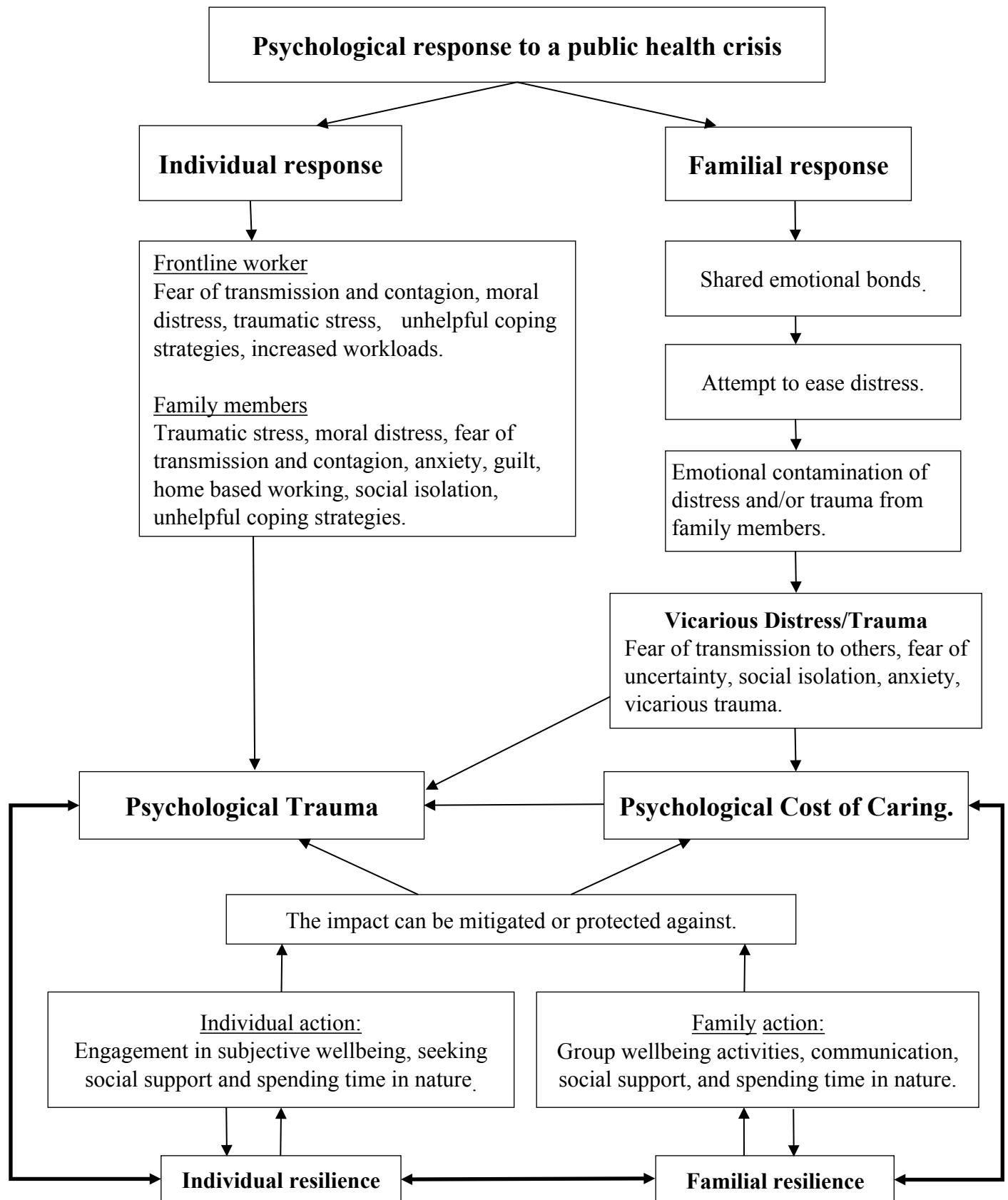


Figure 3: Health Crisis Impact Model (HCIM) - A conceptual model to explain the impact of the COVID-19 pandemic on frontline workers and their families.

Table 1
Descriptive statistics of all variables by sex, frontline worker, family and by PTSD symptom severity.

Measures	n	Overall Mean	(α)
PTSD	203	40.76	.93
Females	167	40.35	
Males	33	42.31	
Vicarious Trauma	203	31.09	.85
Females	167	32.04	
Males	33	27.03	
Moral Injury Events	203	35.37	.73
Females	167	35.34	
Males	33	36.44	
Nature Relatedness	203	20.67	.85
Females	167	20.53	
Males	33	20.44	
Connectivity to Nature	203	45.66	.82
Females	167	46.14	
Males	33	43.65	
Brief COPE	203	62.26	.85
Females	167	62.35	
Males	33	60.76	
Brief Resilience	203	19.57	.85
Females	167	19.35	
Males	33	20.88	
BBC Subjective Wellbeing	203	78.70	.93
Females	167	78.80	
Males	33	79.50	

Interpersonal Support	203	30.99	.86
Females	167	30.99	
Males	33	31.18	

				PTSD Symptoms Range Mean Scores							
Frontline Workers	<i>n</i>	Mean	SD	Little to none				Mod to mod high			
	SD	Some	SD								
	SD	High	SD								
PSTD	98	41.44	13.34	21.29	2.95	27.60	0.90	36.90	4.90	54.68	6.75
Females	86	40.48	13.40	21.15	3.02	27.60	0.89	36.34	4.74	54.42	7.28
Males	10	46.40	10.82	23.00	-	-	-	41.75	3.86	54.80	2.39
Vicarious trauma	98	34.29	10.28	31.64	10.03	28.60	10.41	35.08	9.69	35.15	10.88
Females	86	34.69	10.32	32.69	9.60	28.60	10.41	35.74	9.76	35.27	11.17
Males	10	31.30	10.54	18.00	-	-	-	29.25	7.76	35.60	11.55
Moral Injury	98	34.87	8.87	38.57	12.08	37.40	6.66	35.41	6.96	32.73	9.19
Females	86	35.05	8.65	37.62	12.01	37.40	6.66	35.51	6.80	33.18	9.09
Males	10	36.10	9.77	51.00	-	-	-	34.50	9.40	34.40	9.32
Nature Relatedness	98	21.60	4.58	21.93	3.15	20.20	5.81	21.56	4.52	21.70	5.01
Females	86	21.83	4.39	22.30	2.93	20.20	5.81	21.74	4.33	21.97	4.82
Males	10	19.50	6.08	17.00	-	-	-	20.00	6.48	19.60	7.06
Connectives to nature	98	47.03	6.81	48.64	6.76	46.60	5.94	46.72	6.40	46.83	7.46
Females	86	47.29	6.26	49.15	6.74	46.60	5.94	47.54	5.42	46.39	6.99
Males	10	43.30	10.08	42.00	-	-	-	39.50	10.41	46.60	10.90
Brief Cope	98	62.16	11.45	59.21	14.60	63.40	16.23	59.18	8.83	65.95	11.20

Females	86	61.66	10.69	61.31	12.82	63.40	16.23	59.09	9.00	64.27	10.40
Males	10	62.90	16.04	32.00	-	-	-	60.00	8.16	71.40	13.83
Brief Resilience	98	20.30	4.23	22.93	2.13	21.80	5.54	20.67	4.17	18.83	4.69
Females	86	20.23	4.53	22.85	2.19	21.80	5.54	20.69	4.20	18.48	4.86
Males	10	20.60	3.92	24.00	-	-	-	20.50	4.51	20.00	4.00
BBC Subjective wellbeing	98	78.73	17.10	93.14	10.10	86.60	20.18	77.59	16.36	73.83	16.81
Females	86	79.08	17.50	93.38	10.47	86.60	20.18	78.23	16.26	73.21	17.67
Males	10	76.10	16.62	90.00	-	-	-	72.00	18.62	76.60	12.48
Interpersonal support	98	30.71	3.17	30.64	3.30	30.80	2.39	30.46	2.59	30.98	3.77
Females	86	30.72	3.03	30.54	3.41	30.80	2.39	30.57	2.29	30.94	3.70
Males	10	30.00	4.14	32.00	-	-	-	29.50	4.93	30.00	4.36

PTSD symptoms range Mean Scores											
Little to none				Mod to mod high							
Families	<i>n</i>	Mean	SD	SD	Some	SD	SD	SD	High	SD	
PSTD	105	40.12	13.55	22.16	2.77	28.25	0.50	36.11	3.77	55.51	7.72
Females	81	40.68	13.17	22.57	2.85	28.33	0.58	36.38	3.94	55.23	6.53
Males	23	38.21	15.22	21.000	2.45	28.00	-	34.88	3.10	56.71	12.22
Vicarious trauma	105	28.11	10.28	24.58	9.81	23.75	10.53	28.53	9.56	29.89	10.35
Females	81	29.23	9.56	28.07	7.47	22.00	12.16	29.88	9.68	29.77	10.17
Males	23	24.39	10.92	14.80	9.44	29.00	-	24.50	8.64	30.43	11.94
Moral Injury	105	35.84	6.93	37.58	4.90	35.00	9.27	36.87	5.77	33.81	8.46
Females	81	35.64	6.80	36.43	3.88	37.67	9.29	36.53	5.92	34.07	8.42
Males	23	37.00	7.26	40.80	6.46	27.00	-	39.10	3.90	32.71	9.23

Nature Relatedness	105	19.80	4.83	17.11	3.94	23.25	4.03	19.44	5.22	21.24	4.17
Females	81	19.59	4.76	17.43	4.16	21.67	3.06	19.50	5.51	20.50	4.01
Males	23	20.43	5.18	16.20	3.49	28.00	-	19.00	4.59	24.43	3.46
Connectives to nature	105	44.38	7.96	41.47	8.09	47.00	0.82	44.51	8.56	45.43	7.37
Females	81	44.63	7.92	42.14	8.57	47.00	1.00	45.47	8.59	44.60	7.19
Males	23	43.09	8.10	39.60	7.09	47.00	-	40.30	7.41	49.00	7.62
Brief Cope	105	62.35	10.96	59.42	12.68	57.00	9.45	61.04	9.62	66.03	10.79
Females	81	63.10	10.78	64.07	9.32	57.67	10.07	60.59	10.57	66.33	11.01
Males	23	59.43	11.10	46.40	12.38	64.00	-	61.80	5.90	64.71	10.52
Brief Resilience	105	18.91	4.69	21.89	5.00	17.75	3.40	19.47	4.42	16.78	4.03
Females	81	18.19	4.43	20.36	4.75	17.33	4.04	19.29	4.25	16.00	3.70
Males	23	21.65	4.59	26.20	2.77	19.00	-	20.70	4.80	20.14	3.85
BBC Subjective wellbeing	105	78.68	15.05	86.37	13.83	79.75	19.87	79.49	15.61	73.62	13.00
Females	81	78.49	14.71	84.29	14.58	76.00	22.54	79.79	15.26	74.57	12.92
Males	23	79.22	16.80	92.20	10.62	91.00	-	78.30	18.32	69.57	13.54
Interpersonal support	105	31.25	2.60	30.89	2.02	31.25	2.22	31.18	2.28	31.51	2.85
Females	81	31.25	2.76	30.86	2.25	32.00	2.00	31.18	3.00	31.43	2.85
Males	23	31.35	1.99	31.00	1.41	29.00	-	31.40	1.26	31.86	3.08

Note: - = SD could not be calculated as the $n = 1$. Non-binary/third gender ($n = 2$) and preferred not to disclose ($n = 1$) were not analysed separately due to small sample sizes.