

Saara Martinmäki

# From Stress to Strength

Investigating Mental Health in Humanitarian Aid  
and High-Risk Occupations



**From Stress to Strength:  
Investigating Mental Health in Humanitarian  
Aid and High-Risk Occupations**

Saara Elina Martinmäki



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# **From Stress to Strength: Investigating Mental Health in Humanitarian Aid and High-Risk Occupations**

**Van stress naar kracht: Onderzoek naar geestelijke gezondheid in humanitaire hulpverlening en hoog-risico beroepen**  
(met een samenvatting in het Nederlands)

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## Preface

Occupational health and well-being of people in high-risk professions face new challenges in the 21<sup>st</sup> century. Major shifts such as technological changes, globalisation, climate crisis, and other disasters have impacted the way they work, the nature of required work, and the occupational hazards involved. As the number of complex international crises increases and new emergencies arise, the demand for assistance continues to grow. In 2017, when the research for this dissertation began, 200 million people were in need of humanitarian assistance. By the end of 2022, this number had doubled to 400 million people, not even accounting for the unprecedented number of devastating humanitarian crises that have arisen or continued in 2023 and 2024. Correspondingly, the number of humanitarian aid workers has also increased, and the question of how to support the health and well-being of this high-risk occupational group is increasing in urgency.

Saara Martinmäki, a researcher and policy adviser at ARQ National Psychotrauma Centre, set to investigate the mental health and well-being of international humanitarian aid workers with the aim of identifying new pathways for mitigating and preventing the adverse effects of work-related stress among this occupational group. Together with her colleagues, she examined a large cohort of Médecins Sans Frontières staff before and after their field assignments. The findings of this dissertation contribute to a more nuanced understanding of the mental health and well-being of aid workers than previous research has provided: most humanitarian aid workers in the study remained healthy, yet some developed (sub-)clinical mental health symptoms or began their assignment with already heightened symptoms. Notably, Martinmäki also found that commonly used cut-off scores for mental health self-report questionnaires greatly overestimate the rates of anxiety disorders, PTSD, and depression among aid workers.

To better understand the interplay of stressors in humanitarian fieldwork, Martinmäki and her colleagues examined not only potentially traumatic events and fieldwork-related stressors but also different types of harassment. They were the first to systematically study sexual harassment in a representative sample of aid workers, showing it was associated with negative changes in symptoms of depression and anxiety among female staff, and posttraumatic stress disorder among male staff. Furthermore, their investigation into how different stressor types accumulate and jointly predict mental health and work-related well-being provides important insights for health policy development within humanitarian aid organisations. Their findings reiterate the surprisingly limited impact of potentially traumatic events and highlight the importance of chronic fieldwork-related stressors and interpersonal stressors like harassment. Most crucially, they demonstrate that when humanitarian aid workers

experience multiple stressor types, each additional stressor type adds more strain, associated with higher mental health symptoms and lower work-related well-being.

Additionally, Martinmäki and her colleagues examine how the salutogenic model of health, with Sense of Coherence as one of its central constructs, may help us understand how humanitarian aid workers maintain their health and well-being despite their inherent exposure to often unsolvable stressors. Martinmäki also dedicated a part of her dissertation to investigating occupational trauma in another high-risk occupational group: police officers. From those findings, she draws considerations for the treatment of work-related stress and trauma among humanitarian aid workers.

The findings of this PhD dissertation convincingly demonstrate that humanitarian fieldwork is indeed very stressful, but there are practical avenues for preventing psychological distress among aid workers. It is with great pleasure that we present this dissertation and share its findings. We believe it enhances our understanding of the mental health of this unique occupational group and offers valuable suggestions for improving their care.

Melina Kappeyne van de Coppello-Rakic  
Chair of the Board of Directors





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# 1

## **General Introduction**

Marco is on his 3rd international humanitarian assignment, coordinating medical relief efforts at a refugee camp. As a result of a recent earthquake, resources are even scarcer than they were just two months ago, and a sudden influx of displaced families overwhelmed the camp's infrastructure. This has forced Marco and his colleagues to prioritise and focus on providing essential medical care, meaning that not everyone could be attended to as promptly as usual. As the pressure mounts, Marco begins to experience heightened anxiety and a persistent sense of guilt. Sleepless nights become the norm as he replays the day's scenes in his mind. He works long hours, and at the end of the day, he cannot decompress from the day; due to the security constraints, he cannot leave the living compound to go for a run like he usually does when he gets stressed out. Marco is not the only person experiencing the impact of stress, and tensions mount within the team, leading to more interpersonal conflicts. This leads to Marco feeling further depleted, and he starts wondering what the point of all his work is when he sees how many people he cannot help and does not feel supported by his manager.

This example portrays some of the common stressors that humanitarian workers may experience in their work and their impact on the well-being of the individual and their functioning in the workplace. The mental health and well-being of humanitarian workers have long been overlooked. Although the amount of research focusing on them has steadily increased in recent years, humanitarian aid workers have been dubbed the 'forgotten first responder' (Macpherson & Burkle, 2021). This thesis will mostly focus on a group of international humanitarian workers of Médecins Sans Frontières (MSF).

Occupational health and well-being are facing new challenges in the 21<sup>st</sup> century. Major shifts such as technological changes, globalisation, climate change, and other disasters have impacted the way we work, what kind of work is needed, and the occupational hazards the work carries. These shifts bring with them a wide variety of associated occupational health and well-being issues: In many occupations, work stressors can be both physical as well as psychological, and mental health issues – work-related or general – are among the most common reasons for employee absenteeism (ArboNed, 2022; Bryan et al., 2021; Health and Safety Executive, 2023). With almost 60% of the world's population currently in work and approximately 15% of them having a mental disorder at any point in time (Institute for Health Metrics and Evaluation, n.d.; WHO, 2022), the effects of mental health issues are experienced not only by individuals but also by family, work, and societal levels. Individually, poor mental health has adverse effects on the person's well-being and functioning, whereas, on employer and societal levels, the reverberations of mental health issues can be felt as high turnover and high

economic costs associated with lost productivity (Chisholm et al., 2016). Even though mental health issues can develop independently of work-related factors, there are situations where the work environment itself can negatively affect a person's mental well-being, like in the case of workplace bullying (WHO, 2022).

## High-Risk Occupations, Mental Health, and Well-Being

While all occupations have their sources of stress – some unique and some shared with others – there are specific professions that are associated with a higher (likelihood of) exposure to stress and potentially traumatic events (PTEs). Such high-risk professions may include, for example, the military, first responders, police officers, and emergency care workers. The literature on mental health and well-being of individuals in high-risk professions has primarily concentrated on the abovementioned occupational groups like armed forces staff and emergency or disaster first responders, such as police officers or firefighters (e.g. Brooks et al., 2016). Yet, there are additional high-risk occupational groups whose mental health and well-being warrant attention due to their unique working context. One such occupation is humanitarian aid workers, who are a diverse group of professionals who often serve others in adverse work environments and distressing situations. This thesis will primarily focus on humanitarian aid workers whilst drawing additional insights from police officers.

Individuals in high-risk occupations are exposed to high amounts of cumulative stress and PTEs, sometimes also called critical incidents (Alexander & Klein, 2001), over longer periods. Research in the field of occupational health psychology has indicated that such strain is associated with negative impacts on workers' health and well-being (Harvey et al., 2017; Niedhammer et al., 2012; van der Molen et al., 2020). These negative impacts range from performance deterioration and increased sick leave (e.g., Kleber & van der Velden, 2009; McFarlane & Bryant, 2007) to an increased likelihood of developing mental health problems like post-traumatic stress disorder (PTSD) or depression, compared to the general population (Berger et al., 2012; Harenberg et al., 2018).

Beyond PTEs, daily organisational stressors like high workload or difficulties with supervisors have also been connected to various adverse outcomes, such as increased emotional exhaustion and reduced work engagement (Gouweloos, 2018; van der Velden, 2010). The increased strain and associated health risks notwithstanding, people in high-risk professions have also been found to be remarkably resilient, exhibiting high work engagement and job satisfaction (Sinval et al., 2018; Thielmann et al., 2022). Yet, given the preponderance of previous research findings on the potential health effects

associated with high-risk occupations, understanding the challenges and risks that individuals in these jobs face is essential to safeguard and support their psychological health and well-being.

## Humanitarian Aid Workers

In the subsequent sections of this introduction, we will highlight several critical issues pertaining to humanitarian aid workers' mental health and well-being. First, we provide insight into the occupational context in which these professionals operate. Following that, we review research findings on the health and well-being of humanitarian workers, capturing the findings as they stood at the onset of this thesis project. Subsequently, we examine some of the stressors that humanitarian workers may confront in more detail. Moving forward, we introduce the theoretical concept of sense of coherence and its potential application to the experiences of humanitarian aid workers. Later in this introduction, we draw upon another high-risk occupational group to shed light on the clinical aspects of occupation-related stress and trauma, namely police officers. We conclude with an overview of several research gaps and outline our approach to addressing these gaps in the current thesis.

### **Occupational Context**

As the number of complex international crises increases and new emergencies arise, the number of people requiring humanitarian assistance grows. In 2017, when this thesis research began, 200 million people were in need of humanitarian assistance (Development Initiatives, 2018). By the end of 2022, the number had doubled to 400 million people (Development Initiatives, 2023) – before even accounting for the unprecedented number of devastating humanitarian crises that have arisen (or continued) in 2023 and 2024 in Türkiye, Syria, Sudan, Morocco, Libya, Afghanistan, Armenia, Ukraine, and Occupied Palestinian Territory, among others.

In addition to the number of people requiring humanitarian assistance more than doubling in five years, the majority of the current crises are increasingly complex as they intersect across domains (e.g., conflict *and* climate change or conflict *and* socioeconomic vulnerability). Mirroring these changes, the number of humanitarian aid staff has increased by 10% in the last decade, and the latest figures from 2020 estimated there to be over 630,000 humanitarian aid personnel working in countries with humanitarian crises (ALNAP, 2022). Consequently, the question of how to support humanitarian workers' health and well-being is urgently increasing in importance.



Humanitarian aid workers are a large and diverse occupational group, including international staff working for local or international aid organisations, professional consultants, volunteers, and locally contracted national staff working for national or international non-governmental humanitarian aid organisations (e.g., Red Cross, Save the Children, Médecins Sans Frontières). In the context of this dissertation, ‘international’ humanitarian staff refers to staff members with field-based contracts who go abroad on (typically short-term) assignments, whereas ‘national’ staff refers to individuals who are local to the country where the humanitarian response is taking place. Given the breadth of organisations and types of staff, individuals working in these organisations represent diverse backgrounds, reflecting the wide range of functions they fulfil, including roles in security, transportation, logistics, and healthcare, to name a few. While the challenges faced by humanitarian workers vary, certain experiences are nearly universal.

Humanitarian aid workers can feel isolated, particularly international staff who find themselves far removed from their usual social networks and cultural context. They face the typical daily hassles present in many professional settings, including interpersonal troubles with colleagues and managers (Lopes Cardozo et al., 2012). Moreover, they may also bear the strain of witnessing intense human suffering and may be exposed to the dangers of an active conflict zone or environmental emergency (Welton-Mitchell, 2013). The non-traditional nature of humanitarian work further compounds these stressors; it extends beyond the typical 9-5 job, placing a considerable toll on family life, making it challenging to achieve a satisfactory work-life balance (Curling & Simmons, 2010; Welton-Mitchell, 2013). Furthermore, the often compound-based living arrangements are associated with further challenges such as a curfew, lack of privacy and time alone, and limited ability to leave the compound or, for example, exercise. Furthermore, national staff may face threats specifically associated with working for an international NGO that works on politically sensitive topics, such as women’s rights.

For international and national humanitarian workers whose families and friends live further away from their work location, returning home may present its own challenges. Reintegrating into family life and reconnecting with old friends may prove more demanding than anticipated (Roth, 2015), bringing frustrations and stressors into the post-assignment life period. All in all, irrespective of the category of humanitarian aid worker under consideration, most workers face many challenges that exceed the expectations of typical work settings. Yet, while the demands of humanitarian work are high, the work can also be fulfilling and rewarding. Besides the sense of meaning derived from assisting beneficiaries, humanitarian assignments can, for example, lead to long-lasting interpersonal relationships.

## **Mental Health & Humanitarian Work**

Working in emergency or post-emergency settings equals working with scarce resources and a high workload, often in relatively unstable and insecure settings. As detailed in the previous section, humanitarian aid workers experience not only typical routine work stressors like long hours but also a multitude of extra stressors resulting from working in a fragile context. At the time of writing the current thesis, the number of humanitarian aid workers that have been killed has substantially increased, driven mainly by the continued violence in Sudan and the bombardments in Gaza (Aid Worker Security Database, 2023).

Humanitarian aid workers have been found to exhibit elevated levels of stress (Jachens et al., 2019; Young & Pakenham, 2021), and it has been reported that exposure to (chronic) high stress and exposure to PTEs is connected to elevated health problems, which may, in turn, have a further negative impact on the delivery of aid (Connorton et al., 2012; Eriksson et al., 2001; Lopes Cardozo et al., 2012). International humanitarian aid workers have been found to exhibit increased levels of anxiety, depression, PTSD, alcohol misuse and burnout compared to the general population (Connorton et al., 2012; Jachens et al., 2016; Lopes Cardozo et al., 2012; Young & Pakenham, 2021). Similarly, national staff reports equivalent or elevated levels of PTSD, depression, and anxiety compared to reference groups sharing comparable geographic and cultural contexts (Ager et al., 2012; Strohmeier & Scholte, 2015).

While the research referenced above has provided us with estimates of the mental health burden of this understudied population, there are several limitations to the studies mentioned. First, by the time we began the current research, all but one of the studies (Lopes Cardozo et al., 2012) were cross-sectional. This design limitation precluded researchers from drawing conclusions about causality or changes in health and well-being or predicting those changes. Second, none of the studies incorporated clinical interviews; instead, they exclusively relied on self-report measures, which may overestimate the prevalence of mental health disorders (Charlson et al., 2019). Third, the studies mainly focused on risk factors and ill health, focusing less on examining what factors may help humanitarian aid workers maintain their well-being.

## **Stressors in the Humanitarian Fieldwork Context**

As the above-outlined research shows, chronic stressors and PTEs can be detrimental to the mental health and well-being of humanitarian aid workers. However, other categories of stressors – for example, workplace bullying – have been extensively studied in occupational groups (e.g. Nielsen & Einarsen, 2012), but have thus far been unexplored in research into humanitarian aid workers. Additionally, the research to date has taken a somewhat simplistic view of the lived reality of humanitarian aid workers,

typically focusing on only one stressor category at a time. To comprehensively study and model the health outcomes of humanitarian workers, it is crucial to understand the interplay between different stressors they face in their work. As this thesis will explore several stressor categories, we will provide an overview of our selected stress categories and review the current evidence base concerning the connection between the stressor category and humanitarian aid workers' mental health and well-being.

### ***Traumatic Stressors***

Traumatic stressors, or PTEs, are the stressor type most focused on in previous research on humanitarian field staff. Eriksson et al.'s (2001) investigation into trauma exposure and PTSD showed that international relief and development staff reported exposure to a wide range of direct and indirect PTEs, with 30% reporting significant symptoms of PTSD and approximately 10% fulfilling the diagnostic criteria for it. A review of trauma-related psychological problems among relief workers noted generally elevated levels of trauma exposure and PTSD, depression, and anxiety symptomatology when compared to the general population (Connorton et al., 2012). Furthermore, as referenced above, a meta-analysis of mental health among humanitarian aid national staff suggests the prevalence of PTSD, depression, and anxiety to be similarly elevated as among relevant reference groups (Strohmeier & Scholte, 2015).

### ***Fieldwork Stressors ('Chronic Stressors')***

Beyond PTEs, daily organisational stressors and chronic humanitarian fieldwork-related stressors, such as challenging living conditions, security concerns, heavy workload, and lack of communication, have been shown to be risk factors for the physical and mental health of international humanitarian aid workers (iHAWs) (Young et al., 2018), with chronic stressors linked to depression and emotional exhaustion (Lopes Cardozo et al., 2012). In addition, research from other high-risk occupations, such as police officers, shows that routine work environment stressors are linked to psychological distress and emotional exhaustion (Purba & Demou, 2019).

### ***Workplace Harassment***

A workplace stressor frequently studied among other occupational groups is workplace harassment. Importantly, little evidence about its incidence and impact is available among humanitarian aid workers. The International Labour Organization (ILO) defines workplace harassment as a 'range of unacceptable behaviours and practices, or threats thereof, whether a single occurrence or repeated, that aim at, result in, or are likely to result in physical, psychological, sexual or economic harm, and includes gender-based violence and harassment' (ILO, 2019, p. 5).

*General harassment* can be defined as harassment of a non-sexual nature that may occur based on one's biological sex or minority or other social status. It can consist of, for example, constant scrutiny and questioning someone's skills or capacity, treating them worse than others, or making them feel physically unsafe (Vogt et al., 2013). It is often also termed as workplace bullying. Research from occupational groups other than iHAWs has consistently shown its detrimental impact on both job-related and well-being-related outcomes: Exposure to workplace general harassment has been linked to physical and mental health problems such as general psychosocial distress, depression, burnout, as well as organisational commitment and turnover intentions (Anasori et al., 2020; Coetzee & van Dyk, 2018; Gale et al., 2019; Kim et al., 2019; Nielsen & Einarsen, 2012; Rospenda et al., 2009).

*Sexual harassment* can be defined as any unwelcome conduct of a sexual nature (verbal, non-verbal, or physical) 'with the purpose or effect of violating the dignity of a person, in particular when creating an intimidating, hostile, degrading, humiliating or offensive environment' (Directive 2006/54 of the European Parliament and the Council of the European Union, 2016). Among other occupational groups, workplace sexual harassment has been associated with worse physical and psychological well-being (Chan et al., 2008; Gale et al., 2019; Gunnarsdottir et al., 2006; Hom et al., 2017; Willness et al., 2007), depression (Marsh et al., 2009), anxiety (Richman et al., 1999), and lower organisational commitment (Willness et al., 2007).

### **Risk and Protective Factors for Mental Health of iHAWs**

At the onset of this thesis research, most of the research into the mental health and well-being of humanitarian aid workers was focused on PTSD as an outcome, followed by depression and anxiety. Two systematic reviews, one on trauma-related problems among national humanitarian staff (Strohmeier & Scholte, 2015) and another on the well-being of disaster relief workers (Brooks et al., 2015), considered a variety of risk and protective factors for this occupational group. Many of the results on central potential risk factors such as assignment length and frequency, age, and gender, were found to be inconsistent.

Perrin et al. (2007) reported that *longer* humanitarian assignments were associated with an increased risk for PTSD, yet Bjerneld and colleagues (2004) reported that shorter assignments were experienced as more stressful by the workers, due to insufficient time to adapt to the context. The risk of depression was found to be highest on the first humanitarian assignment or after five or more assignments (Cardozo et al., 2005). Some studies found younger *age* to be associated with a higher likelihood of depression, anxiety (Cardozo et al., 2005; Thormar et al., 2013) and acute stress disorder (Fullerton et al., 2004), but others did not find age to predict psychological outcomes (Eriksson et

al., 2001; Hodgkinson & Shepherd, 1994). Strohmeier et al.'s (2015) systematic review found that most articles about national staff indicated that females had a higher risk of mental health complaints than men, yet other research has found no or few significant *gender* differences in risks (e.g., Lopes Cardozo et al., 2012; Strohmeier et al., 2018).

Additionally, poor organisational *support* was identified as a risk factor for depression at post-deployment (Bjernelid et al., 2004; Cardozo et al., 2005), and lack of coordination and communication were considered central stressors (Bakhshi et al., 2014; Wang et al., 2011; Weber & Hilfinger Messias, 2012). High *job demands* like long work hours were associated with strain and poor well-being: complicated tasks, excessive demands, and high expectations were associated with stress, especially if combined with low resources (Soliman & Gillespie, 2011).

On the side of protective factors, social support appears to predict well-being (Brooks et al., 2015); it has been associated with, for example, lower depression, psychological distress, burnout, and greater life satisfaction among iHAWs (Lopes Cardozo et al., 2012). Furthermore, it might mitigate the effect of exposure to PTEs on stress symptoms (Biggs et al., 2014; Kaspersen et al., 2003). Additionally, *job resources* (e.g., job autonomy and support) appear to have a protective impact on how negative effects of the stress associated with disaster relief work (Biggs et al., 2014).

## Theoretical Considerations: Sense of Coherence

As the preceding section highlighted, engaging in humanitarian fieldwork can have a considerable health impact. While a significant portion of individuals in this professional group experiences mental health or work-related well-being problems, the impressions are that the majority of humanitarian aid workers still seem to be able to maintain their well-being. This raises a critical question: What distinguishes these latter individuals from those who ultimately develop psychological symptoms?

Previous research into the health and well-being of humanitarian aid workers has utilised a number of known occupational health models to answer this question (Foo et al., 2021). For example, the Effort-Reward Imbalance model (ERI; Siegrist, 1996) postulates that when the effort that individuals exert at work is not balanced with corresponding rewards, they experience work-related stress. The ERI model can be useful in that it predicts mental health outcomes (UNHCR, 2016) and heavy alcohol consumption (Jachens et al., 2016), and imbalance is associated with burnout (Jachens et al., 2019; UNHCR, 2016) among aid workers. However, the ERI model may be too simplistic for modelling the full context of humanitarian fieldwork: its focus on balancing

work efforts and rewards simply cannot capture the full breadth and complexity of stressors that iHAWs face. Furthermore, it limits itself to the organisational sphere, failing to consider, for example, personal resources.

Strohmeier (2019) examined several aspects of the well-known Job Demands-Resources (JD-R; Demerouti et al., 2001; Schaufeli & Bakker, 2004) model in the context of aid workers. The JD-R model suggests that job demands (e.g., workload, role unclarity) and job resources (e.g., job autonomy, support) interact and jointly determine the work environment's effect on a worker's strain and motivation. Strohmeier (2019) noted the usability of the JD-R model as a theoretical framework for describing how humanitarian work affects the workers' well-being but remarked that a more nuanced view would be required to accommodate for the specific working context of humanitarian aid work. For example, humanitarian workers may be reluctant to utilise certain available job resources or face barriers accessing them, and the perceptions of job demands and job resources may vary widely based among this occupational group.

One candidate theoretical framework to understand how humanitarian aid workers maintain their health and well-being despite their inherent exposure to often unsolvable stressors is the salutogenetic model of health, with Sense of Coherence as one of its central constructs (SOC; Antonovsky, 1979). The salutogenetic model of health focuses on the origins of positive health and its predictors (Mittelmark & Bauer, 2022); SOC is seen as an enduring attitude to life challenges. It is believed that a strong SOC can help individuals cope with life's stressors. SOC comprises of three components - comprehensibility, manageability, and meaningfulness - each of which describes a unique facet relating to perceptions of and attitudes to life challenges and stress. Comprehensibility refers to the extent to which individuals perceive their environment and challenges they face as structured and understandable; when individuals find their situation comprehensible, they are better equipped to cope with stressors they face. Manageability reflects the belief that individuals have direct or indirect resources to deal with the challenges they encounter; perceiving challenges as manageable could encourage individuals to, for example, problem-solve more effectively and use adaptive coping strategies. Meaningfulness signifies the perception that challenges and efforts are worthwhile and that there is a purpose behind them, creating a sense of control.

There is extensive evidence of the relationship between SOC and positive mental health and general well-being. A strong SOC is associated with fewer mental health complaints and better perceived mental health (Eriksson & Lindström, 2006). Furthermore, it predicts quality of life (Eriksson & Lindström, 2007) and has a negative relationship with anxiety, depression, PTSD, and burnout (Feldt, 1997; Schäfer et al., 2019, 2023). SOC also has associations with work-related health and well-being: it is negatively

associated with depression, burnout, and job stress (Albertsen et al., 2001; Feldt, 1997; González-Siles et al., 2022) and it can buffer the negative effects of work stressors on health and work-related well-being outcomes (e.g., Feldt et al., 1997).

Due to the fact that SOC concentrates on factors that support human health and well-being as opposed to factors causing ill-health and disease, SOC may be critical to understanding mental health and well-being of humanitarian aid workers. The inconsistent findings of extant research on risk factors among humanitarian aid workers suggest that an alternative way of looking at the factors impacting their mental health and well-being may be indicated. A person's capacity to understand and manage the multitude of stressors in humanitarian fieldwork, as well as retain the feeling of their work being meaningful, may be an important element in helping us understand the mechanism behind how stressors relate to health outcomes in this uniquely challenging occupational context. For example, a surgeon working in a field hospital in a conflict zone may experience a workday filled with surgeries on injured civilians as more manageable if they have a sufficient supply of all the medical supplies they need; without those, the situation may be more overwhelming, and they may even lose sight of how their work is meaningful, if they cannot help as well as they would like to.

The first published findings on SOC among humanitarian aid workers suggest that strong SOC is associated with good health and well-being in this occupational group, and that SOC may mediate the impact of stressors on mental health outcomes (Veronese & Pepe, 2014, 2017). However, the extant research is cross-sectional and conducted with small sample sizes, limiting the conclusions that can be derived from the findings. As a next step to inform theorising and improve options for prevention and treatment efforts for the adverse effects of humanitarian fieldwork, it is critical to examine the relationship of SOC and health in a longitudinal manner. That is what we did in this thesis project.

## Treatment of Occupational Stress & Trauma

Thus far in this introduction, we have focused on charting out the knowledge on the mental health toll that working in humanitarian aid settings can place on staff, which specific stressors may play a role in their well-being outcomes, and introduced a possible framework through which we may be able to better understand the health change processes. The complex work environment that humanitarian aid workers face poses the question of how to prevent mental health complaints. Furthermore, as humanitarian aid workers are at elevated risk to develop mental health disorders, this raises the question of how to best alleviate their suffering.

## Need for Specialised Care or Treatment

General guidance and policy advice on supporting the (mental) health and well-being of aid workers have increased in the last years (Antares Foundation, 2012; Foo et al., 2021; IASC 2007). Yet, at the onset of this thesis project, we could not find any published records of research into preventative or curative mental health interventions focused on humanitarian aid workers. In 2024, this remains so, though the first report of a tested intervention has recently appeared (Young, 2022). That leaves us with the question of whether humanitarian aid workers need approaches adapted to fit their unique needs and context, or can we just apply what we know about evidence-based prevention and treatments of stress and trauma from other populations?

Many of the preventative and supportive interventions offered by NGOs – like counselling, debriefing and other secondary prevention programs – are typically not evidence-based. There are, however, a number of well-researched evidence-based psychotherapeutic interventions for the treatment of PTSD, such as trauma-focused cognitive behavioural therapy (CBT) and eye movement desensitization and reprocessing (EMDR) (National Institute for Health and Care Excellence, 2018). Yet, in the case of high-risk occupation groups, the occupational context is still of high importance, as it provides the necessary nuance to optimally prevent or treat the impacts of stress and trauma.

The occupational environment of humanitarian workers has both physical and logistical challenges such as remote locations or active conflict zones; these can impact the delivery or feasibility of interventions. Moreover, humanitarian workers – like most first responders – rarely experience just a single trauma. Rather, they often have chronic exposure to lower-intensity PTEs, which can carry similar risks of adverse mental health impacts as a single high-intensity PTE (Spence Laschinger & Nosko, 2015). The combination of a unique working context and exposure to multiple types of stressors over a longer period of time may have an impact on the feasibility and effectiveness of traditional PTSD treatments and may necessitate a tailored intervention approach.

In our research with humanitarian workers, we lacked the opportunity for a long-term follow-up of those who may develop persisting mental health complaints. Therefore, we chose to substantiate our research and inform the field on the possibilities of interventions for occupation-related stress and trauma by including another high-risk occupational group in this thesis: police officers. The inclusion of this occupational group gave us the opportunity to find clues for potential approaches for trauma treatment among humanitarian aid workers. Moreover, we also wished to highlight the possibilities of augmented trauma treatments for high-risk occupational groups overall.



## Police Officers

Whilst the general population typically experiences at least one PTE in their lifetime (Kilpatrick et al., 2013), the reality of a police officer is often substantially different. Police officers may be personally exposed to life-threatening situations, as well as witness disturbing scenes after serious accidents, (domestic) violence, or suicide. The combination of a high exposure to PTEs, a high workload, and organizational pressures has been associated with higher stress levels (Collins & Gibbs, 2003) and a higher risk of developing PTSD among police officers (Maguen et al., 2009; Marmar et al., 2006). The rates of PTSD in police personnel mostly range between 5% and 13% (Brewin et al., 2022; Carlier et al., 1997; Maia et al., 2007; Rentmeesters & Hermans, 2023; Robinson et al., 1997), though a range as large as 0%-44% has been reported (Wagner et al., 2020).

Investigations into the risk factors for mental health complaints among police officers have identified several organisational and individual risk factors. Sherwood et al. (2019) showed that neuroticism and passive or avoidant coping strategies were associated with negative psychological outcomes, as was low social support from colleagues. High work demands, low resources and low rewards were also identified as risk factors. Syed et al. (2020) identified higher occupational stress and avoidant coping as the strongest risk factor for depression and suicidal ideation; higher support from colleagues, on the other hand, was associated with lower PTSD symptoms.

While there are several evidence-based methods for treating PTSD in general, as previously mentioned, there is a scarcity of PTSD treatment approaches that have been specifically tested in police officers or other individuals in other occupations with work-related PTSD (Haugen et al., 2012; Torchalla & Strehlau, 2018). As with any psychological treatment, not everyone draws sufficient benefit from the existing evidence-based treatments (Schottenbauer et al., 2008); in the case of occupation-related trauma, this can have consequences for one's employment. At the time we initiated the work in this dissertation, there was little consensus in best approaches to augmenting PTSD treatment for police officers who do not sufficiently benefit from evidence-based trauma-focused psychotherapies, by for example increasing the intensity of the treatment or adding additional therapeutic elements. Therefore, we aimed to evaluate the treatment response to an augmented PTSD treatment of police officers in a specialised clinic.

# Gaps in Research

Many questions about the mental health and well-being of humanitarian aid workers, as well as police officers, remained at the beginning of this thesis project. Most centrally, a clear overview of the changes in health as a result of humanitarian aid work was missing, with only one extant longitudinal investigation (Lopes Cardozo et al., 2012). Additionally, the assumed levels of trauma-related and other mental health issues (Connorton et al., 2012) were unexpectedly high when compared to other professional groups routinely exposed to PTEs or other distressing work situations (e.g., Kim et al., 2017; Koen et al., 2011). This difference may arise from the fact that extant research relied exclusively on self-report questionnaires – which are shown to overestimate the true prevalence of clinically significant mental health complaints (Charlson et al., 2019) – in estimating prevalence of common mental health disorders. Furthermore, there was, to date, no research exploring different symptom trajectories of common mental health complaints among humanitarian aid workers. In order to address these gaps in extant literature, a longitudinal investigation including a gold-standard clinical interview was considered to be necessary at the start of this project.

Additionally, much of the research to date has not addressed the full scope of the humanitarian work context (Brooks et al., 2015, 2016). As outlined in earlier sections, there has been a heavy focus on traumatic stressors and their impact, even though research has shown that chronic (daily) stressors assert a perhaps larger impact (Maguen et al., 2009; van der Velden et al., 2010). Further, there are several stressor categories such as harassment, that can have a substantial impact on the lived reality of humanitarian aid workers but that have not been systematically explored by research to date. Furthermore, extant research has typically focused on one stress category at a time, without considering the combined effects of multiple stressor categories, failing to sufficiently reflect the lived realities of humanitarian aid workers.

The theoretical frameworks that have been considered in trying to explain the impact that humanitarian aid work has on aid workers has mostly excluded a salutogenic lens to mental health and well-being. As a result, there is a scarcity of knowledge about theoretical frameworks that could explain how humanitarian aid workers maintain their well-being despite their high exposure to stressors. To address this gap in the literature, we propose utilising the salutogenic concept of SOC as a guiding theoretical framework in this thesis.

Finally, there is a paucity of information about suitable prevention and intervention strategies amongst humanitarian aid workers. Without adequate knowledge about the relationship between different stressors and well-being, preventive and curative

intervention strategies for protecting the workers' health cannot be developed. Additionally, the field may benefit from evidence that can be gathered from research into other high-risk occupational groups that share many similarities with humanitarian aid workers.

## Aims & Outline

### Aims

This thesis contains several articles, with which we aim to add to the discussion on the mental health and well-being of individuals working in highly stressful occupations. Six of the seven articles focus on humanitarian aid workers.

The articles on humanitarian aid workers are based on one large longitudinal study, during which we investigated several domains of the (mental) health, well-being, and functioning of international humanitarian aid workers (iHAWs) of MSF. This study took place 2017-2020 at MSF Operational Centre Amsterdam. As noted above, at the time of setting up the research, all but one of the existing studies into the mental health of humanitarian workers were cross-sectional studies, and none utilised clinical interviews alongside self-report instruments. Furthermore, there seemed to be a strong focus on how dangerous humanitarian work with its exposure to PTEs and other stressors is for one's psyche. While it remains true that humanitarian workers – in particular national staff – are subject to violent attacks and often have to work under very demanding conditions, we thought we could learn something from those who retained their health, as well as those who developed mental health symptoms following working in a humanitarian setting, but subsequently improved their health. That is how we set on the journey of trying to find out answers to many burning questions, such as:

*How many of the staff have decreases in their mental health after a humanitarian mission?*

*Are the decreases clinically significant?*

*Are there characteristics that are associated with remaining healthy, with a lowered mental health but subsequent fast recovery, or with lowered mental health that does not abide promptly?*

These guiding questions together with the identified research gaps guided our research efforts.

## Overview of Chapters

This dissertation has four overarching aims. First, we aim to get a broad baseline understanding of the mental health changes of iHAWs, from pre-assignment to post-assignment. Second, we seek to examine how different types of stressors relate to different mental health and work-related well-being outcomes and possible symptom changes. Third, we want to explore the utility and validity of SOC as a guiding theoretical framework in modelling the mental health and well-being (changes) of humanitarian aid workers. Fourth, we aim to gain understanding on the treatment of occupational trauma from another high-risk occupational group and what may predict treatment success.

In **Chapter 2**, we focus on investigating overall health changes and ill-health risk factors after humanitarian aid field assignments by using pre-assignment, post-assignment and two-month follow-up data. We utilise an extensive battery of self-report questionnaires, as well as compare the results of the questionnaires to a clinical interview to examine whether the questionnaires overestimate the prevalence of clinically significant levels of anxiety, depression, and PTSD among this group. In **Chapter 3**, we examine specific health trajectories and their predictors, in order to explore potential mechanisms for staying healthy. We focus on five health indicators (emotional exhaustion, work engagement, anxiety, depression, and PTSD) using data from all three measurement occasions. We examine any predictors associated with belonging to a specific trajectory. **Chapter 4** delves into a work-place stressor previously not systematically studied among humanitarian aid workers: sexual harassment. We investigate the incidence of sexual harassment on a single humanitarian aid assignment, and whether experiencing sexual harassment is related to symptom changes in depression, anxiety, and PTSD. In **Chapter 5** we examine the roles of four types of stressors on the mental health and work-related well-being of HAWs. We utilise three competing theories to investigate how the impact of traumatic stressors, field stressors, sexual harassment and general harassment may combine to predict psychological distress, emotional exhaustion, work engagement, and organizational commitment. Following that, in **Chapter 6** we test whether SOC buffers the negative impacts of field stressors and traumatic stressors on various mental health outcomes, both cross-sectionally and in a time-lagged manner. We conduct path analyses to examine the longitudinal associations between several mental health outcomes, traumatic stressors, field stressors, and SOC. In order to ascertain the usability of the concept of SOC among HAWs over time, we investigate the psychometric properties of the SOC-13 scale in **Chapter 7**. We utilise confirmatory factor analyses to find the best factor structure for the instrument among this population, and examine its longitudinal measurement invariance. In **Chapter 8** we evaluate a form of augmented PTSD treatment for police-officers with occupation-related trauma. We analyse routine outcome monitoring data from a PTSD day clinic for police-officers who have

insufficiently responded to previous trauma treatment. Finally, in **Chapter 9**, we bring together all the findings, and discuss their implications.

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# Section 1

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Mental Health Changes



# 2

## **Mental and Physical Health of International Humanitarian Aid Workers on Short-Term Assignments: Findings From a Prospective Cohort Study**

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## Abstract

Research findings show humanitarian work impacts one's health. We conducted a prospective observational study among 618 international humanitarian aid workers (iHAWs) recruited from 76 countries to investigate health changes and ill-health risk factors after mostly short-term (<1 year) medical emergency assignments. The aid workers were assigned to 27 countries. Data was collected between 2017 and 2020. We also compared a gold-standard clinical interview with self-report questionnaires to assess whether self-report scores overestimate the prevalence of clinical anxiety, depression and PTSD. Analyses consisted of repeated measures ANOVAs and adjusted odds ratios, using pre-assignment (T1), post-assignment (T2) and two-month follow-up data (T3). Humanitarian workers experienced on average, 2.6 experienced and witnessed potential traumatic events, and 4.8 male and 5.6 female assignment-related stressors. Self-report health indicators demonstrated a significant increase in emotional exhaustion, loss of vitality, decreased social functioning and emotional well-being between T1 and T2, all of which improved between T2 and T3. PTSD, depression, experienced role limitations, physical functioning, pain, and general health – remained stable. Anxiety levels decreased significantly between T1 and T2. The presence of DSM-5 disorders anxiety (6.6%), depression (1.3%) and PTSD (0.3%) was low compared to norm populations, except for alcohol-use disorder (13%). None of the reported T2 risk factors was significant at T3. Compared to the clinical interview, self-report cut-off thresholds inflated the presence of a potential anxiety disorder (3×), PTSD (8×) and depression (25×). Humanitarian work is highly stressful but most iHAWs remained healthy. Looking into how iHAWs stay healthy may be a more useful way forward.

### Keywords

Humanitarian staff mental health, stress, post-traumatic, conflict, well-being, burnout



## Introduction

Currently, over 200 million people need humanitarian assistance, mostly due to conflicts and disasters. Due to growing needs record funding levels (US\$27.3) were reported in 2017 (Overseas Development Assistance, 2019). Aid workers are a diverse group of international staff, professional consultants, and locally contracted national staff working (Stoddard et al., 2019).

IHAWs tend to have higher stress levels compared to general population (Jachens et al., 2019; Young & Pakenham, 2021). This may be the result of potentially psycho-traumatic events, such as attacks on aid workers. Despite a stabilizing trend in the previous decade, the number of attacks on aid workers is on the rise, with casualties exceeding all past years in 2019 (Stoddard, 2020). Most attacks occurred in six countries (Syria, South Sudan, DRC, Afghanistan, CAR, Mali, Yemen). Males, compared to females, were three times more exposed to attacks but sexual harassment and violence was reported mainly by females (Gritti, 2015; Stoddard et al., 2019). Most aid workers themselves however do not consider trauma as a key stressor (Young et al., 2018).

Workers are also confronted with chronic, assignment-related stress such as the overwhelming needs of the beneficiaries, and lack of resources (Holtz et al., 2002). This can evoke moral dilemmas and feelings of helplessness among iHAWs (Eriksson et al., 2009). Organisational stressors such as high deployment frequency, work conflicts, poor management, a lack of management support, a lack of reciprocity, perceived inequity at work, and heavy workload are likely more important causes of stress for iHAWs (Cardozo et al., 2005; Suzic et al., 2016; Eriksson et al., 2009).

Above mentioned (organisational) stressors have been identified as risk factors for the physical and mental health of iHAWs (Young et al., 2018). IHAWs reported elevated levels of mental distress from post-traumatic stress disorder (PTSD), anxiety, depression, alcohol misuse and burnout compared to the general population (Connorton et al., 2012; Young & Pakenham, 2021). These findings support the prevailing perspective that iHAWs' exposure to extreme and chronic stress is high and gives rise to health problems that impede the delivery of humanitarian assistance (Connorton et al., 2012; Lopes Cardozo et al., 2012). For instance, through staff turnover, institutional knowledge loss, and increased healthcare costs (Korff et al., 2015). A recent special report warns against a growing epidemic of aid workers with psychological trauma (Macpherson & Burkle, 2021).

The reported elevated levels of mental distress and the deterioration in quality of life are, however, in contrast to reported stable or improving health outcomes of professionals

confronted with potentially traumatic assignment experiences and distressing work-related situations (Kim et al., 2017; Koen et al., 2011). These discrepancies are possibly due to methodological limitations in previous aid work study designs. Firstly, only a few studies systematically addressed the full scope of the humanitarian work context, such as organisational and environmental stressors (Brooks et al., 2015). Secondly, except for one longitudinal study (Lopes Cardozo et al., 2012), aid worker health studies were cross-sectional, not allowing for conclusions on causality (Galea et al., 2008). Thirdly, other methodological shortcomings included using exclusively self-report questionnaires without gold standard clinical interview, anecdotal reports, both inflating the risk of biased results (Limb, 2011), and the use of small sample sizes, reducing the statistical power to undesirable levels. Self-report instruments can overestimate the prevalence and severity of mental health disorders (Charlson et al., 2019).

The present prospective study aims to clarify discrepancies between iHAWs' health studies by reporting on a structured clinical interview and a comprehensive set of self-reporting health indicators, focusing on various mental and physical health indicators, and quality of life, as well as traumatic, organisational and environmental stressors. We expect, despite high levels of stress, that the iHAWs' health remains stable on all indicators (Kim et al., 2017; Koen et al., 2011).

Other objectives were to establish the prevalence of DSM-5 disorders after a humanitarian assignment and to determine potential demographic and assignment-related risk factors for ill-health. Lastly, we assessed whether self-report questionnaires for common disorders inflated actual pathology in comparisons to a gold standard clinical interview as has been found in psychopathology research (Charlson et al., 2019).

## Method

### Participants

The sample consisted of 609 iHAWs of Médecins Sans Frontières (MSF) Operational Centre Amsterdam. International humanitarian aid workers are defined as staff not from the country within which they are working (Egeland et al., 2011, p. 59). They were aged between 24 and 76, mostly female, European and with a university degree. Most iHAWs had prior iHAW experience (78%). The participants originated from 76 different countries: 24 countries in Europe, 21 countries in Africa, 4 countries in North America, 21 countries in Asia, 2 countries in Oceania, and 4 countries from South America. Some (16%) had experiences as paid aid workers in their home countries. Deployment was mostly short-term (1 < year), emergency focussed in 27 different countries. Assignments were in high security settings: Syria and/or Iraq (n = 100, 20%), Democratic Republic

of Congo (n = 62, 12%), Bangladesh (n = 59, 12%), South Sudan (n = 47, 9%), and Nigeria (n = 42, 8%). See Appendix A for an overview of all aid assignment destinations. Complete and detailed demographic information about the participants are presented in Table 1. We expected a low prevalence of post-assignment mental health issues and aimed for a sample size that could detect small effect sizes ( $f = 0.10$ ). With 15 planned repeated measures ANOVAs, the required Bonferroni alpha correction, and an expected pre-post-follow-up dropout of 26% (Lopes Cardozo et al., 2012), a sample of at least 508 participants would provide adequate power. This study received ethical approval from the internal Ethics Review Board of Médecins Sans Frontières on February 24, 2017 (ID 1642).

**Table 1**  
*Participant Information (n = 609)*

Pre-assignment	N	%
<b>Age</b>		
In years ( <i>M, SD</i> )	40.5	10.8
<b>Biological sex</b>		
Female	343	56.3
Male	266	43.7
<b>Continent of origin</b>		
Africa	62	10.6
Asia	80	13.7
Europe	301	51.6
N. America	111	19.0
S. America	14	2.4
Oceania	15	2.6
<b>Education</b>		
Secondary or high school	10	1.8
Higher vocational training/technical training	40	7.1
University degree: Bachelors or Masters	373	66.1
Postgraduate degree	141	25.0
<b>Relationship status</b>		
Single, never married	249	41.9
Married	130	21.9
Committed relationship but not married	131	22.1
Separated	31	5.2
Divorced	47	7.9
Widowed	6	1.0
<b>Assignment function</b>		
Coordinator	179	31.8
Activity manager & clinical medical specialist	371	63.9

**Table 1** *Continued.*

Pre-assignment	N	%
Supervisor & specialist	26	4.5
Other	7	1.2
Prior assignment experience		
First-timer	110	21.9
Veteran	392	78.1
Number of assignments ( <i>M, SD</i> )	4.7	5.7
Previously worked as national staff		
Any experience	73	15.5
No experience	397	84.5
In years ( <i>M, SD</i> )	5.0	3.7
Early departure		
Early departure	80	16.4
Post-assignment	N	%
Assignment duration		
< 3 months	148	29.5
3-6 months	167	33.3
6-9 months	100	19.9
> 9 months	87	17.3
In months ( <i>M, SD</i> )	6.4	3.9
Return information		
As planned	287	57.3
Completed after extended	135	26.9
Needed to evacuate	8	1.6
Project/position closed	4	0.8
Early return	61	12.2
Other	6	1.2

*Note.* National staff refers to locally recruited staff members from the aid-recipient country (Stoddard et al., 2009). Early departure: departure within two months after previous assignment. First-timer: no prior NGO experience. Assignment experience in number of assignments, national staff experience in years: based on the sample with any experience.

## Study Design

The current study was a prospective observational study with three measurement occasions: pre-assignment, post-assignment and a two-month follow-up.

## Procedure

All iHAWs with field-based contracts and start- and end-of-assignment dates between December 2017 and February 2019 were eligible: data collection ended February 2020. Office staff going on brief field visits were not considered eligible. An independent non-MSF researcher informed and recruited participants during their face-to-face pre-assignment MSF office briefings or via a video call. All participants signed an informed consent.

The participants completed the questionnaires on an online survey platform, either at the office or remotely. The pre-assignment measurement (T1) took place 0–14 days before travelling to the assignment area, the post-assignment measurement (T2) immediately during debriefing, with a maximum of four weeks after returning. Participants debriefing face-to-face were asked to participate in a clinical interview. Two trained non-MSF psychologists (S.M, J.H.) conducted these interviews. The two-month follow-up measurement (T3) was done remotely on the aforementioned online survey platform. T3 took place earlier (4–8 weeks after T2) if the participant was due to leave for a new assignment within two months. In case a participant was already on a new assignment the follow-up measurement was stopped; this occurred 8 times (1.3%) at post-assignment and 46 times (7.6%) at follow-up. The data collection ended prematurely on March 12, 2020 due to Dutch government COVID-19 measures, logistical issues (borders closing) and to avoid confounding the study results.

Participants' scores were monitored for severe and acute suicidal ideation after completing every measurement; no cases were detected.

## **Measures**

All measures, including those outside the scope of the current study, are presented in Appendix B. Demographic information was collected at T1, assignment characteristics at T2 and assignment-related healthcare services utilisation at T3. We provide descriptions for current study measures below.

### ***Stressor Measures***

The *Life Events Checklist for DSM-5* (LEC-5) (Weathers, 2013) screens for self-reported potentially traumatic events (PTEs). It was used at pre-assignment (T1) to determine the extent of lifetime exposure while at post-mission (T2) it assessed exposure to PTEs during the assignment. The psychometrics for the LEC-5 are not available. Given the minimal revisions between the LEC-5 and the original, psychometrically adequate, version of the LEC (Gray et al., 2004), few psychometric differences are expected. The LEC internal consistency score was not checked because it is unlikely that respondents experience the same patterns or clusters of events.

The MSF designed *Humanitarian Field Stressor List (HFSL)* assessed the number and severity of 39 potential humanitarian field stressors. The items were rated on a six-point scale ranging from 0 ('none/not applicable') to 5 ('high'). Six dimensions were assessed: field conditions, cultural stressors, work-related stressors, team stressors, code of conduct and experienced traumatic experiences.

### **Health Outcome Measures**

The health indicators were assessed at all measurement moments. The *Hopkins Symptom Checklist* (HSCL-25) (Parloff et al., 1954), a 25-item self-report questionnaire (four-point scale ranging from 1 ('not at all') to 4 ('often')), was used to assess symptoms of anxiety (10 items) and depression (15 items) during the past week. Subscale scores were calculated by summing up the standardised items scores. A cut-off score of 1.75 was used to screen for elevated symptoms of depression or anxiety (Derogatis et al., 1974). HSCL-25 has adequate psychometric properties (Mollica et al., 1987), can be used cross-culturally (Tinghög & Carstensen, 2010), and in non-psychiatric populations (Winokur et al., 1984). The internal consistency in the current sample was high for both depression ( $\alpha = 0.90$ ) and anxiety ( $\alpha = 0.87$ ) subscales.

The *Post-Traumatic Check List DSM-5* (PCL-5) (Blevins et al., 2015) measured PTSD DSM-5 symptoms using 20 self-report items rated on a six-point scale (0 ('not at all') to 5 ('extremely')). Items rated as 2 ('moderately') or higher were treated as a PTSD symptom endorsement. A provisional PTSD diagnosis was established if participants reported at least: 1 Criterion-B item, 1 Criterion-C item, 2 Criterion-D item, and 2 Criterion-E item symptom endorsements, and endorsed at least one PTE on their LEC-5 score. Internal consistency, test-retest reliability, convergent and divergent validity are good (Blevins et al., 2015). The PCL-5 detects clinical change over time (Wortmann et al., 2016). In the current sample, the scale had a good internal consistency ( $\alpha = 0.89$ ). The *Maslach Burnout Inventory* (MBI-HSS) (Maslach et al., 1981) included 22 items (0 ('never') to 6 ('always')), clustered around three general burn-out scales: emotional exhaustion, depersonalisation and personal accomplishment. The MBI has a good construct, factorial and congruent validity when compared to another known burnout measure (Schaufeli & Dierendonck, 1993). Internal consistency of the subscales was good in previous studies (Schutte et al., 2000) and acceptable to good in the current sample ( $0.67 < \alpha < 0.84$ ).

The *RAND-36* (Hays & Morales, 2001) had 36 items (2–6 response categories) assessing eight dimensions of health: physical functioning, role limitations caused by physical health problems and/or emotional problems, social functioning, emotional well-being, vitality (energy/fatigue), pain, and general health perceptions. Each scored item was transformed to a 0–100 range (highest possible health-related quality of life: 100, lowest possible: 0). The internal consistency and convergent validity of the instrument are high (Van der Zee et al., 1996). In the current sample the internal consistency of the scales was considered good to acceptable ( $0.82 < \alpha < .71$ ), except for the general health perceptions scale that was considered poor ( $\alpha = 0.51$ ).

We applied the semi-structured *International Neuropsychiatric Interview* (M.I.N.I. 7.0.2) (T2) (Sheehan et al., 1998) to identify a range of DSM-5 diagnoses commonly seen in clinical settings: a major depressive disorder, anxiety disorders (panic disorder, agoraphobia, social anxiety, obsessive-compulsive disorder or generalised anxiety), post-traumatic stress disorder, eating disorders (anorexia nervosa, bulimia nervosa or binge-eating disorder), or alcohol or substance use disorder. The M.I.N.I. has demonstrated good to very good reliability (Sheehan et al., 1998), sensitivity and specificity scores (Hergueta & Weiller, 2013). Predictive values of 0.85 or higher have been found across all diagnoses (Sheehan et al., 1998). One PhD and one master-level psychologist were trained as M.I.N.I. interviewers and received supervision. Inter-rater reliability in the current sample was excellent, with Cohen's Kappa's between 0.96 and 1 for all the diagnoses. To determine whether or not screeners inflate actual pathology, we compared the clinical interview (M.I.N.I.) disorder prevalence rates of PTSD, major depression, and any anxiety disorder with the abovementioned clinical threshold scores for PTSD, depression and anxiety on their associated screeners (PCL-5 and HSCL-25). The clinical interview being the interpretation of a trained professional is regarded the gold standard for a diagnosis in mental health care settings.

### Statistical Analyses

We examined differences in baseline characteristics of 'participants' vs. 'not-informed iHAWs' (those without office briefings), 'participants' vs. 'decliners' and the primary outcome health indicators for the subgroups biological sex, level of education, previous national and international staff experience. Comparison was done using  $\chi^2$  tests with continuity correction (or Fisher's exact test when appropriate) and independent *t*-test comparisons or analyses of variance (ANOVA) with Scheffe post-hoc comparisons for continuous data.

To test the likelihood of longitudinal score changes over time we used repeated measures (RM) ANOVAs on the health outcome indicators. Post-hoc pairwise comparison analyses between two measurement moments (T1-T2, T1-T3, T2-T3) were performed on significant outcomes to determine between which measurement moments health changed.

Assumptions required to perform a reliable RM ANOVA were checked for each indicator: the Greenhouse-Geisser correction demonstrated near-perfect sphericity ( $\epsilon \geq 0.95$ ) for all health indicators. Z-score tests combined with visual inspections of change score histograms and Q-Q plots demonstrated approximate normal distributions for all but one indicator.

RM ANOVAs only used data of participants that completed all three measurements. To detect potential non-response bias in the RM ANOVA we performed sensitivity analyses

by repeating the RM ANOVAs using multiple imputed (MI) data for missing scale score values. If the RM ANOVA findings with imputed data correspond with prior RM ANOVA results, it strengthens the reliability of our findings. We created 20 imputation data sets using partitioned predictive mean matching (Vink et al., 2015).

Correlational analyses were executed between demographic, assignment-specific risk-factor variables and post-assignment and follow-up clinical threshold scores (i.e., ill-health) on the health indicators. All risk-factor variables with at least a moderate correlation ( $r > .30$ ) with the health indicators were analysed using adjusted odds ratios (AOR).

SPSS Statistics version 25 (IBM Corp, Armonk, NY, USA) was used for all statistical analyses and the imputation of missing data. We applied a two-sided 5% level of significance for all tests of statistical hypotheses. A Cohen's  $d$  effect size was calculated for significant differences on mean score of variables between two groups (Sullivan & Feinn, 2012). A Cohen's  $d$  of 0.2 was considered small, 0.5 medium, and 0.8 large. Partial eta squared ( $\eta^2$ ) effect sizes were reported for RM ANOVA analyses. A  $\eta^2$  of  $< 0.01$  is considered small, 0.06 medium, and  $\geq 0.14$  large (Levine & Hullett, 2002).

## Results

### Participants

#### **Recruitment**

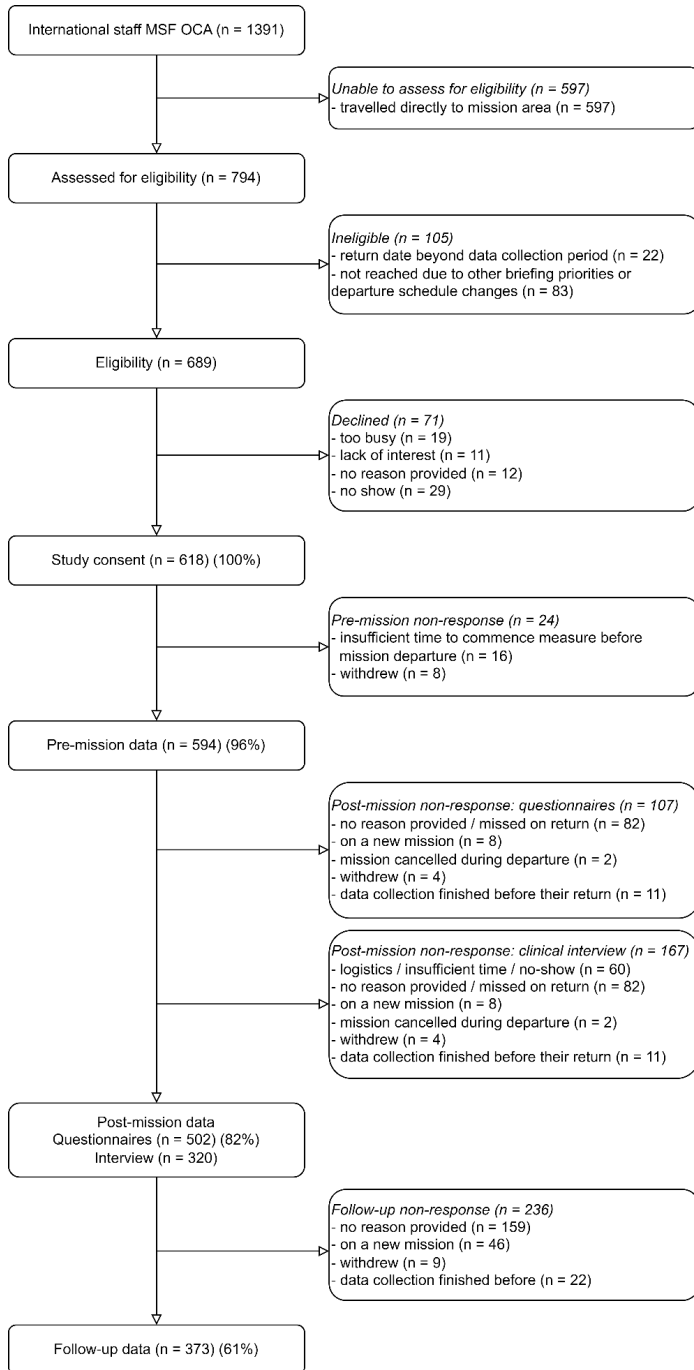
Within the data collection period, 1391 iHAWs departed on an assignment, 794 (58%) were briefed in the Amsterdam office. Eligible staff members ( $n = 689$ ) were informed about the study, 618 (89%) agreed to participate, and 609 (88%) commenced in the present study.

#### **Study Flow**

Ninety-six percent ( $n = 594$ ) of those who agreed to participate in the study completed pre-assignment measures before arriving at the project site. Participant retention at post-assignment measure was good (82%,  $n = 502$ ). The average time between return from the assignment and completing the post-assignment measures was 7.0 days ( $SD = 9.4$ ). Retention rates dropped to 61% ( $n = 373$ ) at two-month follow-up. With regard to the post-assignment clinical interview, 320 (63%) of the 509 participants that returned via the Amsterdam office completed the interview. Fig. 1 provides details on the recruitment and study flow.



**Figure 1**  
Participant Flow Chart



## Stressors

### *Pre-Assignment Lifetime Experienced PTEs*

Almost all participants (96%,  $n = 564$ ) reported one or more lifetime experienced events (average 2.5 events,  $SD = 2.0$ ). Most common experienced events were physical assault (37%), transport accidents (34%), and unwanted or uncomfortable sexual experiences – excluding sexual assault (31%). Males most often reported experienced confrontations with non-sexual violence, such as physical assault (40%), assault with weapon (30%), and exposure to combat or warzone (30%). Females reported substantial higher rates of sexual violence (19%), and other unwanted or uncomfortable sexual experiences (46%).

### *Assignment-Related PTEs*

Three quarters (76%) of the participants reported exposure to a PTE during field assignment (experienced themselves, witnessed, and part-of-the-job). Participants reported on average 0.74 ( $SD = 1.33$ ) experienced assignment-related PTEs. Most frequently reported experiences: combat or warzone exposure (13%), physical assault (8.9%), transport accident (8.9%), or a natural disaster (8.3%). If witnessing a PTE was included the mean number of events increased to 2.55 ( $SD = 2.79$ ). Participants witnessed severe human suffering most often (44%). Table 2 provides an overview of all experienced lifetime and assignment-related PTEs split by gender. Compared to males, females reported substantial higher assignment-related rates of experienced sexual assault (4 vs 0%) and other unwanted or uncomfortable sexual experiences (11 vs 2%). There were no gender differences in the number of experienced PTEs ( $p > .05$ ).

**Table 2**  
*Experienced Shocking Events (LEC) Stratified for Gender*

	Experienced pre-assignment lifetime events		Experienced assignment-related		Witnessed assignment-related		Part of job assignment-related	
	Female	Male	Female	Male	Female	Male	Female	Male
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Natural disaster	75 (22.4)	55 (21.7)	24 (8.2)	16 (8.5)	20 (6.9)	33 (17.6)	19 (6.5)	22 (11.7)
Fire explosion	42 (12.5)	37 (14.6)	7 (2.4)	9 (4.8)	39 (13.4)	47 (25.0)	30 (10.3)	26 (13.8)
Transport accident	112 (33.4)	90 (35.4)	26 (8.9)	17 (9.0)	41 (14.1)	39 (20.7)	42 (14.4)	36 (19.1)
Serious accident at home, work or recreational	45 (13.4)	49 (19.3)	11 (3.8)	11 (5.9)	22 (7.6)	32 (17.0)	39 (13.4)	31 (16.5)
Exposure to toxic substance	11 (3.3)	15 (5.9)	4 (1.4)	6 (3.2)	10 (3.4)	14 (7.4)	17 (5.8)	30 (16.0)
Physical assault	118 (35.2)	102 (40.2)	24 (8.2)	17 (9.0)	30 (10.3)	32 (17.0)	67 (23.0)	29 (15.4)
Assault with a weapon	64 (19.1)	77 (30.3)	14 (4.8)	14 (7.4)	22 (7.6)	23 (12.2)	62 (21.3)	31 (16.5)
Sexual assault	62 (18.6)	2 (0.8)	11 (3.8)	0 (0)	8 (2.7)	5 (2.7)	76 (26.1)	26 (13.8)
Other unwanted or uncomfortable sexual experiences	154 (46.2)	30 (11.8)	32 (11.0)	4 (2.1)	12 (4.1)	6 (3.2)	52 (17.9)	16 (8.5)
Combat or warzone exposure	66 (19.8)	77 (30.3)	40 (13.7)	37 (19.7)	23 (7.9)	30 (16.0)	78 (26.8)	50 (26.6)
Captivity	9 (2.7)	8 (3.1)	2 (0.7)	1 (0.5)	15 (5.2)	8 (4.3)	34 (11.7)	17 (9.0)
Life-threatening illness or injury	36 (10.8)	33 (13.0)	6 (2.1)	6 (3.2)	59 (20.3)	39 (20.7)	99 (34.0)	48 (25.5)
Severe human suffering	12 (3.6)	12 (4.7)	4 (1.4)	2 (1.1)	129 (44.3)	80 (42.6)	146 (50.2)	76 (40.4)
Sudden violent death	10 (3.0)	8 (3.1)	2 (0.7)	0 (0)	24 (8.2)	19 (10.1)	66 (22.7)	44 (23.4)
Sudden accidental death	9 (2.7)	7 (2.8)	1 (0.3)	1 (0.5)	36 (12.4)	32 (17.0)	86 (29.6)	37 (19.7)
Serious injury, harm or death caused to someone	9 (2.7)	8 (3.1)	2 (0.7)	0 (0)	10 (3.4)	9 (4.8)	19 (6.5)	13 (6.9)

### ***Assignment-Related Stressors***

The most frequently reported stressors were the climate (17%), unclear (organisational) communication in the project (16%), workload (16%), travel to location or assignment destination (16%), and the security context of the country (15%). Female participants reported on average 5.6 (SD = 6.0) different sources causing 'significant' levels of stress (score 4 or higher). Male participants reported on average 4.8 (SD = 5.3) sources of significant stress. There were no significant gender differences in the number (T-test;  $p = .15$ ) of experienced significant sources of stress. Chi-square analyses to assess whether females and males experienced different levels of stress for each source of stress. There were no significant differences on most stressors. Males more often reported experiencing significant to high levels of stress (all comparisons ( $p < .05$ ) from being separated from family and friends (22 vs 14%), and regarding the security and safety conditions (20 vs 12%), compared to females. Females more often reported (all comparisons  $p < .05$ ) experiencing significant to high levels of stress from unclear communication within the project (31 vs 19%) and within the team, (26 vs 15%), the lack of technical support (21 vs 10%), the country management team (19 vs 12%), feeling powerlessness or hopelessness (12 vs 7%), regarding the composition of the team (9 vs 4%), and from witnessed sexual harassment or violence toward colleagues (5 vs 2%), compared to males. A gender stratified overview of all environmental, cultural and organisational stressors is presented in the Appendix C.

### **Health & Health Changes**

Table 3 shows RM ANOVA changes on all health indicators including the portion of participants scoring above clinical threshold on indicators with established cutoff scores. Risk factor analyses estimated the likelihood of demographic and assignment-related variables to predict T2 and T3 clinical health levels.

### ***Anxiety and Depression (HSCL-25)***

Anxiety changed significantly ( $p = .00$ ; medium effect size:  $\eta^2 = 0.036$ ). The mean pre-assignment scores were significantly higher ( $M = 1.50$ ) than post-assignment ( $M = 1.39$ ) and follow-up scores ( $M = 1.39$ ). A quarter (26%,  $n = 144$ ) of the participants reported clinical levels of pre-assignment anxiety. These rates dropped to 20% ( $n = 97$ ) at T2 and 21% ( $n = 75$ ) at T3. Being female, a greater number of years of previous national staff experience, a greater number of experienced and witnessed assignment-related PTEs increased the risk for suspected T2 clinical anxiety. None of the variables were risk factors at T3. Mean depression severity levels remained stable ( $p = .59$ ) over time with scores  $M = 1.59$  (T1),  $M = 1.57$  (T2), and  $M = 1.59$  (T3). A third (30%,  $n = 168$ ) of the participants reported clinical levels of pre-assignment depression. These rates increased slightly to 32% ( $n = 158$ ) at T2 and 34% ( $n = 118$ ) at T3. Being female, a greater number of years of national staff experience, a greater number of experienced

and witnessed assignment-related PTEs increased the risk for suspected T2 depression. None of the variables were risk factors at T3.

### ***PTSD (PCL-5)***

Mean PTSD severity levels remained stable ( $p = .13$ ) over time with scores  $M = 8.89$  (T1),  $M = 7.84$  (T2), and  $M = 8.19$  (T3). A small portion (2.6%,  $n = 15$ ) of the participants reported clinical pre-assignment levels for PTSD. These rates remained stable at T2 (2.4%,  $n = 12$ ), and increased at T3 (3.9%,  $n = 14$ ). None of the variables were risk factors for suspected PTSD at T2 and T3.

### ***Burnout (MBI)***

Burnout scale 'feelings of emotional exhaustion' changed significantly ( $p = .00$ ; small effect size:  $\eta^2 = 0.017$ ) between T1 ( $M = 1.66$ ) and T2 ( $M = 1.81$ ). T3 scores ( $M = 1.78$ ) also differed significantly from T1 scores. The burnout scale 'personal accomplishments' showed a significant change ( $p = .00$ ; small effect size:  $\eta^2 = 0.020$ ). Pairwise comparisons indicated that scores were at their lowest at T3 ( $M = 4.67$ ) compared to T1 ( $M = 4.80$ ) and T2 ( $M = 4.77$ ). No health changes were found in the scale 'depersonalisation' ( $p = .16$ ) with scores  $M = 1.15$  (T1),  $M = 1.17$  (T2), and  $M = 1.23$  (T3). Based on all three scales, a small portion (4.1%,  $n = 24$ ) of the participants reported pre-assignment levels for suspected burnout. These rates increased slightly to 5.5% ( $n = 27$ ) at T2 and 6.0% ( $n = 22$ ) at T3. Older participants and participants with greater assignment length were less likely at risk for suspected T2 burnout. None of the variables were risk factors at T3.

### ***Quality of Life (RAND-36)***

Levels of vitality changed significantly ( $p = .00$ ; large effect size:  $\eta^2 = 0.108$ ). Post-hoc pairwise comparisons showed in a significant drop in vitality levels between T1 ( $M = 71.5$ ) and T2 ( $M = 62.8$ ), and a significant increase in vitality levels at T3 ( $M = 68.3$ ). The vitality levels did not return to baseline demonstrated by a significant difference between T1 and T3 scores ( $p = .00$ ). Significant changes in the levels of social functioning were found ( $p = .014$ ; small effect size:  $\eta^2 = 0.014$ ) between T1 ( $M = 86.9$ ) and T2 ( $M = 83.6$ ). Similarly, emotional wellbeing also demonstrated significant changes ( $p = .04$ ;  $\eta^2 = 0.010$ ) between T1 ( $M = 79.7$ ) and T2 (77.9). The remaining RAND-36 health indicators (physical functioning, physical or emotional role limitations, pain and general health) demonstrated stable health levels over time ( $p > .05$ ).

**Table 3**  
*Health Changes Over Time – Repeated Measures ANOVAs & Risk Factor Analyses – Adjusted Odds Ratios*

Domain	+/-	Pre-assignment		Post-assignment		Follow-up	$F_{2,280}$	$p$	$\eta^2$	Sig. pairwise comparisons	Post-assignment risk factors	AOR
		M (SD)	M (SD)	M (SD)	M (SD)							
<b>Anxiety</b>												
Mean	-	1.50 (.48)	1.39 (.44)	1.39 (.44)	1.39 (.44)	1.39 (.44)	11.91	.00	.036	T1>T2*, T1>T3*	Female National staff exp. Number of PTEs	1.88 1.18 1.13
<b>Depression</b>												
Mean	-	1.59 (.51)	1.57 (.53)	1.57 (.53)	1.59 (.57)	1.59 (.57)	.52	.59			Female National staff exp. Number of PTEs	1.72 1.27 1.10
<b>PTSD<sup>a</sup></b>												
Sum	-	8.89 (8.57)	7.84 (8.38)	7.84 (8.38)	8.19 (9.06)	8.19 (9.06)	2.09	.13				
<b>Burnout</b>												
Sum	-	1.66 (.89)	1.81 (1.11)	1.81 (1.11)	1.78 (1.02)	1.78 (1.02)	5.74	.00	.017	T1<T2*, T1<T3*	Age	.69
Emotional exhaustion	-	1.15 (.88)	1.17 (1.03)	1.17 (1.03)	1.23 (1.00)	1.23 (1.00)	1.87	.16			Assignment length	.78
Personal accomplishments	+	4.80 (.82)	4.77 (.86)	4.77 (.86)	4.67 (.85)	4.67 (.85)	7.03	.00	.020	T1>T3*, T2>T3*		
<b>Quality of life</b>												
Physical functioning	+	95.0 (9.6)	94.1 (12.0)	94.1 (12.0)	95.3 (10.2)	95.3 (10.2)	2.19	.11				
Social functioning	+	86.9 (16.2)	83.6 (19.6)	83.6 (19.6)	85.1 (19.6)	85.1 (19.6)	4.26	.02	.014	T1>T2*		
Role limitations physical	+	90.5 (22.0)	88.5 (24.5)	88.5 (24.5)	86.6 (27.8)	86.6 (27.8)	2.58	.08				
Role limitations emotional	+	86.7 (27.3)	86.9 (26.4)	86.9 (26.4)	83.3 (30.8)	83.3 (30.8)	2.17	.12				
Emotional wellbeing	+	79.7 (13.0)	77.9 (15.5)	77.9 (15.5)	78.8 (14.4)	78.8 (14.4)	3.18	.04	.010	T1>T2*		
Vitality	+	71.5 (15.7)	62.8 (21.5)	62.8 (21.5)	68.3 (19.0)	68.3 (19.0)	37.5	.00	.108	T1>T2*, T2<T3*	T1>T3*	
<b>Pain</b>												
General health perception	+	87.2 (14.5)	86.7 (16.0)	86.7 (16.0)	87.5 (16.2)	87.5 (16.2)	.367	.69				
	+	67.1 (12.4)	65.9 (12.0)	65.9 (12.0)	66.8 (12.7)	66.8 (12.7)	1.88	.15				

*Note.* '+' = higher scores represent better health. '-' = higher scores represent poorer health. <sup>a</sup> Excluded from PTSD analysis: 7 (no pre-assignment or post-assignment LEC experiences).  $\eta^2$  = eta squared effect size. Statistically significant post-hoc pairwise findings were determined using  $p < .05$ . \* is post-hoc Bonferroni corrected significance. Adjusted odds ratio (AOR) were calculated for above clinical cut-off (screener) scores of anxiety, depression, PTSD and burnout at T2. None of the risk factors were significant at T3.

### ***Clinical Interview (T2)***

A structured clinical interview (N = 320) assessed the presence of psychological disorders at T2 (Table 4). Approximately one in five participants were indicative of current psychological disorders (19%, n = 60). Alcohol use disorder (AUD) (12%, n = 38) was reported most often. In most AUD cases the disorder was considered mild (n = 33). The remaining cases showed moderate (n = 4) or severe levels (n = 1). None of the demographic and assignment-related variables were risk factors for a likely clinical disorder based on the interview.

**Table 4**

*Prevalence of Current Post-Assignment (T2) Disorders According to the M.I.N.I. Clinical Interview Stratified for Gender*

	<b>Total</b>	<b>Females</b>	<b>Males</b>
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>
<b>Separate disorders</b>			
Alcohol use	38 (11.9)	23 (12.0)	13 (10.8)
Substance use	9 (2.8)	2 (1.0)	7 (5.8)
Major depressive disorder	4 (1.3)	1 (0.5)	3 (2.5)
Obsessive compulsive disorder	7 (2.2)	4 (2.1)	3 (2.5)
Panic	3 (0.9)	2 (1.0)	1 (0.8)
Agoraphobia	3 (0.9)	3 (1.6)	0 (0)
Generalised anxiety	3 (0.9)	3 (1.6)	0 (0)
PTSD	1 (.3)	1 (0.5)	0 (0)
Social anxiety	0 (0)	0 (0)	0 (0)
Anorexia nervosa	0 (0)	0 (0)	0 (0)
Bulimia nervosa	0 (0)	0 (0)	0 (0)
Binge eating	0 (0)	0 (0)	0 (0)
<b>Pooled disorders</b>			
Any anxiety disorders	21 (6.6)	16 (8.3)	5 (4.2)
Any current disorders	60 (18.8)	33 (17.2)	25 (20.8)

*Note.* Early remission not taken into account for alcohol. PTSD = 'post-traumatic stress disorder'. Total sample n = 320 (Female n = 192. Male n = 120. N = 8 gender specification missing).

### ***Inflation of Self-Report Scores (T2)***

We examined differences in the proportions of participants who reported above clinical threshold scores on the questionnaires and the clinical interview. Compared to the gold standard clinical the questionnaires overestimated three times (20 vs 6.6%) the presence of a potential anxiety disorder, eight times (2.4 vs 0.3%) the presence of PTSD, and twenty-five times (32 vs 1.3%) the presence of a major depression.

### ***Healthcare Utilisation (T3)***

Three hundred and forty-six (346) participants completed the healthcare utilisation follow-up measure of whom 45 (13%) utilised assignment-related physical health services and 24 (6.9%) assignment-related mental health services. Another 16 (4.6%) utilised physical and 8 (2.3%) mental health services for issues that might or might not be assignment-related, whilst 72 (21%) utilised physical and 8 (2.3%) mental health services for issues unrelated to the assignment.

Two hundred and eighteen (n = 218) participants completed both the follow-up measure and post-assignment M.I.N.I. clinical interview, of whom 38 participants had an indication of a current DSM-5 disorder. Ten participants (26%) with such a reported disorder utilised mental health services. The remaining 28 participants (74%) with a current mental health disorder did not utilise mental health services at follow-up.

There were substantial differences between the self-report measures and clinical interview regarding the suspected presence of mental health disorders. The self-report rates for suspected clinical pathology were 32.4% (n = 158) for depression, 20% for anxiety-based pathologies (n = 97), and 2.4% (n = 12) for PTSD. In contrast, the clinical interview rates were 1.3% (n = 4) for depression, 6.6% (n = 21) for anxiety-based pathologies, and 0.3% (n = 1) for PTSD.

### **Sample Representativeness**

The representativeness of the sample was determined by comparing demographic information about the current sample with data from the total MSF population, performing decliner analyses, non-responder analyses and sensitivity analyses. For a detailed description see also Appendix D.

### ***Population Comparisons***

Five hundred and ninety-seven (597) iHAWs were not informed about the present study because they did not visit the MSF Amsterdam office for a briefing. Compared to them, our study participants were significantly ( $p < .05$ ) more often female, younger, more often in supervisory/specialist and coordination assignment positions, and less likely assigned as activity managers/clinical medical specialists. All effect size differences were small.

### ***Decliner Analyses***

Study participants were significantly more often female but did not differ in age and roles in the field.



### ***Baseline Subgroup Differences***

Females reported higher levels of anxiety, depression and emotional exhaustion. They also reported lower levels of mental wellbeing and vitality, but better physical functioning. The effect size differences between males and females were small. Participants with national staff experiences reported higher levels of PTSD, lower levels of physical function and felt less emotionally exhausted. The effect size differences were small, with the exception of a medium effect size on physical functioning. There were no baseline differences regarding prior assignment experiences or education.

### ***Non-Responder Analyses***

Compared to baseline, post-assignment non-responders were more often male and reported lower on the burnout 'depersonalisation' scale. Compared to baseline, follow-up non-responders were more often assignment first-timers. There were no baseline differences on the health-indicators between responders and non-responders.

### ***Sensitivity Analyses***

Missing data were likely missing completely at random (Little's MCAR test ( $\chi^2 = 206.5$  (194),  $p = .26$ ). After reanalysis of the RM ANOVA health change scores using multiple imputations for any missing health indicator data results were comparable to the reported RM ANOVAs. It is unlikely that participant dropout influenced the present results.

## **Discussion**

Humanitarian aid workers are considered a scientifically overlooked population with (post-traumatic) mental health problems reaching epidemic proportions (Macpherson & Burkle, 2021). Our current findings provide an objective assessment of the extent of the health problems in international humanitarian aid workers – a particular group of aid workers. The current research confirms that humanitarian assignments are highly stressful. Three-quarters of the iHAWs reported assignment-related exposure to PTEs in addition to a number of organisational and environmental stressors. Males and females reported a similar number of field-related (environmental, cultural and organisational) sources of significant stress, though there are qualitative differences in the sources of stress. Women more often reported sexual assault and other unwanted experiences and witnessing sexual harassment and violence towards colleagues, emphasizing an important gender risk distinction within the humanitarian aid worker community. Women also more often reported experiencing interactional sources of stress (lack of technical support, management issues, team composition, and poor communication within team and project). This may be due to different gender styles in communicating

and conflict management. Males tend to be more competing (dominating) with less concern for others, whereas females tend to focus on noncompeting (integrating, obliging, avoiding and compromising) strategies to resolve work conflicts (Rahim & Katz, 2019). It might also explain why women more often reported feelings of powerlessness and hopelessness. Alternatively, women were more often exposed to sexual threats and violence in workplace interactions, which may then lead them to report more interactional stress rather than differences in conflict management style. They may just feel less safe at work, increasing feelings of powerlessness and hopelessness.

Despite the stressful conditions most participants remained healthy. Health can be defined as ‘the ability to adapt and to self-manage in the face of social, physical, and emotional challenges’ (Huber et al., 2011). Five present findings support our assumptions that iHAWs, on short-term emergency aid assignments, remain predominantly healthy. We found (1) few overall negative health changes on a broad set of health indicators, (2) some health improvements, (3) lower prevalence rates compared to general population norm scores for psychological disorders, (4) post-assignment significant risk factors were no longer significant at follow-up, and (5) as expected, the clinical interview outcomes compared to the self-reporting questionnaires showed substantial inflation of the latter. The outcomes are discussed below.

First, on a broad set of health indicators, only a few negative pre-to post-assignment health changes were detected based on sample average scores with almost exclusively small effect sizes. Emotional wellbeing, social functioning, emotional exhaustion and a loss of vitality deteriorated at post-assignment. Indicative for the recuperation of the iHAWs is the improvement of all negative health changes in the months following their return.

Second, iHAWs reported pre-to post-assignment health improvements. In particular, their anxiety levels were significantly lower. This may be a product of timing of the measurement, a general satisfaction from the assignment, or both. With regard to timing, the current study pre-assignment levels of anxiety were elevated compared to previous longitudinal findings (Lopes Cardozo et al., 2012). Cardozo and colleagues collected pre-assignment data between days and weeks before assignment departure (Lopes Cardozo, personal communication). Our participants were assessed between leaving home and going straight to the assignment. The uncertainties about future threats, leaving their significant others, about their assignment briefings may result in anxiety (Grupe & Nitschke, 2013). At post-assignment, the rewarding nature of humanitarian work (Kim et al., 2017), and prospect of reuniting with family and friends could also explain the decrease of anxiety.

Third, the post-assignment clinical interview iHAWs prevalence rates compared to general population were lower for anxiety (6.6% versus 6.9%) and major depressive disorder (1.3% versus 5.4%) (Steel et al., 2014). IHAWs also reported similar or higher levels of current health-related quality of life compared to general reference populations (Jenkinson et al., 1999; Roser et al., 2019). Better health among iHAWs may be due to self-selection, and/or human resources department strong selection criteria on iHAWs. Fourth, although risk factors, such as gender and previous national staff experience, were identified upon assignment return, none of these predicted ill-health at two-months follow-up. These findings contrast with findings of risk factors negatively affecting the health of iHAWs (Brooks et al., 2015; Gritti, 2015). The effect size of predictive risk factors was small at post-assignment. The lack of significance at follow-up may be attributable to a lack of power to detect small magnitude effects due to T3 study attrition. Both findings (small significant T2 effect size and lack of T3 significance) indicate that these risk factors play a negligible role regarding negative health changes. Altogether, the above findings demonstrate the overall capacity of iHAWs, short-term emergency aid assignments, to stay healthy and manage their highly stressful assignment environment.

Our findings confirmed our assumption that self-report questionnaires tend to substantially overestimate mental health pathologies. Using existing general or professional population cut-off scores, our participants were three times more likely to suffer from an anxiety disorder, eight times more likely to qualify for a PTSD diagnosis, and 25 times more likely to experience a depressive disorder, compared to their clinical interview outcomes. However, screeners reporting above clinical threshold levels may still be indicative of mental health difficulties as discussed in the next paragraph.

There are also some negative health outcomes that require discussion: (1) PTSD, anxiety and burnout – showed high RM ANOVA standard deviations, (2) the negative self-reported health changes for social functioning, emotional wellbeing, emotional exhaustion and vitality require attention, (3) higher than reference norm levels for alcohol use disorder and (4) post-assignment health services indicate negatively changing health conditions among the iHAWs. We discuss each of these results in the following paragraphs.

RM ANOVA mean trajectories with high standard deviations suggest the presence of unidentified iHAW sub-populations with different health trajectories. Findings in military populations describe five different pre-assignment, post-assignment, and follow-up deployment trajectories (Van der Wal et al., 2019). It is possible that similar trajectories are also present among iHAWs.

The negative overall health changes in terms of emotional exhaustion and vitality should not be overlooked. These related concepts are considered important features in common mental health disorders (Tuithof et al., 2017). Emotional exhaustion is often considered the core dimension of burnout (Te Brake et al., 2008). A decrease in these aspects may signify the psychological ‘wear’ or strain of some key elements of working as iHAWs: a high workload, hostile environments, witnessing severe human suffering, unmet medical needs, and impossible moral dilemmas. Fortunately, the magnitude of the effect change for emotional exhaustion is small. It is larger for vitality, but vitality also demonstrates a strong recovery process between post-assignment and follow-up. Some individuals experienced stressful or shocking events. This may explain the small increase in the portion of participants scoring above the clinical threshold on the screeners’ depression, PTSD symptoms and burnout between pre-assignment and follow-up (approximately 2.0%).

The iHAWs’ 12-month prevalence rate of alcohol use disorders (AUD) was substantially higher (12%) compared to the global 12-month alcohol and other substance use disorder rate (4%) (Steel et al., 2014). Most iHAWs reported mild AUD (88%) which is considered a form of self-medication to cope with different stressors and experiences (Biron et al., 2011). Alcohol use is unhealthy and is as such an ineffective coping mechanism (Griswold et al., 2018). AUD is associated with increased mortality rates and burden of illness (Carvalho et al., 2019). Our results are supported by previous findings of increased levels of alcohol use among iHAWs (Cardozo et al., 2005; Dubravka et al., 2016). Higher alcohol consumption may be part of an international humanitarian lifestyle. Alcohol consumption is a colossal global health issue that knows no safe level of consumption (Burton & Sheron, 2018).

Lastly, health service use acts as an indicator of the population’s health (Jordans et al., 2019). Almost one in ten of the iHAWs utilised (possible) assignment-related mental healthcare services at follow-up. With regard to mental health service utilisation, there are no comparison data for iHAWs. These rates are comparable to military deployment-related populations (Hom et al., 2017; Sareen et al., 2007). Apparently, most iHAWs contacting mental health services sought support for psychological distress and/or to prevent more serious mental health problems, rather than seeking treatment for current psychological disorders. Those with current psychological disorders that did not seek any support may experience barriers to care (e.g., stigma, career concerns) that prevent them from utilising healthcare services (Hom et al., 2017).

### **Strengths and Limitations**

The present study has a number of strengths. The longitudinal design and large sample size addressed important methodological limitations of prior studies (Connorton et al.,

2012). It retained a high number of participants between pre-assignment and post-assignment measurements. The inclusion of the clinical interview, rated by trained psychologists with high inter-rater reliability, made this the first research on iHAWs with diagnosed DSM-5 mental health disorders.

There are also a number of limitations. Small but significant differences compared to iHAWs not briefed were found on gender (more females), and profession (more often specialist/supervisory staff). These differences were significant but not practically relevant (Sullivan & Feinn, 2012). The list of assignment-related stressors is based on iHAWs' field experiences and staff health observations. However, the instrument is not validated. The follow-up measure was relatively soon after the post-assignment measure for operational reasons (staff returning to the field). Hence, the identification of health changes in the longer term remains limited. Anxiety, depression and PTSD symptoms may take time to develop. For example, a quarter of PTSD cases in general have a delayed-onset, preceded by subclinical PTSD symptoms (Smid et al., 2009). These findings may also occur within iHAWs but are beyond the scope of the current study. Some participants returned to the field before the follow-up could be administered, which reduced the follow-up retention rate. Note that the sensitivity analyses detected no bias in the results due to study attrition. Adapting to stressful and demanding circumstances may change how iHAWs perceive concepts such as anxiety and stress. Determining the potential impact of a response shift was beyond the scope of this article. Research into the effect of a response shift showed a small effect in the general population (Schwartz et al., 2006).

Our research focused on a population of a large, international humanitarian organization with an emphasis on relatively short-term emergency assignments (Redfield, 2012). International humanitarian aid workers tend to be highly educated and well-trained. It is unclear to what degree our results are generalizable to other aid workers, such as national staff, iHAWs of small aid organizations, consultants, and different types of humanitarian aid workers (emergency, development). Considering that most participants participated in relatively short-term emergency assignments, it is uncertain whether our findings generalize to long-term aid assignments (>1 year). Long-term missions were recently associated with better mental health outcomes and a higher level of wellbeing (Young & Pakenham, 2021). Our risk factor analyses showed no indications that certain characteristics such as education, gender etc. were predictive of ill-health but we cannot exclude cultural and organisational differences from impacting study outcomes. We did not study national staff. This group runs a greater risk to be killed, wounded or kidnapped (Stoddard et al., 2020), and reported greater psychological distress compared to iHAWs (Cardozo et al., 2005). Considering that national staff makes up for 90% of the aid workers (Stoddard et al., 2009), further

investigation into the distinction between international and national staff is warranted (Shevchenko & Fox, 2008).

## Implications

IHAWs on short-term emergency aid assignments experience a range of stressors partly preventable via organisational changes (e.g., in project communication, workload and travel arrangements). Reducing these stressors likely enhances the overall health of all staff (Michie & Williams, 2003). This may also help eliminate the need for alcohol as a coping mechanism (Burton & Sheron, 2018). Furthermore, creating a culture of normalcy and mutual (social) support for coping with PTEs, feelings of (moral) distress, professional inadequacy and loneliness is potentially an effective way to help iHAWs in a healthy, non-alcohol-related manner. Besides creating a supportive environment, alcohol control policies can also help reduce the overall amount of consumption (Carvalho et al., 2019).

Management and safety specialists need to be aware of specific gender related sources of potentially traumatic stress. The implementation of organisational policies that minimize the threat of sexual assault and harassment to iHAWs, female iHAWs in particular, is essential. It warrants explicit attention because of its potential long-term harm to health and associated stigma (Stoddard et al., 2019). Furthermore, awareness on gender differences in team and management-related sources of stress is warranted. Women more often experience significant team and management-related stress. Managers and supervisors can encourage aid workers to use effective context appropriate conflict-resolution strategies to decrease organisational stress (Rahim & Katz, 2019). Providing a socially supportive organisational environment helps to decrease a sense of helplessness and promote health and wellbeing in humanitarian aid workers (Aldamman et al., 2019).

Humanitarian organizations should rethink their screening procedures. Development of iHAW-specific norm populations and clinical cut-off scores based on optimal sensitivity and specificity values is essential. This will help to avoid inflating the presence of clinical health issues that mask the distinction between (transient) distress and pathology. Applying screeners with non-iHAW norm scores may have strengthened the perception among the general public that humanitarian assignments are damaging to one's health. Screeners should focus on health (changes) and act as a dialogue tool for discussing health implications: how to improve one's health or remain healthy in future aid assignments. Vitality, emotional exhaustion and high alcohol use are particularly useful post-assignment iHAW-specific health screeners. PTSD is another important health indicator to monitor because of the repeated exposure to assignment-related PTEs. Clinical interviews of DSM-5 disorders after positive self-report screening provide the

next step in the process of early identification of healthcare needs. Although, our clinical interviews showed comparatively low levels of clinical pathology, elevated distress levels must always be taken seriously. Distress still indicates potential substantial suffering. Organizations need to acknowledge this suffering and provide (preventative) distress-related health services.

Third, a strategy of watchful waiting is recommended to assess post-assignment health. Increases in post-assignment or follow-up depression, burnout and PTSD prevalence rates, the nature of delayed-onset PTSD, frequency of assignment-related health services utilisation, and the absence of use of health services among those with probable disorders, imply that assignment-related health issues can manifest beyond the actual return date and may not recover spontaneously. A strategy of watchful waiting helps to detect but also helps to avoid overtreatment of staff at risk. Overtreatment is unnecessary, expensive, medicalises health and inhibits natural recovery processes (PLOS Medicine Editors, 2013). Our study already demonstrated that health improved on several health indicators two months after assignment return. We suggest a watchful waiting period of 2 months at least.

### **Epilogue: Paradigm Shift?**

To improve the overall health of iHAWs on short-term emergency aid assignments, applying a pathogenic perspective is not productive, except for a disorder-affected minority. Our findings put forward a paradigm shift in the analysis of iHAW health. Most research focuses on the question: ‘How ill or pathogenic are iHAWs and what makes iHAWs sick?’ Rephrasing the question to ‘What keeps and makes iHAWs healthy?’ will give a different, more comprehensive and more useful perspective on the improvement of iHAWs’ health (Antonovsky, 1979). It will open new avenues of scientific interest to explore how ‘doing good’ by delivering aid acts as a meaning-making mechanism to cope with stress.

### **Declaration of Competing Interest**

Kaz de Jong is employed currently by Médecins Sans Frontières. Saara Martinmäki has no conflicts of interest. Hans te Brake has no conflicts of interest. Joris Haagen has no conflicts of interest. Rolf Kleber has no conflicts of interest.

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MSF's Management Team funded the study into the health of its international staff. It was not involved in: study design; collection, analysis, and interpretation of data; writing of the articles; and decisions to submit papers for publication. ARQ Research and Policy Institute Impact independently carried out the collection of the data. The interpretation, (anonymous) analyses and writing of the article were done by all members of the research team. The MSF principal investigator was not involved in the recruitment, retention or follow-up procedures of the study participants, was unaware of the individuals who participated in the study and only had access to anonymized study data. Two scientific experts (professors) from Utrecht University supervised the quality and independence of the scientific process.

### **Author Contributions**

KdJ: conceptualisation, methodology, formal analysis, writing – original draft, project administration, supervision, funding acquisition

SEM: data curation, data collection, methodology, formal analysis, software, visualisation, writing – review & editing

HtB: methodology, formal analysis, software, supervision, writing – review & editing

JFGH: data curation, data collection, methodology, formal analysis, software, writing – review & editing

RJK: conceptualisation, methodology, supervision, writing – review & editing



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# Appendix A

## Aid Assignment Destination

Continent and Country	<i>n</i> (%)
<b>Africa</b>	
Central African Republic (CAR)	5 (1.0)
Chad	6 (1.2)
Democratic Republic of Congo (DRC)	62 (12.4)
Ethiopia	6 (1.2)
Kenya	2 (0.4)
Libya	18 (3.6)
Nigeria	42 (8.4)
Sierra Leone	10 (2.0)
Somalia	3 (0.6)
South Sudan	47 (9.4)
Tunisia / Libya	1 (0.2)
<b>Asia</b>	
Afghanistan	29 (5.8)
Bangladesh	59 (11.8)
Bangladesh / India	1 (0.2)
India	6 (1.2)
Iraq	23 (4.6)
Iraq / Syria	7 (1.4)
Jordan	7 (1.4)
Malaysia	3 (0.6)
Myanmar	24 (4.8)
Pakistan	9 (1.8)
Russian Federation	2 (0.4)
Syria	70 (14.0)
Tajikistan	5 (1.0)
Uzbekistan	8 (1.6)
Uzbekistan / Tajikistan	1 (0.2)
Yemen	12 (2.4)
<b>Europe</b>	
Search and Rescue Mediterranean Sea (SAR)	21 (4.2)
<b>North America</b>	
Haiti	10 (2.0)
<b>South America</b>	
Venezuela	3 (0.6)

*Note.* *n* = 108 missing.

# Appendix B

## Full List of Study Measures

Questionnaire	Pre-assignment (T1)	Post-assignment (T2)	Follow-up (T3)
Demographic information	X		
Coping self-efficacy scale*	x	x	x
Multidimensional scale of perceived social support*	x	x	x
Trust in management*	x	x	x
Organisational commitment*	x	x	x
Utrecht work engagement scale*	x	x	x
Life event checklist	x	x	x
Sense of coherence scale*	x	x	x
RAND-36	x	x	x
Hopkins symptom checklist	x	x	x
PTSD checklist for DSM-5	x	x	x
Maslach burnout inventory - human services survey	x	x	x
Big five inventory*	x		
Assignment information		x	
Humanitarian Field Stressor List		x	
Deployment risk and resiliency inventory-2 K1 & K2*		x	
Job autonomy*		x	
Assignment work hours*		x	
Job stress*		x	
Healthcare utilisation			x

*Note.* Those measures not reported on in the current paper are marked with an asterisk (\*).

## Appendix C

### Humanitarian Field Stressor List (T2) Stratified for Gender

Reported stress level	Females		Males		$\chi^2$
	Significant	High	Significant	High	
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
<b>Conditions in the field</b>					
Location/travel	39 (13.6)	14 (4.9)	35 (19.1)	8 (4.4)	
Climate	52 (18.1)	25 (8.7)	26 (14.2)	9 (4.9)	
Security context of the country	46 (16.0)	16 (5.6)	25 (13.7)	18 (9.8)	
Separation from family and friends*	31 (10.8)	8 (2.8)	25 (13.7)	15 (8.2)	5.5
Housing/sanitation	28 (9.8)	10 (3.5)	11 (6.0)	9 (4.9)	
Food/amenities	20 (7.0)	7 (2.4)	17 (9.3)	6 (3.3)	
Health risks	10 (3.5)	8 (2.8)	16 (8.7)	4 (2.2)	
<b>Cultural stressors</b>					
Language problems with beneficiaries	34 (11.9)	6 (2.1)	16 (8.7)	5 (2.7)	
Local customs or mentality	33 (11.5)	9 (3.1)	18 (9.8)	5 (2.7)	
Cultural sensitivity of colleagues	32 (11.2)	8 (2.8)	13 (7.1)	6 (3.3)	
<b>Work stressors</b>					
Unclear communication in the project*	54 (18.9)	34 (11.9)	22 (12.0)	13 (7.1)	7.8
High workload	51 (17.8)	25 (8.7)	25 (13.7)	17 (9.3)	
Not available staff/replacements	42 (14.7)	24 (8.4)	25 (13.7)	12 (6.6)	
Emotional impact of the work	44 (15.4)	17 (5.9)	19 (10.4)	10 (5.5)	
Role of the project coordinator (PC)/medical team leader (MTL)	34 (11.9)	28 (9.8)	21 (11.5)	12 (6.6)	
Security and safety conditions*	23 (8.0)	11 (3.8)	26 (14.2)	10 (5.5)	5.3
Lack of management appreciation	32 (11.2)	27 (9.4)	20 (10.9)	10 (5.5)	
Lack of technical support*	40 (14.0)	19 (6.6)	13 (7.1)	6 (3.3)	8.5
Role of the country management team (CMT)*	37 (12.9)	18 (6.3)	12 (6.6)	10 (5.5)	4.2
Role of HQ/Operations	28 (9.8)	15 (5.2)	10 (5.5)	8 (4.4)	
Unclear/non-existent job profile or assignment	21 (7.3)	19 (6.6)	12 (6.6)	6 (3.3)	
Powerlessness/hopelessness*	23 (8.0)	12 (4.2)	9 (4.9)	3 (1.6)	4.0
Poor working conditions	18 (6.3)	5 (1.7)	10 (5.5)	3 (1.6)	
Contact with authorities	15 (5.2)	3 (1.0)	11 (6.0)	1 (0.5)	
Working with national staff	11 (3.8)	4 (1.4)	6 (3.3)	3 (1.6)	
<b>Team stressors</b>					
Problematic communication in the team*	46 (16.1)	28 (9.8)	19 (10.4)	9 (4.9)	7.3
Negative team atmosphere	31 (10.8)	21 (7.3)	18 (9.8)	8 (4.4)	
Conflicts in the team	31 (10.8)	16 (5.6)	12 (6.6)	7 (3.8)	
Poor/no relationships with other team members	27 (9.4)	12 (4.2)	13 (7.1)	7 (3.8)	
Breaching of code of conduct by others	17 (5.9)	8 (2.8)	13 (7.1)	3 (1.6)	
Team composition (e.g. gender, cultures, composition)*	16 (5.6)	10 (3.5)	5 (2.7)	2 (1.1)	4.7
<b>Experienced upsetting events</b>					

Continued.

Reported stress level	Females		Males		$\chi^2$
	Significant	High	Significant	High	
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	
Security and safety incidents	20 (7.0)	6 (2.1)	21 (11.5)	3 (1.6)	
Looting/hold-up/assault/shooting	15 (5.2)	9 (3.1)	7 (3.8)	6 (3.3)	
Intimidation by authorities	10 (3.5)	8 (2.8)	8 (4.4)	3 (1.6)	
Hearing or seeing violence/intimidation/abuse	19 (6.6)	13 (4.5)	17 (9.3)	7 (3.8)	
Code of conduct					
Experienced intimidation/aggression by colleagues	16 (5.6)	10 (3.5)	12 (6.6)	2 (1.1)	
Witnessed intimidation/aggression by colleagues	11 (3.8)	8 (2.8)	11 (6.0)	3 (1.6)	
Witnessed sexual harassment/violence toward colleagues*	6 (2.1)	9 (3.1)	2 (1.1)	1 (0.5)	3.9

*Note.* Reported levels of experienced stress per item in the two highest response categories. Females *n* = 287. Males *n* = 183. We performed Pearson Chi-square ( $\chi^2$ ) analyses of classes 'low to moderate' vs 'significant to high' levels of stress (df = 1). \**p* < .05.



# Appendix D

## Sample Representativeness Data

Comparison data			t(df)	Effect size (d)
Population comparisons	iHAW study participants	iHAWs not informed about study		
Age (M)	40.5	42.2		.16
Female sex (%)	56	47		
Assignment function (%)				
Supervisory/specialist	2	5		
Coordination	25	31		
Managers/clinical medical specialists	73	64		
Decliner analyses	iHAW study participants	iHAWs that declined study participation		
Female sex (%)	57	44		
Baseline subgroup differences	Female sex	Male sex		
Anxiety (M)	1.53	1.44	2.36(563)	.19
Depression (M)	1.64	1.5	3.46(544)	.29
Emotional exhaustion (M)	1.76	1.59	2.23(588)	.19
Mental wellbeing (M)	78.8	81.6	-2.60(557)	-.22
Vitality (M)	70.1	73.2	-2.34(534)	-.20
Physical functioning (M)	95.6	93.5	2.25(365)	.21
	<u>With previous national staff experience</u>	<u>Without previous national staff experience</u>		
PTSD (M)	11.4	8.4	2.39(403)	.35
Physical functioning (M)	90.7	95.6	-2.13(52)	-.52
Emotionally exhausted (M)	1.49	1.72	2.27(89)	.26
	<u>Post-assignment non-responders</u>	<u>Post-assignment completers</u>		
Female sex (%)	21	31		
Burnout scale depersonalisation (M)	1.03	1.22	2.10(589)	.17
Assignment first-timers (%)	43	28		

Note. All reported variables were significant ( $p < .05$ )



# 3

## **Health Trajectories of International Humanitarian Aid Workers: Growth Mixture Modelling Findings From a Prospective Cohort Study**

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## Abstract

Most staff stay healthy during humanitarian work, although some worsen. Mean scores on health indicators may be masking individual participants struggling with health issues. To investigate different field assignment-related health trajectories among international humanitarian aid workers (iHAWs) and explore the mechanisms used to stay healthy. Growth mixture modelling analyses for five health indicators using pre-/post-assignment and follow-up data. Among 609 iHAWs three trajectories (profiles) were found for emotional exhaustion, work engagement, anxiety and depression. For post-traumatic stress disorder (PTSD) symptoms, four trajectories were identified. The 'healthy/normative' trajectory had the largest sample size for all health indicators (73–86%). A stable (moderate) 'ill health' trajectory was identified for all health indicators (7–17%), except anxiety. An 'improving' trajectory was found for PTSD and anxiety symptoms (5–14%). A minority of staff (4–15%) worsened on all health indicators. Deterioration continued for PTSD, depressive symptoms and work engagement 2 months post-assignment. A strong sense of coherence was associated with higher odds of belonging to the 'healthy' trajectory. Female biological sex was associated with higher odds of belonging to the 'worsening' depression and anxiety trajectories. Extended duration of field assignment was related to higher odds of belonging to the 'worsening' depressive symptoms trajectory. Most iHAWs stayed healthy during their assignment; a stable 'ill health' trajectory was identified for most health indicators. Sense of coherence is an important mechanism for understanding the health of all iHAWs in the different health trajectories, including the 'healthy' profile. These findings give new possibilities to develop activities to prevent worsening health and help strengthen iHAWs' ability to remain healthy under stress.

### Keywords

Médecins Sans Frontières, staff health, growth mixture modelling, stress, sense of coherence.

## Introduction

A recent study among international humanitarian aid workers (iHAWs) of a large international humanitarian emergency organisation demonstrated that most staff, despite a highly stressful work environment, stayed healthy during and after humanitarian aid assignments (de Jong et al., 2021). Aid workers consist of different groups, such as international staff, professional consultants and locally contracted national staff (Stoddard et al., 2019). The findings also showed a large range among the health scores. In particular, in healthy populations mean scores may be masking individual participants struggling with health issues. It warrants further exploration to ensure appropriate differentiation between subgroups of individuals with different response patterns on the study variables. Latent class growth analysis (LCGA) enables presentation and understanding of this heterogeneity. Findings from other populations exposed to extreme events report different pre-, post- and follow-up deployment trajectories (Bonanno et al., 2012; Galatzer-Levy et al., 2018; van der Wal et al., 2019). These trajectories show various expressions: chronic ill health (low pre- and post-assignment health scores relative to their peers), worsening health (high pre-, low post-assignment health scores), healthy (high pre- and post-assignment health scores) and improving (moderate pre-assignment, high post-assignment health scores).

Identifying and understanding the different health trajectories and their predictors is important for the development of both theoretical and practical knowledge. It may open new avenues on how to prevent, mitigate and treat iHAWs' health problems. Different mechanisms and variables may be involved. For example, the theory of salutogenesis focuses on the individual's capacity to manage, comprehend and give meaning to the perceived (dis)stress and demands and factors that support human health and well-being, rather than on factors that cause disease. The related concept of sense of coherence postulates how individuals manage, comprehend and search for meaning in (extreme) stress and stay healthy. A high sense of coherence may protect iHAWs against the negative psychological impact of potentially traumatic stress (Veronese & Pepe, 2017). Antonovsky considered sense of coherence to be a unidimensional construct built on three key components: comprehensibility (ability to clarify, structure stressors), manageability (awareness and confidence to manage stressors successfully) and meaningfulness (willingness and motivation to manage stressors). He considered the sense of coherence to be a trait-like disposition, stable over time (Antonovsky, 1987). In the transactional stress model (Lazarus & Folkman, 1987), sense of coherence is a personal resource, an underlying mechanism that determines the stress or coping response. Other mechanisms iHAWs may use to stay healthy while enduring high levels of stress are coping self-efficacy (one's belief in one's ability to succeed in highly demanding situations) and several types and resources of social support. High levels of

both are associated with good health while handling stress, emotions and demanding aid work (van der Velden et al., 2012; Eriksson et al., 2009).

In the present study we aim to demonstrate different assignment- related health trajectories in iHAWs. Statistical modelling of health change trajectories is a unique approach to gain new insights into the health of iHAWs. The findings of this approach are not a technical exercise using sophisticated statistical methods, neither are they limited to showing relationships between a set of variables in a large longitudinal dataset of humanitarian aid workers. The analyses used provide a clearer understanding into how and why iHAWs maintain their health or lose their capacity to remain healthy. We will evaluate five health indicators that showed high variance in their longitudinal mean scores in previous research: symptomatology of post-traumatic stress disorder (PTSD), emotional exhaustion, anxiety, depression, and work engagement as indicators of well-being. To further support and improve iHAWs' health, predictors associated with the various health trajectories are identified. We expect different levels of sense of coherence, coping self-efficacy and perceived social support to predict membership of beneficial and detrimental health trajectories (Veronese & Pepe, 2017).

## Method

### Participants

The current study was a prospective survey of 609 iHAWs of Médecins Sans Frontières Operational Centre Amsterdam (MSF OCA). Additional study details can be found elsewhere, including detailed psychometric information about each measure and field assignment information (de Jong et al., 2021); participant information is presented in Table 1. Independent non-MSF researchers contacted all iHAWs going to a field assignment between December 2017 and February 2019 to inform them about the study; data collection ended in February 2020. Participants signed an informed consent. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. All procedures involving human subjects/patients were approved by Ethics Review Board of MSF (ID 1642).

**Table 1**  
*Participant Information (n = 609)*

	N	%	M	SD
Age, years			40.5	10.8
Biological sex				
Female	343	56.3		
Male	266	43.7		
Continent of origin				
Africa	62	10.6		
Asia	80	13.7		
Europe	301	51.6		
N. America	111	19.0		
S. America	14	2.4		
Oceania	15	2.6		
Education				
Secondary or high school	10	1.8		
Higher vocational training/technical training	40	7.1		
University degree: Bachelors or Masters	373	66.1		
Postgraduate degree	141	25.0		
Relationship status				
Single, never married	249	41.9		
Married	130	21.9		
Committed relationship but not married	131	22.1		
Separated	31	5.2		
Divorced	47	7.9		
Widowed	6	1.0		
Assignment position				
Coordinator	179	31.8		
Activity manager & clinical medical specialist	371	63.9		
Supervisor & specialist	26	4.5		
Other	7	1.2		
Prior assignment experience				
First assignment	110	21.9		
Veteran	392	78.1		
Number of assignments			4.7	5.7
Previously worked as national staff				
Any experience	73	15.5		
No experience	397	84.5		
In years			5.0	3.7
Assignment duration, months			6.4	3.9
Pre-assignment health indicators				
Post-traumatic stress disorder (PCL-5)	572	93.9	8.8	8.3
Emotional Exhaustion (MBI)	590	96.9	1.7	.9
Work Engagement (UWES-9)	549	90.1	4.8	.7
Anxiety (HSCL-25)	564	92.6	1.5	.5
Depression (HSCL-25)	564	92.6	1.6	.5

**Table 1** *Continued.*

	N	%	M	SD
Pre-assignment Health Mechanisms				
Sense of Coherence (SOC)	593	97.4	67.2	9.9
Coping Self-efficacy (CSE-7)	567	93.1	42.2	6.2
Social Support (MSPSS)	538	88.3	5.6	1.0

*Note.* PCL-5 = PTSD Checklist for DSM-5; MBI = Maslach Burnout Inventory; UWES-9 = Utrecht Work Engagement Scale; HSCL-25 = Hopkins Symptom Checklist; SOC = Sense of Coherence scale; CSE-7 = Coping Self-Efficacy Scale; MSPSS = Multi-Dimensional Scale of Perceived Social Support.

## Procedure

Participants completed online questionnaires pre-assignment (T1: 0–14 days pre-departure; response rate 98%), post-assignment (T2: within 4 weeks of returning; response rate 82%) and follow-up (T3: 2 months after T2, or 4–8 weeks after T2 in case of a new assignment; response rate 61%). We found no evidence that results on changes in health outcomes were influenced by those who declined to participate or dropped out of the study, based on decliner, non-responder and sensitivity analyses (de Jong et al., 2021).

## Instruments

### *Health Outcome Measures*

The PTSD Checklist for DSM-5 (PCL-5) (past month; range 0–80, scores above 31–33 indicate probable PTSD) (Blevins et al., 2015; Bovin et al., 2016) measures the DSM-5 symptoms of PTSD. In the current sample, the scale had good internal consistency ( $\alpha = 0.89$ ).

The emotional exhaustion subscale of the Maslach Burnout Inventory – Human Services Survey (MBI-HSS) (range: 0–6) (Maslach et al., 1981) measures burnout-related complaints. High emotional exhaustion is defined as a score of 2.1 or above based on the critical boundaries calculation for population norms (Leiter & Maslach, 2016). The internal consistency of this subscale was good ( $\alpha = 0.84$ ).

The Utrecht Work Engagement Scale (UWES-9) (range 0–6) measures work engagement (Schaufeli et al., 2006). Threshold scores indicate very low (<1.77), low (1.78–2.88), average (2.89–4.66), high (4.67–5.50) and very high (>5.50) work engagement (Schaufeli & Bakker, 2004). High scores correspond to a positive and fulfilling work-related state of mind. Internal consistency was good ( $\alpha = 0.84$ ).

The Hopkins Symptom Checklist (HSCL-25) (25-item self-report questionnaire, rated on a 1–4 Likert scale) assesses symptoms of anxiety and depression during the past week (Derogatis et al., 1974). A cut-off score of 1.75 was used to screen for elevated



symptoms of depression or anxiety (Derogatis et al., 1974). The internal consistency in the current sample was good for both the depression ( $\alpha = 0.90$ ) and anxiety ( $\alpha = 0.87$ ) subscales.

### ***Profile Membership (Resilience) Variables***

The Sense of Coherence (SOC) scale (range 13–91) measures the concept ‘sense of coherence’, which includes three properties: (a) comprehensibility (capacity to understand the situation or problem), (b) manageability (the belief that one can master the situation or problem by oneself) and (c) meaningfulness (experience and awareness of sufficient meaning and motivation to manage the situation or problem) (Antonovsky, 1987). People with a high sense of coherence are able to manage (extreme) stressors in a way that maintains and/or protects their good health. The internal consistency of the scale in our sample was good ( $\alpha = 0.81$ ).

The Coping Self-Efficacy (CSE-7) scale (range 7–49) assesses seven trauma-related coping behaviours (Bosmans et al., 2017). A high score implies high confidence in one’s ability to cope with potentially traumatic events. The internal consistency of the scale was high in this sample ( $\alpha = 0.85$ ).

The 10-item Multidimensional Scale of Perceived Social Support (MSPSS) (range 1–7) measures perceived social support on three dimensions (family, friends, significant others) (Zimet et al., 1988). A high score implies good perceived social support. The internal consistency of the instrument was very strong ( $\alpha = 0.91$ ). Perceived support refers to the subjective experience of being supported.

### **Statistical Analysis**

After examining the individual health trajectory plots, measurement occasion (T1, T2 or T3) was chosen as the time metric, ranging from 0 to 2 (pre-assignment to follow-up). Separate growth mixture modelling (GMM) was performed for each of the five health indicators using the four-step GMM approach (Ram & Grimm, 2009). The four steps are (a) problem definition, (b) model specification, (c) model estimation and (d) model selection and interpretation. The specified growth model is a statistical model used to describe individuals’ change over time and examines the between-person differences in those changes in unobservable (i.e. latent) subgroups within a population (Grimm & Ram, 2016).

We tested three baseline (single-group) growth curve models – intercept, linear and latent basis – to detect the best representation of health change using the  $\chi^2$  model fit test ( $P > 0.05$ ), root mean square error of approximation (RMSEA) ( $<0.05$ ), comparative fit index (CFI) ( $>0.95$ ), Tucker–Lewis index (TLI) ( $>0.95$ ) and standardised root mean

squared residual (SRMR) ( $<0.05$ ). A baseline model indicates that it is the simplest model for analysing and understanding the relationships between the different study indicators of the expected changes. It provides a baseline to compare and determine whether more complex models (e.g., by introducing subgroups) better fit the data.

To determine the number of different subgroups (profiles/ classes), their longitudinal trajectories and individual profile membership probabilities, we specified three group difference models for 1–5-profile solutions. The first group difference model is the means model (M2). It allows the means of each group to differ. Second is the means and covariances model (M3), which allows the means, intercept and slope variances and covariance to differ. Third is the means, covariances and residual variances model (M4). It allows all model parameters to differ (the means, intercept, slope variances, covariance and residual variance). Additional detailed information about the terminology can be found in Grimm and colleagues (Grimm & Ram, 2016).

The best fitting group difference GMM models were selected using a decision tree based on model convergence, lowest fit indices (Bayesian Information Criterion (BIC); Akaike's Bayesian information criterion (ABIC); Akaike information criterion (AIC);  $-2$  log likelihood ( $-2LL$ ) difference test), significant bootstrap likelihood ratio test (BLRT) P-value ( $P < 0.05$ ), entropy value ( $>0.75$ ) to adequately distinguish between profiles, meaningful profile size ( $>1\%$ ), model interpretation of iHAWs' health, and model parsimony.

We added the time-invariant covariates (biological sex, assignment duration, and pre-assignment SOC, CSE-7, UWES-9 and MSPSS scores) to each of the selected best fitting group difference GMM models, to determine which predictors were associated with each health trajectory. We used the automatic three-step approach to study these covariates (Grimm & Ram, 2016; Muthén & Asparouhov, 2015). The three steps consist of: (1) an estimation of the latent class growth model using only the latent class indicator variables; (2) assigning participants to their most likely profile based on their latent class posterior distribution; and (3) regressing the most likely profile on each predictor variable while taking into account the misclassification in the second step. The model that includes covariates is called the conditional model.

All analyses were performed in Mplus (version 8 for Windows). The GMMs were estimated using maximum likelihood methods. Missing data were handled using full maximum likelihood. A prior study utilising this sample noted no substantive bias in parameter estimation based on sensitivity analyses using multiple imputation and Little's Missing Completely at Random test (de Jong et al., 2021).

## Results

The distributions of the observed health indicator scores were within the parameters of normality, except for PTSD symptoms, which had kurtosis values between 2.6 and 5.6. Switching to a GMM model with non-normal distributions (Muthén & Asparouhov, 2015) increased convergence problems and did not outperform the regular normal-distributions GMM models for PTSD symptoms. Thus, we used the regular normal-distributions approach.

### Unconditional Model

Based on the general linear model (GLM) fit indices (Table 2), the latent basis model was considered the best fitting baseline model for PTSD, emotional exhaustion and anxiety symptomatology. The baseline linear model was the best fit for work engagement and depression indicators. The 1–5-profile (class) solution M2 fit indices are presented in Table 3. A visual representation of the trajectories for each GMM model is shown in Appendix B. The slope term variance had to be constrained in all M2 models to counter convergence errors that frequently occur in unconstrained models. M3 and M4 group difference models did not converge or remained unidentified.

The relative fit indices of the health indicators indicated a preference for higher-profile solutions, with the 5-profile solutions providing the optimal fit. However, the 5-profile solutions for PTSD, work engagement, anxiety and depressive symptomatology, and the 4-profile solution for work engagement, were unsatisfactory owing to classes accounting for  $\leq 1\%$  of the sample. The 4-profile and 5-profile solutions for work engagement also contained unacceptable out-of-bounds trajectories. The entropy value was acceptable ( $\geq 0.75$ ) to good ( $\geq 0.80$ ) for all profile solutions, except for the 5-profile solution for work engagement (0.70) and the 2-, 3- and 5-profile solutions for depression ( $< 0.75$ ). Only the 4-profile depression solution had an acceptable entropy value (0.76). Consequently, only the 2- to 4-profile solutions for PTSD and anxiety symptoms, the 2- and 3-profile solutions for work engagement, the 2- to 5-profile solutions for emotional exhaustion and the 4-profile solution for depression were interpreted. We also interpreted the 3-profile solution for depression because of its near acceptable entropy level (0.73) and similarities to the 4-profile solution.

**Table 2**  
Fit Indices for Unconditional Baseline General Linear Models<sup>a</sup>

	AIC	BIC	ABC	Log likelihood		Model fit test			CFI	TLI	SRMR	
				Fitted model (H0)	Saturated model (H1)	$\chi^2$	df	p-value				
Post-traumatic stress disorder symptoms												
Intercept	9999.41	10012.58	10003.06	-4996.70	-4984.95	23.5	6	0.00	0.07	0.92	0.959	0.09
Linear	9989.93	10016.28	9997.23	-4988.97	-4984.95	8.04	3	0.01	0.05	0.98	0.976	0.05
<b>Latent basis</b>	<b>9984.45</b>	<b>10015.18</b>	<b>9992.96</b>	<b>-4985.23</b>	<b>-4984.95</b>	<b>0.56</b>	<b>2</b>	<b>0.76</b>	<b>0.00</b>	<b>1.00</b>	<b>1.010</b>	<b>0.01</b>
Emotional exhaustion symptoms												
Intercept	3614.76	3627.99	3618.46	-1804.38	-1766.16	76.4	6	0.00	0.14	0.88	0.937	0.13
Linear <sup>1</sup>	3604.83	3622.47	3609.77	-1798.41	-1766.16	64.5	5	0.00	0.14	0.89	0.937	0.14
<b>Latent basis</b>	<b>3547.02</b>	<b>3577.89</b>	<b>3555.67</b>	<b>-1766.51</b>	<b>-1766.16</b>	<b>0.70</b>	<b>2</b>	<b>0.71</b>	<b>0.00</b>	<b>1.00</b>	<b>1.003</b>	<b>0.01</b>
Work engagement												
Intercept	2821.47	2834.57	2825.05	-1407.73	-1371.81	71.8	6	0.00	0.14	0.88	0.940	0.33
<b>Linear</b>	<b>2756.16</b>	<b>2782.37</b>	<b>2763.32</b>	<b>-1372.08</b>	<b>-1371.81</b>	<b>0.53</b>	<b>3</b>	<b>0.91</b>	<b>0.00</b>	<b>1.00</b>	<b>1.004</b>	<b>0.02</b>
Latent basis	2758.16	2788.73	2766.51	-1372.08	-1371.81	0.53	2	0.77	0.00	1.00	1.004	0.02
Anxiety symptoms												
Intercept	1483.12	1496.29	1486.76	-738.56	-717.35	42.4	6	0.00	0.10	0.89	0.945	0.05
Linear	1465.22	1491.55	1472.50	-726.61	-717.35	18.5	3	0.00	0.09	0.95	0.953	0.05
<b>Latent basis</b>	<b>1449.37</b>	<b>1480.09</b>	<b>1457.87</b>	<b>-717.69</b>	<b>-717.35</b>	<b>0.67</b>	<b>2</b>	<b>0.72</b>	<b>0.00</b>	<b>1.00</b>	<b>1.006</b>	<b>0.02</b>
Depression symptoms												
Intercept	1805.08	1818.25	1808.72	-899.54	-885.94	27.2	6	0.00	0.08	0.95	0.974	0.14
<b>Linear</b>	<b>1785.65</b>	<b>1811.98</b>	<b>1792.93</b>	<b>-886.83</b>	<b>-885.94</b>	<b>1.78</b>	<b>3</b>	<b>0.62</b>	<b>0.00</b>	<b>1.00</b>	<b>1.003</b>	<b>0.04</b>
Latent basis	1786.24	1816.96	1794.73	-886.12	-885.94	0.36	2	0.83	0.00	1.00	1.006	0.01

Note. AIC = Akaike information criterion; BIC = Bayesian information criterion; ABC = Akaike's Bayesian information criterion; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean squared residual.

<sup>a</sup> The optimal model is shown in bold.

<sup>b</sup> The slope term variance was constrained to adjust for small non-significant negative variance.

**Table 3**  
*Model Fit Comparisons for the One-, Two-, Three-, Four-, and Five-Class Solutions for Each Health Indicator<sup>a</sup>*

Class	Class proportions	Entropy	Class probabilities	AIC	BIC	ABIC	Log-likelihood (H <sub>0</sub> )	BLRT	
								-2LL difference	p
<b>Post-traumatic stress disorder symptoms</b>									
1	1.0	1.0	C1(1.0)	9984.45	10015.28	9992.96	-4985.23	-	-
2	.91/.09	.87	C1(.98), C2(.84)	9867.59	9902.71	9877.32	-4925.80	118.9	<.001
3	.82/.09/.08	.86	C1(.96), C2(.90), C3(.82)	9764.05	9812.34	9777.42	-4871.02	109.5	<.001
4	.82/.07/.07/.05	.88	C1(.96), C2(.88), C3(.78), C4(.82)	9715.37	9776.84	9732.39	-4843.69	54.7	<.001
5	.79/.08/.07/.05/.01	.88	C1(.96), C2(.76), C3(.88), C4(.79), C5(.93)	<b>9676.84</b>	<b>9751.48</b>	<b>9697.51</b>	<b>-4821.42</b>	44.5	<.001
<b>Emotional exhaustion symptoms</b>									
1	1.00	1.0	C1(1.0)	3547.02	3577.89	3555.67	-1766.51	-	-
2	.92/.08	.86	C1(.97), C2(.88)	3473.60	3508.88	3483.48	-1728.78	75.5	<.001
3	.77/.17/.06	.75	C1(.92), C2(.77), C3(.83)	3446.38	3494.89	3459.97	-1712.19	33.2	<.001
4	.63/.28/.05/.03	.77	C1(.91), C2(.81), C3(.85), C4(.89)	3427.95	3489.69	3445.24	-1699.97	24.4	<.001
5	.63/.28/.04/.03/.02	.79	C1(.92), C2(.77), C3(.83), C4(.80), C5(.76)	<b>3411.24</b>	<b>3486.22</b>	<b>3432.25</b>	<b>-1688.62</b>	22.7	<.001
<b>Work engagement</b>									
1	1.00	1.0	C1(1.0)	2756.16	2782.37	2763.32	-1372.08	-	-
2	.96/.04	.90	C1(.98), C2(.91)	2709.55	2740.13	2717.90	-1347.78	48.6	<.001
3	.86/.09/.04	.83	C1(.95), C2(.79), C3(.85)	2677.97	2721.65	2689.90	-1328.98	37.6	<.001
4	.84/.10/.06/.004	.83	C1(.93), C2(.79), C3(.83), C4(.99)	2664.73	<b>2721.52</b>	2680.25	-1319.37	19.2	.004
5	.59/.30/.07/.03/.004	.70	C1(.84), C2(.69), C3(.84), C4(.85), C5(.99)	<b>2658.33</b>	2728.22	<b>2677.43</b>	<b>-1313.17</b>	12.4	.030
<b>Anxiety symptoms</b>									
1	1.0	1.0	C1(1.0)	1449.37	1480.09	1457.87	-717.69	-	-
2	.81/.19	.81	C1(.96), C2(.86)	1356.31	1391.41	1366.02	-670.15	95.1	<.001
3	.75/.14/.11	.82	C1(.95), C2(.87), C3(.80)	1267.87	1316.14	1281.22	-622.93	94.4	<.001

Table 3 Continued.

Class	Class proportions	Entropy	Class probabilities	AIC	BIC	ABIC	Log-likelihood (H <sub>0</sub> )	BLRT	
								-2LL difference	p
4	.70/.14/.12/.03	.83	C1(.94),C2(.85),C3(.82),C4(.90)	1214.18	1275.62	1231.18	-593.09	59.7	<.001 <sup>b</sup>
5	.69/.15/.12/.04/.01	.85	C1(.94),C2(.83),C3(.81),C4(.90),C5(.89)	<b>1199.26</b>	<b>1273.87</b>	<b>1219.90</b>	<b>-582.63</b>	20.9	<.001 <sup>b</sup>
Depression symptoms									
1	1.0	1.0	C1(1.0)	1785.65	1811.98	1792.93	-886.83	-	-
2	.77/.23	.69	C1(.92),C2(.73)	1716.28	1747.00	1724.77	-851.14	71.4	<.001
3	.73/.15/.12	.73	C1(.91),C2(.76),C3(.81)	1658.24	1702.13	1670.38	-819.12	64.0	<.0001
4	.67/.17/.14/.03	.76	C1(.91),C2(.77),C3(.73),C4(.87)	1631.10	<b>1688.15</b>	1646.88	-802.55	33.1	<.001
5	.59/.18/.13/.09/.01	.74	C1(.89),C2(.76),C3(.63),C4(.79),C5(.97)	<b>1620.94</b>	1691.16	<b>1640.36</b>	<b>-794.47</b>	16.2	.004

Note. The optimal model is printed in bold. AIC = Akaike information criterion; BIC = Bayesian information criterion; ABIC = Akaike's Bayesian information criterion; BLRT = bootstrapped likelihood ratio test; -2LL difference = two times log-likelihood difference between an *n*-1 profile solution.

<sup>a</sup> The optimal model is shown in bold. Group difference models M3 and M4 are not reported owing to convergence problems for all health indicators. Fixed slope term variance was used to adjust for convergence problems.

<sup>b</sup> A number of bootstrap draws had a smaller LRT value than the observed LRT value and therefore the p-value may not be trustworthy.

The most meaningful and parsimonious models were presented (Fig 1). Note that the time coefficient (b) for each trajectory has different meanings for linear and latent basis models. For linear models,  $b_1 = 0$  reflects pre-assignment baseline scores,  $b_2 = 1$  reflects the change between pre- and post-assignment scores,  $b_3 = 2$  reflects the change between pre-assignment and follow-up scores. In latent basis models,  $b_1 = 0$  is set to 0,  $b_3 = 1$  is set to 1. They reflect the change between pre-assignment and follow-up scores. The estimated post-assignment slope term  $b_2$  is variable and differs for each latent basis model. We show the latent time basis coefficients in Fig. 1. For each health indicator, its associated T1- T3 health trajectory mean scores and estimated slopes (B) are given in Table 4.

**Figure 1**  
*Optimal Model Class Solutions for Each Health Trajectory*

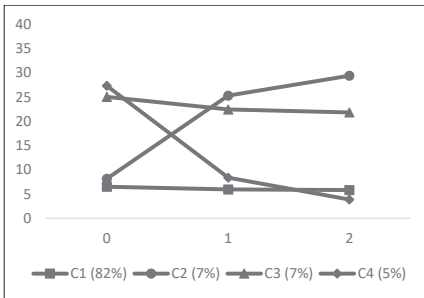
For all Figures:

- Square profile icons represent 'healthy/normative' profile
- ▲ Triangle profile icons represent 'ill health' profile
- Circle profile icons represent 'worsening' profile
- ◆ Diamond profile icons represent 'improving' profile

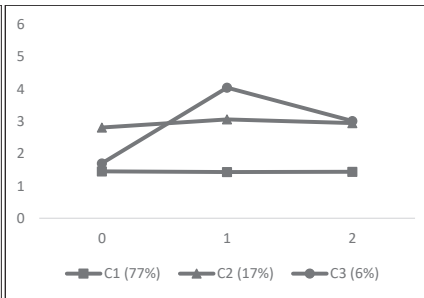
Note that the unstandardized health indicators scores are presented. Multiple scales were used with varying score ranges.

The score range is not directly comparable for most figures.

PTSD latent basis 4-class solution



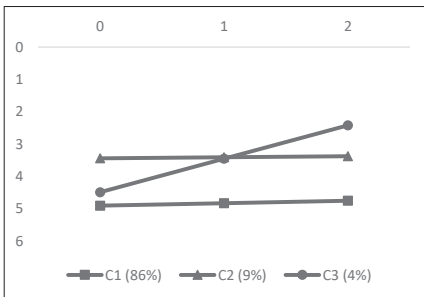
Emotional exhaustion latent basis 3-class solution



The PTSD time basis coefficients for the (optimal) 4-class solution model are  $b_1 = 0.00$ ,  $b_2 = .81$ ,  $b_3 = 1.00$

The emotional exhaustion time basis coefficients for the (optimal) 3-class solution model are  $b_1 = 0.00$ ,  $b_2 = 1.792$ ,  $b_3 = 1.00$ .

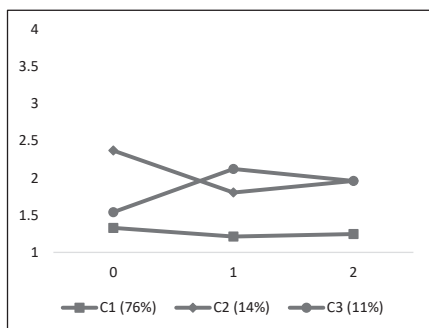
Work engagement linear 3-class solution



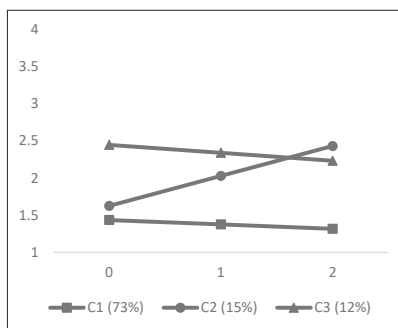
UWES-9 values (0-6) displayed in reverse order to signify that a score '6' is most healthy and score '0' least healthy.



Anxiety latent basis 3-class solution



Depression linear 3-class solution



The Anxiety time basis coefficients for the (optimal) 3-class solution model are  $b_1 = 0.00$ ,  $b_2 = 1.387$ ,  $b_3 = 1.00$

### ***PTSD***

For PTSD symptoms, the 4-profile solution was selected as the best model because the additional health trajectories were more informative compared with the 2-profile and 3-profile solutions. The first profile (82% of the sample) was considered ‘healthy/normative’: it had a low pre-assignment severity level and a stable slope trajectory. The second profile (7%, ‘worsening’) had low pre-assignment severity levels and significant pre-assignment to follow-up increases in severity, with moderate subthreshold severity levels at post-assignment and follow-up. The level of PTSD symptomatology continued to rise between post-assignment and follow-up. The third profile (7%, ‘ill health’) had a moderate, subthreshold pre-assignment severity level and a stable slope trajectory. The fourth profile (5%, ‘improving’) had a moderate, subthreshold pre-assignment severity level that significantly decreased between pre-assignment and follow-up. Post-assignment and follow-up severity scores were low, demonstrating that the greatest symptom decrease took place between pre- and post-assignment.

### ***Emotional Exhaustion***

For emotional exhaustion, the 3-profile solution was considered optimal. It was more informative than the 2-profile solution and more parsimonious than the 4-profile solution. The first profile (77%, ‘healthy/normative’) had low pre-assignment exhaustion scores that remained stable over time. The second profile (17%, ‘ill health’) had moderate severity levels that remained stable over time. The third profile (6%, ‘worsening’) showed a low pre-assignment severity, spiking to a high post-assignment severity level and decreasing to borderline moderate-to-high levels of emotional exhaustion at follow-up.

**Table 4**  
*Latent Trajectory Health Indicator Means and Slopes<sup>a</sup>*

	Measurement point	Healthy/Normative			Worsening			Ill health			Improving		
		Mean	B (SE)	p	Mean	B (SE)	p	Mean	B (SE)	p	Mean	B (SE)	p
PTSD	T1	6.6	-.60 (.42)	.17	8.2	21.3 (3.39)	<.001	25.1	-3.2 (2.12)	.13	27.3	-23.5 (4.47)	<.001
	T2	6.0			25.3			22.5			8.4		
	T3	5.8			29.4			21.8			3.9		
Emotional exhaustion	T1	1.5	.003 (.02)	.89	1.7	1.3 (.38)	<.001	2.8	.14 (.17)	.42	-		
	T2	1.4			4.0			3.1			-		
	T3	1.4			3.0			3.0			-		
Work engagement	T1	4.9	-.08 (.02)	<.001	4.5	-1.0 (.15)	<.001	3.4	-.03 (.10)	.73	-		
	T2	4.8			3.5			3.4			-		
	T3	4.8			2.4			3.4			-		
Anxiety	T1	1.3	-.08 (.02)	<.001	1.5	.42 (.10)	<.001	-			2.4	-.41 (.10)	<.001
	T2	1.2			2.1			-			1.8		
	T3	1.3			2.0			-			2.0		
Depression	T1	1.4	-.06 (.01)	<.001	1.6	.40 (.08)	<.001	2.5	-.11 (.07)	.14	-		
	T2	1.4			2.0			2.3			-		
	T3	1.3			2.4			2.2			-		

Note. PTSD = post-traumatic stress disorder; T1 = pre-assignment; T2 = post-assignment; T3 = follow-up.

<sup>a</sup> The unstandardised regression coefficient (B) for the health outcome indicators 'PTSD', 'emotional exhaustion', and 'anxiety' reflects the change between pre-assignment (T1) and follow-up (T3) scores. The unstandardised regression coefficient (B) for the health outcome indicators 'work engagement' and 'depression' reflects the change between pre-assignment (T1) and post-assignment (T2) and the change between post-assignment (T2) and follow-up scores (T3) (linear models).

### ***Work Engagement***

The linear 3-profile solution was considered the best model for work engagement because it was more informative than the 2-profile solution. It consisted of a 'healthy/normative' majority profile (86%), characterised by high engagement scores that slightly, but significantly, decreased over time, remaining highly engaged at follow-up. The second profile (9%) reported an average work engagement score and a stable slope over time. It can be considered a less engaged profile. The third profile (4%, 'worsening') exhibited high pre-assignment engagement scores, significantly decreasing to a moderate post-assignment and low follow-up work engagement level. The level of work engagement continued to decrease between post-assignment and follow-up.

### ***Anxiety***

The 3-profile solution for anxiety symptoms was considered the best model. It was more informative than the 2-profile model in identifying participants who worsened over time. The 4-profile solution was considered less parsimonious. The first profile (76%, 'healthy/normative') had low pre-assignment anxiety severity that slightly, but significantly, decreased to even lower levels over time. The second profile (14%, 'improving') had moderate-to-high pre-assignment severity levels and significant slope decreases over time, with post-assignment and follow-up scores dropping to a moderate severity level. The third profile (11%, 'worsening') reported low pre-assignment anxiety symptom scores that increased significantly over time, with above clinical threshold post-assignment anxiety symptomatology. At follow-up, anxiety symptomatology decreased although it remained above the clinical threshold. The anxiety 'improving' profile differs from the PTSD 'improving' profile. At follow-up, anxiety levels were still substantially elevated and above threshold norms, unlike PTSD severity scores.

### ***Depression***

The 3-profile solution for symptoms of depression was considered the best model. Although it was slightly below an acceptable entropy value (0.73), it had acceptable to high profile membership probability scores (0.91–0.76). It was considered more parsimonious than the 4-profile solution. The first profile (73%, 'healthy/normative') reported low severity, decreasing over time. The second profile (15%, 'worsening') reported a subthreshold pre-assignment depression severity that increased over time to above clinical threshold levels at post-assignment and follow-up. The level of depressive symptomatology continued to deteriorate between post-assignment and follow-up. The third profile (12%, 'ill health') reported stable pre-assignment depression severity levels above clinical threshold.

### **Conditional Model**

Table 5 provides an overview of all class membership predictor analyses, their

predictive value and log odds. In all cases, the 'healthy/normative' profile served as the reference class for each health indicator. We used biological sex, number of prior assignments and assignment duration as covariates, and we examined the predictive value of the pre-assignment sense of coherence (SOC), coping self-efficacy (CSE-7) and perceived social support (MSPSS) scores as health mechanisms to remain healthy in times of (extreme) stress. Appendix C provides the latent trajectory descriptive for all predictors at each measurement.

### ***Biological Sex***

The odds for being in the anxiety symptoms 'worsening' profile versus the 'healthy/normative' profile were 3.14 times higher among women compared with men ( $P = 0.02$ ,  $OR = 3.14$ ). The odds for being in the symptoms of depression 'worsening' profile versus the 'healthy/normative' profile were 3.85 times higher among women compared with men ( $P = 0.01$ ,  $OR = 3.85$ ). The odds for being in the symptoms of depression 'ill health' profile versus the 'healthy/normative' profile were 2.31 times higher among women compared with men ( $P = 0.02$ ,  $OR = 2.31$ ).

### ***Duration of Field Assignment***

Longer assignment duration was significantly ( $P = 0.04$ ) associated with an increased risk of being in the PTSD 'ill health' profile compared with the 'healthy/normative' profile. The odds were 13% higher ( $OR = 1.13$ ) for each additional month on assignment. Similarly, a longer assignment duration was related to higher odds of being in the symptoms of depression 'worsening' profile ( $P = 0.003$ ;  $OR = 1.16$ ).

### ***Sense of Coherence***

Relative to the 'healthy/normative' profile, the pre-assignment (low) SOC score was the most consistent predictor of membership of the 'worsening' profile for all health indicators. In each instance, a 1 unit increase in SOC score was significantly ( $P < 0.05$ ) associated with lower odds of an individual belonging to the 'worsening' profile (by 4–7%;  $OR = 0.96$ – $0.93$ ). Compared with the 'healthy/normative' reference profiles, higher pre-assignment SOC scores were associated with significantly ( $P < 0.001$ ) lower odds of an individual belonging to the PTSD and anxiety symptoms 'improving' profiles. A 1 unit increase in SOC score was associated with lower odds of membership (by 16% ( $OR = 0.84$ ) and 10% ( $OR = 0.90$ ) respectively). Compared with the 'healthy/normative' profile, higher SOC scores were associated with lower odds of belonging to the PTSD, emotional exhaustion and depression symptoms 'ill health' profiles and the 'less engaged' profile for work engagement. A 1 unit increase in SOC score was associated with 17%, 11%, 16% and 9% lower odds respectively.

**Table 5.** Multinomial Logistic Regression Outcomes for Pre-Assignment (T1) Predictors of Class Membership for Each Health Indicator<sup>a</sup>

Predictors	n	B(SE)	Worsening (7%)			Ill health (7%)			Improving (5%)				
			p	95% CI (B)	Odds Ratio (B)	B (SE)	p	95% CI (B)	Odds Ratio (B)	B (SE)	p	95% CI (B)	Odds Ratio (B)
<b>PTSD</b>													
Female (vs. male)	580	.71 (.47)	.13	-0.21/1.63	2.03	-.17 (.47)	.71	-1.09/0.75	0.84	.37 (.54)	.50	-0.69/1.43	1.45
Number of prior assignments	500	-.01 (.04)	.75	-0.09/0.07	0.99	-.003 (.03)	.92	-0.06/0.06	1.00	-.004 (.03)	.87	-0.06/0.05	1.00
Assignment duration	500	-.08 (.06)	.15	-0.20/0.04	0.92	.12 (.06)	.04	0.00/0.24	1.13	-.14 (.09)	.13	-0.32/0.04	0.87
Sense of coherence	580	-.05 (.02)	.02	-0.09/-0.01	0.95	-.19 (.04)	<.001	-0.27/-0.11	0.83	-.17 (.05)	<.001	-0.27/-0.07	0.84
Coping self-efficacy	567	.02 (.04)	.65	-0.06/0.10	1.02	-.19 (.04)	<.001	-0.27/-0.11	0.83	-.21 (.06)	<.001	-0.33/-0.09	0.81
Social support	538	-.05 (.18)	.78	-0.40/0.30	0.95	-.48 (.16)	<.001	-0.79/-0.17	0.62	-.13 (.20)	.52	-0.52/0.26	0.88
<b>Emotional exhaustion</b>													
Female (vs. Male)	592	.33 (.46)	.47	-0.57/1.23	1.39	.38 (.36)	.47	-0.33/1.09	1.45				
Number of prior assignments	502	-.10 (.08)	.21	-0.26/0.06	0.90	.02 (.03)	.51	-0.04/0.08	1.02				
Assignment Duration	502	-.05 (.05)	.32	-0.15/0.05	0.95	-.12 (.07)	.06	-0.25/0.01	0.88				
Sense of Coherence	592	-.04 (.02)	.04	-0.08/-0.00	0.96	-.11 (.02)	<.001	-0.15/-0.07	0.89				
Coping self-efficacy	567	-.01 (.04)	.75	-0.09/0.07	0.99	-.12 (.04)	<.001	-0.20/-0.04	0.87				
Social Support	567	-.28 (.18)	.12	-0.63/0.07	0.76	-.32 (.16)	.04	-0.83/-0.01	0.72				
<b>Work engagement</b>													
Female (vs. male)	571	1.66 (.95)	.08	-0.20/3.52	5.26	.25 (.43)	.56	-0.59/1.09	1.28				
Number of prior assignments	495	-.06 (.07)	.41	-0.20/0.08	0.94	-.01 (.04)	.86	-0.09/0.07	0.99				
Assignment duration	495	.04 (.06)	.53	-0.08/0.16	1.04	-.09 (.07)	.21	-0.23/0.05	0.91				
Sense of coherence	571	-.06 (.03)	.05	-0.12/-0.00	0.94	-.09 (.02)	<.001	-0.13/-0.05	0.91				
Coping self-efficacy	559	.02 (.05)	.65	-0.08/0.12	1.02	-.08 (.04)	.02	-0.15/-0.01	0.92				
Social support	538	.01 (.30)	.98	-.58/0.59	1.01	-.31 (.15)	.03	-0.60/-0.03	0.73				
<b>Anxiety</b>													
													Improving (14%)

Table 5. Continued.

Predictors	n	B(SE)	p	95% CI (B)	Odds Ratio (B)	B (SE)	p	95% CI (B)	Odds Ratio (B)	B (SE)	p	95% CI (B)	Odds Ratio (B)
Female (vs. male)	579	1.15 (.49)	.02	0.19/2.10	3.14	.28 (.30)	.34	-0.31/0.87	1.32	.07 (.04)	.09	-0.01/0.15	1.07
Number of prior assignments	500	-.08 (.05)	.11	-0.18/0.02	0.92	-.03 (.03)	.32	-0.09/0.03	0.97	-.11 (.02)	<.001	-0.15/-0.07	0.90
Assignment duration	500	.07 (.05)	.12	-0.03/0.17	1.07					-.15 (.03)	<.001	-0.21/-0.09	0.86
Sense of coherence	579	-.06 (.02)	.01	-0.10/-0.02	0.94					-.10 (.11)	.36	-0.32/0.12	0.90
Coping self-efficacy	566	-.01 (.04)	.82	-0.09/0.07	0.99								
Social support	538	-.18 (.20)	.37	-0.57/0.21	0.84								
Depression				Worsening (15%)									
Female (vs. male)	579	1.35 (.48)	.01	0.40/2.30	3.85	.84 (.36)	.02	0.12/1.55	2.31				
Number of prior assignments	500	-.05 (.05)	.28	-0.15/0.05	0.95	-.03 (.03)	.37	-0.09/0.03	0.97				
Assignment duration	500	.15 (.05)	<.001	0.05/0.24	1.16	-.03 (.05)	.59	-0.12/0.07	0.97				
Sense of coherence	579	-.07 (.02)	<.001	-0.11/-0.03	0.93	-.18 (.02)	<.001	-0.22/-0.14	0.84				
Coping self-efficacy	566	-.02 (.03)	.46	-0.08/0.04	0.98	-.16 (.04)	<.001	-0.24/-0.08	0.85				
Social support	538	-.44 (.22)	.05	0.01/0.87	0.64	-.49 (.15)	<.001	-0.78/-0.19	0.61				

Note. CI = confidence interval (lower/upper limit); B = unstandardised regression coefficient.

<sup>a</sup> The optimal unconditional model for each health indicator was used for predictor analyses. The reference profile is always the majority group characterised as 'healthy/normative'.

### ***Coping Self-Efficacy***

Compared with the 'healthy/normative' reference profile, higher pre-assignment CSE-7 scores were associated with significantly ( $P < 0.001$ ) lower odds of an individual belonging to the PTSD and anxiety symptoms 'improving' profiles. A 1 unit increase in CSE-7 score was associated with lower odds of membership (by 19% (OR = 0.81) and 14% (OR = 0.86) respectively). Compared with the 'healthy/normative' profile, higher CSE-7 scores were associated with lower odds of belonging to the PTSD, emotional exhaustion and depression symptoms 'ill health' profiles and the 'less engaged' profile for work engagement. A 1 unit increase in CSE-7 score was associated with 17%, 13%, 15% and 8% lower odds respectively.

### ***Social Support***

Perceived social support was associated with membership of the depression 'worsening' profile. An increase in MSPSS score by 1 unit was significantly ( $P < 0.05$ ) associated with lower odds of membership of this profile (36% lower (OR = 0.64)). Compared with the 'healthy/normative' profile, higher perceived social support was related to lower odds of belonging to the PTSD, emotional exhaustion and depression symptoms 'ill health' profiles and the 'less engaged' profile for work engagement. A 1 unit increase in MSPSS score was associated with 38%, 38%, 39% and 27% lower odds respectively.

## **Discussion**

This study investigated whether iHAWs experience different assignment-related health trajectories and what variables predict membership of those trajectories. The findings specify how humanitarian aid assignments affect health and which mechanisms are used to protect it.

### **Health Trajectories**

All health and work engagement indicators consisted of a healthy and a worsening profile (class). Most health indicators had an 'ill health' profile. Only PTSD and anxiety symptoms indicators had an 'improving' profile. These findings are consistent with research in other populations exposed to extreme stress, including iHAWs (Greene-Cramer et al., 2021).

Most iHAWs remained healthy: the largest trajectory for all health indicators was 'healthy' (73–86%). These and other findings in iHAW research (Greene-Cramer et al., 2021) and general populations demonstrate the human capacity for dealing with high levels of adversity-related stress (Norris et al., 2009).

A minority of iHAWs (4–15%) worsened on the health indicators during their humanitarian work. PTSD, depressive symptoms and work engagement continued to deteriorate post-assignment, demonstrating that these assignment-related health issues do not resolve quickly. This may be indicative of future pathology (delayed onset). IHAWs' emotional exhaustion symptoms improved after return from assignment, although they did not return to baseline level. Emotional exhaustion, being a dimension of work-related burnout, may improve post-assignment, as a result of distance from the emotionally intense work environment (Ram & Grimm, 2009).

All health indicators, except anxiety, had a stable (moderate) 'ill health' profile (7–17%). Some iHAWs improved their pre-assignment elevated levels of PTSD and anxiety during their assignment (respectively: 7%, 14%). The distress from previous assignments and life/work experiences may explain the stable 'ill health' trajectories of most health indicators. The improvement of the pre-assignment anxiety levels of some iHAWs, which is likely related to a temporary, mission-related, anticipatory nervousness, may explain the absence of a stable 'ill health' profile of anxiety as well as the post-assignment improvement of PTSD symptomatology (de Jong et al., 2021).

Some iHAWs, belonging to the 'improving' trajectory, decreased their pre-assignment elevated levels of PTSD and anxiety during their assignment (by 7% and 14% respectively). Pre-assignment anticipatory anxiety may have temporarily increased anxiety levels, only to diminish post-assignment after their actual exposure to the humanitarian emergency (de Jong et al., 2021). Some iHAWs belonged to the PTSD (7%) and anxiety (14%) 'improving' trajectories, which were associated with high levels of PTSD and anxiety symptoms pre-assignment that decreased to low levels after their assignment. The 'improving' trajectories were also associated with lower levels of pre-assignment sense of coherence and coping self-efficacy (i.e. higher pre-assignment sense of coherence and coping self-efficacy levels were associated with lower odds of belonging to the 'improving' trajectory). Given these findings, pre-assignment anticipatory anxiety may have temporarily increased anxiety levels, only to diminish at post-assignment after their actual exposure to the humanitarian emergency (de Jong et al., 2021). The anticipatory anxiety may have undermined participants' belief in their ability to understand and manage assignment-related demands, translating into the lower pre-assignment CSE-7 and SOC scores that were associated with membership of the 'improving' profile. Or, vice versa, a pre-assignment lack of belief in their ability to understand and manage upcoming assignment-related demands may have increased anticipatory anxiety and (anxiety-related) post-traumatic stress levels. In the latter case, it is hypothesised that coping self-efficacy and sense of coherence levels increased during assignment after better understanding of the humanitarian aid context, leading to post-assignment health gains (decreases in PTSD and anxiety symptoms). Moreover,



in accordance with our hypothesis, those with high levels of sense of coherence and coping self-efficacy pre-assignment are more likely to stay healthy (higher odds of membership of the 'healthy/normative' trajectory). Considering that high levels of pre-assignment sense of coherence and coping self-efficacy were associated with fewer symptoms of PTSD and anxiety (de Jong et al., 2022; Appendix A), it is less likely that those who score high on the CSE-7 and SOC have any need for health indicators to improve.

### **Predictor Findings**

Higher levels of sense of coherence were associated with the 'healthy' trajectory and lower levels were associated with increased probability of belonging to any other profile, regardless of the health indicator in question. This shows the importance of sense of coherence as a mechanism for explaining the health condition of iHAWs.

Consistent with global prevalence rates (Muthén & Asparouhov, 2015), findings among deployed military personnel (Jones et al., 2020) and iHAWs (Greene-Cramer et al., 2021), female sex was an important predictor of worsening depression and anxiety trajectories. Higher prevalence of sexual harassment/violence and other negative interactional experiences among female iHAWs, less control over their jobs (Jones et al., 2020), hormonal differences and gender-specific cultural expressions (Greene-Cramer et al., 2021) may explain this.

Unlike most of the literature on biological sex a predictor of PTSD pathology (Olf, 2017), sex did not predict membership of the PTSD 'worsening' trajectory in the present study. The lack of significant findings may be due to the distinction between experiencing symptoms and having a formal PTSD pathology. Another explanation might be that differences in coping strategies (Olf, 2017) allow women to cope better with potentially traumatic events in humanitarian aid settings. For example, women are more likely to use tend-and-befriend responses and emotion-focused, defensive and palliative coping strategies. Men are in general more likely to use fight-or-flight responses and problem-focused coping strategies (Olf, 2017).

Increased assignment duration was associated with the likelihood of developing assignment-related depressive symptoms. The importance of assignment length has been demonstrated in many occupational groups operating in highly threatening environments, including the military, non-governmental organisations and even the diplomatic core (Dunn et al., 2015). Longer assignment means prolonged exposure to high psychological job demands (e.g. excessive workload) and increased potential exposure to traumatic events. These demands may cause chronic stress, wear down individuals' ability to cope and cause depression (Melchior et al., 2007). Alternatively, findings on long-term assignments in other populations (navy and astronauts) suggest

that depressive symptoms develop as a result of extended isolation and separation from loved ones, loneliness and a lack of sense of belonging (Kanas et al., 2009; Kruse et al., 2014). Being in close contact with colleagues does not necessarily prevent loneliness or provide adequate received social support (Kruse et al., 2014). In the absence of partner and family obligations, single people may be more able to form close relationships during missions, whereas those in committed relationships profit more from their existing partner and family support after missions (Greene-Cramer et al., 2021).

## **Implications**

### ***Health Monitoring***

A minority of iHAWs' health worsens during aid assignments. Pre- and post-assignment health screenings enable healthcare professionals to detect this minority, as well as to distinguish between individuals with overall ill health and those whose health worsens during assignment. Screening helps iHAWs to reflect on whether they have taken sufficient time to recuperate before accepting new assignments. Monitoring women is important because they were more prone to develop anxiety and depression issues. IHAWs on long-term assignments can best be monitored for early detection of depressive symptoms during the assignment. Multiple post-assignment screenings, a watchful waiting approach, are useful to detect iHAWs at risk, because assignment-related health problems may manifest fully over time. Some health indicators, such as PTSD symptomatology, may also be less likely to remit spontaneously (Pietrzak et al., 2012).

### ***Strengthening Sense of Coherence***

In the process of staying healthy, meaningfulness is a key component of sense of coherence. To support iHAWs making sense of their work, ongoing communication during assignments on the purpose of the aid work, justification of choices and priorities, a culture of appreciation and management actively seeking feedback from iHAWs are important mechanisms (van den Berg et al., 2013). It is also important to develop interventions that at pre-assignment (e.g. realistic preparation) and peri-assignment (e.g. the fostering of a positive, social working environment) strengthen sense of coherence during field assignments. General interventions that improve sense of coherence and well-being (Vastamäki et al., 2009), such as physical workouts and mindfulness-based meditation practices, including mobile apps (Ando et al., 2011; Kekäläinen et al., 2018), can be encouraged.

### **Strengths and Limitations**

The present study contributes to new insights into the health of iHAWs. We used a prospective design, multiple health indicators and measurement moments, a large sample and advanced statistical techniques to strengthen the quality of findings.

There are also limitations. The study focused on iHAWs and the results cannot be generalised to other groups of aid workers, such as locally contracted staff. We used English language questionnaires. This may have been challenging for non-native speakers, despite being highly educated and proficient in the English language, with onsite support available to clarify the interpretation of the wording and questions. A strength of this study is that it used repeated measures and an emphasis on change scores, rather than on absolute cut-off criteria. Owing to the brief follow-up period, the possibility of a 'delayed onset' trajectory, which typically takes a long time to emerge (Norris et al., 2009), could not be investigated within the present data-set. Sense of coherence was regarded as a stable concept (Antonovsky, 1987), and therefore pre-/post-assignment changes in sense of coherence outcomes were not analysed for the purpose of this study. We cannot exclude the possible impact of the instability of sense of coherence, which might affect both its intensity and nature. Multiple testing increases the risk of false-positive findings (type I errors). Considering the exploratory nature of GMM, no adjustments for multiplicity were made (Li et al., 2017). Some findings may be attributable to a response shift concerning how iHAWs interpreted the questionnaires. The impact of response shift effects is generally small (Schwartz et al., 2006); a previous study detected no response shift among iHAWs (Young et al., 2018).

Future research could also include more specific non-psychopathological outcome measures, for example quality of life or optimal psychological functioning. Overall, we want to conclude that the present findings show how and why and with what 'resources' health workers maintain their health or lose their capacity to remain healthy based on humanitarian aid worker and aid assignment characteristics, as well as several health-promoting theories. The theory of salutogenesis and its associated mechanism of sense of coherence appears to be particularly relevant as a protective mechanism for humanitarian aid workers working in highly stressful and potentially dangerous emergency settings. It enables new insights for possibilities to prevent health worsening and help strengthen iHAWs' ability to remain healthy under stress.

### **Data Availability**

The data that support the findings of this study are available on request from the corresponding author (K.d.J.). The data are not publicly available because they contain information that could compromise the privacy of research participants.

### **Funding**

The Management Team of MSF Operational Centre Amsterdam funded this study into the health of its international staff. It was not involved in: study design; collection, analysis, and interpretation of data; writing of the articles; and decisions to submit papers for publication.

### **Declaration of Interest**

K.d.J. is employed currently by MSF Operational Centre Amsterdam.

### **Author Contributions**

KdJ: conceptualisation, methodology, formal analysis, writing – original draft, project administration, supervision, funding acquisition

SEM: data curation, data collection, methodology, formal analysis, software, visualisation, writing – review & editing

HtB: methodology, formal analysis, software, supervision, writing – review & editing

IK: conceptualisation, methodology, formal analysis, software, supervision, writing – review & editing

RJK: conceptualisation, methodology, supervision, writing – review & editing

JFGH: data curation, data collection, methodology, formal analysis, software, writing – review & editing

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# Appendix A

## Example Syntax: PTSD GMM M2 MPLUS Syntax of Unconditional Model

### TITLE:

A 2-class (C2) latent basis MEANS (M2) model for the PTSD health indicator.

The slope term variance [eta\_2] was constrained to '0' to avoid convergence issues.

Includes BLRT command and output.

### DATA:

FILE IS MSF\_GMM\_180320.dat;

### VARIABLE:

NAMES ARE

ID PCL5\_1 PCL5\_2 PCL5\_3;

AUXILIARY = ID;

USEVARIABLES ARE

ID PCL5\_1 PCL5\_2 PCL5\_3;

MISSING ARE ALL (-999);

CLASSES = c(2);

### ANALYSIS:

TYPE = MIXTURE;

STARTS = 1000 100;

STITERATIONS IS 50;

LRTBOOTSTRAP IS 500;

LRTSTARTS IS 50 20 50 20;

### MODEL:

%OVERALL%

eta\_1 BY PCL5\_1@1 PCL5\_2@1 PCL5\_3@1;

eta\_2 BY PCL5\_1@0 PCL5\_2\* PCL5\_3@1;

eta\_1 (psi\_11);

eta\_2@0 (psi\_22);

eta\_1 WITH eta\_2@0 (psi\_21);

[eta\_1];

[eta\_2];



```
PCL5_1 PCL5_2 PCL5_3 (theta);  
[PCL5_1@0 PCL5_2@0 PCL5_3@0];
```

```
%c#1%  
    [eta_1*6 eta_2*1];  
%c#2%  
    [eta_1*14 eta_2*12 ];
```

**OUTPUT:**

```
SAMPSTAT;  
TECH4;  
TECH14;
```

**PLOT:**

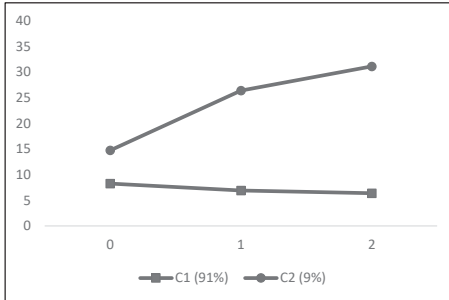
```
TYPE = PLOT3;  
SERIES = PCL5_1 PCL5_2 PCL5_3 (eta_2);
```

# Appendix B

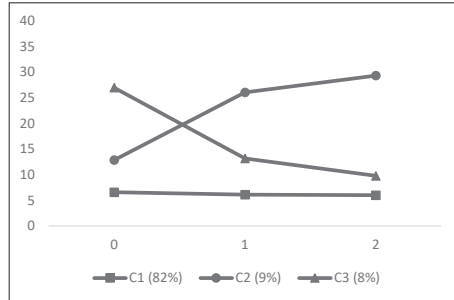
## Visuals of Trajectories

**Figure B1**  
PTSD Trajectories Latent Basis Class Models

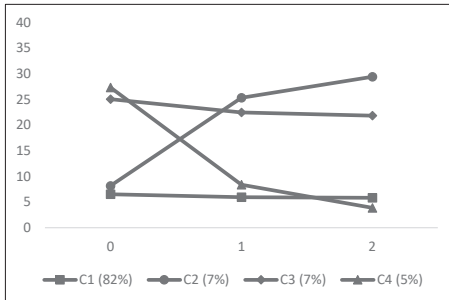
2-Class Solution



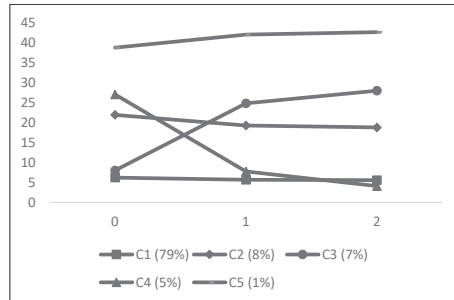
3-Class Solution



4-Class Solution



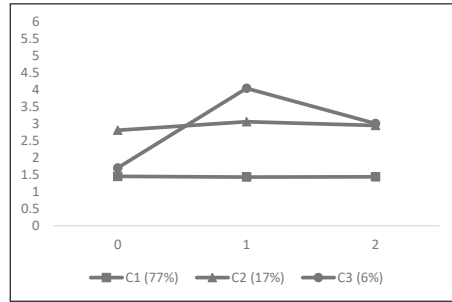
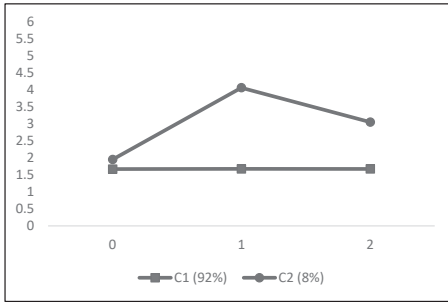
5-Class Solution



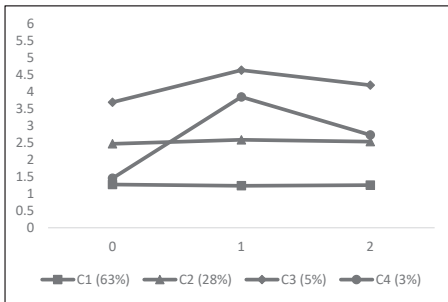
The PTSD time basis coefficient for the (optimal) 4-class solution model at time T1=0.00, T2=.81, T3=1.00.

**Figure B2**

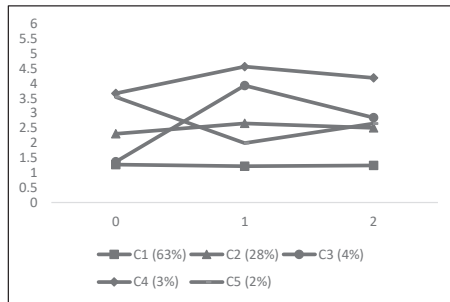
*Emotional Exhaustion Trajectories Latent Basis Class Models*



*4-Class Solution*



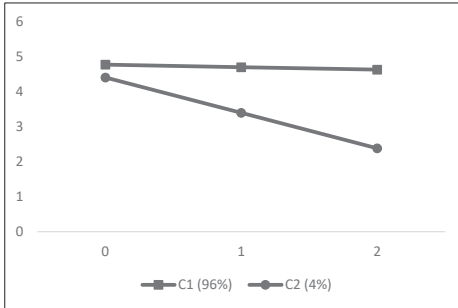
*5-Class Solution*



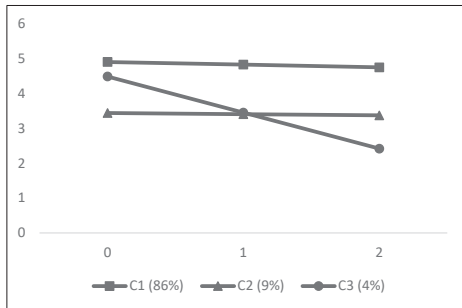
The emotional exhaustion time basis coefficient for the (optimal) 3-class solution model at time T1=0.00, T2=1.792, T3=1.00

**Figure B3**  
*Work Engagement Trajectories Linear Class Models*

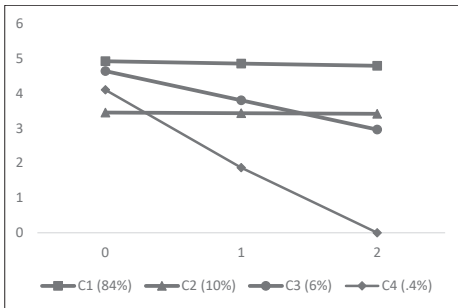
*2-Class Solution*



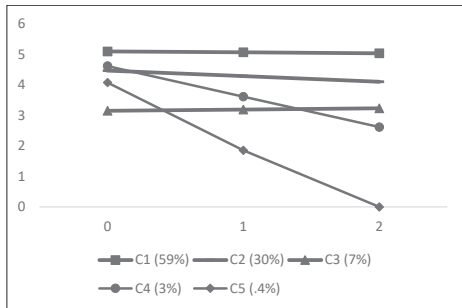
*3-Class Solution*



*4-Class Solution*

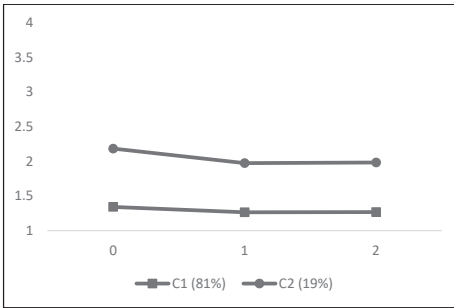


*5-Class Solution*

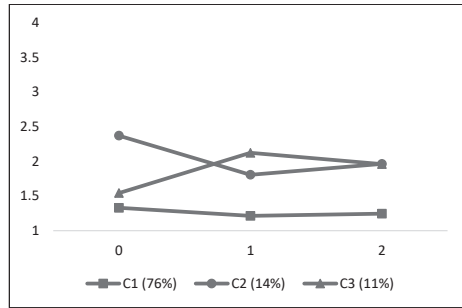


**Figure B4**  
Anxiety Trajectories Latent Basis Class Models

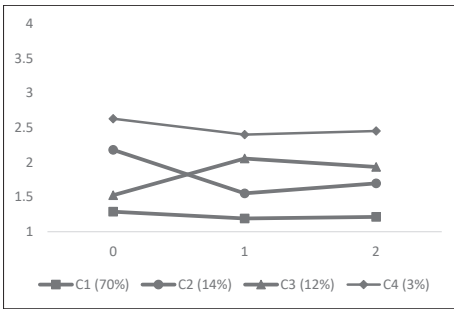
2-Class Solution



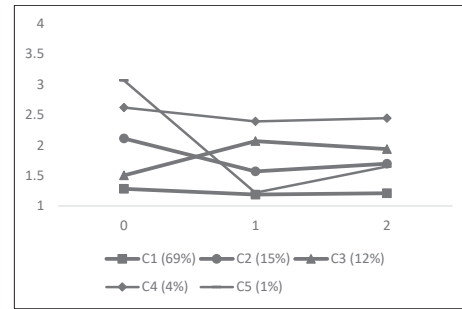
3-Class Solution



4-Class Solution



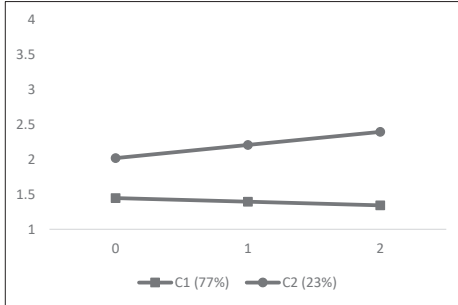
5-Class Solution



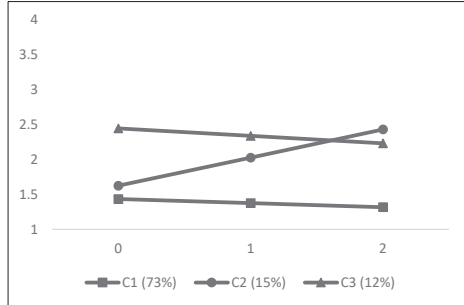
The anxiety time basis coefficient for the (optimal) 3-class solution model at time T1=0.00, T2=1.387, T3=1.00

**Figure B5**  
*Depression Trajectories Linear Class Models*

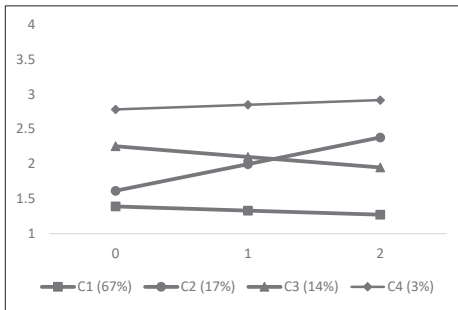
*2-Class Solution*



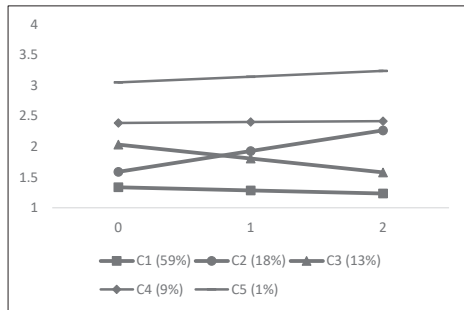
*3-Class Solution*



*4-Class Solution*



*5-Class Solution*



## Appendix C

### Latent Trajectory Class Membership Descriptive

	Healthy/Normative		Worsening		Ill health		Improving	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
PTSD								
Sense of Coherence	68.54	9.22	64.85	8.90	56.00	8.12	57.12	10.14
	69.81	10.01	62.17	10.71	57.15	11.49	62.86	7.80
	69.37	10.07	58.87	10.87	56.80	8.67	62.13	8.68
Coping self-efficacy	42.85	5.85	43.38	5.08	36.14	6.03	35.88	7.37
	44.25	5.84	39.47	6.99	36.35	7.42	42.36	5.61
	43.98	5.91	36.23	7.82	36.17	7.26	44.93	3.79
Social support	5.66	1.02	5.63	.77	5.15	1.01	5.56	.81
	5.60	.89	5.52	1.07	4.88	1.09	5.61	.77
	5.51	1.05	5.56	.99	4.78	1.26	5.45	.85
Female sex (N, %)	273 (55.9%)		23 (69.7%)		19 (54.3%)		15 (62.5%)	
Assignment Duration (Months)	6.47	3.86	5.47	2.99	5.44	3.97	7.93	3.96
Number of prior assignments	3.70	5.73	3.43	3.82	3.59	3.72	3.64	3.20
Emotional exhaustion								
Sense of Coherence	68.31	9.68	65.41	8.27	60.86	9.21		
	70.39	9.74	59.53	9.74	59.37	10.43		
	69.42	9.89	60.12	10.57	59.39	11.00		
Coping self-efficacy	42.61	5.99	42.25	5.63	39.27	7.31		
	44.14	5.99	40.43	6.27	39.81	7.32		
	43.91	6.00	39.00	7.86	39.07	7.57		
Social support	5.67	1.02	5.42	.98	5.42	.90		
	5.64	.93	5.33	.98	5.38	.84		
	5.52	1.02	4.84	1.63	5.34	.92		
Female sex (N, %)	267 (55.5%)		20 (62.5%)		49 (62.0%)			
Assignment Duration (Months)	6.59	3.92	5.97	3.02	5.50	3.68		

Continued.

	Healthy/Normative		Worsening		Ill health		Improving	
	M	SD	M	SD	M	SD	M	SD
Number of prior assignments	3.69	4.36	2.57	3.13	4.12	9.99		
Work Engagement								
Sense of Coherence	67.79	9.78	63.06	10.31	60.77	8.44		
	69.08	10.30	61.24	10.44	60.82	11.90		
	68.45	10.40	55.93	8.78	62.80	10.88		
Coping self-efficacy	42.45	5.94	43.00	5.44	39.77	8.39		
	43.72	6.12	41.65	5.72	39.36	8.42		
	43.57	6.03	35.33	8.78	40.46	8.83		
Social support	5.65	1.02	5.67	.96	5.36	.85		
	5.63	.92	5.50	.98	5.19	.93		
	5.54	1.05	4.88	1.23	4.82	.88		
Female sex (N, %)	285 (55.9%)		14 (82.4%)		27 (61.4%)			
Assignment Duration (Months)	6.41	3.85	6.94	3.67	5.57	3.62		
Number of prior assignments	3.71	5.60	2.82	2.92	3.55	4.43		
Anxiety								
Sense of Coherence	68.67	9.40	64.13	9.92			59.89	8.97
	70.43	9.78	61.17	10.63			60.59	10.21
	69.87	9.81	60.37	10.58			59.58	9.97
Coping self-efficacy	42.95	5.83	42.37	5.94			37.34	6.75
	44.16	6.15	41.12	6.31			40.22	6.71
	43.84	6.18	41.39	6.26			39.10	7.96
Social support	5.65	1.02	5.50	1.14			5.56	.79
	5.65	.93	5.38	.96			5.41	.83
	5.54	1.06	5.22	1.17			5.19	.97
Female sex (N, %)	244 (54.2%)		39 (73.6%)		46 (60.5%)			
Assignment Duration (Months)	6.19	3.68	7.12	4.12	7.12	4.44		
Number of prior assignments	3.88	5.91	2.72	3.01	3.25	3.55		



Continued.

	Healthy/Normative		Worsening		Ill health		Improving	
	M	SD	M	SD	M	SD	M	SD
Depression								
Sense of Coherence	68.97	9.31	64.68	8.68	56.89	7.91		
	70.66	9.61	62.83	10.19	58.69	10.39		
	71.03	8.97	57.85	9.38	58.04	6.39		
Coping self-efficacy	42.88	5.91	42.18	5.68	37.29	6.96		
	44.44	5.84	41.63	6.53	38.48	6.95		
	44.70	5.54	37.96	6.86	38.86	7.30		
Social support	5.71	.99	5.41	1.12	5.28	.93		
	5.70	.87	5.36	.98	5.16	1.04		
	5.61	1.01	5.06	1.14	5.06	1.10		
Female sex (N, %)	233 (56.8%)		51 (73.9%)		45 (69.2%)			
Assignment Duration (Months)	6.23	3.85	7.87	3.93	5.95	3.42		
Number of prior assignments	3.86	5.90	3.05	3.57	3.24	3.64		

Note. In each cell the scores represent: T1 upper scores, T2 middle score, T3 lower score. All descriptive scores were calculated using most likely class membership.



# Section 2

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Stressors



# 4

## **Incidence and Severity of Sexual Harassment, and its Impact on Mental Health in a Cohort of International Humanitarian Field-Workers**

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## Abstract

To date, there have been no cohort studies of sexual harassment incidence and its relation to mental health within humanitarian field-workers. Research among numerous occupations suggests an association between workplace sexual harassment and several health complaints. This study examined the incidence and severity of sexual harassment and its association with changes in mental health in a cohort of international humanitarian aid field-workers (iHAWs). Four hundred and seventy-eight iHAWs filled in questionnaires about sexual harassment, depression, anxiety, and Post-Traumatic Stress Disorder (PTSD) as part of a larger study on health and well-being. Six percent of male and 18% of female iHAWs reported experiencing sexual harassment during their latest field assignment, with most reporting low levels of nonphysical forms of sexual harassment. Sexual harassment was predictive of negative changes in both depression and anxiety symptom severity between before and after an assignment for females; for males, it predicted negative changes in PTSD symptom severity. Sexual harassment did not predict utilization of mental healthcare services within 2 months after the end of assignment. The current findings are the first figures derived from a representative sample of iHAWs on the incidence of sexual harassment during a field assignment and show sexual harassment to be a relatively common and present issue. The findings are mostly in line with the extant literature and underscore the importance of attending to the issue of sexual harassment in the humanitarian sector.

### Keywords

Harassment, humanitarian workers, incidence, mental health, anxiety, PTSD, depression

## Introduction

While workplace sexual harassment has been a topic of study since the 1970s, it has made its way firmly to public awareness in the last years, with a slew of organizations coming under fire about workplace sexual harassment or misconduct. With increasing attention to sexual harassment in occupational contexts following the #MeToo movement, more focus has been placed on the organization's responsibility to safeguard their staff from it. International humanitarian aid field-workers (iHAWs) work in settings characterized by emergencies, danger, and exhausting and demanding working conditions (de Jong et al., 2021). They are often far away from home, working and living in relative isolation, removed from many resources available in their home environments, bound to their professional setting around the clock, and sharing living quarters with other colleagues. Together with significant power differentials among different staff groups, these settings are situations associated with a high likelihood of sexual harassment and abuse (Shaw et al., 2018). This investigation will examine the incidence of sexual harassment and its psychosocial health consequences in this unique occupational group.

Sexual harassment can be defined as any unwelcome conduct of sexual nature (verbal, nonverbal, or physical) 'with the purpose or effect of violating the dignity of a person, in particular when creating an intimidating, hostile, degrading, humiliating or offensive environment' (European Institute for Gender Equality, 2021). Experiencing workplace sexual harassment is unfortunately not uncommon, particularly for women. Estimates vary substantially between countries and occupational groups, as well as women and men (Marsh et al., 2009; Niedhammer et al., 2012; Richman et al., 1999). For example, in the United States, an estimated 41% of female workers appear to face sexual harassment at some point during their careers, as do 32% of male workers (Das, 2009). In China, a meta-analysis estimated the 12-month prevalence of sexual harassment against nurses at 7.5%; no estimate could be derived for male nurses in the meta-analysis, due to their small numbers (Zeng et al., 2019). Further, the estimated 6-month prevalence rates of sexual harassment by a supervisor or by a coworker in the South African Navy were 33.8% and 84.3% for females, and 14.1% and 51.5% for males, respectively (van Wijk et al., 2009). A meta-analysis of over 86,000 female workers found that 58% of women reported experiencing sexual harassment at work; there were large differences in the rates of reporting among different industries (Ilies et al., 2003). Similarly, the rates at which males reported workplace sexual harassment were also related to the industry, with much higher rates in policing (Lonsway et al., 2013) or military (Street et al., 2007) as opposed to for example, government jobs (NASEM, 2018). Male-dominated sectors and their often rigid job gender context, in particular, tended to have more problems with sexual harassment (e.g., Kabat-Farr & Cortina, 2014; Willness et al.,

2007). It is worth noting that a large proportion of the research into workplace sexual harassment has taken place among white women, even though women of color often faced the highest victimization rates (e.g., Leskinen et al., 2011). Furthermore, there is little research on workplace sexual harassment that focuses on the experiences of transgender or nonbinary individuals.

Only a small proportion of those exposed to workplace sexual harassment make a formal report of harassment to their employer (Feldblum & Lipnic, 2016; Lonsway et al., 2013). Without accurate estimates of the incidence of harassment that occurs within an occupational group or setting, it is challenging to create meaningful strategies toward combatting it.

Not only do studies find that a large number of workers experience sexual harassment, but also that experiencing sexual harassment at work has negative health consequences. Repeated workplace sexual harassment and the resulting strain have been connected to less physical and psychological well-being (Chan et al., 2008; Gunnarsdottir et al., 2006; Willness et al., 2007), poor sleep (Nabe-Nielsen et al., 2016), depression (Marsh et al., 2009), anxiety, hostility, and alcohol consumption (Richman et al., 1999), as well as post-traumatic stress disorder (PTSD) (Kang et al., 2005; Street et al., 2007).

Incidence and impact of sexual harassment appear particularly large in male-dominated occupational contexts or client-facing jobs. An investigation (Hom et al., 2017) into harassment and its mental health consequences in a sample of female firefighters found that harassment was positively associated with reporting suicidal ideation and severe mental health symptoms. Similarly, a study into workplace harassment experienced by male and female flight attendants (Gale et al., 2019) revealed associations between the experience of harassment and mental health outcomes (depression, sleep disturbances, and musculoskeletal injuries). There is substantive evidence that while less often targeted, the experience of sexual harassment in a work context is also detrimental to the health and well-being of males (e.g., Kang et al., 2005; Street et al., 2007).

Stoddard et al. (2019) identified three sets of issues revolving around sexual violence within the aid sector: (a) sexual assaults, (b) nonviolent forms of misconduct such as harassment and sexual exploitation, and (c) abuse by aid workers themselves toward recipients. The last issue received much attention following the Oxfam scandal of 2018 (Gayle, 2018), a sexual exploitation scandal involving Oxfam staff members in Haiti. Following that, the first two also began receiving attention via whistleblower stories detailing harassment-permissive work cultures. However, there is a shortage of systematically collected research data on sexual harassment, sexual assault, and their health associations from representative datasets.



The risk of underreporting appears endemic in the humanitarian aid industry. Data from the Aid Worker Security Database, a database recording deliberate acts of violence affecting aid workers, has recorded only 21 incidents of sexual violence affecting 29 female victims between 1997 and 2018 (Stoddard et al., 2019). This figure is in stark contrast to the findings from two recent surveys about sexual harassment and violence in humanitarian fieldwork: the Humanitarian Women’s Network (2017) Survey and Report the Abuse (Nobert, 2017), both of which reported high numbers of experienced sexual harassment.

However, the lack of random sampling or studying a cohort of aid workers instead of self-selection by survey respondents obstructs the generalization of results to (international) humanitarian workers overall (Mazurana & Donnelly, 2017; Stoddard et al., 2019). Furthermore, the two surveys provided no information about the health impact of sexual harassment on humanitarian workers. The reports by Stoddard et al. (2019) and Mazurana and Donnelly (2017) pointed, among other things, to the need for conducting a large-scale representative study that would allow analysis of rates of harassment and their health effects.

The current study attempted to fill the gaps in the literature outlined above. First, we examined the incidence of sexual harassment in a large cohort of international staff members on a humanitarian field assignment. Second, we investigated whether experiencing sexual harassment is associated with changes in psychosocial health between before and after a humanitarian field assignment and the use of health care following a field assignment. An earlier investigation based on the same sample indicated that other stressors than sexual harassment—namely field assignment-related stressors (e.g., health risks, high workload team stressors, security incidents)—were associated with higher mental health symptoms after an assignment (De Jong et al., 2021). Therefore, we chose to control for the effect of field stressors in our analysis. The following hypotheses were put forth: (a) female humanitarian field-workers report more sexual harassment than male humanitarian field-workers and (b) sexual harassment predicts negative changes in psychosocial health when controlling for field stressors and pre-assignment psychosocial health.

## Method

### Study Design and Participants

The present investigation was part of a larger prospective cohort study into the health and well-being of international humanitarian field staff members of Médecins Sans Frontières Operational Centre Amsterdam (MSF OCA) (De Jong et al., 2021). The current

study used data from three measurement occasions: pre-field assignment, post-field assignment, and a 2-month follow-up. Four hundred and seventy-eight international humanitarian fieldworkers of MSF OCA between the ages of 24 and 76 years ( $M = 40.4$ ;  $SD = 10.9$ ) completed post-assignment measures; there was some missing data on pre-assignment measures and the follow-up questionnaire. There were more female (60.9%,  $n = 284$ ) than male (39.1%,  $n = 182$ ) participants. The majority of the participants had prior experience on international humanitarian missions (78.2%,  $n = 374$ ), and some had previously worked on a mission as national staff (14.2%,  $n = 64$ ). Further demographic and mission-related information is presented in Table 1.

The participants were recruited between December 2017 and February 2019. All international field staff of MSF OCA departing for a field mission on an expatriate contract within the recruitment period were eligible for the study. This excluded field visits from the office staff, which were typically as brief as, on average, 2 weeks. The participants were informed and recruited by an independent non-MSF researcher face-to-face during pre-assignment briefings at the MSF office or via a video call. All participants provided written informed consent. Ethics approval for the study was granted by the internal Ethics Review Board of Médecins Sans Frontières on February 24th, 2017 (ID 1642).

### **Procedure**

The participants filled in the self-report questionnaires on an online platform, at each measurement occasion, either at the MSF OCA office or remotely. The pre-assignment measures took place 0 to 14 days before departing on a mission. The participants filled in post-assignment questionnaires as soon as possible after returning from the mission, at the latest 4 weeks after returning. The follow-up measures were filled in on an online platform 2 months after filling in the post-assignment questionnaires (for more details on the procedure, see De Jong et al., 2021). The data collection was terminated on March 12th, 2020, approximately 3 weeks before the official planned termination date, due to the Dutch government's COVID-19 regulations, logistical issues such as borders and workplaces closing, and the desire to avoid confounding the study results.

**Table 1***Demographics and Humanitarian Aid Assignment-Related Data (n = 478)*

Variable	N	%
Age		
In years (M, SD)	40.43 (10.93)	
Sex		
Male	182	39.1
Female	284	60.9
Continent of origin		
Africa	39	8.6
Asia	55	12.1
Europe	250	54.8
North America	87	19.1
South America	12	2.6
Oceania	13	2.9
Education		
Secondary or high school	7	1.6
Higher vocational training / technical training	32	7.3
University degree: Bachelors or Master	286	64.9
Postgraduate degree	116	26.3
Relationship status		
Single, never married	202	43.4
Married	89	19.1
Committed relationship but not married	104	22.4
Separated	24	5.2
Divorced	41	8.8
Widowed	5	1.1
Sexual orientation		
Heterosexual	421	90.1
Gay or lesbian	18	3.9
Bisexual	28	6.0
Assignment function		
Coordinator	133	29.10
Activity manager & clinical medical specialist	297	65.0
Supervisor & specialist	21	4.60
Other	6	1.30
Prior humanitarian assignment experience		
First-timer	104	21.8
Experienced	374	78.2
Number of assignments (M, SD)	4.66	5.80
Previously worked as national staff		
No experience	386	80.8
Any experience	64	14.2
In years (M, SD)	4.72	3.74

## Measures

### *Depression and Anxiety*

The Hopkins Symptom Checklist (HSCL-25) (Parloff et al., 1954) was used to assess symptoms of anxiety and depression within the past week. The self-report questionnaire consists of 10 anxiety and 15 depression items, scored on a four-point scale ranging from 1 ('not at all') to 4 ('often'). The internal consistency was good for the two subscales ( $\alpha = .90$  depression;  $\alpha = .87$  anxiety).

### *Post-Traumatic Stress Disorder*

The Post-Traumatic Check List for DSM-5 (PCL-5) (Blevins et al., 2015) was used to assess symptoms of post-traumatic stress. The questionnaire consists of 20 items scored on a 0–4 scale ('not at all' to 'extremely'). The range of total scores is 0 to 80, with higher scores denoting higher symptom severity. In the current sample, the scale had good internal consistency ( $\alpha = .89$ ).

### *Humanitarian Field Stressor List*

The Psychosocial Care Unit (MSF OCA) developed an instrument that was used to measure the severity of 39 potential assignment-related stressors in six dimensions (De Jong et al., 2021) at post-assignment: field conditions, cultural stressors, work-related stressors, team stressors, self-experienced traumatic events, and code of conduct. The answers were scored on a six-point scale ranging from 0 ('none/not applicable') to 5 ('high'). A total sum score (0– 195) was used, with a higher score denoting higher experienced stressor exposure. The sum score was used as a control predictor variable.

### *Sexual Harassment*

The sexual harassment section of the Deployment Risk and Resilience Inventory-2 (DRRI-II) (Vogt et al., 2013) was used to estimate the incidence and severity of sexual harassment on a humanitarian field assignment of MSF OCA and therefore used only at post-assignment. The DRRI-II has been widely used for assessing deployment-related risk and resilience among veterans. As the instrument is designed to be used by veterans or Armed Forces service members, we adapted the wording by replacing 'deployment' with 'assignment'. All the questions referred to the field assignment from which the participant has just returned. Following the recommendations of the DRRI-II manual, we named the scale 'relationships during assignment' rather than 'sexual harassment'. Sexual harassment was assessed with eight questions rated on a four-point scale with the answer options 0 ('never'), 1 ('once or twice'), 2 ('several times'), and 3 ('many times'). The sum scores of each scale range between 0 and 24, with higher scores denoting a higher level of exposure to harassment. Sexual harassment, as measured by the DRRI-II scale, is conceptualized as 'exposure to unwanted sexual contact or verbal conduct of a sexual nature' from 'people you work with' (Vogt et al., 2013). The

sexual harassment scale of the DRRI-II has demonstrated strong internal consistency, reliability, and criterion-related validity (Vogt et al., 2013). In the current sample, the internal consistency of the sexual harassment scale was acceptable ( $\alpha = .62$ ). The sexual harassment scale sum score (possible range 0–24) was used to estimate the incidence and severity of harassment on a single field assignment and as a predictor variable of changes in psychosocial health.

### ***Healthcare Utilization***

At the 2-month follow-up measurement occasion, participants were asked to report whether they had utilized any healthcare services since returning from the assignment. If affirmative, they were asked whether they had used services related to physical health, mental health, or both. Mental healthcare utilization was binary coded as ‘yes’ or ‘no’ and was used as the outcome variable for logistic regression analyses.

### **Statistical Analyses**

Descriptive analyses and hierarchical regression analyses were performed using SPSS (Version 27.0). The frequencies of reported sexual harassment were used to estimate the incidence of sexual harassment per field assignment. Cross-tabulation and chi-square statistics were employed to contrast the incidence between males and females, and to examine any differences in incidence related to the control variables sexual orientation, previous humanitarian mission experience, or age. Age was mean centered for the analyses, and for the sexual orientation variable, we collapsed across categories to make sure there were enough cases in each category. Listwise deletion on scale level was applied in case of missing data.

The association between potential predictors and change in depression, anxiety, and PTSD symptoms was examined separately by using three multi-variate hierarchical regression analyses. The predictors were regressed on the change in symptom severity throughout the field assignment. The analyses were stratified by sex, and all used an alpha level of .05. The change in symptom severity was operationalized as the difference score between the pre- and post-assignment symptom severity scores, implying that positive change scores denote an improvement (decrease) in symptoms and negative change scores denote a worsening (increase) in symptoms. The predictors were added to the models in a specific order. In the first step, pre-assignment symptom severity (depression, anxiety, or PTSD) was added to the model to predict change in symptoms, together with the three control variables. In the second step, the severity of field assignment stressors score was added. In the final step, the sexual harassment score was added to the model. Significance of the overall model, change in variance explained by the model, and regression coefficients of the predictors were tested after each step. The association between sexual harassment and mental healthcare service utilization

2 months after an assignment was examined through a logistic regression analysis, also stratified by sex. The outcome was binary coded (0 = no; 1 = yes), and the predictor variable was the sum score of the sexual harassment scale.

## Results

### Incidence of Sexual Harassment

The incidence of sexual harassment was higher among females than males: 17.7% of female iHAWs reported having experienced at least one incident of sexual harassment at least once or twice during the latest assignment. The corresponding figure for males was 6.6%. The difference was statistically significant ( $\chi^2(1) = 12.01, p < .001$ ). In addition, whether the participant was on a humanitarian assignment for the first time or had previous experience was significantly related to reporting sexual harassment; a larger proportion of first-timers reported sexual harassment ( $\chi^2(1) = 4.21, p < .05$ ). There was no significant difference in the incidence of sexual harassment based on sexual orientation ( $\chi^2(1) = .07, p = .79$ ).

There were significant differences in the extent the participants endorsed the different items of the sexual harassment questionnaire (Table 2). Females' most commonly endorsed (14.1%,  $n = 38$ ) item was receiving crude and offensive sexual remarks directed at them by people with whom they worked, either publicly or privately. In contrast, fewer than 2%<sup>1</sup> of males endorsed the same item. For males, the most commonly endorsed item concerned people with whom they worked spreading negative rumors about their sexual activities, which was endorsed by 5.6% ( $n = 10$ ) of male iHAWs. The same item was also endorsed by 5.9% ( $n = 16$ ) of female iHAWs. Two other items were endorsed by more than five female iHAWs, and they concerned someone with whom they worked with trying to talk them into participating in sexual acts when they did not want to (3.7%,  $n = 10$ ) or touching them against their will in a sexual way (2.2%,  $n = 6$ ). The remaining items on the questionnaire were endorsed by fewer than five (<2%) male or female iHAWs, but all endorsed by at least some iHAWs.

1 To safeguard the anonymity of the participants, if fewer than five participants (<2% of the subsamples) had endorsed a specific type of harassment, the exact  $n$  was not reported. 'Under 2%' was utilized to denote these cases.

**Table 2***Incidence of Sexual Harassment on the Latest Assignment, Per Type of Sexual Harassment*

Type of sexual harassment	Females				Males			
	No		Yes		No		Yes	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
... made crude and offensive sexual remarks directed at me, either publicly or privately.	232	85.9	38	14.1	>98%		<2%	
... spread negative rumors about my sexual activities.	254	94.1	16	5.9	169	94.4	10	5.6
... tried to talk me into participating in sexual acts when I didn't want to.	260	96.3	10	3.7	>98%		<2%	
... used a position of authority to pressure me into unwanted sexual activity.		>98%		<2%	>98%		<2%	
... offered me a specific reward or special treatment to take part in sexual behavior.		>98%		<2%	>98%		<2%	
... threatened me with some sort of retaliation if I was not sexually cooperative (for example, the threat of negative review or physical violence).		>98%		<2%	>98%		<2%	
... touched me in a sexual way against my will.	264	97.8	6	2.2	>98%		<2%	
... physically forced me to have sex.		>98%		<2%	>98%		<2%	

*Note.* The types of sexual harassment are based on the questions from the Deployment Risk and Resiliency Inventory-2 (DRRI-II), section K2. Each question begins with 'During mission, the people I worked with...'. Categories 'once or twice', 'several times', and 'many times' were collapsed into one category: 'yes'.

### Severity of Sexual Harassment

The mean reported sum score of the exposure to sexual harassment was 0.34 ( $SD = 0.96$ , range 0–7) for females and 0.13 ( $SD = 0.74$ , range 0–8) for males. This difference in means was significant,  $t(447) = -2.40$ ,  $p < .05$ , denoting that in addition to a significantly larger proportion of females reporting sexual harassment, the mean exposure to sexual harassment (discrete types and frequency) was also significantly higher for females than for males. Age was negatively correlated with severity of sexual harassment (correlation  $-.183$  [ $p < .001$ ]), meaning that lower age was associated with higher severity of reported sexual harassment. The mean reported severity sum score of participants who had no previous humanitarian fieldwork experience was significantly higher than the mean score of participants with previous experience,  $t(478) = 6.34$ ,  $p < .05$ . The mean difference in severity score when comparing heterosexual participants with gay, lesbian, or bisexual participants was insignificant,  $t(466) = .008$ ,  $p = .93$ .

## Sexual Harassment as Predictor of Change in Psychosocial Health

### Correlations and Descriptive Analyses

Among female iHAWs (Table 3), sexual harassment was significantly and negatively correlated with depression and anxiety symptom change. For male iHAWs, sexual harassment was not significantly correlated with any of the change scores (Table 4). Severity of field-assignment stressors was also significantly and positively correlated with more sexual harassment for both males and females. Age was positively correlated with depression change score among females and males, and negatively correlated with sexual harassment sum score and general harassment sum score for females only.

The mean changes in depression symptoms of female and male iHAWs were 0.01 ( $SD = 0.51$ ) and 0.01 ( $SD = 0.43$ ), respectively, whereas the baseline depression mean scores were 1.65 ( $SD = 0.51$ ) for females and 1.51 ( $SD = 0.46$ ) for males. Anxiety mean change scores were 0.12 ( $SD = 0.49$ ) and 0.11 ( $SD = 0.40$ ) for female and male iHAWs, respectively, with females having slightly higher baseline scores ( $M = 1.54$ ,  $SD = 0.49$ ) than males ( $M = 1.44$ ,  $SD = 0.45$ ). PTSD change scores, on the other hand, had a mean of 0.57 ( $SD = 10.81$ ) among female iHAWs and 1.02 ( $SD = 7.76$ ) among male iHAWs. Like with the change scores, baseline PTSD scores were slightly lower among females ( $M = 8.9$ ,  $SD = 8.93$ ) than among males ( $M = 9.00$ ,  $SD = 7.84$ ). With regard to severity of field stressors, females reported a higher mean total score ( $M = 63.51$ ,  $SD = 27.89$ ) than males ( $M = 59.60$ ,  $SD = 27.94$ ).

**Table 3**

*Correlations Between Sexual Harassment, and Change in Depression, Anxiety, PTSD, and Field Stressors Among Female Participants*

Variable	1	2	3	4	5	6
1 Sexual harassment	-					
2 Depression change	-.19**	-				
3 Anxiety change	-.16*	.70**	-			
4 PTSD change	-.11	.53**	.44**	-		
5 Field stressors	.25**	-.15*	-.13*	-.15*	-	
6 Age	-.21**	.18**	.07	.05	-.20**	-

*Note.* Sexual harassment was measured with the Deployment Risk and Resiliency Inventory-2, section K2. Depression and anxiety change scores (T2-T1) were measured with the Hopkins Symptom Checklist (HSCL-25) depression and anxiety subscales, respectively. PTSD change score was measured with the PTSD Checklist for DSM-5. Field stressors were measured with the Humanitarian Field Stressor List. PTSD = post-traumatic stress disorder.

\*  $p < .05$ . \*\*  $p < .01$ .



**Table 4**

*Correlations Between Sexual Harassment, Change in Depression, Anxiety, PTSD and Field Stressors Among Male Participants*

Variable	1	2	3	4	5	6
1 Sexual harassment	-					
2 Depression change	-.05	-				
3 Anxiety change	-.08	.61**	-			
4 PTSD change	-.07	.57**	.38**	-		
5 Field stressors	.22**	-.04	-.07	-.13	-	
6 Age	-.10	.19**	-.02	.04	-.14	-

*Note.* Sexual harassment was measured with the Deployment Risk and Resiliency Inventory-2, section K2. Depression and anxiety change scores (T2-T1) were measured with the Hopkins Symptom Checklist (HSCL-25) depression and anxiety subscales, respectively. PTSD change score was measured with the PTSD Checklist for DSM-5. Field stressors were measured with the Humanitarian Field Stressor List. PTSD = post-traumatic stress disorder. \*  $p < .05$ . \*\*  $p < .01$ .

### **Prediction of Symptom Change**

#### ***Depression***

**Females.** As shown in Table 5, baseline depression severity together with the control variables explained 19.8% of the variance of changes in depression symptom severity from pre-assignment to post-assignment. The addition of field stressor severity explained a further 2.1% of the variation in change scores. Finally, the addition of sexual harassment to Block 3 of the model explained an additional 1.7% of the variance, so that for each standard deviation increase in sexual harassment score, we would expect a 0.14 standard deviations smaller depression change score (implying increased depression symptomatology). The total variance explained by the final model was 23.6%, and each predictor significantly added to the model. Age was the only significant control predictor, predicting a larger change score and, therefore, decreased symptoms of depression.

**Males.** For males, baseline depression together with control variables explained 22.9% of the variance in changes of depression symptom severity. The addition of field stressors and sexual harassment did not significantly improve the model (Table 5) and did not significantly explain any change in depression symptoms. As with females, the only significant control predictor among males was also age, which was associated with decreased symptoms.



**Table 5 Continued.**

Predictors	Males						
	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>	<i>R</i> <sup>2</sup>	$\Delta R^2$
Baseline depression	.39	.06	.43	6.01	<.001		
Age	.006	.003	.16	2.26	.025		
Experience	.09	.08	.08	1.13	.259		
Sexual orientation	-.15	.11	-.10	-.14	.164		
Field stressors	-.002	.001	-.13	-1.69	.093		
Sexual harassment	.05	.04	.09	1.25	.213		

*Note:*  $\Delta R^2$  is change in  $R^2$  compared to the previous step. Depression was measured with the Hopkins Symptom Checklist (HSCL-25) depression subscale. Age was mean centered. Previous humanitarian field assignment experience was coded as 0 = no, 1 = yes. Sexual orientation was coded as 0 = heterosexual, 1 = gay, lesbian, or bisexual. Field stressors were measured with the Humanitarian Field Stressor List. Sexual harassment was measured with the Deployment Risk and Resiliency Inventory-2 (DRRI-II), section K2.

\*\**p* < .01. \*\*\* *p* < .001.

### *Anxiety*

**Females.** The initial model with baseline anxiety and control variables explained 31.3% of the variance in changes in anxiety symptom severity. The addition of field stressors explained a further 1.9%, and finally, adding sexual harassment score increased the explained variance by an additional 1.2% when controlling for the previously added predictors. Like with depression, the significant association between sexual harassment and change in anxiety was negative, so that for each standard deviation increase in sexual harassment score, we would expect a 0.11 standard deviations smaller anxiety change score (implying increased anxiety symptomatology). As shown in Table 6, the total model explained 34.4% of the variance in anxiety change scores. All the changes in  $R^2$  were significant, indicating that each added predictor significantly improved the model. None of the control variables were significant predictors of change in anxiety symptomatology in the final model.

**Males.** Baseline anxiety explained 34.7% of the variance in change in anxiety score severity. Field stressor scores explained a further 3.3% of the variance. Similar to the depression model of males, sexual harassment was not predictive of changes in anxiety scores. The control variables were not significant predictors of change in severity of anxiety symptoms.



**Table 6 Continued.**

Predictors	Males					R <sup>2</sup>	ΔR <sup>2</sup>
	B	SE B	β	t	p		
Block 3						.380	.000
Constant	-.63	.11		-5.97	<.001		
Baseline anxiety	.55	.06	.62	9.52	<.001		
Age	.001	.002	.04	.59	.559		
Experience	.12	.06	.12	1.78	.076		
Sexual orientation	.03	.09	.02	.35	.725		
Field stressors	-.003	.001	-.19	-2.83	.005		
Sexual harassment	.008	.03	.02	.23	.816		

*Note:* ΔR<sup>2</sup> change in R<sup>2</sup> compared to the previous step. Anxiety was measured with the Hopkins Symptom Checklist (HSCL-25) anxiety subscale. Age was mean centered. Previous humanitarian field assignment experience was coded as 0 = no, 1 = yes. Sexual orientation was coded as 0 = heterosexual, 1 = gay, lesbian, or bisexual. Field stressors were measured with the Humanitarian Field Stressor List. Sexual harassment was measured with the Deployment Risk and Resiliency Inventory-2 (DRRI-II), section K2.

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

Post-Traumatic Stress Disorder

**Females.** For female iHAWs, the initial model with baseline PTSD symptoms as the predictor explained 30.3% of the variance in PTSD symptom severity change scores. As shown in Table 7, the addition of field stressors increased the explained variance by 3.5%, but the addition of sexual harassment scores did not improve explained variance quite significantly ( $p = .065$ ) when controlling for the other variables. In other words, sexual harassment was not predictive of change in PTSD symptom severity for female iHAWs. The final model explained 34.7% of the variance in PTSD change scores. None of the control variables significantly predicted change in PTSD symptom severity.

**Males.** For male iHAWs, baseline PTSD symptom severity explained 24.2% of the variance in changes in PTSD symptom severity scores. The addition of field stressors increased the explained variance by 5%, and adding sexual harassment score added a further 1.8% to the variance explained by the model. The association between sexual harassment and change in PTSD symptoms was negative so that for each standard deviation increase in sexual harassment score, we would expect a 0.14 standard deviations smaller PTSD change score (implying increased PTSD symptomatology). Altogether, this model explained 31.0% of the variation of changes in PTSD scores for male iHAWs. Similar to females, the control variables were not significant predictors of PTSD symptom severity change.



**Table 7 Continued.**

Predictors	Males						R <sup>2</sup>	ΔR <sup>2</sup>
	B	SE B	β	t	p			
Block 3							.310	.018*
Constant	.65	1.49		.44	.662			
Baseline PTSD	.56	.07	.57	8.18	<.001			
Age	.07	.05	.10	1.46	.146			
Experience	-1.36	1.29	-.07	-1.05	.293			
Sexual orientation	-.21	1.81	-.008	-.12	.908			
Field stressors	-.06	.02	-.21	-2.92	.004			
Sexual harassment	-1.45	.70	-.14	-2.06	.041			

*Note:* ΔR<sup>2</sup> change in R<sup>2</sup> compared to the previous step. PTSD was measured with the PTSD Checklist for DSM-5 (PCL-5). Age was mean centered. Previous humanitarian field assignment experience was coded as 0 = no, 1 = yes. Sexual orientation was coded as 0 = heterosexual, 1 = gay, lesbian, or bisexual. Field stressors were measured with the Humanitarian Field Stressor List. Sexual harassment was measured with the Deployment Risk and Resiliency Inventory-2 (DRRI-II), section K2.

\*p < .05. \*\*\* p < .001.

### Sexual Harassment and Mental Healthcare Utilization

As shown in Table 8, a logistic regression analysis found no significant relationship between exposure to sexual harassment during the assignment and utilizing mental healthcare services within 2 months following an assignment. The lack of association was found for both male and female iHAWs.

**Table 8**

*Association of Sexual Harassment and Use of Mental Healthcare Services of Female (n = 184) and Male (n = 115) International Humanitarian Workers in a Simple Logistic Regression Model*

Variable	Females						95% C.I.	
	B	SE B	Wald	df	p	Exp.(B)	Lower	Upper
Sexual harassment	.026	.225	.013	1	.908	1.026	.660	1.595
(Constant)	-1.353	.191	1	<.001	.259			
Variable	Males						95% C.I.	
	B	SE B	Wald	df	p	Exp.(B)	Lower	Upper
Sexual harassment	.225	.213	1.116	1	.291	1.252	.825	1.901
(Constant)	-1.329	.233	32.617	1	<.001	.265		

*Note.* Sum score of the sexual harassment subscale (K2) of the Deployment Risk and Resiliency Inventory-2 was used to measure sexual harassment. The outcome – use of mental healthcare services - was binary coded (0 = no; 1 = yes).

## Discussion

As hypothesized, a significantly more sizable proportion of female than male iHAWs reported at least one incident of sexual harassment during their latest field assignment. Exposure to sexual harassment was associated with worsening depression and anxiety symptom severity in female iHAWs and worsening PTSD symptom severity in male iHAWs at post-assignment.

### **Incidence and Severity of Sexual Harassment**

The estimates of the current study are the first figures derived from a representative sample of iHAWs. The reported incidence and severity of sexual harassment found among iHAWs are considerably lower than the rates reported for other occupations such as female firefighters (21.7%; Hom et al. 2017), flight attendants (26%; Gale et al. 2019), and female veterans of the Gulf War (24%; Kang et al., 2005). Differences are likely related to the different time periods applied in the different studies. Our single field assignment, on average half a year in length ( $SD = 3.82$  months), measured incidence per average field assignment, as opposed to a 12-month prevalence (Gale et al., 2019) or prevalence based on several years in the specific occupation (Hom et al., 2017). However, this should not be a reason to discount the findings. The nature of international humanitarian work means that their work is assignment based rather than a continuous job. Therefore, measuring a 12-month prevalence would be difficult, if not impossible.

Furthermore, female firefighters work in a strongly male-dominated setting, often being the sole female in a crew, perhaps making them more of a target of harassment. Flight attendants, on the other hand, are working in a strongly feminized, client-facing profession, with the potential of being subject to harassment by clients as well as colleagues. These factors can also explain some of the differences in incidence rates between previous research and the current study.

Being exposed to sexual harassment is often considered a typically female-specific risk. The significant difference between female and male iHAWs on reported mean scores of sexual harassment is in line with Vogt et al.'s (2013) findings on such differences among military personnel. The mean score reported by females from the military cohort was considerably higher than that of female iHAWs. Male iHAWs and males from the military cohort reported almost similar mean scores on sexual harassment. However, sex is only one of the many identities that can be related to the likelihood of experiencing workplace sexual harassment. In the current study, sexual orientation was not predictive of differences in reported mean scores of sexual harassment; this is in contrast to much of previous research, which suggests that individuals with minority identities (e.g., sexual



orientation, race) face more sexual harassment (Konik & Cortina, 2008; McDonald, 2012). On the other hand, previous experience of humanitarian fieldwork was related to exposure to sexual harassment, with more first-time field staff members reporting sexual harassment than the participants who had previous fieldwork experience. This finding echoes the results of other studies: for example, LeardMann et al.'s (2013) study with a large female military cohort showed that previous deployment was associated with a lower risk of sexual stressors, as was higher age.

While the current study tried to ensure optimal conditions for participants to feel comfortable reporting any experienced sexual harassment (e.g., researchers from outside the organization handling all of the data collection and analysis), the rates of harassment reported in the study might have still been subjected to underreporting. One way to examine the overall potential underreporting of sexual harassment among iHAWs is to compare the current study's reporting level relative to the officially filed reports of sexual harassment within the organization in the same time frame. MSF OCA's internal Responsible Behavior Unit (RBU) has been collecting data systematically since 2019. Altogether, 36 official complaints of sexual harassment were filed by field staff between March 2019 and December 2020, according to the RBU's internal reporting (personal communication, received April 07, 2021). Seventeen (47.2%) of these reports were filed by international staff, and in 15 of those (88.2%), the alleged perpetrator was also an international staff member. The current study's data collection period was approximately 6 months shorter than that of the RBU, yet at the very least, twice as many occurrences of sexual harassment were reported in our study than through the official reporting channels. Of note, most reported incidents of sexual harassment in the current research referred to making sexual remarks or spreading rumors, and these harassment types are typically dealt by the line management. They may not, therefore, end up at the RBU office. The lower reporting numbers through the official channels is not surprising: few sexually harassed women and even fewer men tend to formally report, with reporting figures being as low as 15% of women and 11% of men (Lonsway et al., 2013). Fear or blame, inaction, damage to one's career, trivialization, and retaliation are some of the common reasons for not reporting sexual harassment (e.g., Lonsway et al., 2013; NASEM, 2018).

One aspect of the results which invites further discussion is the meaning behind the reported mean severity of sexual harassment on assignment. While most participants who reported sexual harassment, reported types of verbal harassment as opposed to physical harassment, the relationship between the severity of sexual harassment and impact is not a straightforward one. Langhout et al.'s (2005) study of a very large female military sample reported that the mildest forms of sexual harassment—when experienced in a pervasive manner—can lead to similar distress as infrequent sexual

coercion. Furthermore, Sojo et al. 's (2016) meta-analysis of over 70,000 women in the workforce found that high-frequency low-intensity sexual harassment had stronger effects on general health, job satisfaction, as well as organizational commitment, than low-frequency but high-intensity sexual harassment experiences.

### **Health Associations**

Exposure to sexual harassment predicted worsening depression and anxiety symptomatology from pre-assignment to post-assignment in females and worsening of PTSD symptom severity in males, when controlling for baseline symptom scores, field stressors, and the control variables. These findings are partially in line with earlier research into the consequences of sexual harassment. Several studies have previously found associations between sexual harassment and depression and anxiety (e.g., Gale et al., 2019; Marsh et al., 2009; Richman et al., 1999), but unlike in our study, earlier studies have found those associations to also hold for males. Indeed, a meta-analysis (Chan et al., 2008) did not find evidence that sexual harassment would be associated with a larger impact among females than males. Similarly, Bergman and Henning (2008) found that sex did not moderate the relationship between sexual harassment and various outcomes.

One potential reason for the lack of (linear) relationship between sexual harassment and changes in anxiety and depression scores in male iHAWs could be related to the different impacts of field stressors on male and female iHAWs. De Jong et al. (2021) showed that field stressors had a larger negative impact on the Sense of Coherence—a mechanism that typically protects one's well-being and mental health (Antonovsky, 1987; Mittelmark et al., 2017)—of male than female iHAWs in this cohort. Therefore, it is plausible that for most male iHAWs, field stressors were the main culprit for anxiety and depression; in contrast, field stressors and sexual harassment had unique contributions for females. Additionally, females and males can appraise sexual harassment differently and that appraisal could, in turn, affect how sexual harassment and various outcomes are connected (Cortina & Areguin, 2021; Willness et al., 2007). Furthermore, the power to find any potentially existing relationships may not be sufficient as a relatively small proportion of male iHAWs reported experiencing sexual harassment.

The finding that sexual harassment was associated with worsening PTSD symptom severity in male iHAWs warrants attention. A large study on the sex-specific risks of PTSD following work-related sexual harassment or assault among Gulf War veterans showed that despite the vastly lower reporting of sexual harassment and assault among male veterans than female veterans, the association with PTSD was significant for both males and females (Kang et al., 2005). The similarity in association also held when controlling for other covariates like combat exposure levels. Our dissimilar findings

could stem from two different sources. First, the most commonly reported type of sexual harassment was related to verbal harassment of sexual nature. Unfortunately, confrontation of females to such harassment is common in their everyday life and many occupational contexts. Therefore, it may be that this type of harassment, if experienced in low volumes, does not produce a strong psychological impact in terms of provoking PTSD on females but is perceived as an unavoidable occupational hazard creating anxiety and sadness. The findings of a recent study on different types of military sexual trauma (MST) and their associations of PTSD seem to support this idea: while women were overall at higher risk for many of the PTSD symptoms, when considering those reporting harassment-only MST men were at higher risk of severe PTSD symptoms (Tannahill et al., 2021). Second, the association of sexual harassment with PTSD severity trended toward significance; with larger sample size and therefore more power, we may have seen a significant (weak) association between PTSD symptoms and the experience of sexual harassment for female iHAWs as well.

Several control variables were also included in our analyses. Sexual orientation and whether the participants had previous experience of humanitarian fieldwork were not associated with symptom severity changes in any of the measured outcomes for neither males nor females. To the authors' knowledge, there is no previous research on whether sexual orientation or previous fieldwork or deployments moderate the relationship of sexual harassment and mental health outcomes. In looking at other potentially 'vulnerability characteristics' of individuals exposed to sexual harassment, Bergman and Drasgow (2003) found that while race was associated with different mean levels of sexual harassment, it did not moderate the relationship between sexual harassment and various outcomes. Similarly, Bergman and Henning (2008) showed that neither ethnicity nor sex moderated the same relationship. In the current study, there was no main difference in the incidence of sexual harassment depending on sexual orientation, but there was a difference in incidence depending on experience level. This difference was not, however, reflected in symptom changes, similar to these earlier findings about other participant characteristics. The remaining control variable, age, was predictive of change in only depression symptoms for both males and females. These findings partially echoed those of a meta-analysis which showed that the relationship between workplace sexual harassment and psychological outcomes was stronger among young than older workers. LeardMann et al. (2013) also showed that lower age was associated with a higher risk of sexual stressors (harassment or assault) in a large female military cohort, but the study did not consider the impact of harassment.

The lack of association between experiencing any sexual harassment and the use of mental healthcare services in the 2 months following return from an assignment suggests that while experiencing sexual harassment was detrimental to the mental

health of iHAWs, experiencing sexual harassment did not lead to help-seeking, which contradicts some earlier findings on the effects of sexual and general harassment on service utilization. For example, Rospenda (2002) showed that workers who experienced workplace sexual harassment were likelier to seek mental health or other health services than those who had not experienced sexual harassment, regardless of sex. However, as our follow-up measurement occasion was 2 months after returning from an assignment, some delayed reactions related to the experience of sexual harassment may have been missed. Furthermore, some iHAWs may have decided not to seek help due to shame or self-blame, which can be experienced by those who have experienced sexual harassment (Houle et al., 2011). Furthermore, it is possible that help-seeking occurred, but it was underreported.

### **Strengths, Limitations, and Diversity**

This study had several strengths. For one, it was the first study in which a cohort of international humanitarian workers reported on any sexual harassment they faced during their assignment; furthermore, the cohort was reasonably large and representative of the international staff of MSF. The participants were aware that all the data were collected and processed by independent non-MSF affiliated researchers, which likely contributed to more open reporting of sexual harassment. This study also allowed the participants to report sexual harassment they had experienced without going through the official reporting process, which can lead to lower reported numbers. In addition, our sexual harassment measure captured several types of sexual harassment, rather than utilizing a single-item question.

However, there are also limitations to this study. First, the sample might not be typical for all aid workers: our sample only covered international humanitarian workers, who tend to be highly educated professionals in middle or higher management positions, with relatively equal male–female ratios. As national staff makes up more than 80% of the humanitarian field-work workforce (Stoddard et al., 2019), they can be expected to bear the brunt of sexual harassment and violence, and efforts should be directed toward investigating the incidence of sexual harassment among national staff specifically. In future studies, it would be advisable to also consider the structural context of violence against women in the specific country (Brown et al., 2021). Similarly, sexual harassment toward clients or patients using medical or other aid services requires research attention. While our study concerns staff members from various countries and cultural backgrounds, we could not examine potential differences in the exposure to and consequences of sexual harassment based on race or ethnicity due to the lack of demographic data on these topics; the intersection of race and sex is particularly important, and we invite future research to take this into account. The current study also did not investigate the potential association of gender identity and the experience

of sexual harassment. Finally, while our research is the first to systematically report the incidence and consequences of harassment in humanitarian workers, it does not reveal anything about the perpetrators, whether the person exposed to harassment reported the event, and how the reporting process was. It would be particularly useful to include questions about the perpetrator in future research, to better understand the organizational dynamics, such as power differentials, that may play a role in who experiences sexual harassment. Further research is recommended to tackle these issues in more detail and in relation to health outcomes, particularly with national humanitarian staff.

### **Implications**

The current findings of the incidence and the detrimental impact of sexual harassment on increasing depression, anxiety, and PTSD symptom severity of iHAWs underscore the importance of addressing the issue of harassment in aid organizations. With these first estimates of incidence per assignment from a representative sample, it is possible to start creating meaningful strategies toward combating sexual harassment in the field. While the added detrimental impact of sexual harassment may be relatively low, it is by no means negligible. Some of the concrete steps that can be taken to lessen the impact of sexual harassment on iHAWs include but are not limited to: training managers, addressing organizational culture, increasing awareness of the health connection, creating better structures for reporting of sexual misconduct, and making sure that reports lead to action. However, as Cortina and Areguin (2021) outlined in their review on workplace sexual harassment, relying on reporting by individuals is not the ideal focus when trying to address the issue: when most of the focus goes into reporting, the more difficult tasks of changing organizational climate can easily be overlooked, and action against known ‘bad apples’ might not be taken unless formal reports come through. As Stoddard et al. (2019) pointed out in their report on sexual violence in the aid world, organizational cultures that permit relatively lower levels of sexual misconduct create an environment where higher levels of misconduct such as sexual assaults or abuse of aid recipients are likelier to occur. Therefore, addressing the issue of sexual harassment, regardless of its frequency and severity, within aid organizations is of even higher importance.

### **Conclusion**

The current findings add further evidence toward sexual harassment as a relatively common and present problem during humanitarian field assignments, in particular for female iHAWs. Most of the iHAWs reported nonphysical forms of sexual harassment. Sexual harassment experiences were associated with worsening symptomatology of depression and anxiety in females and a worsening PTSD symptom severity in males. Consequently, sexual harassment in the humanitarian world should be given consistent

and thorough attention.

### **Declaration of Conflicting Interests**

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### **Author Contributions**

SEM: Conceptualisation, data curation, data collection, methodology, formal analysis, software, visualisation, writing – original draft

KdJ: Methodology, project administration, supervision, funding acquisition, writing – review & editing

IHK: Methodology, supervision, writing – review & editing

PAB: Methodology, supervision, writing – review & editing

RJK: Methodology, supervision, writing – review & editing

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# 5

## **The Accumulation of Stressors Among International Humanitarian Workers: Examining the Combined Effects of Four Stressor Types**

Submitted as:

Martinmäki, S. E., de Jong, K., Komproe, I. H., Kleber, R. J., & Boelen, P. A. The accumulation of stressors among international humanitarian workers: Examining the combined effects of four stressor types.

## Abstract

Research on the mental health and wellbeing of international humanitarian aid workers (iHAWs) has predominantly focused on single stressor types, notably traumatic stressors. However, research suggests that iHAWs do not find traumatic stressors the most taxing parts of their work. This prospective observational study examined the combined effects of traumatic stressors, humanitarian fieldwork-related stressors, sexual harassment, and general harassment on iHAWs' outcomes. Four hundred and seventy-eight iHAWs filled in questionnaires about these stressors, psychological distress, emotional exhaustion, work engagement, and organisational commitment. For most outcomes, evidence for additive effects was found, implying that each additional type of stressor further strained the humanitarian worker. Yet, a minority of outcomes exhibited either inurement or exacerbating effects (i.e., no worse outcomes from multiple stressor types than one versus several stressor types magnifying the negative impact of stressors on health, respectively). Several sex differences were identified. The current study encourages the examination of multiple forms of work-related stressors in the context of mental health and work-related wellbeing of iHAWs. Further, it suggests that concentrating on reducing modifiable stressors, such as harassment, by adapting organisational policies and training, is an effective intervention to reduce mental health symptoms and improve work-related wellbeing of iHAWs.

### Keywords

Traumatic stress, occupational stress, workplace harassment, humanitarian aid

# Introduction

International humanitarian aid workers (iHAWs) are an occupational group with a distinctively challenging work context: they work long hours in often insecure and stressful environments, sometimes far from home and their usual social support network. Following early reports on the negative mental health impact of the (chronic) stress of humanitarian fieldwork (Cardozo et al., 2005; Eriksson et al., 2001; Holtz et al., 2002), research has increasingly focussed on the wellbeing of humanitarian aid staff. Most of the subsequent research suggests that the high stress load of humanitarian fieldwork is associated with health issues (Ager et al., 2012; Connorton et al., 2012; Eriksson et al., 2013; Greene-Cramer et al., 2021; Lopes Cardozo et al., 2012). However, a recent longitudinal study found that the majority of iHAWs remained healthy in most (mental) health domains, with a minority exhibiting increased symptoms after field assignments (De Jong et al., 2021).

## Occupational Stressors and Health Outcomes

Humanitarian aid work is associated with a multitude of stressors, ranging from fieldwork-related workplace stressors such as heavy workload and difficulties with colleagues or managers to exposure to potentially traumatic events (PTEs) such as attacks on aid workers, combat or warzone exposure, and witnessing human suffering (De Jong et al., 2021; Stoddard et al., 2019; Young et al., 2018). In addition, humanitarian aid workers (HAWs) can be exposed to workplace harassment. Sexual harassment has emerged as an area of concern (Martinmäki et al., 2023; Mazurana & Connelly, 2017; Stoddard et al., 2019), and general harassment may also affect some, considering that colleagues are named as one of the largest sources of stress by HAWs (Young et al., 2018).

To date, most research on stressors in humanitarian work has only examined a singular stressor type: most typically, the focus has been on the impact of PTEs (Eriksson et al., 2001; Lopes Cardozo et al., 2012; Strohmeier & Scholte, 2015), despite humanitarian workers themselves rarely mentioning PTEs as main stressors (Young et al., 2018). As Jachens (2019) pointed out, there is mounting evidence that job context stressors – such as conflicts with team members and workplace harassment – play an essential role in the health and wellbeing of staff. Moreover, studies among other high-risk professional groups, such as police officers, have shown the relative importance of PTEs to be limited, with organisational stressors being more central (e.g., van der Velden et al., 2010).

## Accumulating Stressors

Stressors unlikely exist in isolation during humanitarian fieldwork. On a field

assignment with a high occurrence of PTEs, other types of stressors may also be triggered. For example, PTEs could create discord within the team, contributing to increased organisational stressors. Studying different forms of stressors related to humanitarian fieldwork together, as opposed to in isolation, more closely matches the actual experiences of this group. This approach is important for research, advancing theoretical frameworks, and accumulating insights that may help inform strategies for preventing, mitigating, and addressing adverse work-related health outcomes.

Studies on multiple traumatic experiences (e.g., Briere et al., 2016) and multiple discrimination (e.g., Vargas et al., 2020) have shown that multiple exposures to stressors are often associated with worse mental health outcomes than single exposures. To our knowledge, only one recent study (Foo et al., 2023) focused on the combined effects of different stressors on health outcomes of HAWs. It found that workplace psychosocial stressors (e.g., workload and pace, role ambiguity, job dissatisfaction, harassment, and discrimination) had a stronger association with burnout than adversity exposure (e.g., PTEs, poor living conditions). Furthermore, only workplace psychosocial stressors were associated with psychological distress. In our previous studies on iHAWs (de Jong et al., 2022; Martinmäki et al., 2023), we did not investigate how stressor types may combine to predict work-related health. The current study aims to expand prior work by examining several types of stressors and their individual and combined impacts on various health- and work-related outcomes among international HAWs.

Drawing from Raver and Nishii's (2010) study, we consider three competing ways in which workplace stressors may combine to predict mental health and work-related wellbeing outcomes. *Additive effect* of stressors describes a situation in which each negative stressor contributes additional strain and thus negative impact on one's health, so that a larger number of experienced stressors is associated with worse health outcomes (Holmes & Rahe, 1967; Rahe & Arthur, 1978). *Inurement effect* of stressors, based on Helson's (1964) adaptation theory, posits that experiencing several types of stressors does not necessarily lead to a worse health outcome than experiencing just one type of stressor. Lastly, *exacerbation effect* describes a situation in which experiencing several types of stressors magnifies the negative impact on health, so the combined effect is above and beyond what additive effects would be. This last view (Hockey, 1997) postulates that stressful conditions lead individuals to deplete their energy reserves in order to be able to function. Should further stressors be experienced while in this depleted state, maintaining functioning is harder due to the already limited resources, leading to exponentially worse health outcomes.

Research has shown sex differences in exposure and responses to different stressors among iHAWs (De Jong et al., 2021; Martinmäki et al., 2023) and other occupational

groups (Rospenda et al., 2009). Therefore, examining differences between male and female iHAWs in the current study was deemed important.

### **Aims**

This study examined different stressors and their combined effect on different domains of mental health and work-related wellbeing among iHAWs, separately for males and females. First, we examined to which extent traumatic stressors, field stressors, sexual harassment, and general harassment are each related to the following health- and work-related outcomes: psychological distress, emotional exhaustion, work engagement, and organisational commitment. We expected all stressors to be positively associated with psychological distress and emotional exhaustion, and negatively associated with work engagement and organisational commitment. Second, we examined how the four types of stressors combined to predict these outcomes, using the previously outlined three theoretical approaches. Due to the scarcity of prior research on the topic, we did not formulate specific hypotheses, instead opting for an explorative stance.

## **Method**

### **Participants**

The current investigation was a part of a larger prospective cohort study focusing on the psychosocial health and wellbeing of iHAWs employed by Médecins Sans Frontières Operational Centre Amsterdam (MSF OCA) (De Jong et al., 2021). For this study, data from pre-field assignment and post-field assignment were utilised. A total of 478 iHAWs, aged 24 to 76 ( $M = 40.4$ ;  $SD = 10.9$ ), completed the post-assignment measures. The sample had a higher proportion of females (60.9%,  $n = 270$ ) than males (39.1%,  $n = 179$ ). Most participants had experience with international humanitarian assignments (78.2%,  $n = 374$ ), and a subgroup had prior experience working on projects as national staff (14.2%,  $n = 64$ ). Additional demographic and mission-related details can be found in Table 1.

Recruitment for the study occurred between December 2017 and February 2019. All MSF OCA international staff departing for a field mission on an expatriate contract within the specified recruitment period were eligible for participation. Office staff and individuals engaging in short field visits only were excluded. The participants were informed and enlisted through face-to-face interactions or video calls with an independent non-MSF researcher during pre-assignment briefings at the MSF OCA office. Written informed consent was obtained from all participants. Ethics approval for the study was granted by the internal Ethics Review Board of Médecins Sans Frontières on the 24<sup>th</sup> of February 2017 (ID 1642).

**Table 1***Demographics and Humanitarian Aid Assignment-Related Information (n = 478)*

Variable	N	%
<b>Age</b>		
In years (M, SD)	40.4	10.9
<b>Sex</b>		
Female	270	60.1
Male	179	39.9
<b>Continent of origin</b>		
Africa	39	8.6
Asia	55	12.1
Europe	250	54.8
North America	87	19.1
South America	12	2.6
Oceania	13	2.9
<b>Education</b>		
Secondary or high school	7	1.6
Higher vocational training/ technical training	32	7.3
University degree: Bachelors or Master	286	64.9
Postgraduate degree	116	26.3
<b>Relationship status</b>		
Single, never married	202	43.4
Married	89	19.1
Committed relationship but not married	104	22.4
Separated	24	5.2
Divorced	41	8.8
Widowed	5	1.1
<b>Assignment function</b>		
Coordinator	133	29.1
Activity manager & clinical medical specialist	297	65.0
Supervisor & specialist	21	4.6
Other	6	1.3
<b>Prior humanitarian assignment experience</b>		
First-timer	104	21.8
Experienced	374	78.2
Number of previous assignments (M, SD)	4.7	5.7
<b>Previously worked as national staff</b>		
No experience	386	85.8
Any experience	64	14.2
In years (M, SD)	5.0	3.7



## **Procedure**

The participants filled in questionnaires in English on a secured internet platform at each measurement occasion, either at the MSF OCA office or remotely. The pre-assignment measures took place 0-14 days before departing on assignment. Upon return, the participants filled in their post-assignment measures as soon as possible, at least within four weeks. The data collection was terminated on the 12<sup>th</sup> of March 2020, approximately three weeks before the originally planned termination date, due to the Dutch government's COVID-19 regulations, the consequent logistical challenges, and the desire to avoid confounding the study results.

## **Measures**

### ***Traumatic Stressors***

The Life Events Checklist for DSM-5 (LEC-5) (Weathers et al., 2013) screens for self-reported PTEs. At post-assignment, it was used to assess exposure to 16 PTEs during the assignment. In the current study, we operationalised exposure to traumatic stressors by tallying a total score of experienced PTEs from events directly experienced or witnessed by the participant; a higher total score denoted higher exposure to traumatic stressors.

### ***Field Stressors***

The Humanitarian Field Stressor List (HFSL), developed by the Psychosocial Care Unit of MSF OCA, assessed the severity of 39 potential assignment-related stressors (De Jong et al., 2021) at post-assignment. The HFSL covers potential stressors related to fieldwork conditions, cultural stressors, work-related stressors, team stressors, self-experienced traumatic events, and code of conduct. The answers were scored on a six-point scale ranging from 0 (*none/not applicable*) to 5 (*high*). A total sum score (possible range 0-195) was used, with a higher score denoting higher experienced field stressor exposure. As with LEC-5, we did not calculate the internal consistency of the measure.

### ***Workplace Harassment***

The Sexual Harassment and General Harassment sections of the Deployment Risk and Resilience Inventory-2 (DRRI-II) (Vogt et al., 2013) were used to estimate the exposure to workplace harassment during the assignment. The wording was adapted by replacing the word 'deployment' with 'assignment'. All the questions referred to the field assignment from which the participant had just returned. The questionnaire was named 'relationships during assignment' rather than 'sexual harassment' or 'general harassment', as using the word harassment may lead to underreporting or overreporting of experiences (Vogt et al., 2013).

Sexual harassment and general harassment were assessed with eight questions each, rated on a four-point scale with the answer options 0 (*never*), 1 (*once or twice*), 2

(*several times*), and 3 (*many times*). The sum score of the scale ranges between 0-24, with higher scores denoting a higher level of exposure to harassment. Sexual harassment, as measured by the scale, is conceptualised as 'exposure to unwanted sexual contact or verbal conduct of a sexual nature ... that contribute to a hostile working environment', and general harassment is conceptualised as 'exposure to harassment that is non-sexual but that may occur on the basis of one's biological sex or minority or other social status' (Vogt et al., 2013). In the current sample, the internal consistency of the sexual harassment and general harassment scales were acceptable ( $\alpha = .62$ ) and good ( $\alpha = .87$ ), respectively.

### **Psychological Distress**

The Hopkins Symptom Checklist (HSCL-25) (Parloff et al., 1954) was used to assess symptoms of anxiety and depression within the past week. The self-report questionnaire consists of 10 anxiety items and 15 depression items, which were scored on a four-point scale ranging from 1 (*not at all*) to 4 (*often*). HSCL-25 is suitable for use in a multicultural setting (Tinghög & Carstensen, 2010). We used the total mean score to measure psychological distress. The internal consistency of the total scale was excellent ( $\alpha = .94$ ).

### **Burnout**

The Maslach Burnout Inventory (MBI-HSS) (Maslach et al., 1981) includes 16 items scored from 0 (*never*) to 6 (*always*), clustered around three general burn-out scales: emotional exhaustion, depersonalisation and personal accomplishment. For this research, only the emotional exhaustion subscale was utilised; higher scores indicate higher emotional exhaustion. The MBI has a good construct, factorial and congruent validity compared to another known burnout measure (Schaufeli & Van Dierendonck, 1993). Internal consistency of the subscales was good in previous studies (Schutte et al., 2000); the emotional exhaustion subscale internal consistency in the current sample was good ( $\alpha = .88$ ).

### **Work Engagement**

Utrecht Work Engagement Scale (UWES-9) (Schaufeli et al., 2006) is a short self-report instrument measuring work engagement with nine statements about how often the participants feel a certain way about their work. The items are scored from 0 (*never*) to 6 (*always/every day*), with a higher score denoting higher work engagement. A mean items score is used as an index of work engagement. High work engagement is 'a positive, fulfilling, work-related state of mind'. The internal consistency in the current sample was good ( $\alpha = .84$ ).

### **Organisational Commitment**

To measure organisational commitment in a way that captures the extent to which an individual is involved in and attached to the goals and values of the organisation and the likelihood of voluntary turnover, we adapted a selection of questions from the 'affective commitment' and 'continuance commitment' subscales from Allen and Meyer's (1990) original Organisational Commitment Scale. The following five items were included: 'I would be very happy to spend the rest of my career with this organisation', 'I am proudly talking to others about this organisation', 'I often think it was a mistake on my part to choose this organisation over others I had considered', 'I do not feel a sense of belonging to my organisation', and 'I do not feel emotionally attached to this organisation'. The questionnaire was scored with a five-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with the last three listed items reverse-scored so that a higher mean score meant higher affective organisational commitment. Internal consistency of the organisational commitment scale was good ( $\alpha = .81$ ).

### **Statistical Analyses**

To investigate our first aim, several regression analyses were conducted. All the analyses were conducted separately for males and females using SPSS (Version 27.0), and independent variables were mean-centred. Separate simple regression analyses were run to examine the association between each of the stressors and each of the outcomes, separately, to examine any main effects of the stressors. For our second aim, we examined the combined effect of the different stressor types on each outcome through hierarchical regression analyses. In each regression model, the four stressor types were entered in the model simultaneously, and in the following steps, the interaction terms (interactions between two types, then interactions between three types) were added to the model. Due to the constrained utility and applicability of examining and interpreting four-way interactions, we did not include them in the regression analyses. To interpret the hierarchical regression analyses in relationship to the three competing theories of how different stressors may combine, we applied the criteria set by previous researchers (Raver & Nishii, 2010; Thoma & Huebner, 2013): 1) each stressor producing separate effects with no interactions when combined in a model is considered evidence of an *additive effect*; 2) combined effects of two or more stressors not being worse than the effect of just one type of stressor is considered evidence of *inurement effect*; and 3) a significant interaction between two or more types of stressors may be considered as evidence of *exacerbative effects*, if probing of the interaction shows that effects of additional stressors magnify each other (Thoma & Huebner, 2013).

## Results

### Descriptive Analyses

The correlations and descriptive statistics for female and male iHAWs are provided in Table 2. Male iHAWs reported on average a higher number of traumatic stressors ( $M = 2.8, SD = 2.9$ ) than female iHAWs ( $M = 2.3, SD = 2.7$ ),  $t(461) = 2.02, p = .04$ . The average number of reported field stressors was not significantly different between female and male iHAWs. Female iHAWs reported on average more sexual harassment ( $M = 0.3, SD = 1.0$ ) than male iHAWs ( $M = 0.1, SD = 0.7$ ),  $t(436) = -2.51, p = .01$ ; similarly, they also reported more general harassment ( $M = 4.4, SD = 4.5$ ) compared to male iHAWs ( $M = 3.4, SD = 3.9$ ),  $t(416) = -2.53, p = .01$ . For females, all stressor types except traumatic stressors were correlated with all outcome variables; traumatic stressors were only correlated with psychological distress. For males, fewer significant correlations were found. Most notably, sexual harassment was not correlated with any of the outcome variables.

### Simple Effects of Stressors on Mental Health and Work-Related Outcomes

#### *Psychological Distress*

**Females.** As shown in Table 3, all four stressor types were positively related to psychological distress in simple regression models. General harassment had the strongest association, followed by field stressors, sexual harassment, and traumatic stressors.

**Males.** All stressor types except sexual harassment were significantly related to psychological distress (Table 4). Field stressors had the strongest positive association to psychological distress, followed by general harassment and traumatic stressors.

#### *Emotional Exhaustion*

**Females.** As seen in Table 3, all but one of the stressors were significantly associated with emotional exhaustion. Field stressors and general harassment were positively related to emotional exhaustion, as was sexual harassment. Traumatic stressors, on the other hand, were unrelated to emotional exhaustion.

**Males.** As Table 4 shows, three out of four stressors were significantly associated with emotional exhaustion among male iHAWs. As among female iHAWs, field stressors and general harassment were positively associated with emotional exhaustion, and additionally, so were traumatic stressors. Sexual harassment was unrelated to emotional exhaustion.

**Table 2**  
*Descriptive Statistics and Correlations Among Female and Male International Humanitarian Workers*

Scales	M	SD	1	2	3	4	5	6	7	8
Females (N = 284)										
1 Traumatic stressors	2.29	2.72	(.67)							
2 Field stressors	63.51	27.89	.20*	(.93)						
3 Sexual Harassment	0.34	0.96	.06	.25**	(.60)					
4 General Harassment	4.4	4.48	.05	.42**	.27**	(.88)				
5 Psychological distress	1.57	0.49	.15*	.24**	.18**	.28**	(.94)			
6 Emotional exhaustion	1.95	1.11	.04	.35**	.15*	.31**	.51**	(.89)		
7 Work engagement	4.59	0.84	.05	-.16**	-.13*	-.17**	-.35**	-.53**	(.89)	
8 Organizational commitment	4.09	0.76	-.03	-.27**	-.14*	-.32**	-.20**	-.37**	.45**	(.82)
Males (N = 182)										
1 Traumatic stressors	2.82	2.85	(0.65)							
2 Field stressors	59.6	27.9	.24**	(0.94)						
3 Sexual Harassment	0.13	0.74	-.03	.22**	(0.81)					
4 General Harassment	3.39	3.89	.19*	.49**	.18*	(0.87)				
5 Psychological distress	1.45	0.44	.18*	.27**	-.01	.23**	(0.94)			
6 Emotional exhaustion	1.72	1.11	.17*	.37**	.02	.41**	.48**	(0.88)		
7 Work engagement	4.71	0.82	.01	-.21**	-.14	-.014	-.25**	-.36**	(0.86)	
8 Organizational commitment	4.25	0.77	-.07	-.25**	-.04	-.18*	-.07	-.34**	.53**	(0.79)

Note. Numbers in parenthesis are alpha coefficients.

\*p < .05. \*\*p < .01

### ***Work Engagement***

**Females.** Most of the stressor types were negatively related to work engagement (Table 3). While traumatic stressors were unrelated to work engagement, the other stressor types had significant relationships with it. The strongest associations were found with general harassment and field stressors, followed by sexual harassment.

**Males.** Unlike among female iHAWs, only one type of stressor was significantly associated with work engagement among male iHAWs: field stressors. Traumatic stressors, sexual harassment, and general harassment were all unrelated to work engagement (Table 4).

### ***Organisational Commitment***

**Females.** General harassment, field stressors, and sexual harassment (but not traumatic stressors) were negatively associated with organisational commitment (Table 3).

**Males.** As among female iHAWs, general harassment and field stressors (but not traumatic stressors and sexual harassment) were negatively associated with organisational commitment (Table 4).

**Table 3**  
Regression Coefficients for Female International Humanitarian Aid Workers

Variable	PD (n = 269)			EE (n = 270)			WE (n = 269)			OC (n = 270)		
	$\beta$	$\Delta F$	$\Delta R^2$	$\beta$	$\Delta F$	$\Delta R^2$	$\beta$	$\Delta F$	$\Delta R^2$	$\beta$	$\Delta F$	$\Delta R^2$
Simple regressions												
Traumatic stressors	.15*	6.60	.024	.04	0.50	.002	.06	0.80	.003	-.03	0.32	.001
Field stressors	.24***	16.33	.057	.35***	38.2	.124	-.16**	7.16	.026	-.27***	21.94	.075
Sexual harassment	.18**	9.34	.034	.15*	5.99	.022	-.13*	4.40	.016	-.14*	5.55	.020
General harassment	.28***	22.59	.078	.31***	27.58	.093	-.17**	8.12	.030	-.32***	30.08	.101
Multiple regression												
Step 1												
Traumatic stressors	.09	8.71	.117	-.05	11.99	.153	.12	3.56	.051	.04	9.52	.126
Field stressors	.11			.23***			-.03			-.14		
Sexual harassment	.19*			.12			-.18*			-.04		
General harassment	.26***			.21***			-.15*			-.19*		
Step 2												
TS x FS	-.004	2.91	.056	.06	2.58	.048	-.11	1.45	.031	-.05	.69	.014
TS x SH	.21*			.15			-.08			.07		
TS x GH	-.05			-.05			.05			.005		
FS x SH	-.19			-.34			.34			.41		
FS x GH	-.12			.04			.07			-.10		
SH x GH	-.02			-.18			.28*			-.12		
Step 3												
TS x FS x SH	.01	.040	.005	.13	1.02	.013	-.09	2.52	.035	-.14	1.49	.020
TS x FS x GH	.03			-.04			-.07			-.10		
TS x SH x GH	-.08			-.02			.08			.05		
FS x SH x GH	.09			.39			-.56**			-.35		
Total model R <sup>2</sup>			.178			.214			.117			.159

Note. PD = psychological distress; EE = emotional exhaustion; WE = work engagement; OC = organizational commitment; TS = traumatic stressors; FS = field stressors; SH = sexual harassment; GH = general harassment.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Table 4**  
*Regression Coefficients for Male International Humanitarian Aid Workers*

Variable	PD (n = 179)			EE (n = 179)			WE (n = 178)			OC (n = 179)		
	$\beta$	$\Delta F$	$\Delta R^2$	$\beta$	$\Delta F$	$\Delta R^2$	$\beta$	$\Delta F$	$\Delta R^2$	$\beta$	$\Delta F$	$\Delta R^2$
Simple regressions												
Traumatic stressors	.18*	5.77	.031	.17*	5.28	.028	.01	0.03	.000	-.07	0.89	.005
Field stressors	.28***	14.43	.075	.37***	27.85	.136	-.21**	7.99	.043	-.25***	12.01	.064
Sexual harassment	-.01	0.02	.000	.02	0.08	.000	-.14	3.59	.020	-.04	0.25	.001
General harassment	.23**	9.49	.051	.41***	36.68	.172	-.14	3.38	.019	-.18*	5.64	.031
Multiple regression												
Step 1												
Traumatic stressors	.02	4.95	.102	-.12	12.11	.218	.20	2.63	.057	.17	3.16	.068
Field stressors	.23*			.22**			-.20*			-.23*		
Sexual harassment	.17			-.21			-.05			.23		
General harassment	.16			.36***			-.15			-.05		
Step 2												
TS x FS	.09	1.00	.031	-.11	1.64	.043	-.12	.44	.015	-.02	.73	.024
TS x SH	-.10			-.36			.30			.28		
TS x GH	-.14			.11			.13			.07		
FS x SH	-.02			.10			-.49			-.30		
FS x GH	-.14			-.09			.12			-.09		
SH x GH	.26			.42			-.16			.01		
Step 3												
TS x FS x SH	.34	1.01	.021	.05	1.71	.030	-.41	1.18	.026	.01	1.88	.040
TS x FS x GH	.17			.20			-.13			-.30*		
TS x SH x GH	-.17			.21			-.06			-.23		
FS x SH x GH	-.34			-.49			.47			.19		
Total model R <sup>2</sup>			.154			.291			.098			.131

Note. PD = psychological distress; EE = emotional exhaustion; WE = work engagement; OC = organizational commitment; TS = traumatic stressors; FS = field stressors; SH = sexual harassment; GH = general harassment.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

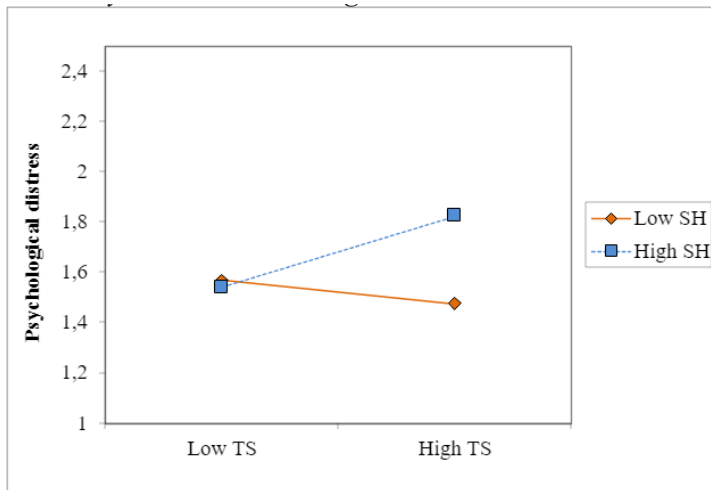


## Combined Effects of Stressors on Mental Health and Work-Related Outcomes

### Females

**Psychological Distress.** When all the stressor types were entered simultaneously in Step 1 of the multiple regression analysis, sexual harassment and general harassment both remained significant predictors of psychological distress, with general harassment being the stronger predictor (Table 3). Furthermore, a significant two-way interaction for psychological distress emerged. The interaction was plotted as shown in Figure 1.

**Figure 1**  
*Two-way interaction among female iHAWs*



Note. TS = traumatic stressors; SH = sexual harassment.

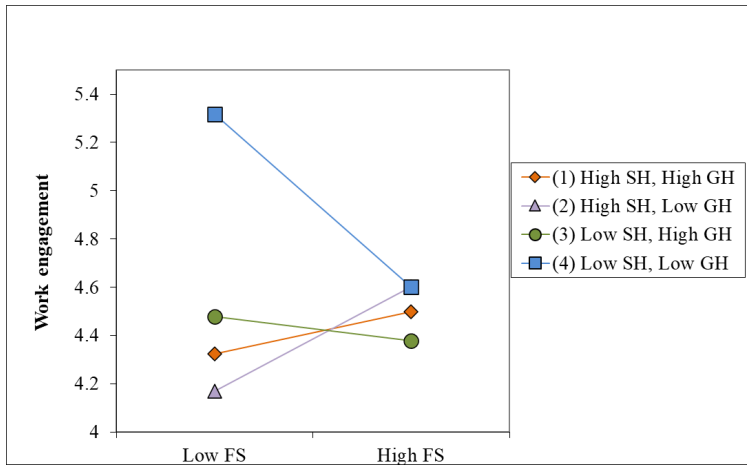
A simple slope analysis affirmed that the relationship between traumatic stressors and psychological distress was significant when sexual harassment was high ( $b = .052$ ,  $p > .05$ ), but it was not significant when sexual harassment was low ( $b = -.017$ ,  $p = .32$ ). This interaction is the most consistent with an exacerbating effect, as the relationship between traumatic stressors and psychological distress only became significant under the context of high sexual harassment. The model with the significant interaction explained more than twice as much variance in post-assignment psychological distress than any of the stressors individually.

**Emotional Exhaustion.** When predicting emotional exhaustion (Table 3), adding all the stressor types to the regression simultaneously led to only field stressors and general harassment significantly predicting the level of emotional exhaustion at post-assignment. There were no significant interactions. The model with all the stressors

explained slightly more variance than field stressors or general harassment alone, providing support for additive effects.

**Work Engagement.** Sexual harassment and general harassment remained significant predictors of variance in post-assignment work engagement when adding all stressors simultaneously (Table 3). A significant two-way interaction between sexual harassment and general harassment was found, but considering that a higher order significant three-way interaction was seen in the next step of the analysis, we did not interpret the lower-order interaction. The three-way interaction is depicted in Figure 2.

**Figure 2**  
*Three-way interaction among female iHAWs*



*Note.* FS = field stressors; SH = sexual harassment; GH = general harassment.

While a significant interaction effect could point toward an exacerbation effect, we observed that field stressors and sexual harassment were not associated with work engagement when general harassment was high, suggesting inurement effect. Simple slope analyses showed that the slope of line 4 (low sexual harassment, low general harassment) is significantly different from the slope of all the other lines. The significant difference between lines 2 and 4 ( $p = .001$ ) suggests that sexual harassment and field stressors interact to predict work engagement when general harassment is low. Sexual harassment was negatively related to work engagement when field stressors were low, and field stressors only had a negative association with work engagement when sexual harassment was low. In other words, adding another stressor type did not have an additional negative effect on work engagement, again suggesting inurement effect. The significant difference between lines 3 and 4 ( $p = .02$ ) shows a

similar pattern: general harassment and field stressors interacted to predict work engagement when sexual harassment was low. This, too, is suggestive of inurement.

**Organisational Commitment.** Only general harassment remained a significant predictor of variance in post-assignment organisational commitment when all four stressor types were added simultaneously (Table 3). Yet, the model with the four stressor types combined explained an additional 2.5% beyond what general harassment alone explained. This suggests a small additive effect of combined stressor types.

### *Males*

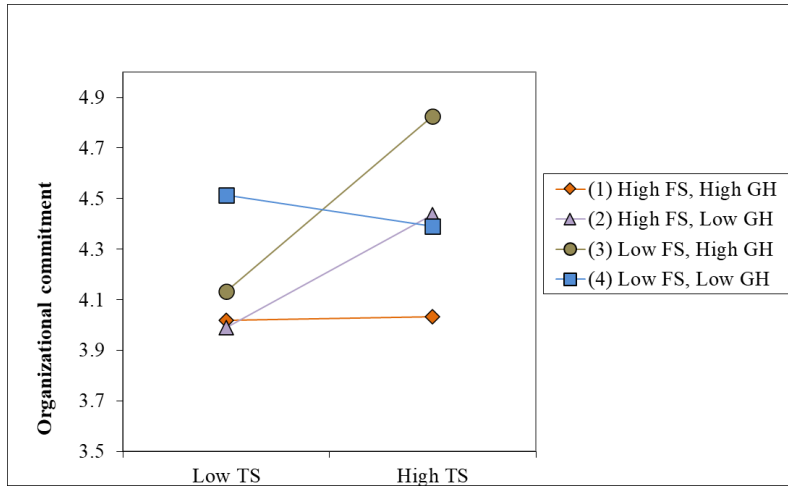
**Psychological Distress.** Field stressors remained the only significant predictor of post-assignment psychological distress, when adding the four stressor types into the regression analysis simultaneously (Table 4). However, the multi-stressor model accounted for more variance in psychological distress than field stressors alone, suggesting small additive effects. No interactions were found in the following steps of the regression analysis.

**Emotional Exhaustion.** Both field stressors and general harassment remained significant predictors of emotional exhaustion when all the stressors were added in the model (Table 4). No interactions were found in Steps 2 or 3. The model with all the stressors explained more variance in emotional exhaustion than general harassment alone, showing additive effects of multiple stressors.

**Work Engagement.** Field stressors remained the sole significant predictor of variance in post-assignment work engagement once all the stressors were added simultaneously (Table 4). The total model explained slightly more variance in work engagement compared to organisational stressors alone, suggesting small additive effects of multiple stressors on work engagement.

**Organisational Commitment.** Only field stressors remained a significant predictor of organisational commitment in Step 1 of the multiple regression analysis (Table 4). The inclusion of the other stressors on this step provided only minimal improvement of the overall predictive power compared to what field stressors alone could predict. However, a significant three-way interaction between traumatic stressors, field stressors and general harassment was found in Step 3, doubling the predictive power of the total model. The interaction is portrayed in Figure 3.

**Figure 3**  
*Three-way interaction among male iHAWs*



Note. TS = traumatic stressors; FS = field stressors; GH = general harassment.

When field stressors and general harassment were *both* either high (Line 1) or low (Line 4), the level of traumatic stressors was not predictive of organisational commitment, suggesting inurement against any further effects of traumatic stressors. Lowest organisational commitment was seen when field stressors and general harassment were both high. However, simple slope analysis indicated that none of the line pairings were significantly different from one another. In other words, while a significant interaction was found, no clear conclusion on the specific combined effects can be drawn when examining the interaction through the usual lens of ‘high’ vs. ‘low’ levels of the predictor variables. This interaction does not clearly support one of the three effect types.

## Discussion

While previous studies have indicated that there are several types of stressors that may influence iHAWs’ wellbeing, there is paucity of evidence on how these may combine to predict mental health and workplace wellbeing. Therefore, we examined competing expectations about how traumatic stressors, field stressors, sexual harassment, and general harassment combine to predict four mental health and work-related outcomes: psychological distress, emotional exhaustion, work engagement, and organisational commitment.

## **Relationships Between Individual Stressor Types and Health Outcomes**

The four stressor types were, for the most part, related to the outcomes in the expected way. The two most notable exceptions were traumatic stressors having few health outcome associations among female and male iHAWs alike, and sexual harassment not being associated with any health outcomes at all among male iHAWs. General harassment and field stressors emerged as the strongest and most consistent predictors of mental health and work-related outcomes among both male and female iHAWs. This is broadly in line with the findings of Foo and colleagues (2023), who showed that workplace psychosocial stressors and adversity exposure both had independent associations to burnout, with the former being stronger – although Foo et al.'s (2023) division of stressor types was slightly different from that of the current study .

## **Effects of Combined Stressors and Health Outcomes**

The majority of the health and work-related outcomes among male and female iHAWs followed the pattern of additive effects. That is, the four stressor types combined predicted more variation in the post-assignment outcome scores than any individual stressors. In other words, each additional stressor type added further strain on the iHAWs' wellbeing. This finding is largely in line with studies examining the effects of multiple forms of discrimination (Vargas et al., 2020) and multiple PTEs (Briere et al., 2016). However, we also found an inurement effect when predicting work engagement among female iHAWs, indicating that while all stressors types except traumatic stressors individually predicted worse work engagement, experiencing more than one type of stressor did not have a further detrimental association with work engagement. Additionally, we found an exacerbating effect when predicting psychological distress among female iHAWs, showing that in the context of high sexual harassment, traumatic stressors had a significant relationship with psychological distress.

## **Sex Differences**

Whilst for self-experienced traumatic stressors, we previously found no difference between male and female iHAWs (de Jong et al., 2021), when considering both self-experienced and witnessed PTEs as sources of traumatic stress, male iHAWs had higher mean exposure to traumatic stressors. Female iHAWs, on the other hand, reported significantly more sexual and general harassment than male iHAWs. Furthermore, there were some clear differences between the sexes with regard to which stressors were significant predictors, and the extent to which different stressors contributed to variance in each outcome. As mentioned earlier, the predictor sexual harassment was not a predictor of any of the four outcomes among male iHAWs. Among female iHAWs, however, sexual harassment predicted each of the four mental health and work-related outcomes. The extant evidence about the impact of sexual harassment on the mental health of males (e.g., Kang et al., 2005; Martinmäki et al., 2023; Nielsen & Einarsen,

2012) shows inconsistent findings.

A second clear difference was that more types of stressors had a significant association with mental health and work-related outcomes among female than among male iHAWs. In addition, the only support for exacerbating effects were found when predicting psychological distress among female iHAWs. The burden of traumatic stressors in addition to sexual harassment possibly magnified the strain already experienced, leading to a much higher load of strain.

### **Interactions Beyond Exacerbation Effect**

We found that sexual harassment was negatively related to work engagement among female iHAWs only when field stressors and general harassment were low. This inurement effect shows an intriguing interaction that likely speaks specifically to the nature of humanitarian field work. It may be that in the context of high field stressor and general harassment, these other stressors become a tool to stop thinking about the unpleasant experience of sexual harassment, or that the high field stressors become an alternative explanation for the feelings of distress or discomfort one may feel after sexual harassment. In settings where the other stressors are not present or only in low amounts, it may not be possible to ‘assign’ the potential negative effects of sexual harassment to another type of stressor.

In the case of male iHAWs, the significant interaction in predicting organisational commitment may also speak of a similar humanitarian-work specific situation. High general harassment seemed to be associated with lower organisational commitment *only* when both field stressors and traumatic stressors were low. Perhaps, during a highly taxing emergency field assignment where there is a high level of PTEs and field stressors, general harassment is tolerated or not noted, similar to how sexual harassment was only predictive of work engagement of female iHAWs under specific conditions.

### **Strengths, Limitations and Future Research**

The fundamental strength of the current study is the focus on four distinct types of stressors in predicting mental health and work-related wellbeing. Moreover, the studied cohort was large and representative of international staff of MSF. There are some limitations to the findings of this investigation. The data analysed were cross-sectional, preventing us from drawing any causal conclusions. The analytical method utilised to tease out the meanings in a three-way interaction in particular, but also in general, are based on rough guidelines only. It leaves space for interpretation, and therefore, inconsistencies: for example, while we followed the example of Raver and Nishii (2010) and labelled any independent associations of stressors in the hierarchical regression

models as evidence for additive effects, others have suggested additive effects to be present when the combined effect of individual stressors is equal to the sum of the independent effects (Coulter et al., 2017). Furthermore, all the measures were based on self-report, which could lead to issues relating to common method variance. While the current results are meaningful in the light of the specific occupational circumstances of iHAWs, they are context-specific, meaning they may have a low generalizability outside of humanitarian fieldwork. At the same time, they do encourage explorations on the effects of various stress forms among other occupational groups!

### **Practical Implications**

Our findings amplify the critique of using only a single occupational stressor when predicting work-related health outcomes (Foo et al., 2023; Jachens, 2019): in most cases, iHAWs do not inure or adapt themselves against multiple sources of strain after experiencing one, but the stressors pile up. Although some stressor types such as PTEs or fieldwork-related difficult conditions are difficult to avoid in humanitarian work, other sources of stress such as sexual harassment, general harassment, or communication-related stressors could be potentially addressed through organisational changes.

Furthermore, general harassment and field stressors emerged as the most consistent predictors of outcomes, showing their relative importance for mental health and work-related wellbeing among iHAWs. This suggests they may be useful targets for adapting organizational policies and creating interventions. Furthermore, our findings on sexual harassment in particular call to taking gender effects into account when examining the connection between occupational stressors and mental health or work-related outcomes, without ignoring extant research on the potential negative associations of sexual harassment and mental health outcomes for male iHAWs as well (Martinmäki et al., 2023). While bullying thrives in stressful or poor social environments (Hauge et al., 2009; Skogstad et al., 2011) and in situations of team conflict (Gardner et al., 2016), a recent investigation into the moderators between workplace bullying and wellbeing suggests that a supportive organisational climate buffers the negative effects of bullying (Farley et al., 2023). Additionally, our findings suggest it is essential for humanitarian organisations to avoid focusing only on traumatic stressors, as they had considerably lower relative importance in predicting mental health and work-related wellbeing than the other stressors studied. Consequently, it is important to consider various measures or models of stress, when trying to understand how HAWs are coping with stressors (de Jong et al., 2022; Foo et al., 2021; Jachens, 2019).

### **Conclusion**

Our cohort study of international humanitarian aid workers assessed both ‘contextual’ (fieldwork-related and traumatic stressors) as well as ‘interpersonal’ (sexual and general

harassment) categories of stressors. The study revealed that the interplay of different types of stressors in predicting mental health and work-related outcomes among iHAWs is complex. In most cases, additional stressor types increase the experienced strain and decrease mental health and work-related wellbeing. Only in the case of work engagement did we find that female iHAWs seem to adapt to specific combinations of stressors taking place at the same time. We also found that the combination of high sexual harassment and high PTEs has exacerbating effects on the psychological distress of female iHAWs. As the preponderance of findings point toward additional strain from more stressor types, we suggest that addressing and preventing, where possible, any ‘manageable’ types of stressors is an important target intervention to improve mental health and work-related outcomes of iHAWs, in particular for female staff.

### **Disclosure Statement**

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### **Author Contributions**

SEM: conceptualisation, data curation, data collection, methodology, formal analysis, software, visualisation, writing – original draft

KdJ: methodology, writing – review & editing, project administration, supervision, funding acquisition

IHK: methodology, supervision, writing – review & editing

RJK: methodology, supervision, writing – review & editing

PAB: methodology, supervision, writing – review & editing



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# Section 3

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Sense of Coherence:  
A Framework for Understanding  
How iHAWs Remain Healthy?



# 6

## **How Do International Humanitarian Aid Workers Stay Healthy in the Face of Adversity?**

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## Abstract

International humanitarian aid workers (iHAWs) are motivated strongly to travel abroad to help communities affected by war, famine, disaster and disease. They expose themselves to dangers and hardships during their field assignments. Despite working under such challenging circumstances, most workers remain healthy. The objective of the present study was to unravel the mechanism that enables workers to remain healthy under the same circumstances that affect these communities. We hypothesised that the different components of the Sense of Coherence (SOC) health mechanism mediate the relationship between field stressors and post-assignment health. The stress-health model was tested among 465 international aid workers using a longitudinal pre-post assignment study design and structural equation modelling for path analyses. The (health) outcome variables were PTSD, anxiety, depression, emotional exhaustion, and work engagement. Our findings highlight the importance of being healthy before aid assignment and the negative health impact of field stressors that were not potentially traumatic. The SOC components mediated the relationship between field stress and post-assignment health, with males and females using different SOC components to alleviate stress. Males are more likely trying to understand the nature of the stressor, whereas females mobilise their resources to manage stressors. In both groups, a high level of meaningfulness of the work was an important component in maintaining health. Regarding using the SOC concept for understanding the process of maintaining health, our findings indicated that SOC is best considered context-specific and multidimensional. In addition to good pre-mission health, the SOC components help prevent field assignment-related negative health effects in iHAWs. Our findings support the idea to compose gender-balanced teams of iHAWs to maintain and promote health. The findings can be used to develop or refine health conversation tools and SOC based health interventions to promote health and wellbeing and prevent ill-health among aid workers and other stress-exposed populations.



## Introduction

Approximately 40,000 international humanitarian aid workers (iHAWs) provide urgent humanitarian care to people in need all over the world. These trained professionals make a deliberate, conscious choice to work in extremely stressful and demanding settings of war, natural disaster, or pandemics with overwhelming medical needs of large numbers of affected individuals. iHAWs' work environments are often poorly structured, highly insecure, and exposure to potentially traumatic events (e.g., violence, extreme suffering) is likely. Their workload is high with limited job autonomy and poor remuneration. Personal stressors such as poor work-life balance, minimal privacy after work (living in teams), and being away for long periods from their social network are further examples of the unique challenges iHAWs' are confronted with.

Despite these challenges, most iHAWs maintain their pre-assignment level of health and work engagement (de Jong et al., 2021). Rather than looking for risk factors in a population with low prevalence to optimize iHAWs' health another perspective may be useful (Greene-Cramer et al., 2021). This triggers the central question of this manuscript: How do iHAWs stay healthy in the face of unsolvable and unavoidable adversity? What prevents or mitigates the impact of the stressful environment and promotes health and work engagement?

The Salutogenetic Model of Health (Antonovsky, 1979) is a frequently used theory to explain how individuals maintain and regain their health while engaging in highly demanding work and overwhelming life challenges. Salutogenesis refers to the ability to manage stress in behavioural, cognitive, and motivational ways.

The mechanism to achieve Salutogenesis is Sense of Coherence (SOC). SOC is defined as 'a global orientation that expresses the extent to which one has a pervasive and enduring though dynamic, feeling of confidence that one's internal (within the person; emotions and thoughts) and external environments (between persons, social experiences, events) are predictable. As well as the belief that there is a high probability that things will work out as well as can reasonably be expected' (Antonovsky, 1979, p. 123). SOC consists of three key components. First, the cognitive ability to clarify and structure the nature of stressors (comprehensibility). Second, being aware of one's available resources and keeping confidence to mobilise them via behavioural and instrumental responses to manage stressors successfully (manageability). Third, the willingness and motivation to manage stressors depending on whether it makes sense to mobilize resources to deal with these challenges (meaningfulness) (Antonovsky, 1987).

Unravelling the working of SOC on iHAWs' health and work engagement can provide the key to designing preventive activities and interventions resulting in staff health improvements. In many different stressful and demanding circumstances high SOC levels were associated with good health and well-being (de Jong et al., 2023; Mittelmark et al., 2017); low SOC levels with higher levels of disease and mortality incidence (Super et al., 2016). SOC mediated the relationship between stressors and health or well-being (Eriksson et al., 2006). A high SOC decreases the negative effects of field stressors; it acts as go-between stressors and good health. Contrary to national staff humanitarian workers (Veronese & Pepe, 2014), the mediating role of SOC has not been examined in the population of iHAWs.

The SOC component 'meaningfulness' may be a leading mechanism in the iHAWs' process of staying healthy. The act of 'doing good' and the advocacy of deploying personal presence, capacities and skills in a context of oppression or neglect are strong internal motivators for iHAWs (Barber, 2008; Solomon et al., 1998). IHAWs mentioned moral reasons most frequently as a motivation for deployment in the West African Ebola outbreak (Rubin et al., 2016). A high level of 'meaningfulness' ensures the willingness and motivation of iHAWs to face the extraordinary levels of stress associated with humanitarian work. At the same time when 'giving meaning' to one's actions fails, it was associated with poor mental health (anxiety, depression, burn-out) (Carstens & Spangenberg, 1997; Ekblad & Roth, 1997; Siglen et al., 2007).

Sex differences moderated the effects of SOC on health in an elderly community sample (Saevareid et al., 2007). In mental health sex differences in prevalence, symptomatology, and influencing factors are both fascinating and poorly researched (Riecher-Rössler, 2017). We considered important potential sex differences in salutogenetic mechanisms and pathways to improve our understanding and tailor health-improving interventions to both women and men.

The present study aims to determine whether the SOC components act as mediators between humanitarian aid work-related stressors and iHAWs' health and well-being. We hypothesized that pre-field assignment SOC, especially the component meaningfulness mediates (weakens) the relationship between field stressors, work engagement and post-assignment health. We also hypothesized that the three SOC components act differently among males and females.

# Method

## **Participants and Procedure**

The current study was a prospective survey of 465 iHAWs of Médecins Sans Frontières Operational Centre Amsterdam (MSF OCA). This sample is a subset of the larger sample previously described in detail elsewhere (de Jong et al., 2021). All iHAWs who completed at least one of the health outcome variables at both pre-and post-assignment was included in the present study. Sixty-one per cent of the participants were females. The average participant age at the start of their participation was 40.5 years old (SD = 11.0, range 24.4–76.5). Independent non-MSF researchers informed all iHAWs going to a field assignment about the study between December 2017 and February 2019; data collection ended February 2020. Participants signed informed consent and completed questionnaires on an online survey platform. Pre-assignment measurement (T1) took place 0–14 days before departing to the assignment area, the second measurement (T2) immediately post-assignment, at a maximum of four weeks after returning. This study received ethical approval from the internal Ethics Review Board of Médecins Sans Frontières on the 24<sup>th</sup> of February 2017 (ID 1642).

## **Instruments**

### ***Health and Work Engagement Outcome Indicators***

The Maslach Burnout Inventory, emotional exhaustion scale (MBI-HSS, range: 0–6) (Maslach et al., 1981) measures burnout-related complaints of emotional exhaustion. The internal consistency of this subscale was good ( $\alpha = .84$ ).

The Hopkins Symptom Checklist (HSCL-25, range anxiety and depression: 1–4), assesses symptoms of anxiety and depression during the past week (Derogatis et al., 1974). The internal consistency in the current sample was good for both depression ( $\alpha = .90$ ) and anxiety ( $\alpha = .87$ ) subscales.

The Post-Traumatic Check List DSM-5 (PCL-5, range: 0–80) (Blevins et al., 2015) measures the DSM-5 symptoms of PTSD. In the current sample, the scale had good internal consistency ( $\alpha = .89$ ).

Utrecht Work Engagement Scale (UWES-9, range 0–6) measures work engagement. The definition of high work engagement is ‘positive, fulfilling, work-related state of mind’ (Schaufeli et al., 2006). The internal consistency was good ( $\alpha = .84$ ).

### ***Health Mechanism Indicator***

Sense of Coherence (SOC, range: 13–91) measures three components: comprehensibility, manageability, and meaningfulness (Antonovsky, 1987). People with a high SOC are able

to manage (extreme) stressors in keeping their good health. The internal consistency of the scale in the current sample was good ( $\alpha = .80$ ), to modest for the subscales (comprehensibility  $\alpha = .65$ , manageability  $\alpha = .59$ , and meaningfulness  $\alpha = .58$ ). The reduction in alpha is likely attributable to the small number of items that comprise each subscale (Tavakol & Dennick, 2011). The mean inter-item correlation provides a more suitable reliability test because it is not hampered by the limited number of items of the subscales (Briggs & Cheek, 1986). According to Briggs and Cheek, the optimal correlation ranges between .20 and .40. Scores below .20 are likely to measure heterogeneous dimensions instead of a single dimension, whereas scores above .40 are indicative of redundant items. The present study mean inter-item correlations were all within the optimal range (comprehensibility .27, manageability .27, meaningfulness .26).

### ***Stressor Indicators***

The Life Events Checklist for DSM-5 (LEC-5 range: happened to me) (Weathers et al., 2013) assesses the prevalence of 16 potentially traumatic events, and one additional item assessing any other extraordinarily stressful event in a respondent's life. We used this measure the amount of exposure to PTE's during the assignment (T2).

Humanitarian Field Stressor List (HFSL) developed by the Psychosocial Care Unit of MSF OCA measures the severity of 39 potential assignment-related stressors in six dimensions (de Jong et al., 2021; Appendix C). The six dimensions are field conditions, cultural stressors, work-related stressors, team stressors, self-experienced traumatic experiences, and code of conduct. The answers were scored on a six-point scale ranging from 0 ('none/not applicable') to 5 ('high'). A total sum score (range 0–195) was used, with a higher score denoting higher experienced stressor levels. The HFSL is not a screener for a specific latent construct, but was used as an inventory of the number and types of experienced field stressors.

### **Statistical Analyses**

Descriptive analyses were conducted with SPSS (version 23.0) and structural equation modeling (SEM) was applied for path analyses with MPlus (version 8) to test the likelihood of specific pathways between predictors of wellbeing and five different health outcomes. To explore the strength of linear relationships between the variables at different time points, Pearson correlations were calculated between all the health and work engagement variables and predictive membership and stressor variables. T-tests were carried out for each health and work engagement variable to examine whether there were significant differences in the pre- and post- assignment indicators for the whole sample and whether there were significant differences between males and females.

To improve understanding of the temporal relationships between the SOC components and the health outcome variables, the SEM path analyses were directed by pre-defined steps and stages. In the 'pre-modelling' stage, each outcome variable was modelled as a function of its baseline value, baseline SOC components, field stressors, and traumatic stressors. Following that, the post-assignment SOC components were added to the model. We specified a pathway from post-assignment SOC components to the health outcome variable, also included the auto-regression (in time) of the SOC components. In the final pre-modelling step, we treated SOC as a latent construct defined by its three observed indicators (i.e., components). This allowed us to examine whether the temporal relationship of the latent SOC construct was the same as for each SOC component.

After completing the pre-modelling steps, the 'main' mediation models were estimated (see 'hypothesized mediation model' section below). On the basis of modification indices provided by MPlus, we specified several hierarchically nested models, evaluating the model fit at each step. New pathways were specified based on theoretical considerations and added only when they improved the model fit substantially. The final optimized model only contained significant pathways. This way we derived the most likely best fitting (MLBF) (Kamperman et al., 2007; Tol et al., 2007) model for each outcome variable in the total sample. Subsequently, the robustness of the MLBF models was tested separately for the male and female subgroups, to see whether the model represented the relationships between the variables in the model equally well for males and females. If the overall model is robust across genders, it is expected the earlier found pathways remain significant. If they do not, they are sensitive for gender differences. We report on the hypothesized mediation models for each health outcome, their optimized MLBF models, and the robustness of the MLFB models for males and females.

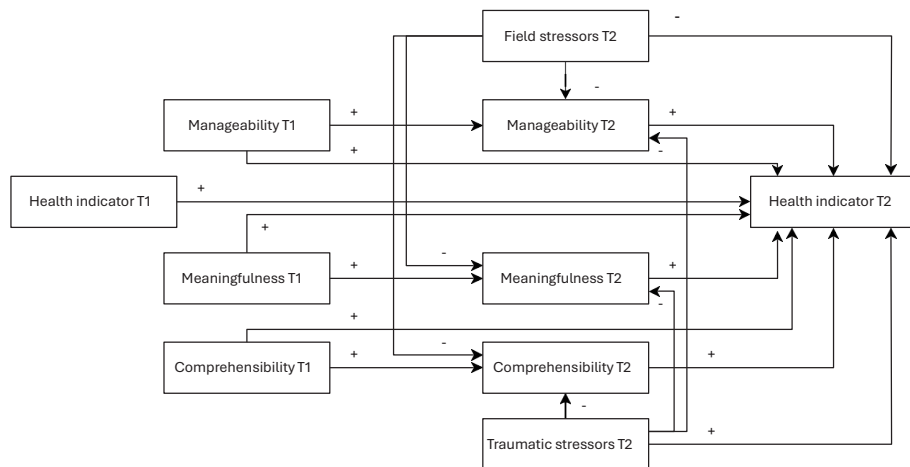
There was a minor missing data problem in the analyses concerning all outcome variables besides emotional exhaustion. When a case was missing data on exogenous variables, it was not included in the analyses (1.1–4.1% of the cases in the analyses). To examine and compare how well the various models represented the (co)variations present in the data, the models were evaluated according to maximum likelihood fit indices, including the discrepancy (chi-square), comparative fit index (CFI), root-mean-square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Models that fit well are indicated by CFIs  $\geq 0.90$ , RMSEAs  $\leq 0.08$ , and SRMRs  $\leq 0.05$  (Hu & Bentler, 1999). As our intention was to look for the best model out of several theoretically sound models, the model fit indices were used to guide our selection of the best model out of these theoretically based models.

### ***Hypothesized Mediation Model***

Our hypothesized model defined the relationships between field stressors, traumatic stressors, different components of SOC and health outcomes before (T1) and after (T2) humanitarian field assignment (Fig 1). The hypothesis was that pre-assignment health has the strongest associations with post-assignment health, and field stressors and traumatic stressors exert a detrimental effect on the post-assignment health outcome. Based on previous research (de Jong et al., 2021; Veronese & Pepe, 2017), it was hypothesized that higher scores on SOC components would be associated with more positive health at T2. Besides specifying direct pathways from the traumatic and field stressors and the SOC components to the health outcome, mediation effects of T2 SOC components were also modelled. More specifically, the T2 mediating role of field stressors and traumatic stressors in the relationships between SOC components and the health outcomes were tested. Our assumption was that both stressor types would have a detrimental impact on the SOC components, thereby reducing the so-called ‘true protective (beneficial) effect’ of the SOC components on health. Based on potential gender differences, the models were tested separately for males and females.

**Figure 1**

*Hypothesized Model About the Relationship Between the Health Outcome and its Predictors. A Plus Sign Denotes a Positive/Beneficial Association; A Negative Sign Denotes a Detrimental Association*



# Results

## Descriptive Statistics

The descriptives of the variables chosen for the hypothesized model are presented in Table 1. Compared to men, females reported significantly more symptoms of anxiety, depression, and emotional exhaustion both before and after humanitarian field-assignment. There were no significant differences between males and females in their mean post-traumatic stress symptoms or work engagement. Post-assignment manageability, as well as pre- and post-assignment comprehensibility, were the only other variables of the model with significant sex differences in the mean scores. In general, males scored higher than females. Males and females did not differ on changes over time (direction and significance) with the exception of the indicator work engagement: there was a general decrease over time, but females decreased significantly. Considering that both males and females decrease in the same direction, the differences between males and females are likely trivial.

**Table 1**

*Descriptive Statistics of the Health Outcome Variables Before Assignment (T1) and After Assignment (T2)*

	Timepoint	Males		Females		Difference
		Mean	SD	Mean	SD	Stat. test
Anxiety	T1	1.45	.03	1.55	.03	$t(561) = -2.40^*$
	T2	1.34	.03	1.44	.03	$t(472) = -2.20^*$
	Difference	$t(174) = 3.74^{***}$		$t(282) = 3.84^{***}$		
Depression	T1	1.51	.04	1.65	.03	$t(544) = -3.46^{**}$
	T2	1.49	.04	1.65	.03	$t(472) = -2.97^{**}$
	Difference	$t(174) = .32$		$t(282) = .21$		
Emotional exhaustion	T1	1.58	.06	1.78	.06	$t(587) = -2.26^*$
	T2	1.72	.09	1.95	.07	$t(479) = -2.12^*$
	Difference	$t(186) = -2.42^*$		$t(290) = -3.19^{**}$		
PTSD	T1	8.47	.58	8.99	.55	$t(569) = -.10$
	T2	7.56	.58	8.43	.59	$t(474) = -.88$
	Difference	$t(180) = 1.62$		$t(285) = .86$		
Work engagement	T1	4.80	.06	4.70	.05	$t(546) = 1.32$
	T2	4.73	.06	4.60	.05	$t(463) = 1.73$
	Difference	$t(171) = 1.61$		$t(270) = 2.59^*$		
Manageability	T1	21.13	.27	20.21	.21	$t(590) = 1.66$
	T2	21.54	.27	20.19	.24	$t(481) = 2.97^{**}$
	Difference	$t(190) = -1.37$		$t(290) = -.12$		

**Table 1** *Continued.*

	Timepoint	Males		Females		Difference
		Mean	SD	Mean	SD	Stat. test
Meaningfulness	T1	21.86	.33	21.80	.21	$t(590) = -.06$
	T2	22.52	.31	22.30	.21	$t(481) = .09$
	Difference	$t(190) = -2.42^*$		$t(290) = -2.67^{**}$		
Comprehensibility	T1	25.31	.35	24.11	.28	$t(590) = 2.47^*$
	T2	26.03	.40	24.73	.29	$t(482) = 2.51^*$
	Difference	$t(191) = -2.83^{**}$		$t(290) = -2.50^*$		
Field stressors	T2	58.27	2.12	63.64	1.67	$t(466) = -1.61$
Traumatic stressors	T2	.70	.10	.75	.08	$t(477) = .23$

*Note.* Anxiety = HSCL-25 anxiety subscale mean score. Depression = HSCL-25 depression subscale mean score. Emotional exhaustion = MBI-HSS emotional exhaustion subscale mean score. PTSD = PCL-5 total score. Work engagement = UWES-9 mean total score. Manageability = SOC-13 manageability subscale total score. Meaningfulness = SOC-13 meaningfulness subscale total score. Comprehensibility = SOC-13 comprehensibility subscale total score. Field stressors = Humanitarian Field Stressors list total score. Traumatic stressors = LEC-5 number of self-experienced potentially traumatic events.

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

## Correlations

Appendix A shows the correlation tables between the health and work-engagement outcome variables and the various stressor indicators and the predictive membership indicators. Higher scores on SOC subscales (both pre- and post-assignment) were significantly associated with better health and work engagement at post-assignment. Post-assignment SOC scores had a stronger association with the post-assignment health outcomes than did pre-assignment SOC scores. Higher reported field stressors were significantly associated with higher symptomatology or lower work engagement at post-assignment. Based on the explored correlations between the variables of our interest, we defined the hypothesized path model.

## Pre-Modelling

Each outcome variable went through the pre-modelling steps described in the methods. Overall, the models showed that pre-assignment health had a strong positive impact on post-assignment health, that field stressors had a negative impact on some health outcomes, and that while SOC subscales at post-assignment had positive impacts on health outcomes, we could not find the same positive impact between pre-assignment SOC subscales and the health outcomes. The SOC total scale variable demonstrated a comparable pattern of associations within the model as its separate components (manageability, meaningfulness, and comprehensibility). These analyses provide support for all expected pathway associations, except for some contradictory associations for SOC at different time points in relation to the main outcomes, which is likely due to a response shift between the two different time points. Pre-assignment SOC had significant negative associations with all post-assignment health and work



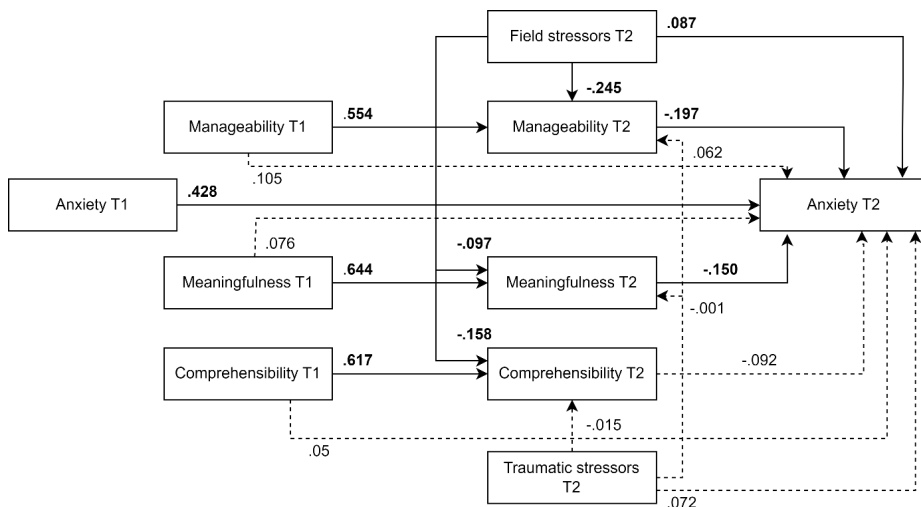
engagement indicators, whereas post-assignment SOC also had some significant positive associations (see Appendix C).

### Main Mediator Models

#### Anxiety

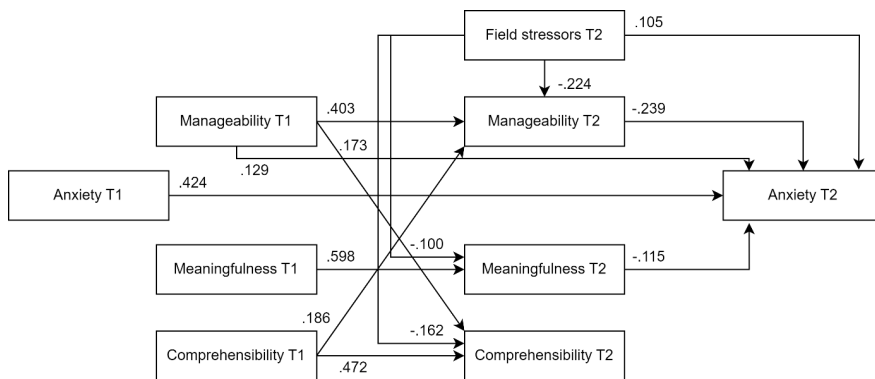
**Model.** The hypothesized mediation model (Fig 2, N = 453) did not show an acceptable fit with the variance-covariance matrix of the total sample's data ( $\chi^2(12) = 314.28$ , RMSEA .236, CFI .757, SRMR .116). There were ten significant pathways in this model: as hypothesized, post-assignment anxiety was predicted by its pre-assignment value, by field stressors, and post-assignment manageability and meaningfulness. Congruent with our hypothesis, these two SOC components acted in a protective manner; the higher the SOC component, the lower the post-assignment anxiety. The path from post-assignment comprehensibility to post-assignment anxiety was not significant ( $p > .05$ ), similar to all paths originating from traumatic stressors. Pre-assignment SOC components were not significantly predictive of post-assignment anxiety. In addition to a direct effect, field stressors also had a significant indirect detrimental effect on post-assignment anxiety.

**Figure 2**  
Tested Structural Equation Model for Anxiety



**Optimized Model.** Guided by theoretical considerations and modification indices given by MPlus, the model was optimized by adding covariations between the post-assignment SOC components, adding paths from baseline manageability to post-assignment comprehensibility, as well as from baseline comprehensibility to post-assignment manageability, and removing non-significant paths (Fig 3, N = 453). In this optimized model, pre-assignment manageability was in the end a significant predictor of post-assignment anxiety. All the other remaining path- ways were significant, and the MLBF model was a significantly better representation of the data than the original hypothesized model, showing a reasonable fit ( $\chi^2(9) = 29.566$ , RMSEA = .072, CFI = .983, SRMR = .046). Based on our hypothesis that the SOC components may act different among males and females, we proceeded to test the robustness of the optimized model in both subgroups.

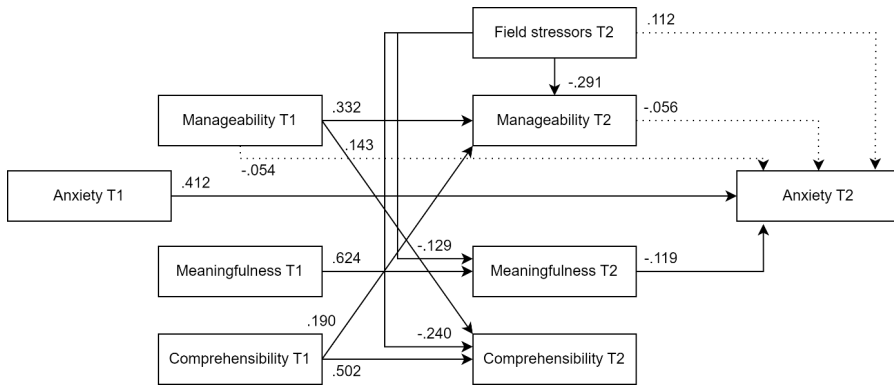
**Figure 3**  
*Optimized Structural Equation Model for Anxiety*



### Male and Female Models

**Males.** The optimized model was a worse fit for the male subsample than for the female subsample (Fig 4, N = 173). Compared to the optimized model estimated for the whole sample, neither pre- nor post-assignment manageability was a significant predictor of post-assignment anxiety. Furthermore, field stressors were not significantly directly or indirectly associated with post-assignment anxiety.

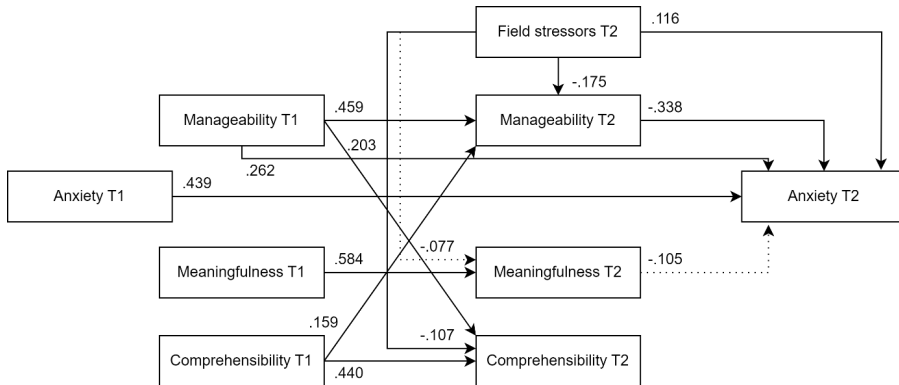
**Figure 4**  
*Tested Structural Equation Model for Anxiety – Males*



Note.  $\chi^2(9) = 23.084$ , RMSEA = .095, CFI = .972, SRMR = .061

**Females.** The pathways specified in the optimized model explained the relationships between variables significantly better for the female subsample than for the male subsample (Fig 5, N = 280). Compared to the optimized model for the whole sample, the relationship between post-assignment meaningfulness and post-assignment anxiety was not significant, and neither was the relationship between field stress and post-assignment meaningfulness.

**Figure 5**  
*Tested Structural Equation Model for Anxiety – Females*

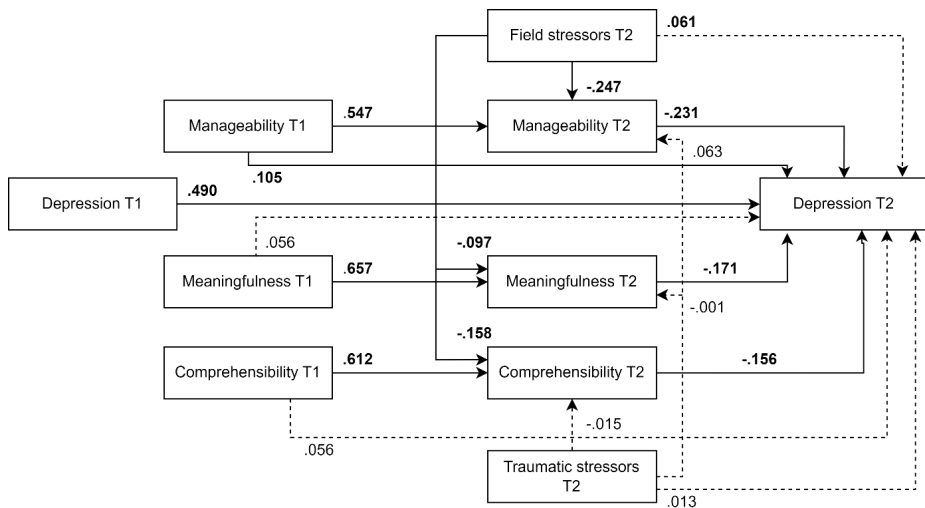


Note.  $\chi^2(9) = 13.083$ , RMSEA = .04, CFI = .994, SRMR = .036

## Depression

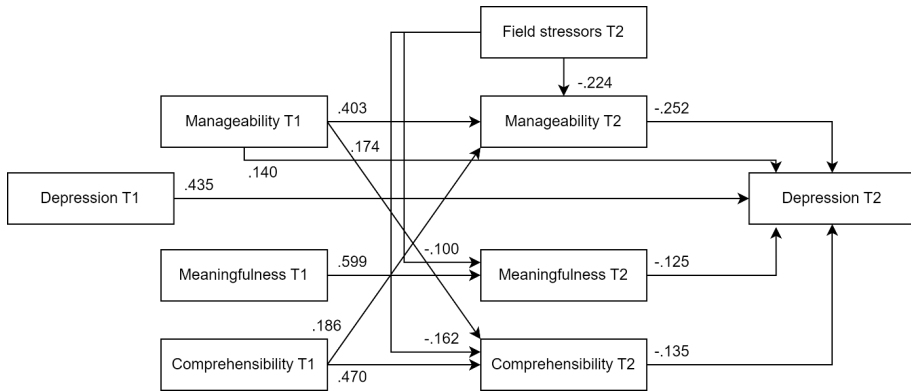
**Model.** The hypothesized mediation model (Fig 6, N = 453) did not show an acceptable fit ( $\chi^2(12) = 310.10$ , RMSEA .234, CFI .775, SRMR .118). Post-assignment depression was predicted by its pre-assignment value, and higher post-assignment SOC component scores were associated with lower post-assignment depression scores. A higher pre-assignment manageability score, on the other hand, was associated with a higher post-assignment depression score. Neither field stressors nor traumatic stressors were directly predictive of post-assignment depression, but field stressors had an indirect detrimental impact.

**Figure 6**  
Tested Structural Equation Model for Depression



**Optimized model.** The model was optimized by taking the same steps as earlier outlined for anxiety. The optimized model was a significantly better representation of the data than the hypothesized model (Fig 7, N = 453). All the remaining pathways were significant, and the final optimized model (MLFB) showed an adequate fit with the data ( $\chi^2(10) = 27.695$ , RMSEA = .063, CFI = .987, SRMR = .047).

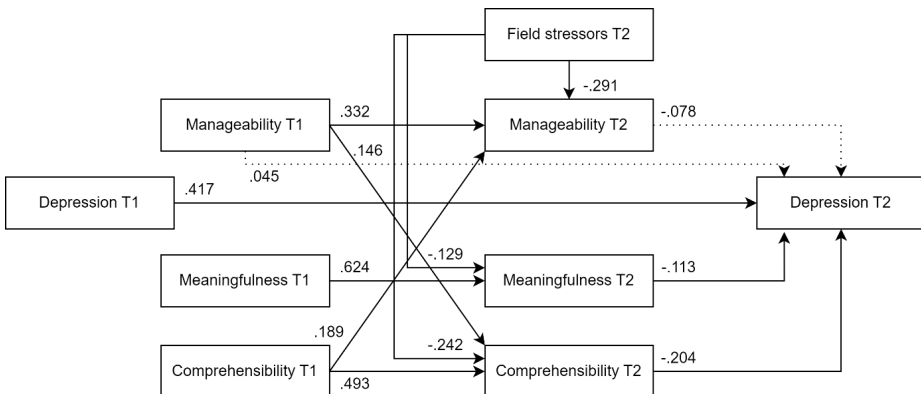
**Figure 7**  
*Optimized Structural Equation Model for Depression*



*Male and Female Models*

**Males.** The optimized model for males (Fig 8, N = 173) showed a somewhat worse fit than for females, and was not an adequate representation of the relationships between the variables. Unlike in the optimized model for the whole sample, pre- and post-assignment manageability were not significant predictors of post-assignment depression.

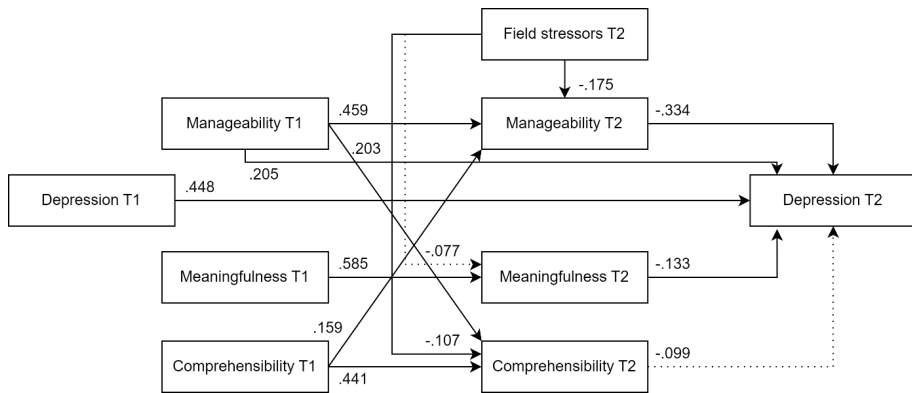
**Figure 8**  
*Tested Structural Equation Model for Depression – Males*



Note.  $\chi^2(10) = 21.189$ , RMSEA = .080, CFI = .978, SRMR = .06

**Females.** The optimized model showed a more adequate fit with the female subsample (Fig 9, N = 280) than the male subsample. Unlike for males and the overall sample, post-assignment comprehensibility was not a significant predictor of post-assignment depression. However, also opposed to the findings for males, post-assignment manageability had a strong beneficial association to post-assignment depression symptoms. Similar to the anxiety model, field stressors did not have a significant relationship with post-assignment meaningfulness.

**Figure 9**  
Tested Structural Equation Model for Depression – Females

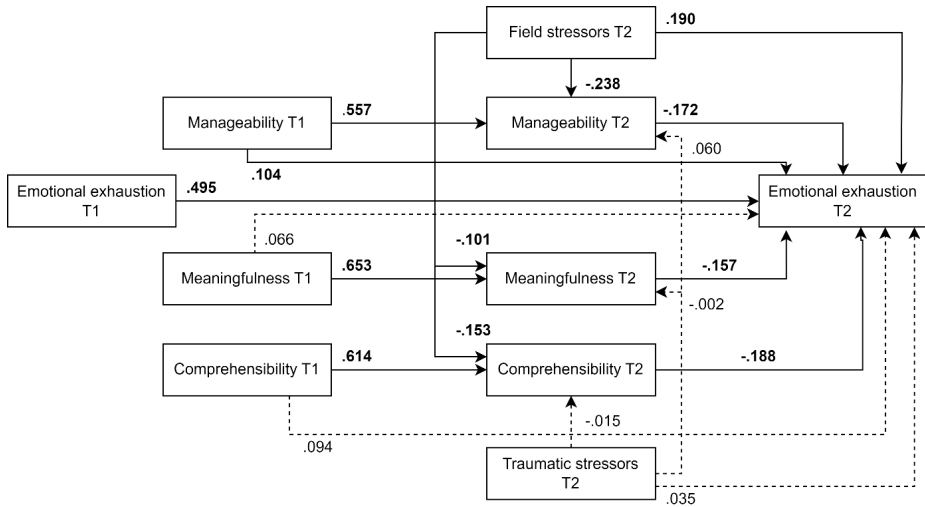


Note.  $\chi^2(10) = 14.254$ , RMSEA = .039, CFI = .995, SRMR = .04

### Emotional Exhaustion

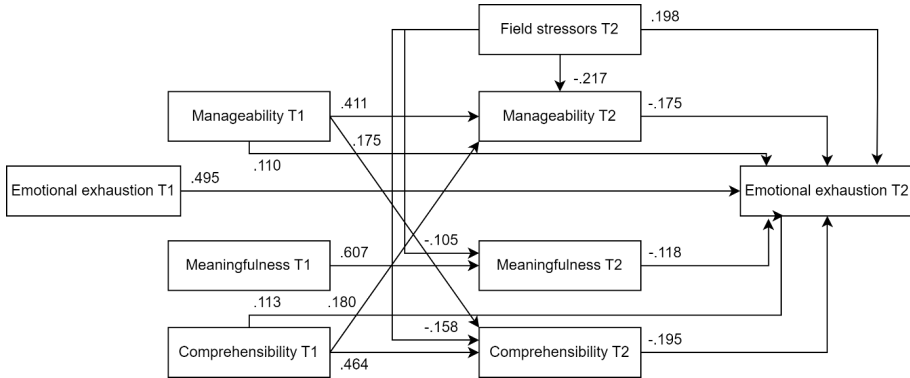
**Model.** The model fit was not acceptable ( $\chi^2(12) = 320.33$ , RMSEA .235, CFI .789, SRMR .120). As seen in Fig 10 (N = 465), post-assignment emotional exhaustion was directly predicted by its pre-assignment value, but also by field stressors and pre-assignment manageability, both of which had a detrimental impact on post-assignment emotional exhaustion. All the post-assignment SOC components had significant beneficial associations with post-assignment emotional exhaustion. In addition to the direct detrimental effect, field stressors also had an indirect effect detrimental on post-assignment emotional exhaustion.

**Figure 10**  
*Tested Structural Equation Model for Emotional Exhaustion*



**Optimized Model.** The model was optimized in the same manner as the earlier optimized models. This optimized model was a significantly better representation of the data than the hypothesized model (Fig 11, N = 465). Unlike in the earlier model, pre-assignment comprehensibility was also a significant predictor of post-assignment emotional exhaustion, showing a detrimental association with the outcome variable. All the remaining pathways were significant, but the final optimized model (MLFB) did not show an adequate fit with the data ( $\chi^2(8) = 36.121$ , RMSEA = .087, CFI = .981, SRMR = .054).

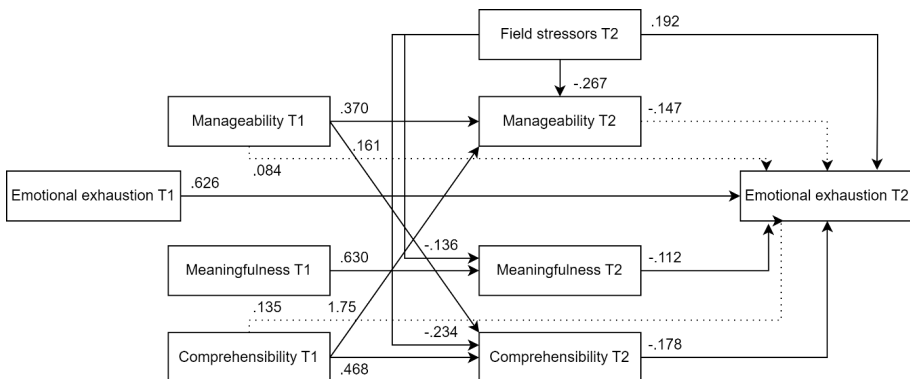
**Figure 11**  
*Optimized Structural Equation Model for Emotional Exhaustion*



*Male and Female Models*

**Males.** The optimized model fit the male subsample (Fig 12, N = 180) significantly worse than it did the female subsample. Unlike in the overall optimized model, pre-assignment comprehensibility was not a significant predictor of post-assignment emotional exhaustion. Furthermore, the paths from pre- and post-assignment manageability to post-assignment emotional exhaustion were not significant.

**Figure 12**  
*Tested Structural Equation Model for Emotional Exhaustion – Males*

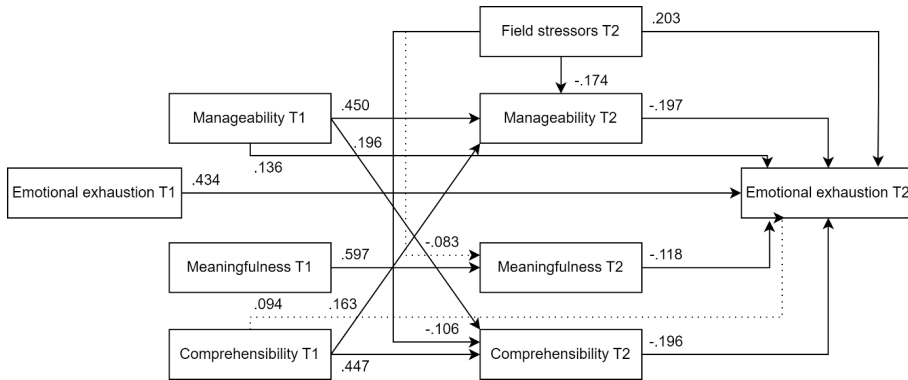


Note.  $\chi^2(8) = 27.717$ , RMSEA = .117, CFI = .967, SRMR = .067



**Females.** For females (Fig 13, N = 285), the optimized model showed a better fit than for males. Unlike in the optimized model for the full sample, the path from pre-assignment comprehensibility to post-assignment emotional exhaustion was not significant. Similar to the previous outcome variables, field stressors did not predict post-assignment meaningfulness.

**Figure 13**  
Tested Structural Equation Model for Emotional Exhaustion – Females

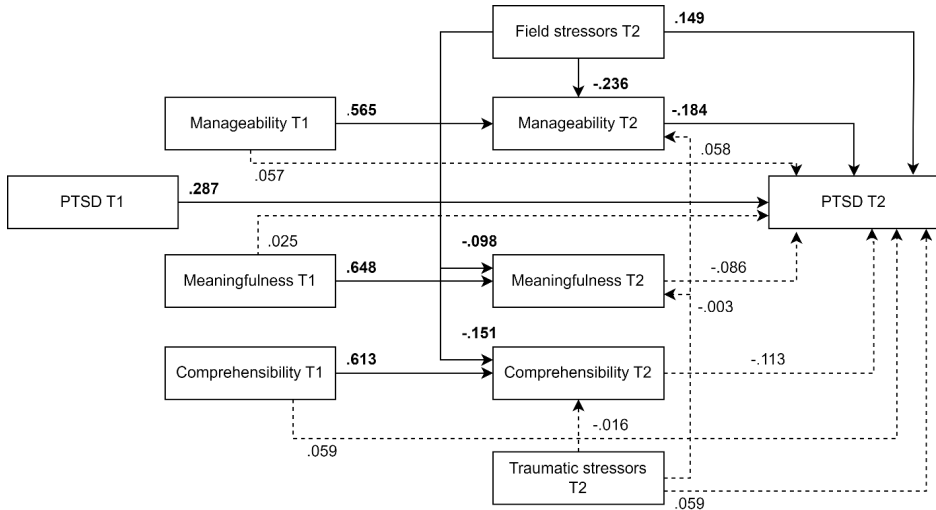


Note.  $\chi^2(8) = 16.932$ , RMSEA = .063, CFI = .989, SRMR = .047

**PTSD**

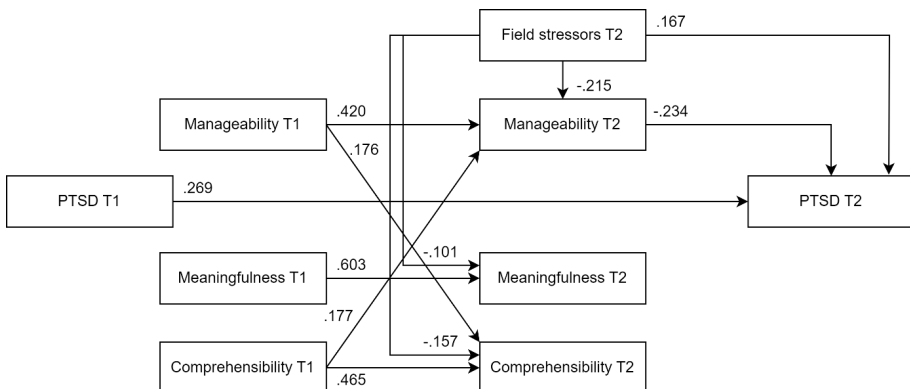
**Model.** The model fit was not acceptable ( $\chi^2(12) = 308.43$ , RMSEA .232, CFI .751, SRMR .113). Post-assignment PTSD symptoms were predicted by pre-assignment PTSD symptoms, as well as field stressors and post-assignment manageability (Fig 14, N = 460). Furthermore, field stressors had a further indirect effect on post-assignment PTSD symptoms. Traumatic stressors during the assignment had no impact on the post-assignment PTSD symptoms.

**Figure 14**  
*Tested Structural Equation Model for PTSD*



**Optimized model.** The model was optimized in the same manner as the earlier optimized models in this manuscript. The optimized model was a significantly better representation of the data than the hypothesized model (Fig 15, N = 460). All the remaining pathways were significant and the final optimized model (MLBF) showed an adequate fit with the data ( $\chi^2(10) = 23.933$ , RMSEA = .055, CFI = .988, SRMR = .043).

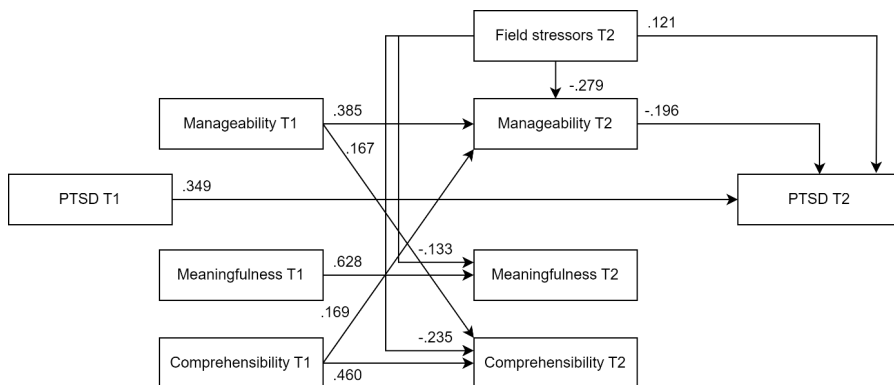
**Figure 15**  
*Optimized Structural Equation Model for PTSD*



*Male and Female Models*

**Males.** The MLBF model did not show as good a fit for males (Fig 16, N = 178) as it did for females. However, all the paths specified in the MLBF model remained significant.

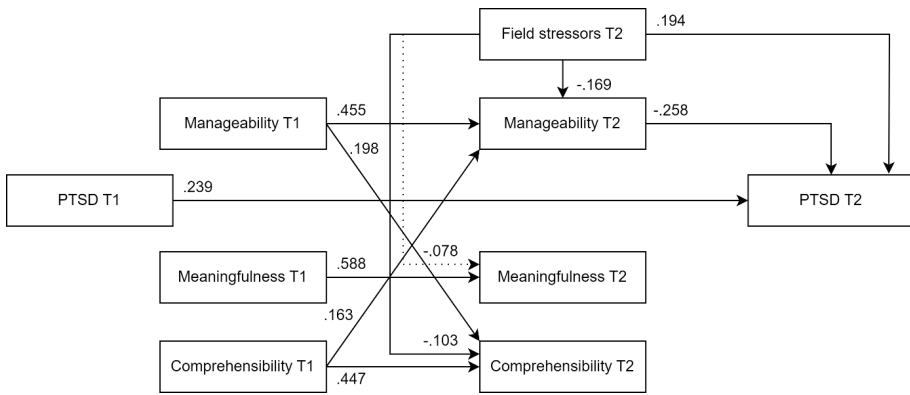
**Figure 16**  
*Tested Structural Equation Model for PTSD – Males*



Note.  $\chi^2(10) = 23.103$ , RMSEA = .086, CFI = .974, SRMR = .065

**Females.** The MLBF model showed a good fit for females (Fig 17, N = 282). Similar to the previous models, the relationship between field stress and meaningfulness was not significant; however, all other paths remained significant. Compared to males, field stressors had a larger detrimental impact on post-assignment PTSD in females, almost equaling that of pre-assignment PTSD.

**Figure 17**  
*Tested Structural Equation Model for PTSD – Females*

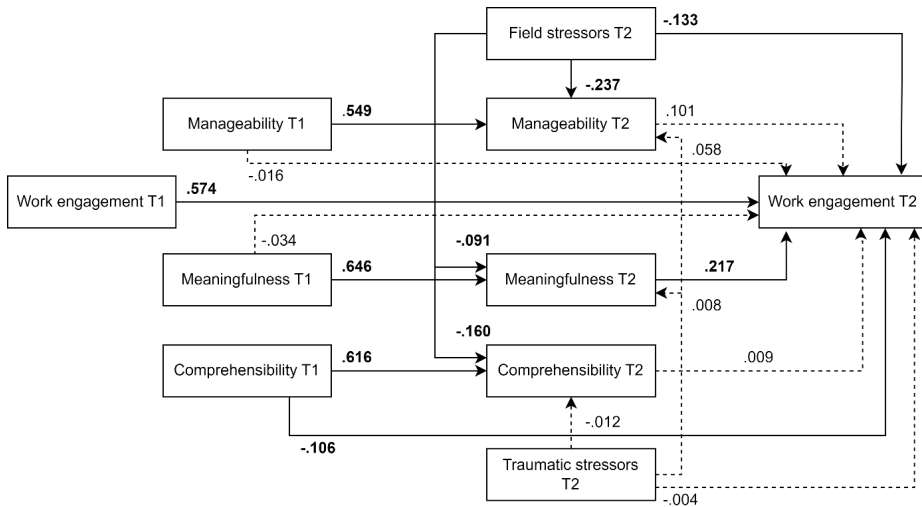


Note.  $\chi^2(10) = 11.016$ , RMSEA = .019, CFI = .999, SRMR = .037

### **Work Engagement**

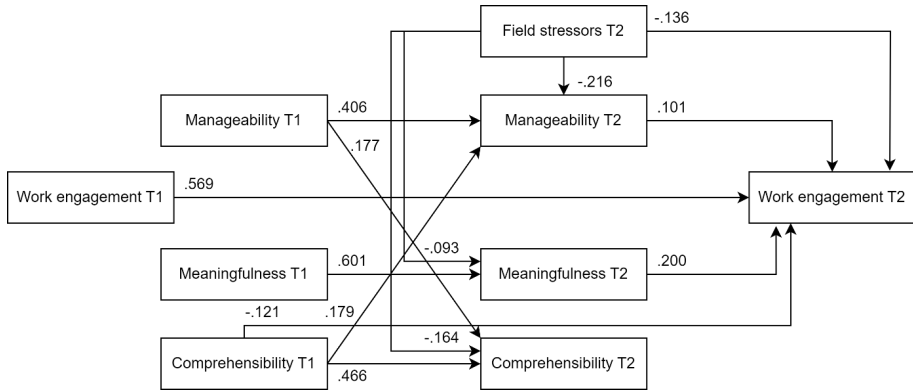
**Model.** The model fit was not acceptable ( $\chi^2(12) = 330.97$ , RMSEA .244, CFI .768, SRMR .115). As it can be seen in Fig 18 (N = 446), post-assignment work engagement was significantly predicted by field stressors, post-assignment meaningfulness and pre-assignment comprehensibility, as well as pre-assignment work engagement. There was a small but significant indirect detrimental effect of field stressors on post-assignment work engagement.

**Figure 18**  
*Tested Structural Equation Model for Work Engagement*



**Optimized model.** The model was optimized according to the same steps specified in the anxiety model. The optimized, MLBF model was a significantly better representation of the data than the hypothesized model (Fig 19, N = 446). Unlike in the original model, in the MLBF model post-assignment manageability was a significant predictor of post-assignment work engagement. All the remaining pathways were significant, yet the final MLBF model did not show an adequate fit with the data ( $\chi^2(9) = 52.289$ , RMSEA = .104, CFI = .969, SRMR = .054).

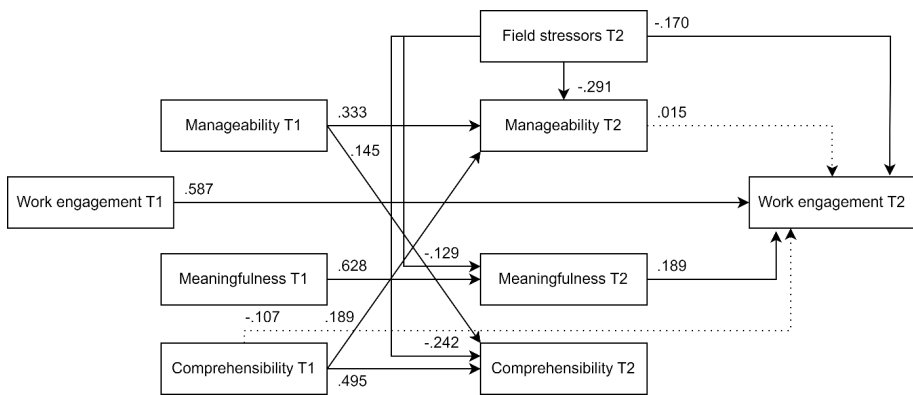
**Figure 19**  
Optimized Structural Equation Model for Work Engagement



*Male and Female Models*

**Males.** The MLBF model tested in males (Fig 20, N = 172) showed a less adequate fit than in the female subsample. Unlike in the MLBF model, the path from post-assignment manageability to post-mission work engagement was not significant, and neither was the path from pre-assignment comprehensibility to post-assignment work engagement. Furthermore, field stressors had no indirect effect on post-mission work engagement.

**Figure 20**  
Tested Structural Equation Model for Work Engagement – Males

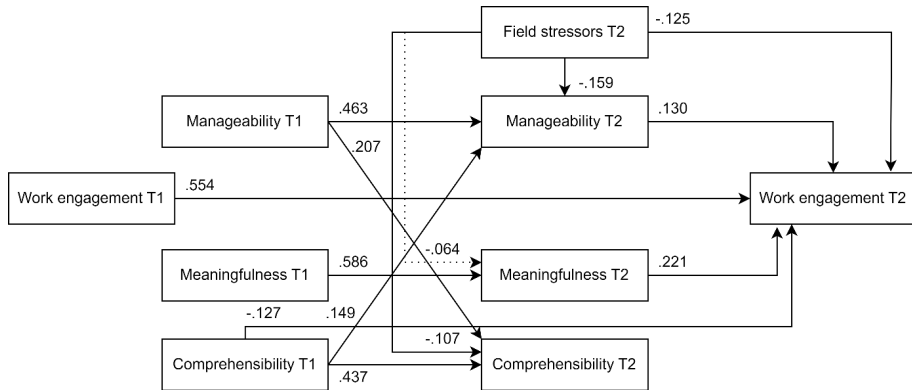


Note.  $\chi^2(9) = 36.063$ , RMSEA = .132, CFI = .952, SRMR = .066

**Females.** The optimized model showed a better fit for females than for males (Fig 21, N = 274). Similar to the previous models, the relationship between field stress and

meaningfulness was not significant. Other paths remained similar to those of the overall MLFB model.

**Figure 21**  
*Tested Structural Equation Model for Work Engagement – Females*



Note.  $\chi^2(9) = 30.740$ , RMSEA = .094, CFI = .973, SRMR = .048

## Discussion

The present study investigated whether SOC and its components mediated the relationship between traumatic and field stressors and health and work engagement in iHAWs. We also tested whether the SOC mechanisms differed between males and females. Key findings are discussed below.

### The Importance of Being Healthy Before Assignment

The strongest and most consistent predictor for staying healthy and engaged during assignment was good pre-assignment health and work-engagement. Health is a relatively stable state overtime despite the influence of external events and conditions (Keyes et al., 2002).

### Traumatic Stressors Hardly Affected Health

Potentially traumatic stressors did not impact work engagement or any health indicators. There are two possible explanations for this notable finding. First, the labelling of a stressor as (potentially) traumatic is partly context-specific. People living in areas of mass conflict may register violence as a common occurrence, even if the same events are categorized as traumatizing in other contexts (e.g., in low-conflict societies) (Horwitz & Wakefield, 2007; Spitzer et al., 2007). IHAWs expect to endure hardship and exposure to shocking events due to the nature of their work. Therefore, they are more

likely to appraise potentially traumatic experiences as part-of-the-job hardships, which they are trained to handle.

Second, a delayed onset response may also explain our finding. The demanding circumstances of an assignment do not allow for reflection time on one's health and experiences until one's return from the field. Only upon return, being in a quiet and safe environment, the trauma-related symptoms may emerge, or be recognized, and labelled as the consequence of a traumatic stressor. PTSD symptom increases during the first 2–6 months upon return from the field in both veterans and iHAWs support this assumption (de Jong et al., 2021; van der Wal et al., 2019).

### **Field Stressors Had a Detrimental Impact on Health**

The difficult field-stressors (de Jong et al., 2021) destabilise health and cause higher symptomatology on all health indicators and lower work engagement, both directly and indirectly. These findings follow the prevailing perspective that (occupational) stress causes health problems in iHAWs (Ager et al., 2012; Brooks et al., 2015; Connorton et al., 2012).

### **SOC Counteracted the Detrimental Impact of Field Stressors**

Field stressors put a strain on the individual, causing health problems or lower work engagement. However, although field stressors have this negative effect, SOC mitigated some of it. In other words, SOC mediated the relationship between field stressors and health and work engagement. SOC, as reported before (Barber, 2008; Horwitz & Wakefield, 2007; Keyes et al., 2002), had the ability to improve or maintain iHAWs' health and work engagement. How the different SOC components interplay specifically with the different health and engagement indicators is discussed below.

### ***SOC, Depression and Emotional exhaustion***

All three SOC components acted as a go-between for the impact of field stressors on post-assignment symptoms of depression and emotional exhaustion. The theoretical framework of SOC does not describe a sequential working of the different components. However, it is possible that the different components may work in sequence when dealing with depressive symptoms. Previous research has shown that the healing process of depression appears to start with the motivation to do something: the meaningfulness component was, at the onset of the depression treatment, the first predictor for successful healing (Petrie & Brook, 1992). Later on, understanding how the negative mood can be affected (comprehensibility) and what to do (manageability) to avoid or to deal with the negative effect of emotional conflict and uncertainty became the most important predictors for symptom improvement (Petrie & Brook, 1992).



### ***SOC, Anxiety and Posttraumatic Stress***

In the present study, the post-assignment SOC component manageability acted as a go-between for the negative effects of field stressors on anxiety and posttraumatic stress responses. The significance of manageability reflected the importance of being confident to resolve anxiety and post-trauma effectively. A similar mechanism is postulated in general stress management theories in which effective coping with stress (e.g. feeling safe) depends on the confidence of personal and organizational resources being in place (Lazarus & Folkman, 1984). Firm meta-analytic evidence of a substantial negative correlation between SOC and PTSD supports our findings (Schäfer et al., 2019).

### ***The Importance of ‘Doing Good’: Meaningfulness***

The post-assignment SOC meaningfulness component acted as a go-between for field stressors and work engagement, depression, and emotional exhaustion. Also, the negative impact of field stressors on post-assignment meaningfulness was substantially less compared to the impact of these stressors on comprehensibility and manageability; in the case of female iHAWs, meaningfulness was not even significantly impacted by field stressors. To do good and meaningful work appears to be an important driver of staying healthy and engaged (Rubin et al., 2016). Meaningfulness motivates iHAWs to mobilize the necessary resources to manage the extreme humanitarian field stress and to stay healthy and engaged. Meaningfulness is indeed a positive predictor of work engagement, which is associated with fewer health issues, such as depression (Torp et al., 2012). When ‘giving meaning’ to one’s actions fails, it may result in a negative cascade on the other SOC components and result in poor mental health. Meaningfulness defines the iHAWs community and may be a population-specific characteristic considering that those that perform aid work are likely self-selected based on the need to help others.

### **Males and Females Used Different SOC Components to Deal With the Consequences of Stress**

A high sense of meaningfulness predicted better work engagement and health outcomes in both males and females, with the exception of PTSD. Also, in the case of females, meaningfulness was not a significant predictor of post-assignment anxiety. There were more sex differences in the use of manageability and comprehensibility in dealing with unescapable stressors (e.g., violence, being away from home). Males leaned towards their cognitive ability to clarify, understand and structure the nature of stressors (comprehensibility) to alleviate stress.

Females tended to mobilise their available supportive resources (e.g., social support) to effectively deal with any negative consequences of the stressors via behavioural responses (manageability). Both strategies are effective and complementary. These different strategies have been described before among populations in distress, with

females at risk of mental ill-health reporting greater difficulties in managing life compared to their healthy counterparts, and at-risk males reporting greater difficulties in comprehending one's life compared to their healthy counterparts (Bergsten Brucefors et al., 2011).

### **Conceptualizing SOC**

The current findings also raise a number of conceptual discussion points.

#### ***Context Specific***

Unlike post-assignment SOC, pre-assignment SOC acted as a health-deteriorating mechanism. Higher pre-assignment SOC predicted post-assignment ill health (anxiety, depression, emotional exhaustion) and decreased work engagement. These findings were unexpected and contrast with prior findings of SOC as a predictor of good health and well-being (Mittelmark & Bauer, 2017).

The discrepancy between pre- and post-assignment SOC in promoting health may imply that SOC is not a stable (*fixed*) construct over time as viewed by Antonovsky (Antonovsky, 1979). The instability is likely attributable to retesting in a radically different environment. The pre-assignment SOC, with its Generalised Resistance Resources such as coping strategies, emotional closeness, knowledge and intelligence, and support system (Antonovsky, 1987), is not geared toward dealing with such new challenges, for example, arriving and working in a (new) humanitarian context. An environment that entails a different Generalised Resistance Resources (GRR), exerting their influence on SOC.

Transposing a pre-assignment SOC to function in a novel extreme stress environment may cause health issues if SOC is not adapted to the new environment. This may explain the pre-assignment SOC health-deteriorating mechanism described earlier. It may require iHAWs time to reassess current stressors, their meaning, available resources, to create a context-appropriate SOC to deal with new challenges.

Though SOC may be (more) stable in environments that do not change (much) over time (Mittelmark & Bauer, 2017), SOC, and its underlying GRR, may be best viewed as a context-specific or situational state-like disposition rather than a trait-like disposition or global life orientation (Eriksson & Mittelmark, 2017; Idan et al., 2017). By accepting that SOC is not a stable construct we can explain the different response on the different 'environmental threats, challenges, demands, and resources (GRR). Based on our study findings we expect that future studies specify SOC as a flexible concept which will help to improve understanding of the different longitudinal trajectories. More importantly, it can help to specify guidance on supportive interventions, prevention measures,

individual case management of those with deteriorated longitudinal trajectories.

### ***Multi-Dimensionality***

Antonovsky considered SOC to be a uni-dimensional construct. Nevertheless, the unidimensional conceptualization of SOC has been described as elusive (Eriksson & Mittelmark, 2017; Bauer et al., 2020) and recent findings show SOC to be rather multi-dimensional (Eriksson & Mittelmark, 2017). The present study modelled each SOC component separately to advance this multi-dimensional conceptualization. The information our approach generated proved useful to understand how iHAWs stay healthy, such as how different SOC components act on different health indicators, the finding that meaningfulness appears less affected by field stressors compared to the other components, and the identification of different strategies used by males and females to cope with stress. These findings may extend current SOC theories regarding its mechanisms to promote health under stress.

### **Implications**

Leaving on assignment in good health is the most important predictor for staying healthy and engaged during field assignments. Pre-employment and pre-deployment mental health screening could be a useful way to detect staff suffering from health-related problems. However, currently, there is no research that shows such screenings are effective in predicting future disorders in staff (Opie et al., 2020). Systematic advisory health conversations with iHAWs before and after assignment are a feasible alternative to improve the iHAWs' knowledge on how to stay healthy. These conversations should focus on current health status, knowledge of SOC as a context-specific personal health mechanism, and personal strategies to remain healthy.

Aid organizations that actively minimize the stress associated with humanitarian work will improve their employees' health and work engagement. Recommended is to focus on the most stressful field stressors (de Jong et al., 2021). For instance, by enhancing climate control, reducing dangerous and tiring outreach activities, and improving iHAWs' comprehension of the situational security and safety procedures. High-quality management, timely human resources replacement, technical support, good food, privacy, and internet connectivity help to further decrease levels of stress and exhaustion. Excessive workload is another major iHAW field stressor. It is important, despite contextual restrictions, to rationalise working hours, to create off-work recreational facilities and to organise social activities. Visser and colleagues (Visser et al., 2016) found out that especially trust in management was crucial for iHAWs to commit to a proper work-life balance. In addition, iHAWs and management should be aware that field stressors are likely to exert a greater negative impact on health compared to potentially traumatic stressors for most iHAWs.

Strengthening SOC during aid assignments in a manner that best fits the appropriate field context is possible within a short space of time. General interventions that improve SOC and well-being (Vastamäki et al., 2009) are, for example, physical workouts and mindfulness-based meditation practices, including mobile apps (Ando et al., 2011; Kekäläinen et al., 2018). A key SOC component in the process of staying healthy is meaningfulness. Ongoing communication on the purpose of the aid work, justification of choices and priorities, a culture of appreciation, and management actively seeking feedback from iHAWs (van den Berg et al., 2013) helps iHAWs to make sense of their work and may prevent mental health disorders (Torp et al., 2012).

Lastly, pre-departure SOC training, especially when it mimics the real humanitarian context, may strengthen the SOC during field assignments. Consider that males and females use different SOC components to stay healthy, a balanced sex composition is recommended in training and field team composition. It enables iHAWs to familiarise themselves with the different, complementary strategies of female and male iHAWs to mitigate inescapable stress.

### **Strengths and Limitations**

The present study on iHAWs has several strengths. First, it was the first to examine the association between SOC and health or work engagement in iHAWs. Moreover, the longitudinal design and substantial sample size allowed us to use advanced statistical analyses for explaining how SOC and its components function as health mechanisms in iHAWs exposed to dangerous and demanding work environments. The inclusion of traumatic and work stressors separately allowed us to compare their differential impact on health. Finally, the use of SOC components allowed us to examine gender-specific approaches to maintain good health. The current health promoting findings also provide avenues of interest for other populations that operate in similar settings, such as military personnel on deployment.

This study also has several limitations. First, while we found convincing evidence of mediating associations between SOC components and health outcomes, the current study design does not allow for causal inference. Second, the ratio of males and females was not equal in our sample. Therefore, when defining and testing the MLBF model, the sample with the largest N—in this case, females—determines most of the specifications of the MLBF, and that is likely why the MLBF is a better fit for females. Third, while obtaining a good model fit was not the focus of the current investigation, it can be noted that the model fit in some of the path analyses remained poor, indicating that they could not explain the (co)variance in our sample adequately. A poor fit can be attributed to testing specific theoretical pathways rather than allowing all model variables to covary with each other to better fit the data. More complex models could help to better

fit the data and understand iHAW health changes, for example, by introducing general and specific resistance resources to the model. Both resource types facilitate the individual's abilities to cope with stressors (see Keyes et al., 2002; p.57-62, p.71-76). Fourth, the SOC component Cronbach's alpha scores were modest, indicating that a considerable proportion of the measurement scores may have been attributable to measurement error. This was not considered problematic because the reduction in alpha was expected due to the small number of items measuring each component (Tavakol & Dennick, 2011), and the mean inter-item correlations demonstrated reliable component scores. Using the single latent SOC variable, with a high Cronbach's alpha score, delivered comparable model pathways and model fit results, and the results were generally in accordance with our expectations and prior findings.

### **Conclusion**

Being healthy and engaged before a humanitarian aid assignment is the best protection against high levels of stress that affect iHAWs' health during an aid assignment. The present study also demonstrated how the Sense of Coherence mediates the relationship between field stressors and health, enabling aid workers to remain healthy and engaged in their work. The different SOC components, especially meaningfulness, play an important role in this relationship. We also identified differences between male and female iHAWs in the SOC components. Our findings indicate that a context-specific perspective of SOC is appropriate. The implications of these findings are to be used by both organizations and professionals to promote better health of iHAWs before, during and after assignments, so that they can best serve those in need in war and disaster-affected areas.

### **Author Contributions**

KdJ: conceptualisation, methodology, formal analysis, writing – original draft, project administration, supervision, funding acquisition

SM: data curation, data collection, methodology, formal analysis, software, visualisation, writing – review & editing

HtB: methodology, formal analysis, supervision, writing – review & editing

RK: conceptualisation, methodology, supervision, writing – review & editing

JH: data curation, data collection, methodology, formal analysis, writing – review & editing

IK: conceptualisation, methodology, formal analysis, software, supervision, writing – review & editing

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# Appendix A

## Correlations Between Health Outcome Variables and Predictor Variables

### Anxiety

	1	2	3	4	5	6	7	8	9	10
1 Anxiety T1	-									
2 Anxiety T2	.51**	-								
3 Manageability T1	-.41**	-.25**	-							
4 Manageability T2	-.38**	-.40**	.58**	-						
5 Meaningfulness T1	-.21**	-.17**	.44**	.37**	-					
6 Meaningfulness T2	-.20**	-.29**	.35**	.52**	.66**	-				
7 Comprehensibility T1	-.43**	-.28**	.65**	.52**	.49**	.42**	-			
8 Comprehensibility T2	-.39**	-.38**	.52**	.71**	.42**	.54**	.65**	-		
9 Field stressors T2	.10*	.24**	-.14**	-.30**	.	-.14**	-.19**	-.27**	-	
10 Traumatic stressors T2	.	.12**	.	.	.	.	.	.	.14**	-

Note. Only significant correlations are shown.

\* $p < .05$ ; \*\* $p < .01$ .

### Depression

	1	2	3	4	5	6	7	8	9	10
1 Depression T1	-									
2 Depression T2	.59**	-								
3 Manageability T1	-.44**	-.33**	-							
4 Manageability T2	-.41**	-.51**	.58**	-						
5 Meaningfulness T1	-.40**	-.32**	.44**	.37**	-					
6 Meaningfulness T2	-.34**	-.43**	.35**	.52**	.66**	-				
7 Comprehensibility T1	-.46**	-.37**	.65**	.52**	.49**	.42**	-			
8 Comprehensibility T2	-.42**	-.49**	.52**	.71**	.42**	.54**	.65**	-		
9 Field stressors T2	.15**	.25**	-.14**	-.30**	.	-.14**	-.19**	-.27**	-	
10 Traumatic stressors T2	.	.	.	.	.	.	.	.	.14**	-

Note. Only significant correlations are shown.

\* $p < .05$ ; \*\* $p < .01$ .

### Emotional exhaustion

		1	2	3	4	5	6	7	8	9	10
1	Emotional exhaustion T1	-									
2	Emotional exhaustion T2	.62**	-								
3	Manageability T1	-.32**	-.24**	-							
4	Manageability T2	-.32**	-.48**	.58**	-						
5	Meaningfulness T1	-.30**	-.24**	.44**	.37**	-					
6	Meaningfulness T2	-.34**	-.43**	.35**	.52**	.66**	-				
7	Comprehensibility T1	-.40**	-.32**	.65**	.52**	.49**	.42**	-			
8	Comprehensibility T2	-.39**	-.49**	.52**	.71**	.42**	.54**	.65**	-		
9	Field stressors T2	.18**	.37**	-.14**	-.30**	.	-.14**	-.19**	-.27**	-	
10	Traumatic stressors T2	.	.	.	.	.	.	.	.	.14**	

Note. Only significant correlations are shown.

\* $p < .05$ ; \*\* $p < .01$ .

### PTSD

		1	2	3	4	5	6	7	8	9	10
1	PTSD T1										
2	PTSD T2	.40**									
3	Manageability T1	-.42**	-.26**								
4	Manageability T2	-.37**	-.39**	.58**							
5	Meaningfulness T1	-.28**	-.20**	.44**	.37**						
6	Meaningfulness T2	-.24**	-.28**	.35**	.52**	.66**					
7	Comprehensibility T1	-.45**	-.27**	.65**	.52**	.49**	.42**				
8	Comprehensibility T2	-.38**	-.36**	.52**	.71**	.42**	.54**	.65**			
9	Field stressors T2	.15**	.29**	-.14**	-.30**	.	-.14**	-.19**	-.27**		
10	Traumatic stressors T2	.	.11*	.	.	.	.	.	.	.14**	

Note. Only significant correlations are shown.

\* $p < .05$ ; \*\* $p < .01$ .

### Wok engagement

	1	2	3	4	5	6	7	8	9	10
1 Work engagement T1										
2 Work engagement T2	.67**									
3 Manageability T1	.19**	.19**								
4 Manageability T2	.16**	.28**	.58**							
5 Meaningfulness T1	.42**	.36**	.44**	.37**						
6 Meaningfulness T2	.44**	.48**	.35**	.52**	.66**					
7 Comprehensibility T1	.24**	.18**	.65**	.52**	.49**	.42**				
8 Comprehensibility T2	.19**	.27**	.52**	.71**	.42**	.54**	.65**			
9 Field stressors T2	.	-.18**	-.14**	-.30**	.	-.14**	-.19**	-.27**		
10 Traumatic stressors T2	.	.	.	.	.	.	.	.	.14**	

*Note.* Only significant correlations are shown.

\* $p < .05$ ; \*\* $p < .01$ .

# Appendix B

## Humanitarian Field Stressors List

Reported stress level	Significant		High	
	<i>n</i>	%	<i>n</i>	%
<i>Conditions in the field</i>				
Location/travel	77	16.0	22	4.6
Climate	80	16.6	38	7.9
Security context of the country	74	15.4	36	7.5
Separation from family and friends	59	12.2	23	4.8
Housing/sanitation	40	8.3	19	3.9
Food/amenities	39	8.1	13	2.7
Health risks	27	5.6	12	2.5
<i>Cultural stressors</i>				
Language problems with beneficiaries	50	10.4	11	2.3
Local customs or mentality	53	11.0	14	2.9
Cultural sensitivity of MSF colleagues	46	9.6	15	3.1
<i>Work stressors</i>				
Unclear communication in the project	79	16.4	48	10.0
High workload	78	16.2	44	9.1
Not available staff/replacements	71	14.8	37	7.7
Emotional impact of the work	64	13.3	28	5.8
Role of the project coordinator (PC)/medical team leader (MTL)	58	12.1	43	8.9
Security and safety conditions	51	10.6	21	4.4
Lack of management appreciation	53	11.0	39	8.1
Lack of technical support	54	11.2	26	5.4
Role of the country management team (CMT)	51	10.6	30	6.2
Role of HQ/Operations	40	8.3	24	5.0
Unclear/non-existent job profile or assignment	33	6.9	26	5.4
Powerlessness/hopelessness	34	7.1	15	3.1
Poor working conditions	29	6.0	8	1.7
Contact with authorities	28	5.8	4	.8
Working with national staff	17	3.5	8	1.7
<i>Team stressors</i>				
Problematic communication in the team	67	13.9	38	7.9
Negative team atmosphere	50	10.4	30	6.2
Conflicts in the team	44	9.1	25	5.2
Poor/no relationships with other team members	43	8.9	20	4.2
Breaching of code of conduct by others	31	6.4	11	2.3
Team composition (e.g., gender, cultures, composition)	23	4.8	13	2.7
<i>Self-experienced upsetting events</i>				
Security and safety incidents	42	8.7	9	1.9
Looting/hold-up/assault/shooting	23	4.8	15	3.1
Intimidation by authorities	18	3.7	11	2.3

*Continued.*

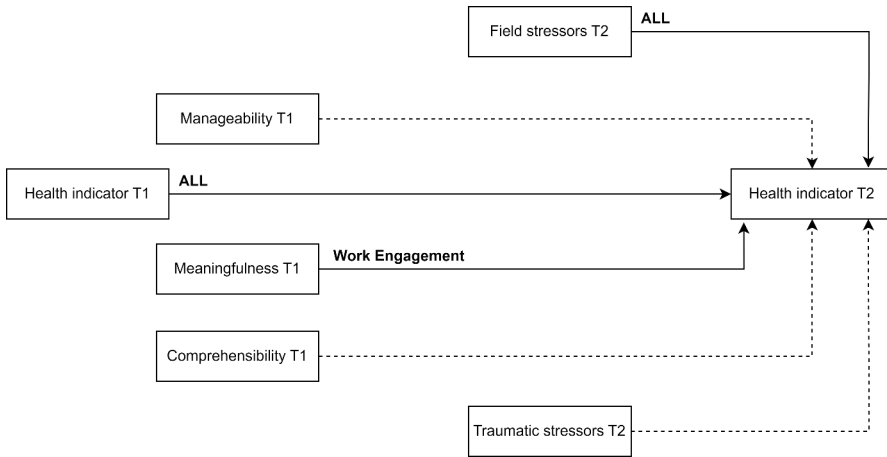
Reported stress level	Significant		High	
	<i>n</i>	%	<i>n</i>	%
Hearing or seeing violence/intimidation/abuse	37	7.7	20	4.2
<i>Code of conduct</i>				
Experienced intimidation/aggression by colleagues	28	5.8	13	2.7
Witnessed intimidation/aggression by colleagues	22	4.6	12	2.5
Witnessed sexual harassment/violence toward colleagues	8	1.7	10	2.1

*Note.* Reported levels of experienced stress per item in the two highest response categories. Table reported in de Jong et al. (2021).

# Appendix C

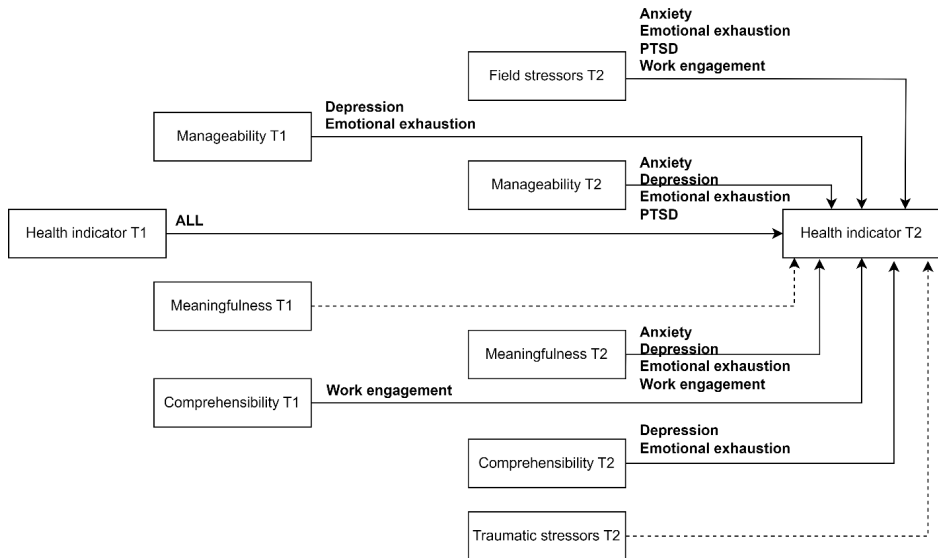
## Visuals Depicting Pre-Modelling Steps 1-3

**Figure C1**  
*Pre-Modelling Step 1*



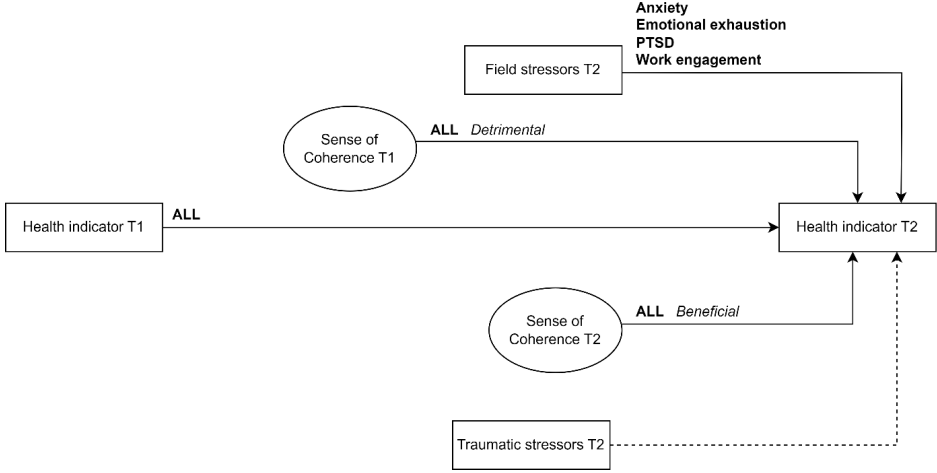
*Note.* There was a strong positive correlation with health indicator scores at T1 and T2. Field stressors score always had a detrimental association with health indicators at T2 – the higher the field stressors score, the higher the symptoms or the lower the work engagement. In the case of work engagement, meaningfulness at T1 had a small but significant positive (beneficial) association with work engagement at T2. In all other cases, SOC subscales at T1 were not predictive of health indicator scores at T2.

**Figure C2**  
Pre-Modelling Step 2



*Note.* There was a strong positive correlation with health indicator scores at T1 and T2. Field stressors score had a detrimental association with all health indicators except depression at T2 – the higher the field stressors score, the higher the symptoms or the lower the work engagement. Manageability at T1 had small but significant detrimental associations with depression and emotional exhaustion at T2. Comprehensibility at T1 had a small but significant detrimental association with the health indicator at T2, so that higher SOC subscale scores were associated with lower symptoms or more work engagement.

**Figure C3**  
*Pre-Modelling Step 3*



*Note.* There was a strong positive correlation with health indicator scores at T1 and T2. Field stressors score had a detrimental association with all health indicators except depression at T2 – the higher the field stressors score, the higher the symptoms or the lower the work engagement. Both of the latent SOC variables – SOC at T1 and SOC at T2 – had strong associations with the health indicator score at T2. In all cases, a higher score on SOC at T1 had a detrimental association, whereas a higher score on SOC at T2 had a beneficial association.







# 7

## **Longitudinal Measurement Invariance of the SOC-13 Sense of Coherence Scale in International Humanitarian Aid Fieldworkers**

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## Abstract

Sense of Coherence (SOC) is a core construct of the salutogenetic model of health and can be described as a trait-like attitude to life challenges. It plays a role in how stress affects well-being and comprises three main components: comprehensibility, manageability, and meaningfulness. SOC offers a framework for examining why and how international humanitarian aid workers (iHAWs) maintain their health and well-being. iHAWs work on an assignment-basis, in stressful and often dangerous contexts. SOC is a prime candidate for targeted prevention, intervention, and routine health monitoring initiatives. Consequently, it becomes imperative to ascertain the stability of this construct within the dynamic and demanding context of humanitarian fieldwork. While SOC is a relatively stable construct, its structural invariance has not been longitudinally examined before and after highly stressful time periods. We examined the factor structure and longitudinal measurement invariance of the SOC-13 self-report questionnaire among 593 iHAWs over the course of a humanitarian aid field assignment, with measurement occasions at pre- and post-assignment. Instead of the more frequently used three-factor model, the best measurement model was a two-factor model with a combined comprehensibility-manageability factor and a meaningfulness factor. We could establish full metric, partial scalar, and partial strict measurement invariance. We conclude that SOC-13 is longitudinally usable in professional settings characterised by variations in stress levels and working contexts. Its longitudinal measurement invariance indicates that any changes in SOC as a result of organisational policies or interventions can be attributed to the efforts, rather than potential instability in SOC-13.

### Keywords

Sense of coherence, humanitarian workers, psychometric, longitudinal measurement invariance

# Introduction

Sense of Coherence (SOC), a concept first described by Aaron Antonovsky (1979), is a core construct in the salutogenic model of health. This perspective addresses the origins of positive health and its predictors, as opposed to illness and risk factors thereof (Mittelmark & Bauer, 2022). SOC is conceptualised as an enduring attitude to life challenges, which plays a crucial role in whether stress has an adverse impact on the individual or not. SOC comprises of three components - comprehensibility, manageability, and meaningfulness - each of which describes a unique facet relating to perceptions of and attitudes to life challenges and stress. *Comprehensibility* refers to an individual's assessment of the clarity, structure, and understanding of the difficulties or challenges they are facing. *Manageability* considers how much direct or indirect control the person thinks he or she has over managing these challenges. Finally, *meaningfulness* pertains to the extent to which the challenge or stress seems important to the individual and whether it is something worth struggling for. According to Antonovsky (1979), one's life experiences form one's SOC, and a strong SOC is helpful in coping with the inevitable stressors of life.

## SOC and Health

The salutogenetic model, particularly the relationship between SOC and (positive) health, has been extensively researched (e.g., del-Pino-Casado et al., 2019; Eriksson & Contu, 2022; Schäfer et al., 2023). A strong SOC has been linked to fewer mental health complaints overall and better perceived (mental) health (de Jong et al., 2022; Eriksson & Lindström, 2006); furthermore, it predicts better health and quality of life (Eriksson & Lindström, 2007), and is associated with lower anxiety, depression, posttraumatic stress disorder and burnout (de Jong et al., 2022; Feldt, 1997; Schäfer et al., 2019; 2023). The role of SOC in work-related well-being has also been extensively studied. The evidence-base overall suggests that: 1) SOC can be influenced by different work-related issues, like job resources (e.g., Jenny et al., 2022); 2) SOC is negatively associated with work-related health problems, e.g. depression, burnout, and job stress (Albertsen et al., 2001; de Jong et al., 2023; Feldt, 1997; González-Siles et al., 2022; Michele Masanotti et al., 2020) and 3) SOC can mediate or moderate the negative effects of work stressors on health and work-related wellbeing outcomes (e.g. de Jong et al., 2022; Feldt, 1997).

One occupational context where the concept of SOC can be applied is humanitarian aid fieldwork. Humanitarian fieldwork implies the confrontation with unavoidable and oftentimes unsolvable stressors. The concept of SOC is worthwhile as it might help explain why – despite the overwhelming stressors and demands – most humanitarian fieldworkers are able to maintain their health and keep on working (De Jong et al., 2021). Indeed, research on SOC among humanitarian fieldworkers indicates that, in

line with research from other occupational groups, strong SOC is associated with good health and wellbeing (de Jong et al., 2022; Veronese & Pepe, 2014, 2017).

However, the results of a recent longitudinal investigation into the mediating role of SOC in the mental health and work-related well-being of international humanitarian aid workers (iHAWs) indicated that while SOC mediated stress, the relationship between SOC and stressors showed inconsistencies across time (de Jong et al., 2022). When examining the sub-components of SOC (i.e. comprehensibility, manageability, and meaningfulness), the expected associations with health outcomes were evident cross-sectionally, with higher SOC component scores associated with better health and fewer symptoms. However, when using the components as a cross-lagged predictor, not all associations were statistically significant or, when significant, exhibited a direction opposite to what was seen in cross-sectional analyses. This led to the impression that the items measuring SOC may be interpreted differently over time, due to the influence of the stress and drastically changing contexts that humanitarian aid workers find themselves in.

Considering the potential importance of SOC in affecting the mental health of humanitarian aid workers, SOC has emerged as a candidate for prevention, intervention, and routine health monitoring initiatives within organizations employing aid workers. However, if the instrument measuring SOC is not stable in a humanitarian aid context, including it in health monitoring or developing interventions based on it is futile. Without a stable way of measuring SOC, any assessment of interventions may be inaccurate, making it difficult to determine if any resulting changes in SOC are due to the intervention or the instability of the SOC instrument while establishing the long-term impact of the intervention would be similarly challenging. In order to avoid developing or implementing interventions that may appear useful in the short term but fail to address the dynamic nature of SOC in a humanitarian aid context, it is crucial to establish whether the instrument measuring it shows stability over time in a humanitarian aid work context. The current investigation aims to address that knowledge gap.

### **Measurement of SOC**

SOC is most often measured by the SOC-13 instrument, a shortened version of the original 29-item measure (Antonovsky, 1987). In general, the SOC-13 is found to be a reliable and valid self-report questionnaire (Eriksson & Lindstrom, 2005; Feldt et al., 2004; 2007; Grevenstein & Bluemke, 2017; Hakanen et al., 2007; Lerdal et al., 2017; Richardson et al., 2007). While Antonovsky's original intention was to use the global scale, later research has shown a three-factor structure, theoretically derived from the three sub-components of SOC, to be a better fit (e.g., Feldt et al., 2000). However, there

is growing evidence favouring a two-factor measurement model, due to the often very high correlation between the comprehensibility and manageability factors (Grevenstein & Bluemke, 2017, 2021; Zimprich et al., 2006).

The reliability and validity of SOC-13 have been strongly established. However, researchers have to consider the issue of measurement invariance (MI) (Vandenberg & Lance, 2000). The central question underlying MI is whether the instrument measures the construct similarly across different conditions. In the context of longitudinal research, this could be seen as examining whether the construct has the same meaning over time. If an instrument measures the construct similarly across time or groups, MI is established. Only then can one be sure that any observed differences or similarities across time or groups are true instead of measurement errors arising from, for example, different understandings of items across time or groups (Chen, 2008; Davidov et al., 2014).

Extant research into the MI of SOC-13 at different time points has mainly been conducted by comparing SOC-13 scores cross-sectionally across different age groups (Grevenstein & Bluemke, 2021; Luyckx et al., 2012; Zimprich et al., 2006). A minority of studies have also examined the MI longitudinally, with a multiple-year interval between measurement occasions (Feldt et al., 2007; Grevenstein & Bluemke, 2017; Richardson et al., 2007). The overall results suggest that SOC-13 is reasonably invariant across time, fulfilling at least partial MI (Feldt et al., 2007; Grevenstein & Bluemke, 2017, 2021; Luyckx et al., 2012; Richardson et al., 2007; Zimprich et al., 2006). This is generally considered sufficient for comparing means across groups or time (Dimitrov, 2010). However, none of the previous research examined longitudinal MI before and following a period of time with unusually high amounts of stressors. While earlier research concludes that negative life events (Volanen et al., 2007) or major life stressors, such as experiencing a life-threatening accident (Schnyder et al., 2000), can impact SOC, these studies do not report on MI.

### **Study Aims**

The study described in this paper investigated the longitudinal MI of the SOC-13 scale in a sample of iHAWs, to examine whether the SOC-13 construct remains stable or whether the experience of having been on a humanitarian fieldwork assignment alters the iHAWs' perspective or understanding of the questions. We determined the best measurement model of the instrument and then examined the MI of the instrument across time (pre-humanitarian field assignment vs. post-humanitarian field assignment) utilising longitudinal confirmatory factor analysis.

# Method

## Participants

The current study had 593 participants, most of whom were female ( $N = 336$ , 57%). The participants' ranged in age between 24 and 76 years old ( $M = 40.5$ ;  $SD = 10.8$ ). Most of them ( $N = 301$ , 51%) were of European origin, were classified as clinical activity managers or clinical medical specialists ( $N = 359$ , 61%) or coordinators ( $N = 167$ , 28%), and had completed a university degree ( $N = 514$ , 91%). The mean length of fieldwork was 6.3 months ( $SD = 3.8$ ), and the field assignment locations were diverse, ranging from longer-term projects in stable and conflict-free areas (e.g., Uzbekistan) to areas of high conflict and uncertainty (e.g. Syria).

While there are no strict rules for the number of participants needed for confirmatory factor analyses, the required sample size recommendations for a maximum likelihood estimator range from a 5:1 participant-indicator ratio (Tanaka, 1987) to about 400 (Jackson, 2001; Wolf et al., 2013). With 593 and 498 participants at the first and the second measurement occasion, respectively, the current study was deemed to have ample power. Sensitivity analysis conducted previously on the same prospective sample showed missing data were likely missing completely at random (De Jong et al., 2021). The Ethics Review Board of MSF has approved this research (ID 1642).

## Procedure

The participants were recruited as part of a larger longitudinal study into the (mental) health and wellbeing of iHAWs of Médecins Sans Frontières Operational Centre Amsterdam (MSF OCA) between December 2017 and February 2019 (De Jong et al., 2021). They were approached during their pre-assignment briefings, which took place at the MSF Operational Centre Amsterdam offices or, in some cases, online, before the start of the field assignments. A non-MSF researcher briefed the potential participants on what the study was about, and all participants signed informed consent. Pre-assignment questionnaires were filled in 0-14 days before arriving at the fieldwork site. Post-assignment questionnaires were filled in upon return from the assignment during the in-person debriefings in Amsterdam, or in some cases, remotely when the participant did not return via Amsterdam, at a maximum of four weeks after the return. Data collection ended in March 2020. The questionnaires were filled in on a secured online platform.

## Measures

The SOC-13 (Antonovsky, 1987) instrument consists of five questions on comprehensibility, four on manageability, and four on meaningfulness. It is a 7-point Likert scale with different anchor points in response to statements, most typically



ranging from 'very seldom/never' to 'very often'. A higher total score denotes a higher SOC. The negatively worded items (#1, #2, #3, #7, and #10) were recoded. Eriksson and Lindstrom's (2007) large systematic review found SOC-13 well-suited for measuring SOC cross-culturally. Considering our international sample, we utilised the English version of the instrument. The internal consistency of the instrument was good ( $\alpha = .80$ ) overall, modest for the subscales (comprehensibility  $\alpha = .65$ , manageability  $\alpha = .59$ , and meaningfulness  $\alpha = .58$ ).

### Statistical Analysis

The descriptive statistics were calculated using *IBM SPSS Statistics 23. MPlus 8.5* was used for the confirmatory factor analyses. The goodness-of-the-fit of the models was assessed by a  $\chi^2$  test (Bentler & Bonett, 1980), the comparative fit index (CFI), the root-mean-square error of approximation (RMSEA), the standardised root mean square residual (SRMR), the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). CFI values of .90/.95 or higher indicate appropriate/good model fit (Bentler, 1990; Hu & Bentler, 1999), as do RMSEA and SRMR values of .08/.05 or lower, respectively (Brown & Cudeck, 1993; Hu & Bentler, 1999; Schumacker & Lomax, 2004). The AIC and the BIC reflect not only the model fit but also the parsimony of the model, with BIC assigning a stronger penalty on more model parameters; lower scores indicate a better relative model fit, and differences greater than  $\pm 10$  are considered to indicate an unlikely equal fit (Raftery, 1995). In light of the criticism of strict cut-off criteria in goodness-of-the-fit indices (e.g., Hu & Bentler, 1999), particularly the tendency of the  $\chi^2$  test to be overly sensitive to large sample sizes, some alternatives have been proposed. In the case of a significant  $\chi^2$  test, the model fit can still be considered acceptable so long as the change in CFI is smaller than 0.01, in combination with a change of maximum 0.015 or 0.03 in RMSEA and SRMR, respectively (Chen, 2007; Cheung & Rensvold, 2002). Maximum likelihood (ML) was used for parameter estimation.

For longitudinal examinations of MI with the same people across time, longitudinal CFA can be applied (Brown, 2015), instead of multi-group CFA. Four increasingly restrictive levels of MI can be examined through nested longitudinal CFA models (Vandenberg & Lance, 2000): configural invariance, metric invariance, scalar invariance, and strict invariance. Under configural invariance, the pattern of item loadings on the factors is the same across time. In other words, the same items relate to the same latent constructs at each measurement occasion. Metric invariance can be established when the corresponding factor loadings are equivalent across time, indicating that the items have the same meaning over time. Scalar invariance indicates that the corresponding factor loadings *and* intercepts are equal across time, meaning that the item difficulty is equal over time; when this condition is fulfilled, at least partially, latent means can be compared across measurement occasions (Byrne et al., 1989; Lubke & Dolan,

2003). Finally, strict invariance, also known as residual invariance, assumes that the corresponding factor loadings, intercepts, *and* residual variances are equal across time. The nested models are tested sequentially, beginning with the configural MI model as a baseline model, always comparing the model fit of the more restrictive nested model to the less restrictive model before. If the model fit of the more restrictive model is not significantly worse, it is evidence for MI at the corresponding level. Beyond the four levels of longitudinal MI, one can also examine structural invariance with additional models looking for the equality of factor variances, factor covariances, and factor means. In practice, reaching MI at a higher level than metric MI can be challenging (Schmitt & Kuljanin, 2008), but this does not have to preclude one from making comparisons as partial invariance may also be sufficient for making meaningful comparisons (Byrne et al., 1989; Steenkamp & Baumgartner, 1998). When full MI at a certain level cannot be reached, one of the available possibilities is to check modification indices (ModInd) in order to examine which specific parameters caused the decline in the model fit, and explore whether freeing one of those parameters would improve the model fit. Presuming that the changes suggested by the modification indices are a) theoretically plausible, and b) clearly documented, this process is acceptable (Dimitrov, 2010). If the resulting drop in model fit of the new modified model is acceptable, partial invariance has been established, and one may continue examining the next level of MI.

## Results

### Descriptive Results

Mean total SOC-13 scores significantly increased from pre-assignment ( $M = 66.94$ ,  $SD = 9.82$ ) to post-assignment ( $M = 68.27$ ,  $SD = 10.76$ ),  $t(481) = 3.70$ ,  $p < .001$ ,  $d = .17$ .

### CFA at Pre-Assignment and Post-Assignment

Following the incongruous previous research findings surrounding the best measurement model for the SOC-13 (e.g., Eriksson & Contu, 2022; Grevenstein & Bluemke, 2017, 2021), we tested six measurement models with CFA, separately for each measurement occasion. The tested measurement models were a single global-factor model, a two-factor model, and a three-factor model, plus each of the earlier models with correlated residuals between items #2 (*‘Has it happened in the past that you were surprised by the behavior of people whom you thought you knew well?’*) and #3 (*‘Has it happened that people whom you counted on disappointed you?’*). These items have been found to have a high correlation in several previous studies (e.g., Grevenstein & Bluemke, 2017, 2021; Naaldenberg et al., 2011; Sardu et al., 2012), as they reflect interpersonal trust and participants likely perceive these questions as similar.

**Table 1**  
*Model Fit Indices for CFAs of the SOC-13 Scale for Participants at Pre-Assignment and Post-Assignment*

Measurement model	$\chi^2$	df	$\chi^2/df$	CFI	RMSEA [ $CI_{90}$ ]	SRMR	AIC	BIC
<b>Pre-assignment</b>								
M1 (single global factor)	323.79	65	4.98	.830	.082 [.073-.091]	.059	25580	25751
M1a (single global factor)	239.24	64	3.74	.885	.068 [.059-.077]	.051	25498	25673
M2 (two factors)	272.64	64	4.26	.863	.074 [.065-.083]	.055	25531	25706
<b>M2a (two factors)</b>	<b>189.30</b>	<b>63</b>	<b>3.00</b>	<b>.917</b>	<b>.058 [.049-.068]</b>	<b>.046</b>	<b>25450</b>	<b>25630</b>
M3 (three factors)	271.11	62	4.37	.862	.075 [.066-.085]	.055	25533	25718
M3a (three factors)	186.90	61	3.06	.917	.059 [.049-.069]	.046	25451	25640
<b>Post-assignment</b>								
M1 (single global factor)	339.29	65	5.22	.840	.092 [.082-.102]	.059	21192	21356
M1a (single global factor)	226.91	64	3.55	.905	.071 [.061-.082]	.048	21081	21250
M2 (two factors)	295.08	64	4.61	.866	.085 [.075-.095]	.054	21150	21318
<b>M2a (two factors)</b>	<b>185.59</b>	<b>63</b>	<b>2.95</b>	<b>.929</b>	<b>.062 [.052-.073]</b>	<b>.043</b>	<b>21042</b>	<b>21215</b>
M3 (three factors)	291.26	62	4.70	.867	.086 [.076-.096]	.055	21150	21327
M3a (three factors)	177.62	61	2.91	.932	.062 [.051-.073]	.043	21038	21219

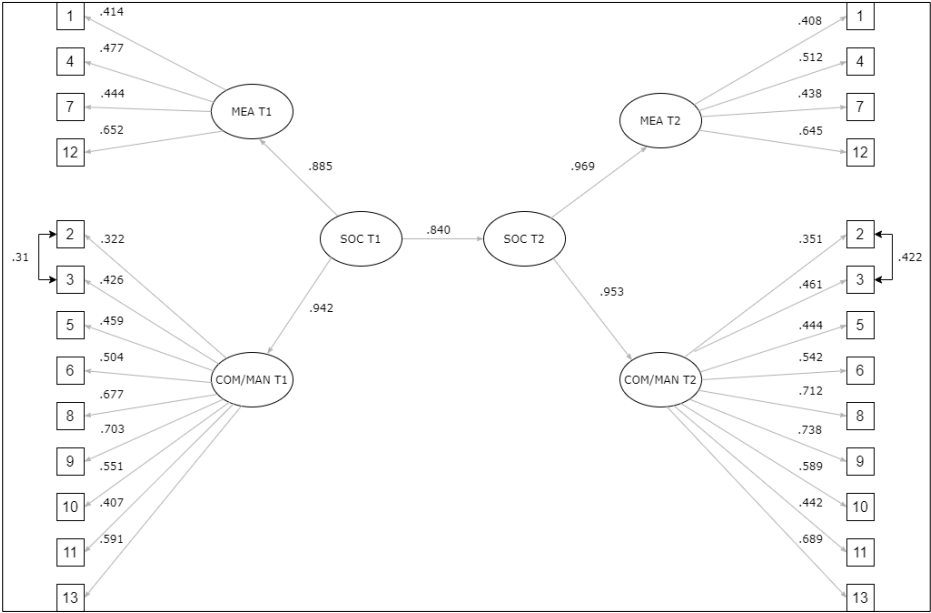
*Note.* CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; AIC = Akaike information criterion; BIC = Bayesian information criterion.  
a = model with correlated residuals between items #2 and #3.

The version of each model that included the correlated residuals was a better fit than the model that did not (see Table 1). The model fit in the single-factor model was considerably worse than in the two- and three-factor models. The latter two both had an acceptable model fit, with the two-factor model showing a slightly better fit at pre-assignment and the three-factor model at post-assignment. However, as we observed that the comprehensibility and manageability factors were very highly correlated at both pre- and post-mission ( $r = .95$  and  $r = .94$ , respectively), we chose the two-factor model as a more parsimonious way of describing the data.

**Longitudinal Factor Analyses and Measurement Invariance**

The final model of the longitudinal factor analysis is illustrated in Figure 1 below. In this model, the combined comprehensibility/manageability factor and the meaningfulness factor loaded onto the global SOC factor at both the pre- and post-assignment time points, with pre-assignment global SOC predicting post-assignment global SOC. In addition to the previously mentioned correlated residuals for items two and three, correlated residuals between corresponding items (e.g. item 1 at pre-assignment and post-assignment) were included in the model to account for the interdependency of items in a longitudinal dataset (Landis et al., 2009).

**Figure 1**  
*Longitudinal Factor Analysis: a Fully Standardized Model of SOC-13 with Two Factors, Meaningfulness (MEA) and Comprehensibility/Manageability (COM/MAN) at T1 (pre-assignment) and T2 (post-assignment)*



Note. Correlated residuals between corresponding items are not shown.

As seen in Table 2, we could establish full configural MI across both measurement occasions with a good model fit. Similarly, full metric MI held without the model fit significantly deteriorating after constraining factor loadings to be equal across measurement occasions. In other words, the indicators were similarly related to the latent factors across both measurement occasions. However, the model fit deteriorated significantly when testing for scalar invariance by fixing item intercepts to be equal at pre- and post-assignment; not only was the chi-square difference test significant, but the AIC increased by +10, and CFI decreased by .05, too.

We checked the modification indices and freed one parameter's intercept at a time to see whether this would improve the model fit. A ModInd of 3.84 suggests a statistically just significant improvement of the model ( $p = .05$ ); we looked for improvements with a significance of at least  $p = .01$  (ModInd > 6.64). The intercepts of item #5 (*'Do you have the feeling that you are being treated unfairly?...very often vs very seldom or never'*, ModInd. 10.4) and item #7 (*'Doing things you do every day is: ... a source of deep pleasure and satisfaction vs a source of pain and boredom'*, ModInd. 8.7) were not invariant across time. After relaxing the equality constraints for the two items, one at a time, the model's fit improved substantially. After that, partial scalar invariance could be established.

As the next step, we tested strict invariance by fixing the item residuals to be equal over the measurement occasions. This led to a significant decrease in model fit, as evidenced by a significant chi-square difference test, in combination with a .07 unit decrease in CFI and a 19-unit increase in AIC. By relaxing the residuals of item #13 (*'How often do you have feelings that you're not sure you can keep under control? ... very often vs very seldom or never'*, MondInd. 11.5), item #5 (ModInd. 10.7), and item #4 (*'Until now your life has had... no clear goals or purpose at all vs very clear goals and purpose'*, ModInd 7.3) in turn, we achieved partial strict MI. Having established partial strict MI, we proceeded to examine the equality of structural parameters, i.e. the equality of factor (co-)variances and factor means. In the first step, constraining the factor variances to be equal led to a significantly poorer model fit, indicating that the amount of individual variation across the two measurement occasions was unequal.

As we had previously established partial scalar MI, we next examined differences in latent factor means. When comparing unstandardised comprehensibility-manageability factor means from pre-assignment ( $M = 39.5, SD = 6.6$ ) to post-assignment ( $M = 40.2, SD = 7.4$ ), there was a significant increase ( $t(481) = -2.7, p = .007$ ). Similarly, the unstandardised meaningfulness factor means increased from pre-assignment ( $M = 21.8, SD = 3.8$ ), to post-assignment ( $M = 22.3, SD = 3.7$ ),  $t(481) = -3.6, p < .001$ . In addition, we estimated the longitudinal stability of SOC-13 from pre-assignment to post-assignment (Figure 1). The path from pre-assignment global SOC (SOC T1) to post-assignment

global SOC (SOC T2) has a standardised regression weight of .84, indicating that pre-assignment SOC explained about 70% of the post-assignment SOC variance.

**Table 2**  
*Measurement Invariance of SOC-13 at Pre- and Post-Assignment According to Longitudinal Confirmatory Factor Analysis*

Longitudinal CFA	Equal loadings	Equal intercepts	Equal residual variances	Equal means	df	$\chi^2$	$\Delta df$	$\Delta \chi^2$	CFI	RMSEA		SRMR	AIC	BIC
										[CI <sub>90</sub> ]	[CI <sub>90</sub> ]			
1. Configural invariance					279	616.4			0.923	.045	[.040-.049]	0.051	45458	45890
2. Metric invariance	x				290	624.3	11	7.9	0.924	.044	[.039-.048]	0.053	45444	45827
3. Scalar invariance	x	x			301	657.6	11	33.3	0.919	.044	[.040-.049]	0.054	45455	45790
3a. Partial scalar invariance	x	x			299	638.3	9	14	0.922	.043	[.039-.048]	0.053	45440	45784
4. Residual (strict) invariance	x	x	x		312	684	13	45.7	0.915	.044	[.040-.049]	0.064	45459	45746
<b>4b. Partial strict invariance</b>	<b>x</b>	<b>x</b>	<b>x</b>		<b>309</b>	<b>653.9</b>	<b>10</b>	<b>15.6</b>	<b>0.921</b>	<b>.043</b>	<b>[.038-.047]</b>	<b>0.056</b>	<b>45435</b>	<b>45735</b>
5. Variance invariance	x	x	x	x	312	663	3	9.1	0.92	.043	[.038-.048]	0.058	45438	45725
6. Full structural invariance	x	x	x	x	-	-	-	-	-	-	-	-	-	-

*Note.* CFA = Confirmatory Factor Analysis. CFI = Comparative Fit Index. RMSEA = Root-Mean-Square Error of Approximation. SRMR = Standardised Root Mean Square Residual. AIC = Akaike Information Criterion. BIC = Bayesian Information Criterion.

## Discussion

The current study examined the longitudinal MI of the SOC-13 instrument in measuring SOC in a sample of iHAWs before and after a humanitarian fieldwork assignment. A two-factor measurement model of SOC-13, containing a combined comprehensibility-manageability and a meaningfulness subscale, was found to provide the best representation of the data due to its model fit and parsimony. While the often-used three-factor model also fits the data, the very high positive correlation between the comprehensibility and manageability subscales makes it more advantageous to model these as a combined factor instead, as the constructs are closely related and it increases the parsimony and interpretability of the model. This model specification adds to the debate on the best way to operationalise SOC (Eriksson & Contu, 2022) and is in line with recent research findings among varied participant populations, which have favoured the two-factor model (Grevenstein & Bluemke, 2017, 2021; Zimprich et al., 2006). Additionally, including the frequently correlated residuals (Eriksson & Contu, 2022; Feldt et al., 2004; 2007; Grevenstein & Bluemke, 2017) between items #2 and #3 – each relating to interpersonal trust – led to a better model fit across both time points, showing the importance of including this adaptation to the measurement model in the context of humanitarian aid workers.

The central question of our investigation was whether SOC-13 scores of iHAWs measured just before and directly after a field assignment can be compared, considering the drastic changes in work and living contexts and the types of stressors experienced between the two measurement occasions. Despite the substantial changes and stressors, SOC-13 remained sufficiently stable: we could establish full metric MI, partial scalar MI, and partial strict MI across the measurement occasions. Having reached partial scalar MI indicates that the SOC-13 scores of humanitarian aid workers can be compared across measurement occasions (Byrne et al., 1989; Lubke & Dolan, 2003).

### Examining Invariability

The invariant intercepts of items #5 and #7 may be explained by the differences in context at the time of assessment: the content of the indicators focused on the feeling of being treated unfairly (#5), and the satisfaction or boredom derived from one's daily activities (#7). An individual's perception of receiving fair treatment may differ when working in a stable and secure country compared to an active or post-conflict setting. Similarly, when iHAWs go on field assignments, their day-to-day activities drastically change: there is no more taking the children to school, cleaning your home, or taking the dog for a walk – the everyday tasks prevalent in one's usual day-to-day life are removed to make space for serving beneficiaries in a humanitarian setting instead. These tasks may be experienced as more meaningful than their usual everyday activities. The



experience of meaningfulness has been suggested to mediate some of the negative stressors of humanitarian fieldwork (de Jong et al., 2022; Young & Pakenham, 2021). Aside from items #13, #5, and #4, the amount of indicator variance not explained by the factor was the same across time (partial strict MI). Item #13 had more, and items #5 and #4 had less residual variance at post-assignment; these changes may be explained by the impact of the field assignment. Item #13 focuses on one's ability to keep feelings under control, or in other words, regulate their emotions. This change may be reflective of a change in mental wellbeing of participants in the current study. Previous research based on the same larger study on the health of iHAWs showed that the mean levels of emotional exhaustion increased from pre-assignment to post-assignment (De Jong et al., 2021), and research among healthcare staff and other human services occupations has suggested a relationship between emotion regulation and emotional exhaustion (Geisler et al., 2019; Jackson-Koku & Grime, 2019; Lee & Jang, 2019). Differences in individual emotional exhaustion symptom trajectories among humanitarian aid workers might explain the larger residual variance relating to keeping feelings under control at post-assignment than at pre-assignment (de Jong et al., 2023). The lower post-assignment residual variance of items #5 and #4 may relate to more clarity at post-assignment on what being treated unfairly looks like (#5) and what one's life goal or purpose is (#4), with the latter also relating to meaning-making.

### **Changes in Factor Means**

Despite being unable to establish full MI on at least scalar level (Dimitrov, 2010), there appears to be a broad consensus that already partial scalar MI is sufficient to interpret mean structures (Byrne et al., 1989; Lubke & Dolan, 2003) so long as there are not too many invariant indicators (Steinmetz, 2013). While there are no universal guidelines for what may count as 'not too many', we tentatively argue our partial scalar MI with two invariant intercepts and partial residual MI with three invariant residuals can be considered sufficient for interpreting mean structures. Our finding that participants' scores on both the comprehensibility-manageability factor and the meaningfulness factor increased over time is partially similar to findings from previous research: while increases in the combined comprehensibility-manageability factor have been reported elsewhere (Grevenstein & Bluemke, 2017; Zimprich et al., 2006), the increase in meaningfulness is a new finding. In humanitarian fieldwork settings, staff typically perceive the value, impact and urgency of their work, perhaps therefore rating it as more meaningful compared to pre-assignment.

### **Implications**

The results of the current study support the usability of SOC-13 longitudinally in professional settings characterized by significant variations in stress levels and working contexts. SOC could be leveraged for promoting better mental health and well-being as

well as preventing or mitigating the adverse effects of high-stress work environments by utilising SOC as part of routine health monitoring initiatives or developing and implementing interventions that aim to strengthen SOC (Langeland et al., 2022). Given that SOC-13 demonstrates a sufficient level of longitudinal MI, any changes as a result of organizational policies or interventions aimed at strengthening SOC can be attributed to the efforts, rather than potential instability in SOC-13.

When it comes to research, our findings underscore the relevance of SOC-13 within the context of humanitarian aid fieldwork. Existing research on the relationship between SOC and the mental well-being of humanitarian aid workers thus far has consistently identified SOC as an important predictor of psychological health, both in cross-sectional studies (Veronese & Pepe, 2014, 2017) and over time (de Jong et al., 2022; de Jong et al., 2023). The observed discrepancy between the unexpected relationship of pre-assignment SOC-13 components and post-assignment health outcomes (de Jong et al., 2022) and the predictive power of pre-assignment SOC for ‘healthy’ symptom trajectories (de Jong et al., 2023) is less likely attributable to a lack of longitudinal MI and rather reflective of inherent differences in analyses methods.

There are several opportunities to further improve the psychometric qualities of the SOC-13 in the context of humanitarian aid work. While one approach could be to omit the ‘troublesome’ items, this would result in a considerable loss of data and overlook the dynamic nature of the context contributing to MI. An alternative strategy involves reviewing and modifying the non-invariant items to enhance their relevance across contexts. Therefore, our recommendation for future research is to prioritize the validation of longitudinal MI across various sub-groups of humanitarian aid workers, e.g. those in an active conflict setting vs. those working in non-conflict setting with infectious disease outbreak. If researchers identify a lack of invariance across different samples, one strategy is to adapt the subscales by allowing context-specific cross-loadings to improve the robustness of measurement models across diverse samples (Jordans et al., 2009).

## **Conclusion**

We found the two-factor model with correlated residuals between items #2 and #3 to be a better option than the more traditionally used single-factor or three-factor option. Beyond that, SOC-13 showed full metric invariance, as well as partial scalar and partial strict invariance. This indicates that SOC as measured by SOC-13 is a relatively stable construct, also in substantially changing contexts.

## **List of Abbreviations**

iHAW = international humanitarian aid worker

MI = measurement invariance  
ModInd = modification indices  
SOC = Sense of Coherence

## **Declarations**

### ***Ethics Approval and Consent to Participate***

This study received ethical approval from the internal Ethics Review Board of Médecins Sans Frontières on February 24, 2017 (ID 1642). All participants signed an informed consent document.

### ***Availability of Data and Materials***

The datasets generated and/or analysed during the current study are not publicly available due to conflicts with the requirement of protecting participants' privacy and confidentiality, but are available from the corresponding author on reasonable request.

### ***Competing Interests***

KdJ works at Médecins Sans Frontières. The other authors declare that they have no competing interests.

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This research was funded by Médecins Sans Frontières (MSF). To ensure no potential conflicts of interest could arise, the recruitment, data collection and statistical analyses were performed by independent researchers without involvement of Dr de Jong or any other employee of MSF. MSF had no role in decision to publish. The results were interpreted with the full research team, including independent researchers and external supervisors (university professors RJK, IHK, PAB) to ensure quality and independence. MSF also signed a written agreement that it would adhere to the code of conduct for scientific integrity of the Royal Netherlands Academy of Arts and Sciences regarding this research.

### **Author's Contributions**

SEM: Conceptualisation, data curation, data collection, methodology, formal analysis, software, visualisation, writing – original draft

KdJ: Methodology, project administration, supervision, funding acquisition, writing – review & editing

RJK: Methodology, supervision, writing – review & editing

IHK: Methodology, supervision, writing – review & editing

PAB: Methodology, supervision, writing – review & editing

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# **Section 4**

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Treatment of Occupational Stress & Trauma



# 8

## **Treatment Response and Treatment Response Predictors of a Multidisciplinary Day Clinic for Police Officers With PTSD**

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## Abstract

Police officers typically face multiple potentially traumatic events and consequently have a higher conditional probability of developing PTSD. Although most police officers with PTSD benefit from first-line treatment, it is unknown whether recommended intensification of treatment for low responders is effective and which factors contribute to response. This study aimed to examine the treatment response of a day clinic for police officers with PTSD and identify predictors of treatment response. Between 2009 and 2019, routine outcome monitoring measurements consisting of PTSD symptom severity and general psychological distress were administered at two timepoints among 102 patients undergoing a day clinic treatment consisting of trauma-focused therapy, sociotherapy, and psychomotor therapy. Hierarchical regression was used to assess whether change in PTSD symptom severity was associated with baseline PTSD and depression severity, gender, age, and eligibility for a recognition procedure. Significant improvements in PTSD symptom severity were found over the course of the treatment ( $d = .59$ ), with 47% of patients showing statistically reliable improvement in their symptoms. The only significant predictor of treatment response was eligibility for a recognition procedure, with the total model explaining approximately 10% of the variation in treatment response. Intensifying treatment for police officers with PTSD who do not respond to previous trauma-focused treatment appears beneficial for a substantial number of patients. However, eligibility for a recognition procedure may negatively impact treatment response.

### Keywords

First responders, treatment response, predictor, compensation, occupational stress

## Introduction

Police officers often directly experience and bear witness to a wide range of potentially traumatic experiences (PTEs) as an inherent part of their job. Whereas the majority of the general population is estimated to experience at least one PTE in their lifetime (Kilpatrick et al., 2013), police officers tend to have a far higher exposure, ranging from personal exposure to life-threatening situations, to observing terrifying details such as in the aftermath of severe accidents, interpersonal violence or suicide. In a large sample of Canadian public safety personnel, the police participants reported exposure to on average 11 types of PTEs (Carleton et al., 2019): Dutch treatment-seeking police officers have been found to report on average 16.8 different types of professional PTEs (van der Meer et al., 2017). When increased trauma exposure is combined with a high workload and organizational pressures, police officers tend to experience high levels of stress and ill-health (Collins & Gibbs, 2003), which lead to a higher conditional risk for developing posttraumatic stress disorder (PTSD; American Psychiatric Association, 2013; Maguen et al., 2009; Marmar et al., 2006) and may also be associated with other negative health effects such as compassion fatigue, burnout, and moral injury (Blumberg & Papazoglou, 2019). Internationally, rates of PTSD among police officers have been found to range between 7% and 13% (Carlier et al., 1997; Maia et al., 2007; Robinson et al., 1997).

Few PTSD treatment approaches have been formally tested in police officers or other first responders, or in patients with work-related PTSD overall (Haugen et al., 2012; Torchalla & Strehlau, 2018). Since 1995, Dutch police officers who suffer from PTSD symptoms have been treated with brief eclectic psychotherapy for PTSD (BEPP; Gersons et al., 2000; Smid et al., 2018) as the first line of treatment. BEPP is a 16-session manualized treatment that combines cognitive-behavioral and psychodynamic approaches and that has been found to be effective for treatment-seeking police officers (Gersons et al., 2000; Smid et al., 2018). For those police officers who do not sufficiently benefit from this first-line treatment, a specialist, multidisciplinary day clinic was initiated in 2009 by ARQ Centrum'45, the Dutch national center for specialist diagnostics and treatment of people with complex psychotrauma complaints. According to the Dutch guidelines for PTSD treatment (van Balkom et al., 2013), when one type of trauma-focused treatment (i.e., BEPP) has insufficient effect, another type of trauma-focused treatment should be offered and adding medication should be considered; when this again proves insufficiently effective, treatment should be intensified in a day-clinical or clinical setting. The latter recommendation of intensifying treatment is mainly practice-based. Although there is increasing evidence that intensifying PTSD treatment is effective (Ragsdale et al., 2020; Zepeda Méndez et al., 2018), to our knowledge no research has been conducted into intensifying treatment for police officers. In this study, therefore, we examined treatment response in a multidisciplinary day clinic for

police officers with PTSD.

Research on predictors of treatment response in police officers is also limited. To date, there is only one published study on police officers specifically (Smid et al., 2018), which showed that type of PTE and pretreatment PTSD symptom severity predicted treatment outcome after BEPP. Research from other populations has identified a number of clinical predictors, most notably baseline symptom severity of PTSD and depression (Elliott et al., 2005; Galovski et al., 2016; Haagen et al., 2017, 2015; Schumm et al., 2013; Stein et al., 2012; Taylor et al., 2001), even though the exact relationship between some of these variables and treatment outcomes is still unclear (Galovski et al., 2016). As to demographic predictors, older police officers and female police officers seeking treatment have been found to report higher PTSD symptoms than their younger or male counterparts (van der Meer et al., 2017). Whereas female gender (Karatzias et al., 2007; Tarrrier et al., 2000) and higher age (Fletcher et al., 2021) have in general been associated with better treatment response in PTSD populations, these were not significant predictors in Smid et al. (2018) investigation on police officers. As for contextual variables, while not yet studied in police officers, occupational PTSD compensation-seeking appears to be associated with treatment response in military veterans, with research showing a negative association between benefit claims and symptom reduction throughout treatment (Sripada et al., 2019; Walter et al., 2014).

In this study, we examined the predictive value of the following clinical, demographic and contextual variables on treatment response: baseline PTSD and depression symptom severity, gender, age, and eligibility for a procedure for obtaining recognition of PTSD as an occupational disease and for obtaining financial compensation. To investigate treatment response among patients of the day clinic, we analyzed routine outcome monitoring (ROM) data from police officers who took part in the treatment between 2009 and September of 2019. Based on the literature, we hypothesized higher baseline PTSD and depression, male gender, lower age, and eligibility for a recognition procedure to be associated with worse treatment response.

## Method

### Sample

Between its inception in 2009 and the end of September 2019, 160 police officers were enrolled at the day clinic. Of these 160, 102 (63.75%) filled out both pre- and posttreatment measures. The final sample consisted of 76 (74.5%) male and 26 (25.5%) female participants whose average age at the start of treatment was 46.36 ( $SD = 9.84$ ) years. A PTSD diagnosis by a clinician was required for enrolment in the program and was determined based on a Clinician-Administered PTSD Scale (CAPS-IV; Blake et al.,

1995) or Clinician-Administered PTSD Scale for *DSM-5* (CAPS-5; Weathers et al., 2018) interview. The mean length of treatment was 8.66 months ( $SD = 1.80$ ) with a range of 3.22 to 13.60 months ( $Mdn = 8.97$  months). Table 1 further details the demographic and pre- and posttreatment clinical characteristics of the sample.

**Table 1**  
*Demographic and Clinical Characteristics of the Sample*

Participant characteristic	<i>M</i>	<i>SD</i>	<i>n</i>	%
<b>Demographic</b>				
Age	46.36	9.84		
Male			76	74.50
Female			26	25.50
<b>Occupational trauma recognition</b>				
Yes			55	53.90
No			47	46.10
<b>Pre-treatment clinical</b>				
PTSD combined scale (n = 102)	62.76	15.87		
HTQ (n = 43)	2.56	0.53		
Combined scale	52.99	17.81		
PCL-5 (n = 59)	52.15	7.38		
Combined scale	69.89	9.3		
<b>Provisional diagnosis</b>				
Yes			83	81.37
No			19	18.63
General psychopathology (n = 102)	1.74	0.66		
Depression (n = 102)	1.82	0.84		
<b>Post-treatment clinical</b>				
PTSD combined scale (n = 102)	49.77	26.87		
T1-T2 PTSD change score (n = 102)	13.00	22.06		
HTQ (n = 25)	1.56	0.57		
PCL-5 (n = 77)	44.68	16.91		
<b>Provisional diagnosis</b>				
Yes			60	58.82
No			42	41.18
General psychopathology (n = 102)	1.50	0.94		
Depression (n = 102)	1.57	1.13		

*Note.* A PTSD diagnosis by a clinician was required to enrol in the program. General psychological distress measured by the BSI total score. Depression measured by the Depression subscale of the BSI scale. Provisional diagnosis measured by the HTQ and PCL-5 cut-off and/or scoring rules only. PTSD = posttraumatic stress disorder as measured by '% of the possible max score'.

HTQ = Harvard Trauma Questionnaire; PCL-5 = PTSD Checklist for DSM-5.

## Procedure

Participants were asked to complete routine outcome assessments at the start and the end of treatment. Data were primarily collected for clinical purposes as part of a routine assessment procedure during treatment and archived anonymously for scientific research purposes. Participants were informed about the storage of the anonymized assessment data and given the opportunity to have their data removed from the database. Upon consultation, the Institutional Review Board of Leiden University stated that no review of the ethical merits of this study was needed and obtaining informed consent was not required, because assessments were conducted primarily for diagnostic and secondarily for research purposes.

## Treatment Program

The treatment program of the day clinic takes place 1 day a week, from 10 a.m. until 4 p.m., for approximately 9 months. Patients are referred to the day clinic primarily by their occupational physician and sometimes by their primary care physician. The program aims to enhance psychological recovery and resilience (Friedman & Higson-Smith, 2003) through individual trauma-focused therapy, sociotherapy, and psychomotor therapy, delivered in a group format. All treatment components last 75 min and are received by each participant. Social work and pharmacotherapy are included when indicated. Individual therapy focuses on processing traumatic memories primarily through eye movement desensitization and reprocessing (EMDR) therapy or prolonged exposure. Trauma-focused psychotherapy was conducted by licensed, postdoctoral, trained psychotherapists and clinical psychologists. Sociotherapy was conducted by licensed mental health nurses and psychomotor therapy by licensed psychomotor therapists. Both group therapies begin by psychoeducation and by simple exercises that aim at restoring connection with the body. In sociotherapy, the participants learn to monitor their daily activities, stress and fatigue, and learn how to structure their days. Through it, participants gain insight into the connection between their daily structure or activities and their symptoms. They focus on creating new structure and habits to their days by including time for rest, recovery, and relaxation. In this way, sociotherapy aims to attenuate the exhaustion most patients feel as a result of sleepless nights due to their PTSD-related nightmares. It also includes cognitive therapy sessions with a focus on thought experiments and coping with new challenging situations. In psychomotor therapy, the participants are coached in recognizing physical stress and tension, in recognizing and naming emotions, and in exposure techniques. A lot of attention is put on learning how to deal with physical stress and tension by means of for example relaxation techniques, and this is practiced through exposure exercises. Furthermore, participants (re-)learn emotion regulation strategies and attend sessions aimed at increasing the coping capacity of the individual. The treatment starts with an orientation phase of four to six weeks, after which the trauma-focused treatment begins;



in the end, the final phase places emphasis on the client's reintegration back into the workforce or other meaningful daily activities and creating a relapse prevention plan.

## Measures

### **PTSD**

Change in PTSD symptom severity was the primary outcome of the study. The measure for assessing PTSD symptoms was updated once during data collection, due to changes in the diagnostic criteria of PTSD (in the transition to *DSM-5*). Until May 2014, the Harvard Trauma Questionnaire (HTQ; Mollica et al., 1996; Mollica et al., 1992) was used. The HTQ is a self-report questionnaire that consists of four parts. In this study only the third part was used: it assesses PTSD symptom severity according to *DSM-IV* during the last week, using 16 items rated on a 4-point scale ranging from 1 (*not at all*) to 4 (*very much/extremely*). An average score of all the items is computed (range = 1–4), with a higher score denoting more severe symptoms. In this study, a mean score of at least 2.5 denotes a clinical level of PTSD symptomatology. This criterion was used to examine which patients had experienced clinical recovery in addition to reliable change. Cronbach's alpha in the current sample was .95.

From May 2014 onward, the PTSD Checklist for *DSM-5* (PCL-5; Weathers et al., 2013) was used. It is a 20-item self-report questionnaire that asks participants how much they were bothered by the *DSM-5* PTSD symptoms during the last month, rated on a 5-point scale ranging from 0 (*not at all*) to 4 (*extremely*). A total score is computed by adding the item scores (range = 0–80). A higher total score denotes higher symptom severity. According to the basic PCL-5 symptom scoring rule (SEV2 rule), a symptom or impairment is considered present if its severity is rated with 2 or higher (Weathers, 2017). Using the *DSM-5* algorithm in combination with the SEV2 rule it was established whether participants met a provisional diagnosis of PTSD. Cronbach's alpha in the current sample was .91.

### **Comorbid Symptoms**

Comorbid general psychopathology was assessed with the Brief Symptom Inventory (BSI; Derogatis, 1975; de Beurs, 2006). The BSI is a 53-item self-report questionnaire that evaluates overall psychopathology by asking respondents to rate to what extent they have been bothered by various psychological symptoms in the last week. It measures nine domains of psychological distress; in this study, only the Depression subscale and the Overall Psychological Distress scale were used. Items are rated on a 5-point scale ranging from 0 (*not at all*) to 4 (*very much*). The score for the overall scale is computed by calculating the average of all the item scores, and the Depression subscale is computed by calculating the average of the six depression item scores (range = 0–4). The overall scale had a strong internal consistency (Cronbach's  $\alpha = .92$ )

and the internal consistency of the depression sub-scale in the current sample also was excellent (Cronbach's  $\alpha = .89$ ).

### ***Occupational Trauma Recognition and Compensation Procedure***

Eligibility for a procedure for obtaining recognition of PTSD as a profession-related disorder and for obtaining financial compensation was used as a contextual variable. The procedure for police officers with PTSD to apply for recognition and compensation was launched in September 2014. From then on, participants were generally enrolled in some stage of the procedure during treatment. All participants who started the day clinic before September 2014 were coded as 'not eligible for a recognition procedure'; all other participants were coded as 'eligible for a recognition procedure'.

### **Data Analysis**

Descriptive analyses and hierarchical regression analyses were performed using SPSS (Version 23.0).

### ***Combined PTSD Outcome Variable***

Due to the update of the PTSD measure during this study, PTSD symptom severity was assessed with the HTQ as well as PCL-5 in this study. Although changes in the *DSM-IV* and *DSM-5* diagnostic criteria for PTSD have been argued to have minor influence on PTSD prevalence estimates and individual diagnoses (Kilpatrick, et al., 2013), scores from the HTQ and PCL-5 cannot be compared directly for two reasons. First, because the *DSM-IV* and *DSM-5* PTSD concepts are different and encompass partly different symptoms, there is no complete overlap in item content between the HTQ and PCL-5. Second, because a 5-point response scale (0–4) is used for the PCL-5 and a 4-point (1–4) response scale is used for the HTQ, scores resulting from both measures are not equivalent and cannot be compared directly. In order to combine the PTSD scores from both measures into a single measure of PTSD symptom severity, the following procedure was used. Both the HTQ and PCL-5 hold within themselves a subset of the same 14 items that are equivalent to the *DSM-IV* PTSD symptoms, which was used. First, the total PTSD symptom severity score based on the 14 equivalent items (see the Appendix) was computed by the scoring procedure of the measure, resulting in a score that could range between 1 and 4 for the HTQ and between 0 and 56 for the PCL-5. Subsequently, the PTSD symptom severity scores were combined by transforming each individual score into the percentage out of the maximum score corresponding to the measure (i.e., respectively 4 and 56 for the HTQ and PCL-5). To establish concurrent validity of this new composite measure, it was correlated with the original HTQ and PCL-5 measures, as well as the total scores of the BSI, a measure that was previously found to correlate very highly with the HTQ and PCL-5 scores. The correlations between the original PTSD measures and the combined PTSD measure were very high ( $r . .90$ )

for both instruments at both timepoints. The combined PTSD scale also correlated strongly ( $r = .77$ ) with the overall psychological distress scale of the BSI. Therefore, combining both instruments into a single unified baseline symptom severity measure appeared feasible. Besides allowing us to utilize the full dataset, this approach had the advantage of allowing us to report change in relative terms. Considering that this was a naturalistic study attempting to evaluate treatment response, using a metric that can easily be communicated among clinicians, policymakers, and patients alike, was important to us and the choice for percentage scores was based on recommendations in recent literature (Larsen et al., 2020; Varker et al., 2020).

### ***Treatment Response Analysis***

Treatment response was examined through the combination of a pre-post mean score analysis, as well as the reliable change index (RCI) and criteria for clinically relevant change as described by Jacobson and Truax (1992). The mean symptom change between the pre- and posttest was tested by a paired-samples  $t$  test. RCI is the ratio between the difference score between the pre- and posttest and the standard error of the difference score, and an RCI value larger than 1.96 or smaller than -1.96 would be statistically unlikely ( $p, .05$ ) to occur without the posttest score reflecting a real change, as opposed to random fluctuation in the person's scores (Jacobson & Truax, 1992). A value smaller than -1.96 would denote a reliable decrease in symptom severity, whereas a value larger than 1.96 would mark a reliable increase in symptom severity. RCI values were calculated for the composite PTSD scores as well as for the overall psychological distress score of the BSI. A shift from a clinical to subclinical symptom severity in PTSD or the BSI scores was considered clinically significant change. The clinical cut-off used for analyzing the BSI total score was based on a large Dutch norm group (de Beurs, 2006). A cut-off for the combined PTSD outcome scores could not be calculated in the same manner since the outcome measure was based on two different instruments. Instead, a clinically relevant change was assessed by using the *DSM-5* algorithm in combination with the SEV2 rule in the case of PCL-5, and by the cut-off score of 2.5 in the case of HTQ. If patients had a subclinical posttreatment score and they had improved reliably, they were classified as 'recovered'. Those patients who did not experience a clinically significant change but reliably improved or deteriorated on their symptoms were classified as 'improved' or 'worsened', respectfully. Patients without statistically reliable change were classified as 'unchanged'.

### ***Predicting Treatment Response***

To examine the potential predictors of treatment outcome, a hierarchical regression analysis in which the predictor variables were regressed on the change in PTSD symptom severity during treatment was carried out. The change in PTSD symptom severity was operationalized as the difference score between the pre- and posttreatment

PTSD symptom severity scores. The predictors were entered into the regression model in specific groupings. The first block consisted of baseline clinical predictors (pretreatment PTSD symptom severity, pretreatment depression symptom severity) as it was of greatest interest for us to examine whether baseline symptom severity was associated with treatment response. The second block consisted of demographical variables (gender and age) that have been found important in previous literature. The third block consisted of our exploratory contextual variable about eligibility for compensation. After adding additional variables to the model, significance of the overall model, change in variance explained by the model, and regression coefficients of the separate predictors were tested.

## Results

### Descriptives

As detailed in Table 1, mean PTSD symptom severity as measured by the combined PTSD scale was 62.8 before treatment and 49.8 after treatment. The mean change score between pre- and posttreatment was 13.0. General psychopathology mean scores were 1.74 and 1.50 for pre- and posttreatment, respectively. Mean depression severity was 1.82 before treatment and 1.57 after treatment. A little over half of the participants were eligible for applying for recognition and compensation for occupation-related PTSD at the start of treatment.

### Treatment Response

Mean PTSD symptom severity significantly decreased from start to end of treatment (see Table 1), showing a mean symptom decrease of 13% as measured by the combined PTSD scale corresponding with a medium effect size,  $t(101) = 5.9, p < .001$ , Cohen's  $d = .59$ . Mean change in general psychopathology from before treatment to after treatment was .24, corresponding with a small effect size,  $t(101) = 2.9, p < .01$ , Cohen's  $d = .25$ . Depression mean symptom change from before treatment to after treatment was .25, also corresponding with a small effect size,  $t(101) = 2.4, p < .05$ , Cohen's  $d = .24$ .

As Table 2 details, altogether 47% of the patients reliably improved on or recovered from their PTSD symptoms, whereas 41% remained unchanged and 12% worsened. Approximately a third of the patients improved or recovered from their overall psychological distress symptoms, while half of patients remained unchanged, and a minority of 17% reliably worsened.

**Table 2**

*Treatment Outcome of Posttraumatic Stress Symptom Severity and Comorbid General Psychological Distress Symptom Severity*

RCI category	PTSD		BSI	
	n	%	n	%
Recovered	36	35.29	20	19.61
Improved	12	11.76	11	10.78
Unchanged	42	41.18	54	52.94
Worsened	12	11.76	17	16.67

*Note.* RCI = reliable change index. PTSD refers to posttraumatic stress disorder symptom severity as measured by ‘% of the possible max score’. General psychological distress measured by the Brief Symptom Inventory (BSI) total score.

### Predicting Treatment Response

Correlations between changes in PTSD symptom severity over the course of treatment and the hypothesized predictor variables are shown in Table 3. From the correlation matrix, it appears that only being eligible for the recognition and compensation procedure for occupational PTSD had a significant correlation with PTSD symptom change. The relationship between the dependent variable and the predictors was linear, and there was no multicollinearity in our data, showed by VIF scores of well below 10 and tolerance scores above .2. The values of the residuals were independent and normally distributed, with a constant variance. There were no influential cases biasing the model, as evidenced by low Cook’s distance values.

**Table 3**

*Correlation Between the Variables of the Hierarchical Regression Analyses*

Variable	1	2	3	4	5	6
1 PTSD change score (T1-T2)						
2 PTSD pre-treatment	.02					
3 Depression pre-treatment	-.01	.60**				
4 Age	-.10	.00	.02			
5 Gender	.06	-.05	-.14	-.43**		
6 Recognition procedure	-.25*	.48**	.22*	.06	.04	

*Note.* PTSD refers to posttraumatic stress disorder symptoms severity as measured by percentage of the possible maximum score. T1 refers to pre-treatment, T2 to post-treatment.

\*  $p < .05$  \*\*  $p < .01$ .

The results of the hierarchical regressions analyses are detailed in Table 4. In the first block, the clinical predictors were added to the model. The model was not significant ( $p > .05$ ), and the associated  $R^2$  value suggested the clinical predictors explain only .2% of the variation in treatment response. In other words, neither of the clinical predictors—baseline PTSD symptom severity and baseline depression symptom severity—were

significantly associated with change in PTSD symptoms.

In the second block, the two demographic predictors were added to the model. The model remained insignificant ( $p > .05$ ), with neither age nor gender as significant predictors of PTSD symptom change. Adding the demographic predictors to the model only accounted for an additional 1.1% of the variation in treatment response.

In the third block, the contextual predictor variable – eligibility for occupational trauma recognition and compensation procedure – was added. Whereas the total model remained insignificant ( $p = .066$ ), adding the recognition variable to the model led to a significant increase of the proportion of explained variance in PTSD treatment response. Adding the contextual predictor to the model accounted for an additional 8.8% of the variation in treatment response. In total, the final model explained 10.1% of the variation in treatment response. There was a significant negative association between eligibility for occupational trauma recognition procedure and PTSD treatment response. The change in PTSD symptom severity for those individuals who were eligible to apply for recognition and compensation prior to starting their treatment, was on average 15.11 points smaller compared with those who were not.

**Table 4**  
*Association of Predictors and PTSD Treatment Response (T1-T2) in a Hierarchical Regression Model*

	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>	$R^2$	$\Delta R^2$
Block 1						.002	.002
Constant	13.00	2.21		5.90	<.001		
Baseline PTSD	0.07	0.17	0.05	0.40	.691		
Baseline depression	-1.15	3.29	-0.04	-0.35	.729		
Block 2						.013	.011
Constant	12.67	2.64		4.81	<.001		
Baseline PTSD	0.07	0.18	0.05	0.38	.706		
Baseline depression	-0.98	3.34	-0.04	-0.29	.771		
Gender	1.09	5.70	0.02	-0.83	.849		
Age	-0.21	0.25	-0.09	0.19	.409		
Block 3						.101	.088**
Constant	35.47	7.86		5.72	<.001		
Baseline PTSD	0.32	0.19	0.23	1.72	.089		
Baseline depression	-1.73	3.22	-0.07	-0.54	.593		
Gender	2.96	5.50	0.06	-0.52	.592		
Age	-0.13	0.24	-0.06	0.54	.608		
Recognition	-15.11**	4.93	-0.34	-3.07	.003		

*Note:* PTSD = posttraumatic stress disorder. Dependent variable PTSD symptom change.  $\Delta R^2$  change in  $R^2$  compared with the previous step. Baseline PTSD, baseline depression, and age were centered at their means. Gender was dummy coded as follows: male = 0; female = 1.

\*\* $p < .01$ .

## Discussion

The current study set out to examine treatment response and its predictors in a day clinic treatment program for traumatized police officers, using routine outcome monitoring data.

### Treatment Response

There was a significant difference between pre- and posttreatment PTSD symptom severity with medium effect size, as well as a significant difference between pre- and posttreatment general psychopathology and depression with small effect size. Altogether almost half of the day clinic patients recovered from or reliably improved on their PTSD symptoms. Over a third of the patients did not fulfil the criteria for a provisional diagnosis at the end of treatment. These findings lean toward the typical response rates found in PTSD treatment studies (56% to 67%; Bradley et al., 2005) and the wide range of nonresponse across treatment types and measures used (Schottenbauer et al., 2008). The police day clinic treatment is only offered to individuals who have not benefited sufficiently from previous trauma- focused treatments and require a more intensive treatment. This study's finding of almost half of the participants benefiting from the treatment is encouraging for this specific population and supports the recommendation to intensify treatment after patients did not draw benefit from first-line trauma-focused treatment. Findings are in line with recent developments in the field of psychotrauma to intensify treatment for patients who insufficiently benefit from, or are expected to insufficiently benefit from, regular outpatient treatment (Ragsdale et al., 2020; van Gelderen et al., 2020; Zepeda Méndez et al., 2018). Treatment can be intensified in a number of ways, such as offering various trauma-focused sessions per day over 1 to 2 weeks, adding specific components such as virtual reality therapy or exercise, or adding supportive therapy elements, such as psychomotor therapy and sociotherapy. In the current study, treatment was intensified by having several hours of treatment one day per week.

The study also showed a relatively large portion of participants whose symptom severity remained unchanged (41%) and a smaller but substantial minority (12%) who reported worsening in their symptoms by the end of treatment, suggesting that treatment intensification in this form does not provide an adequate solution to all police officers with treatment-resistant PTSD. Therefore, a further search for adequate treatment approaches for these officers is warranted, including evaluations of what would work best for whom. Previous research on symptom exacerbation shows that only a minority of patients in trauma-focused treatments experience symptom exacerbation (Larsen et al., 2016). The relatively high percentage of participants experiencing symptom worsening in our study might be related to patient characteristics, treatment characteristics, contextual factors, or a combination thereof. We therefore examined a

number of treatment outcome predictors, based on the literature.

### **Treatment Outcome Predictors**

In the current study neither baseline PTSD symptom severity nor baseline depression symptom severity were predictive of PTSD symptom change. These findings are largely at odds with previous research findings, which predominantly show that a higher baseline symptom severity is related to limited treatment response. In a meta-regression on the efficacy of PTSD treatments for military veterans, Haagen et al. (2015) found lower treatment gains for those with higher and lower pretreatment PTSD symptom severity levels as compared to those with moderate levels. Because our preanalyses did not give indications of nonlinear relationships between predictors and the outcome variable, as well as due to the limited sample size, we tested only for linear relationships. Nonetheless it is possible we may have missed a potential curvilinear relationship. Galovski et al. (2016) found that patients with the highest initial levels of PTSD and depression symptoms had the least change in symptoms over the course of PTSD treatment. Similarly, Taylor et al. (2001) found that nonresponders had more severe baseline depression symptoms. Severe baseline depression has also been associated with poor treatment responses in several other studies (e.g., Haagen et al., 2015; Schumm et al., 2013). However, some studies (e.g., Elliott et al., 2005) have found that patients with high initial depressive symptoms make rapid gains and improvements in PTSD symptomatology. Differences in demographic and clinical characteristics of the sample could partially explain why the abovementioned baseline predictors did not appear significant in the current study. Compared with another recent police PTSD treatment study (Smid et al., 2018), our participants were on average older, with approximately similar gender proportions to their study. Smid et al. (2018) sample had on average lower pretreatment PTSD symptom severity score than our sample, if comparing percentage scores.

Two demographic variables and one contextual variable were also investigated as predictors of PTSD treatment response in the police day clinic. Against our expectations, age was not associated with treatment response. The value of age as a predictor for treatment outcome has varied among studies and our finding concurred with the outcomes of a study among police officers by Smid et al. (2018) in which age was not predictive of treatment response either. Gender was not related to treatment response in the current study, even though previous research has found a rather consistent positive association between female gender and baseline PTSD symptoms on the one hand and treatment response on the other (e. g., Karatzias et al., 2007; Tarrier et al., 2000). However, being eligible for a procedure for obtaining recognition of PTSD as an occupational disorder and for obtaining financial compensation was associated with a considerably smaller improvement on PTSD symptoms.



These findings echo reports of PTSD disability compensation-seeking veterans showing a more limited response to treatment (Sripada et al., 2019; Walter et al., 2014). One of the explanations offered for this phenomenon is that those who seek compensation may be afraid of not receiving recognition and compensation if they report significant improvements in their PTSD symptoms (Walter et al., 2014). Furthermore, many may struggle with returning to work after being treated for profession-related PTSD (Torchalla & Strehlau, 2018), for example because of residual symptoms such as concentration problems (Smid et al., 2018) or fear of stigmatization (Haugen, et al., 2017)—which might influence symptom reporting. Finally, this finding could be related to the larger occupational context of police officers in the Netherlands. The launch of the recognition and compensation procedures for police officers coincided with a large-scale restructuring of the national police. It is reasonable to assume that such a major reorganization can increase routine work–environment stress — an important contributor to PTSD symptoms in police officers (Collins & Gibbs, 2003; Maguen et al., 2009). For example, issues such as lack of control over big changes, impaired communication and consultation possibilities, as well as inadequate support, could be expected as a result of organizational restructuring, and have been found to be the highest ranked stressors among police officers (Collins & Gibbs, 2003). It can be assumed that police officers who came into treatment after 2013 have been exposed to more work environment stressors as a result of the reorganization, but empirical investigations would be necessary to establish whether there is a relationship between routine work environment stressors and severity and course of PTSD symptoms in the patients of the day clinic.

### **Strengths and Limitations**

This study is one of the first to look into treatment response and predictors in police officers treated for PTSD. Although police officers in general have extremely high trauma exposure during their careers, research into this group lags behind in comparison to other groups exposed to occupational trauma, especially military personnel. It is also one of the first studies to look into treatment outcome over the course of an intensified form of treatment for police officers with a low response to first-line treatment for PTSD, providing insight into treatment response in a naturalistic setting, contrary to highly controlled experimental settings.

The study is limited by the fact that the data were not collected primarily for research purposes, which means that potentially relevant predictors, including cognitive functioning, sleep and neuro-endocrine parameters were missing from the database. Inherent to a naturalistic study relying on archival data, one limitation is that there is no comparison group, and another is that there is no record of exact number of sessions that each patient attended. The majority of the sample were males, which

could have potentially lead to a lack of power to detect a true gender effect. The use of two different PTSD measures and the consequent need for alternative scoring to combine the measures is another potential limitation. While the combined measure's strong relationship to the original PTSD measures and its convergent validity speaks in favor of the operationalization of our measure, subtleties in the wording across the two measures could affect the responses. Additionally, given the participants had a history of treatment resistance, a restriction of range issue may contribute to why pretreatment PTSD scores did not emerge as a significant predictor. The use of self-report measures is another potential limitation of this study: considering that eligibility for compensation-seeking came out as a significant predictor of treatment response, it may be especially important to utilize clinical interviews as it may be plausible that a positive treatment response can be masked in the posttreatment self-report measures. Finally, the one significant exploratory variable, eligibility for an occupational recognition procedure, could potentially be partially confounded by other variables, such as increased routine work environment stressors following organizational changes, or change in measurement instruments. Since the eligibility for employment recognition coincided with the change in PTSD measurement instrumentation, one could argue that the effect of eligibility for employment recognition is likely to be confounded by the change of PTSD measurement instrumentation. Specifically, changes in item content between both PTSD measures could account for differences in PTSD symptom improvement instead of eligibility for employment recognition. However, considering that a psychometric evaluation study of another PTSD measure showed that the discord between the *DSM-IV* and the *DSM-5* measure was no larger than the discord in a test-retest evaluation of the *DSM-5* measure (Weathers et al., 2018), we find it is rather unlikely that the change in measurement instruments confounded the results substantially in the current study.

### **Conclusion and Recommendations**

In conclusion, we found a significant decrease in mean PTSD symptom severity, as well as general psychopathology and depression. Almost half of the patients participating in a day clinic treatment program for police officers with a degree of treatment-resistant PTSD experienced improvement on or recovery from their PTSD symptoms. This supports the practice-based recommendation that treatment may be intensified after first-line evidence-based treatment fails to yield a sufficient response, and that a multidisciplinary approach to treatment may lead to significant treatment gains for police officers. However, the current study also showed that a substantial percentage of participants left treatment still meeting PTSD criteria or having significant residual symptoms. Future research should examine whether some patients would draw more benefit from treatment if other or additional intensification strategies were used or if treatment focused more on increasing quality of life for example through acceptance and commitment therapy for PTSD. A mixed quantitative and qualitative study on this

patient group could also provide new insight.

We were unable to identify any significant clinical or demographic predictors for treatment response, meaning that treatment response in this initially unresponsive group may be predicted by other factors than baseline symptom severity, gender and age. It is recommended that future studies look into other factors known to be associated with response to PTSD treatment, such as limited verbal memory capacity (Nijdam et al., 2015) or persistent sleep problems (Lommen et al., 2016), and into whether interventions focused on improving cognitive functioning or sleep would enhance treatment response. We exploratively identified eligibility for a recognition procedure as a factor related to worse treatment response. This is a potentially important finding meaning that such procedures in a subgroup of patients might actually, paradoxically, contribute to symptom maintenance or exacerbation. It might be beneficial to further examine the connection between eligibility for or involvement in a recognition procedure and PTSD treatment response in police officers in a separate study that more broadly focuses on return-to-work factors. Finally, given the variation in treatment response, assessing other potential predictors of treatment response that could apply to this specific group of patients is recommended to ultimately gain more insight and improve care for first responder populations in the future.

### **Author Contributions**

SEM: conceptualisation, methodology, formal analysis, software, visualisation, writing – original draft

NvdA: methodology, data curation, software, supervision, writing – review & editing

MJN: conceptualisation, methodology, supervision, writing – review & editing

MJP: conceptualisation, methodology, supervision, writing – review & editing

FJtH: conceptualisation, methodology, supervision, writing – review & editing

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# Appendix A

## The 14 Items Included from the Harvard Trauma Questionnaire and the PTSD Checklist for DSM-5 in the Combined PTSD Outcome Variable

HTQ	PCL-5
1. Recurrent thoughts or memories of the most hurtful or terrifying events	1. Repeated, disturbing, and unwanted memories of the stressful experience
2. Feeling as though the event is happening again	3. Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)
3. Recurrent nightmares	2. Repeated, disturbing dreams of the stressful experience
4. Feeling detached or withdrawn from people	13. Feeling distant or cut off from other people
5. Unable to feel emotions.	14. Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)
6. Feeling jumpy, easily startled	18. Feeling jumpy or easily startled
7. Difficulty concentrating	19. Having difficulty concentrating
8. Trouble sleeping	20. Trouble falling or staying asleep
9. Feeling on guard	17. Being 'superalert' or watchful or on guard
10. Feeling irritable or having outbursts of anger	15. Irritable behaviour, angry outbursts, or acting aggressively
11. Avoiding activities that remind you of the hurtful event	7. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)
12. Inability to remember parts of the most hurtful events.	8. Trouble remembering important parts of the stressful experience
13. Less interest in daily activities.	12. Loss of interest in activities that you used to enjoy
15. Avoiding thoughts or feelings associated with the hurtful events	6. Avoiding memories, thoughts, or feelings related to the stressful experience





# 9

## **Summary of Main Findings and General Discussion**

With the number of complex humanitarian crises increasing, the number of people requiring humanitarian assistance grows. Consequently, the number of humanitarian aid workers (HAWs) serving those in need has also increased (ALNAP, 2022). HAWs face a multitude of challenges in their occupational context, leading to increased exposure to stress and potentially traumatic events (PTEs), which in turn can place a burden on their mental health and well-being.

In this thesis, we examined a cohort of international HAWs (iHAWs) from Médecins Sans Frontières (MSF) to investigate (changes in) their mental health and well-being. We aimed to identify new pathways for mitigating and preventing the adverse effects of work-related stress among this occupational group, which faces a unique set of challenges. Considering that some high-risk professionals end up developing post-traumatic stress disorder (PTSD) as a result of work-related PTEs and accompanying work stressors, we also devoted a part of this thesis to exploring the treatment of work-related traumatic stress. For this purpose, we studied the treatment response of an augmented PTSD treatment for previously treatment-resistant police officers.

We will begin this discussion chapter by summarising the most central findings of this dissertation. Subsequently, we will integrate our central findings into the extant literature. Afterwards, we will reflect on the research process itself and the dissertation's strengths and weaknesses. Finally, we will conclude with recommendations for future research and organisational policy.

## Summary of Main Findings

### Part 1: Mental Health Changes

The first section of this thesis was focused on the general questions regarding the mental health and well-being of iHAWs: do iHAWs remain healthy, or does their health deteriorate following an aid assignment? And, can we distinguish different symptom trajectories and what predicts the likelihood of an iHAW belonging to a specific symptom trajectory?

In **Chapter 2**, we found few negative mean changes in the health of iHAWs from pre-assignment to post-assignment. We showed that symptoms of several common mental health complaints like depression and PTSD remained stable. While we found that symptoms of emotional exhaustion increased and social functioning and emotional well-being decreased from pre-assignment to post-assignment, those symptoms improved between post-assignment and the two-month follow-up measurement. The presence of DSM-5 disorders was low compared to norm populations except in the case

of alcohol use disorder, and we found that the typically used self-report questionnaire cut-offs substantially inflated the reported risk of clinically significant levels of mental health problems among iHAWs. We identified several risk factors for self-reported post-assignment health decreases, but none of those risk factors were significant at the two-month follow-up, and none were risk factors for clinical levels of mental health symptoms.

In **Chapter 3**, we examined different symptom trajectories of iHAWs, finding three trajectories for emotional exhaustion, work engagement, anxiety, and depression and four trajectories for PTSD. Most iHAWs remained healthy, as evidenced by 73-86% belonging to the 'healthy/normative' trajectory for each outcome. Further, we found a stable 'ill health/increased symptomatology' trajectory (7-17%) for all outcomes except anxiety. An 'improving' category was found for PTSD and anxiety (5-14%). In addition, a 'worsening' trajectory (4-15%) was found for all health indicators. A low Sense of Coherence (SOC) was found to be the most consistent predictor of belonging in the worsening trajectory for all outcomes, whereas a strong SOC protected iHAWs from belonging to the improving or ill-health trajectories. Female sex, on the other hand, was related to higher odds of belonging to the worsening trajectory in depression and anxiety. Finally, a longer duration of assignment was related to higher odds of belonging to the worsening depression category.

## **Part 2: Stressors**

The second part of the thesis took a closer look at various types of stressors that humanitarian aid workers may face during their fieldwork. **Chapter 4** focused on the incidence of sexual harassment during a single humanitarian fieldwork assignment. We found that 18% of female and 7% of male iHAWs reported experiencing at least one type of sexual harassment during their assignment, with non-physical forms of sexual harassment reported the most. Lower age was associated with higher severity of reported harassment, as was being a first-timer on a humanitarian assignment. Sexual harassment predicted variance in increased post-assignment symptoms of depression and anxiety among females but not among males, and it predicted increased post-assignment symptoms of PTSD among males but not females.

In **Chapter 5**, we examined competing expectations about how four different types of stressors combine to predict psychological distress, emotional exhaustion, work engagement, and organisational commitment. We found general harassment and fieldwork stressors to be the most consistent predictors among male and female iHAWs alike. Additionally, sexual harassment predicted each of the four outcomes among female iHAWs, but none of the outcomes among male iHAWs. We found that stressors combine most typically in an additive manner, where each additional stressor type

experienced places a further burden on the mental health and well-being of the iHAW. Moreover, we found an exacerbating effect when predicting psychological distress among female iHAWs, showing that in the context of high sexual harassment, traumatic stressors had a significant relationship with psychological distress. We also found an inurement effect when predicting work engagement among female iHAWs, indicating that experiencing more than one type of stressor did not have a further detrimental association with work engagement.

### **Part 3: Sense of Coherence: A Framework for Understanding How iHAWs Remain Healthy?**

In **Chapter 6**, we examined the role of SOC and its relationship to the mental health and work-related well-being of iHAWs. Through path analysis, we attempted to unravel the mechanism that enables iHAWs to maintain their well-being. We found pre-assignment health to be of crucial importance for post-assignment levels of anxiety, depression, emotional exhaustion, PTSD, and work engagement, and that field stressors, but not PTEs, had a negative health impact on mental health and work-related well-being outcomes. The different SOC components mediated the relationship between field stressors and post-assignment health, counteracting the detrimental impact of the field stressors.

We examined the longitudinal measurement invariance of the SOC-13 instrument in **Chapter 7**, to find out whether the instrument is psychometrically stable in the humanitarian aid working context. We could establish full metric invariance, as well as partial scalar and strict invariance, indicating the measurement invariance was strong enough to compare the SOC-13 scores over time. Given the evidence of the role of SOC in the mental health and well-being of iHAWs and the relative stability of the associated measurement instrument, we concluded SOC to be a prime candidate for targeted prevention, intervention, and routine outcome monitoring purposes.

### **Part 4: Treatment of Occupational Stress & Trauma**

We dedicated **Chapter 8** to examining an augmented form of trauma-focused treatment among another high-risk occupational group, namely police officers. By examining Routine Outcome Monitoring (ROM) data, we found that approximately half of the previously treatment-resistant police officers reliably improved their PTSD symptoms with the offered treatment. We did not find any clinical or demographic predictors of treatment response, but occupational PTSD recognition and compensation-seeking status had a significant association with treatment response in that those involved in a recognition and compensation program at the start of treatment had a much poorer treatment response than those who were not involved in such procedure.

## General Discussion

### **Changes in Mental Health and Work-Related Well-being After a Humanitarian Aid Field Assignment**

Some of the recent literature paints a stark picture of the mental health of HAWs, characterising them as ‘the forgotten first responders’ (e.g., Macpherson & Burkle, 2021). Informal surveys have reported that over 80% of aid workers suffer from mental health issues (Young, 2015), with peer-reviewed rates of PTSD, depression, and anxiety ranging anywhere from single digits to 30-40% (see Connorton et al., 2012, for an overview). Our results contribute toward a more nuanced look at the mental health and well-being of iHAWs than what has been painted by previous research: in our studies, most iHAWs remained healthy, yet some developed (sub-)clinical mental health symptoms or began their assignment with already heightened symptoms.

### ***A Positive Outcome for Most iHAWs***

In Chapter 3, we showed that the majority of iHAWs belonged in the ‘healthy’ symptom trajectory for anxiety, depression, PTSD, emotional exhaustion, and work engagement, meaning they remained asymptomatic over time. This finding was in line with the few health changes from before humanitarian assignment to after it found in Chapter 2. The few identified negative changes in emotional exhaustion, social functioning, and emotional well-being had almost exclusively small effect sizes. Moreover, iHAWs improved on all those indicators in the follow-up period, suggesting that the distress experienced was likely a typical stress reaction in response to a challenging working environment, with a natural recovery of symptoms following a rest period. These results point toward an overall strong capacity of iHAWs to deal with high levels of adversity-related stress. That conclusion contradicts the findings of the only other longitudinal study of iHAWs thus far (Lopes Cardozo et al., 2012), which reported HAWs to have an increased risk of anxiety, depression, emotional exhaustion, and depersonalisation after an assignment, with increased risk of depression and emotional exhaustion continuing at the three-to-six-month follow-up moment. It is not entirely clear what accounts for this incongruence in the results between these studies. One possibility is that selection bias affected Lopes Cardozo et al.’s (2012) study sample so that people with existing mental health problems or those who had been negatively impacted by previous humanitarian assignments were likelier to participate. Whilst this is a possibility for any study, our cohort study allowed us to conduct a sensitivity analysis; their data collection method did not allow for sensitivity analysis, nor did they report the percentage of potential participants that consented to the study, making it hard to elucidate whether selection bias could be behind the observed differences in results. The second possibility is that MSF may have – in comparison with the various organisations sampled in the study of Lopes Cardozo et al. (2012) – more rigorously trained and better-supported staff,

making it operate much like a UN organisation which typically do better than other humanitarian organisations on staff wellbeing (Ager et al., 2012).

### ***Clinically Significant Symptoms & Inflation of Estimates by Self-Report Cut-Off Scores***

By utilising a clinical interview (The Mini-International Neuropsychiatric Interview; Sheehan et al., 1998) in addition to self-report measures, we were able to estimate how many iHAWs exhibit clinical levels of mental health symptoms following an aid assignment (Chapter 2). As our study was the first study on humanitarian workers to utilise a clinical interview, we had no direct comparison points from the same occupational group. However, the proportion of iHAWs presenting with clinically significant symptoms was lower than in norm populations for anxiety, depression, and PTSD (Kilpatrick et al., 2013; Steel et al., 2014). In the case of an alcohol use disorder, however, three times as many iHAWs screened above the clinical cut-off than in norm populations for combined alcohol and substance use disorder (Steel et al., 2014). Most (88%) of the iHAWs that screened positive for alcohol use disorder fell into the 'mild' severity category, potentially signifying that it was used as a mechanism to cope with stress. This result is in line with previous research, which suggests high levels of problematic drinking among HAWs (Jachens et al., 2016). However, as Young et al. (2018) showed, although people may use it to cope with stress, it is not considered an *effective* coping strategy by HAWs themselves.

We also showed that the typically recommended cut-offs for the utilised self-report questionnaires inflated the estimates of a potential anxiety disorder threefold, PTSD eightfold, and depression twenty-fivefold. These notable findings are in line with and surpass the severity observed in previous research, which found that self-report questionnaires tend to overestimate the true prevalence of common mental health disorders by 1.5 to 2 times (Charlson et al., 2019). This suggests the futility of using the standard self-report questionnaire cut-offs among iHAWs without adjusting them to this population or without supplementing them with a follow-up clinical interview in case of an above-the-cut-off-point self-report score. Without doing so, one risks mistaking potentially transitory feelings or symptoms like sadness or sleeplessness in the past week for a functionally impairing, longer-lasting set of symptoms. We did not find demographic or assignment-related risk factors predicting clinically significant mental health symptoms.

Despite the percentage of iHAWs reporting clinically significant distress being on the smaller side, this group remains an important group of workers to focus on. The finding that most people with clinically significant distress did not seek out mental health support in the two months following the assignment may indicate that these people

face barriers in accessing care (Cockcroft-McKay & Eiroa-Orosa, 2021; Nerenberg & Kia-Keating, 2022; Stevens et al., 2022). Yet, as we only conducted a clinical interview after the assignment and did not ask about ongoing psychological care before the assignment, it is possible that some of the iHAWs screening positively for clinically significant distress at post-assignment were already experiencing that at pre-assignment and receiving ongoing psychological support.

### ***Sub-Clinical Levels of Distress***

Whilst the finding of relatively low levels of clinically significant mental health symptoms among iHAWs is a positive sign about their overall well-being, it does not tell the whole story. Many iHAWs may still experience acute or chronic distress and sub-clinical levels of mental health symptoms, feeling distressed even if they are functioning reasonably well in their daily life. For example, changes in emotional exhaustion and vitality found in Chapter 2 should not be overlooked: Emotional exhaustion is considered the core dimension of burnout (Edú-Valsania et al., 2022; Te Brake et al., 2008) and these concepts are important features in common mental health disorders (Tuithof et al., 2017). The emergence of increased emotional exhaustion or decreased vitality could signify the psychological strain of working as an iHAW arising from a high workload, moral dilemmas, or witnessing severe human suffering. Since emotional exhaustion has been found to precede the other symptoms of burnout temporally (Taris et al., 2005), its increase can certainly serve as an early signal of burnout.

Similarly, those belonging to the worsening or ill-health symptom trajectories should not be ignored. Together they make up 4-27% of the iHAWs, depending on which outcome we are considering (Chapter 3). This indicates that up to a quarter of iHAWs show moderate-to-severe levels of self-reported mental health or work-related well-being symptomatology, even if they do not fulfil the diagnostic criteria. These individuals may benefit from additional support or additional follow-ups, and some may go on to develop clinically significant symptoms later on (e.g., Hardeveld et al., 2010; Yarvis & Schiess, 2009). In the case of the steady ill-health trajectory, experienced iHAWs could still be experiencing the effects of their previous field assignment, pointing toward the importance of a sufficiently long rest period between humanitarian assignments.

Another important consideration is that not all mental health symptoms may develop quickly enough to be detected immediately at post-assignment. For example, PTSD can only be diagnosed after at least one month of symptoms. In our analysis of symptom trajectories, we found that 7% of iHAWs had a 'worsening' profile, where their symptoms increased from pre- to post-assignment and further increased between post-assignment and follow-up without reaching the clinical threshold. This finding is congruent with recent research showing subclinical PTSD symptom response patterns

among HAWs (Greene-Cramer et al., 2021). Some of these iHAWs may later fulfil the diagnostic criteria for PTSD, potentially exhibiting a delayed expression of PTSD; the opposite may, of course, also be true, and some of these iHAWs may subsequently improve on their symptoms.

### **Which Stressors Are the Most Impactful?**

As outlined in the Introduction of this thesis, most of the early research on the mental health and well-being of HAWs focused on PTSD as an outcome, with PTEs as the examined stressor type. However, more recent research has identified (daily) chronic stressors as an important source of stress for the HAWs (Jachens, 2019; Strohmeier, 2018; Young et al., 2018). Therefore, we chose not to limit ourselves to PTEs but explore a wider variety of stressor types. Our findings reiterate the surprisingly limited impact of PTEs and highlight the importance of chronic fieldwork-related stressors, interpersonal stressors like harassment, and the accumulation of various stressor types.

### ***PTEs: The Extent of the Issue***

Whilst 76% of the iHAWs in our cohort reported exposure to a PTE during the field assignment, with on average 2.6 directly experienced or witnessed PTEs during their assignment, the presence of clinical levels of PTSD symptoms in the sample was very low (0.3%). When looking at the self-screener instrument, two percent more participants scored above the designated cut-off for clinically significant symptoms after the assignment compared to before. However, this difference was not statistically significant. The reason behind such low prevalence of clinically significant PTSD levels may lay in the training that iHAWs receive. They know to expect PTEs, just like other emergency personnel (Gouweloos, 2018; Gouweloos-Trines et al., 2019). Furthermore, the potential impact of an event is assessed based on the context in which it takes place: For example, people exposed to mass violence may not rate the same events as traumatising as people living in stable surroundings due to not perceiving the events as out of proportion to their context (de Jong et al., 2011). This may also contribute to the low PTSD prevalence in our study (Chapter 2) and to the nonutility of PTEs in predicting mental health and work-related outcomes (Chapter 6) when compared to chronic fieldwork-related stressors. Yet, as previously discussed, the proportion of iHAWs belonging to the stable 'ill-health' or the 'worsening' PTSD symptom trajectory is not inconsequential, with the two totalling 15% of the sample, showing that PTSD symptoms are not a negligible issue among iHAWs.

Research published after the onset of this thesis project has found somewhat similar results. Greene-Cramer and colleagues (2021) found a low prevalence of PTSD among their sample of HAWs (1.3%) and identified a number of PTSD symptom trajectories. The majority of their sample fell into either a resistant (steadily low symptoms;



66.7%) or resilient (initially high symptoms which subsequently decrease; 14.6%) trajectory. Studies among other populations similarly indicate that approximately 70% of individuals have a resilient pattern of response to PTEs (Bryant et al., 2015; Galatzer-Levy et al., 2018; Mancini & Bonanno, 2006). Whilst our research did not find the previous experience of humanitarian aid work to be a predictor of PTSD symptom trajectories, Greene-Cramer et al. (2021) found that HAWs with one previous deployment were three times likelier to be non-resilient, compared to those with no or more previous experience – perhaps due to cumulative stress combined with insufficient time to develop new coping mechanisms yet. This difference compared to our result could be associated with the lower-than-desired sample size of Greene-Cramer et al.'s (2021) investigation. On the other hand, in a cross-sectional study, Dewar et al. (2023a) reported that less experienced aid workers had the largest odds of being in severe PTSD symptom profiles. Altogether, these results point toward previous humanitarian aid work experience being an inconsistent predictor of PTSD symptom profile or trajectory. This could reflect the impact of confounding variables such as the type of organisation (e.g., U.N. vs. NGO) or the worker's experience affecting their chances of being placed in a particularly hazardous or otherwise challenging assignment.

### ***The Other Stressors & Their Accumulation***

Our findings affirm that humanitarian fieldwork assignments may, indeed, be highly demanding. In addition to the PTEs, iHAWs reported several fieldwork-related (chronic) stressors like unclear (organisational) communication, workload, difficult travel to the destination, and the security context of the country. Moreover, both general and sexual harassment were frequently reported. In Chapter 5, we analysed the associations of all these stressor types on various mental health and well-being outcomes, both alone and in combination. We concluded that the most important categories of stressors for the mental health and well-being of iHAWs are fieldwork-related stressors and general harassment for both male and female iHAWs; for female iHAWs, sexual harassment was an additional important stressor in predicting the outcomes. Our findings further call attention to the importance of considering various measures or models of stress when trying to understand how HAWs cope with stressors (Foo et al., 2021; Jachens, 2019).

**Field Stressors.** Male and female iHAWs reported, on average, 4.8 and 5.6 significant fieldwork-related sources of stress, respectively (Chapter 2). Fieldwork-related stressors were predictive of increases in mental health symptoms from pre-assignment to post-assignment (Chapters 4 and 6). This is in line with findings from previous research among iHAWs, which suggested that chronic stressors like excessive workload or conflicts with colleagues were associated with a higher risk of depression at post-assignment and follow-up (Lopes Cardozo et al., 2012). It further adds to the body of research among high-risk occupational groups, which suggests that daily stressors

place substantial strain on the mental health and well-being of these workers (e.g., Gouweloos, 2018; van der Velden et al., 2010).

**Sexual Harassment.** In Chapter 4, we showed that 18% of female and 7% of male iHAWs had experienced at least one incident of sexual harassment on their latest field assignment. Compared to the previous findings, these figures may appear low: For example, in a survey by Report the Abuse (Nobert, 2017a), 69% of respondents had experienced sexual violence during a humanitarian assignment, and in the Humanitarian Women's Network (2016) survey, 55% of respondents reported persistent romantic or sexual advances and 48% reported unwanted touching. There are several clear reasons why the percentages we found are lower. For one, these surveys were opt-in surveys, likely attracting those who have experienced harassment to participate, creating a bias. Furthermore, these surveys queried lifetime experiences in the humanitarian work field, not a single occurrence like our study or another shorter time period like in the past year. Our results likely portray a more accurate reflection of the average number of iHAWs exposed to sexual harassment, with the caveat of it describing a relatively short time period. However, as we may still assume some level of underreporting (Stoddard et al., 2019), these numbers are high, and they also point toward the importance of not painting the issue as a 'female-only' problem.

Importantly, the finding that most of the reported sexual harassment in our research consisted of non-physical types of sexual harassment does not mean we should take it lightly. In fact, the opposite appears to be true, according to research: Among female military staff, it has been shown that even the mildest forms of sexual harassment experienced commonly can lead to similar distress as infrequent sexual coercion (Langhout et al., 2005). Indeed, high-frequency, low-intensity sexual harassment has been shown to have even stronger effects on general health, job satisfaction, and organisational commitment than low-frequency, high-intensity sexual harassment (Sojo et al., 2016). This is likely because the latter may reflect the actions of the few 'bad apples', whereas the former may be seen as indicating an organisational culture that is permissive of sexual violence (Stoddard et al., 2019).

Sexual harassment was related to mental health symptoms, with higher sexual harassment being associated with increased symptoms of anxiety and depression among females and increased symptoms of PTSD among males. These findings largely align with previous research among high-risk and other occupational groups. For example, Hom et al. (2017) reported that among female firefighters, sexual harassment was associated with several mental health complaints and suicidal ideation. Several studies among other occupational groups have also found associations between sexual harassment and depression and anxiety (e.g., Gale et al., 2019; Marsh et al., 2009; Richman et al., 1999).

**General Harassment.** To our knowledge, this dissertation encompassed the first study to examine general harassment among HAWs. We found that female iHAWs experience more general harassment than male iHAWs (Chapter 5). It could be that female iHAWs face more general harassment where the content of the harassment is not explicitly tied to their gender. However, this result may also be indicative of gender-based harassment (e.g., comments about women being ‘less intelligent’ or ‘more emotional’) or discrimination, which was previously reported by the Humanitarian Women’s Network (2016) survey. As our chosen general harassment instrument did not contain gender-harassment-specific questions, we could not examine this possibility specifically. In the wider occupational health psychology literature, most evidence points towards small sex differences in general workplace harassment (Bowling & Beehr, 2006); yet, for female iHAWs, general harassment was the stressor type most consistently negatively associated with mental health and wellbeing, also when controlling for the effect of the other stressor types.

**Accumulation of Several Stressor Types.** Our findings clearly indicate that when iHAWs experience multiple types of stressors, these typically combine in a manner where each additional stressor type adds to the overall strain and results in higher symptomatology and lower work-related well-being (Chapter 5). This finding provides a clear and practical avenue of intervention: By trying to reduce the number of different stressors that iHAWs might be exposed to, humanitarian organisations would be reducing the overall strain experienced by their staff. The most consistent and important predictors of mental health and well-being were field stressors and general harassment, with the addition of sexual harassment for females; each of these stressor types is controllable or manageable, to a certain extent, by the organisation. Within field stressors, there are several sources of interpersonal or organisational stress, like unclear organisational communication or workload, that can be minimised with appropriate managerial training and policy changes. Similarly, general harassment and sexual harassment consist of a range of unacceptable behaviours, which can be tackled by improving prevention measures, procedures and policies regarding harassment (Nobert, 2017b).

### **How Do iHAWs Remain Healthy: Sense of Coherence (SOC) as a Framework for Understanding Health and Well-Being**

Previous research has applied well-known occupational health psychology models in trying to model how job strain is associated with the mental health outcomes of HAWs (Jachens, 2019; Strohmeier, 2019). Yet, the utility of the traditional occupational health psychology models alone can be questioned, in particular when modelling the health of a professional group known to be working under conditions that – by default – are often lacking in the balance of efforts and rewards or demands and resources. We,

therefore, investigated the potential of SOC as an alternative framework through which to understand how iHAWs maintain their well-being.

In Chapter 3, we examined assignment duration, the number of prior assignments, SOC, coping self-efficacy, and social support as potential predictors of different health trajectories, and found SOC to be the most consistent predictor of healthy symptom trajectories. Furthermore, in Chapter 6, we showed that SOC buffered the negative effects of field stressors on depression, anxiety, emotional exhaustion, and PTSD symptoms, as well as work engagement. These findings are consistent with earlier cross-sectional research suggesting that strong SOC is associated with good health and well-being among HAWs and that SOC may mediate the impact of stressors on mental health outcomes (Veronese & Pepe, 2014, 2017). Furthermore, the findings are congruent with research among other professional groups (Albertsen et al., 2001; Feldt, 1997; González-Siles et al., 2022) and general populations (Schäfer et al., 2019, 2023). In Chapter 7, we established partial longitudinal measurement invariance for the SOC-13 instrument, showing its usability in examining the SOC of iHAWs.

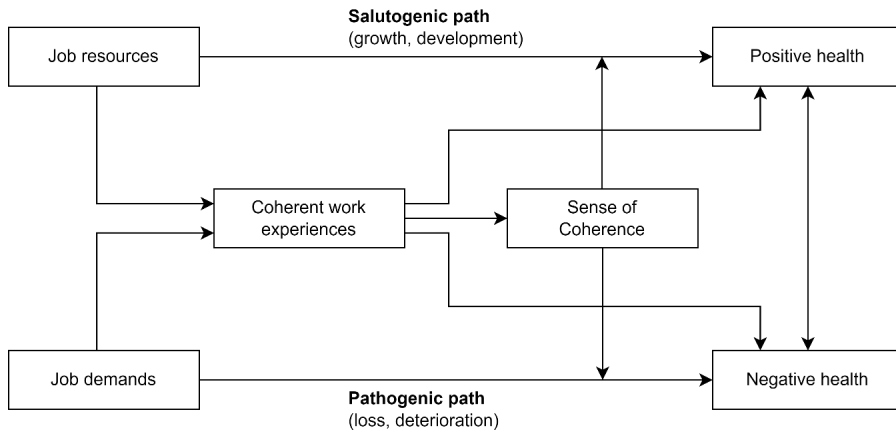
### ***Part of a Bigger Puzzle?***

How can we place these findings in the larger landscape of SOC research and earlier findings on the mental health and well-being of iHAWs? What exactly are the implications of our findings? How does it add to our knowledge and theoretical ideas, and does it provide any practical ways for NGOs to address the well-being of their staff?

Our findings seem to lend support to the relatively recent notion that SOC is the central piece of a bigger theoretical puzzle explaining how iHAWs maintain their mental health and well-being. Previous research on the connection between occupational health psychology models and the salutogenetic theory has identified a model that combines the two ways of thinking: the Job Demands-Resources Health Model (Brauchli et al., 2015). In this model, the core idea of the Job Demands-Resources model (Demerouti et al., 2001; Schaufeli & Bakker, 2004) is combined with the idea of salutogenic and pathogenic health development. Personal resources like SOC can be added to this model so that general SOC mediates and/or moderates the relationship between job resources and demands and the positive or negative health outcomes (Figure 1).

**Figure 1**

*A Visual Representation of the Job Demands-Resources Health Model with Sense of Coherence as a Mediator and/or Moderator. Adapted from Jenny et al. (2022). Some Modifications to the Figure Were Made. <https://link.springer.com/book/10.1007/978-3-030-79515-3>, Licensed Under the Terms of the Creative Commons BY 4.0 License.*



Research shows that job resources and job demands affect the extent to which work experiences are felt as coherent (Vogt et al., 2013), which again affects the general SOC (and vice versa, Broetje et al., 2019). Coherent work experiences then partially mediate the relationship between job resources and work engagement (positive health) on the one hand, as well as between job demands and exhaustion (negative health) on the other hand (Vogt et al., 2013). Considering the role of coherent work experiences in getting ill and staying well, and the knowledge of the role of job demands on them, we can further point toward the importance of reducing modifiable stressors. Previous research has found that general interventions that improve SOC and well-being (Vastamäki et al., 2009) are, for example, physical workouts and mindfulness-based meditation practices (Ando et al., 2011; Kekäläinen et al., 2018). However, the Job Demands-Resources Health Model with SOC as a mediator and moderator would suggest that focusing on increasing job resources and decreasing job demands would already be a great way to improve SOC. It appears that humanitarian organisations stand to benefit by simply reducing modifiable stressors (e.g., excessive workload,) and focusing on increasing job resources (e.g., clear organisational communication, a culture of appreciation and management actively seeking feedback). If both of these feed into more coherent work experiences by making the aid workers' work situation more comprehensible, manageable, and meaningful, it further impacts their general SOC. Psychoeducation on the connection of SOC and well-being to staff – including the managerial level – could form an important part of the attempts to integrate SOC into prevention, intervention, and routine health monitoring initiatives of NGOs.

### ***Inconsistencies in SOC Findings***

While SOC was found to be a consistent predictor of belonging in the healthy trajectory in Chapter 3, in Chapter 6 higher pre-assignment SOC was in some cases predictive of worse post-assignment health. In Chapter 6, we suggested this may be due to a response shift and that the vastly different contexts in which the participants had been prior to the measurement occasions may have impacted the way they interpreted the questions. More specifically, certain items of the SOC-13 instrument may have been evaluated differently before the assignment vs. after it; for example, an individual's perception of receiving fair treatment may differ when working in a stable and secure country compared to a post-conflict or post-disaster setting. Yet, in Chapter 7, we found partial longitudinal invariance, at a level which suggested that SOC-13 instrument scores were invariant enough over time to make longitudinal comparisons. That raises the question: What else may have been behind these inconsistencies between the findings of Chapters 3 and 6? Some of the potential culprits may relate to a response shift in the health indicators (e.g., depression, anxiety) instead of the SOC instrument, the number of people used for the analyses (subgroup in Chapter 3 vs. whole group in Chapter 6), the number of time points considered in each analysis (two in Chapter 3 vs. three in Chapter 6), the type of outcome score used (trajectory in Chapter 3 vs. post-assignment in Chapter 6), or the different covariates included in the models.

### ***Alternatives to SOC in Explaining How iHAWs Maintain Their Well-being***

In choosing to focus on SOC, we did not select to examine certain other potential theoretical frameworks of variables that may also contribute toward understanding the mechanisms regulating how HAWs maintain their well-being. One of these is the concept of Coping Self-Efficacy, which describes someone's ability to cope with the stressors present in someone's life. Our research included the brief Coping Self-Efficacy scale (CSE-7, Bosmans et al., 2017), but as the CSE-7 focuses on the perceived ability to cope with *traumatic stressors* instead of any other types of stressors, it restricts its utility. Whilst we found CSE-7 to be predictive of some *improving* or *ill-health* trajectories, it was a far less consistent predictor in our analysis than SOC was. Considering that traumatic stressors are not the most impactful stressors that HAWs report, nor is PTSD the biggest health concern, focusing on Coping Self-Efficacy with regard to traumatic stressors may be of low practical utility among this occupational group.

Another potentially relevant theoretical approach to understanding how HAWs maintain their mental health and well-being during highly stressful work settings is the idea of regulatory flexibility (Bonanno & Burton, 2013). Recent research suggests that regulatory flexibility – flexibly adapting one's behaviour and coping depending on what the context requires – may be behind resilient symptom trajectories following traumatic events (Bonanno et al., 2023). There is also some initial evidence connecting

less flexibility in emotion regulation to greater symptoms of depression and anxiety (Chen & Bonanno, 2021). A related concept of psychological (in)flexibility has also been found to relate to a number of transdiagnostic processes (e.g., rumination, perfection) that maintain psychopathology (Morris & Mansell, 2018). Considering that aid workers operate in often highly stressful and unpredictable settings – international staff typically in contexts that are new to them – regulatory flexibility and/or aspects of psychological flexibility may provide potential targets for the prevention and intervention of mental health problems among aid workers.

### **Risk & Protective Factors Associated With the Well-Being of iHAWs Throughout the Dissertation**

As mentioned earlier in this Discussion, in Chapter 2, we found several variables associated with higher chances of scoring above the cut-off score at post-assignment. Being female, as well as having a longer experience as national staff, were associated with a higher risk for anxiety and depression, for example. Older age and greater assignment length, on the other hand, were associated with a higher risk of burnout. Although these findings are in line with much of previous research, the effect sizes at post-assignment were small, and none of the variables were significant predictors at follow-up anymore. Furthermore, they were not significant predictors of clinically significant distress based on the clinical interview. This diverges from the results of a previous longitudinal study among aid workers, which found significant risk factors also at follow-up (Lopes Cardozo et al., 2012)). This nuance is important, as it shows that predicting longer-term health outcomes and identifying at-risk individuals among HAWs may be more complex than previously thought – in particular, considering that we did not find any predictors for clinically significant levels of distress, as assessed by a clinical interview. As hypothesised earlier in this discussion, a potential reason for differences between our results and those from the other existing longitudinal study on the mental health of HAWs (Lopes Cardozo et al., 2012) could be related to sampling biases. On the other hand, attrition between post-assignment and follow-up assignments in our study could have also impacted these results.

In our other studies, however, it was clear to see that female sex was a risk factor for worse mental health symptoms and was associated with higher exposure to certain stressors. In the case of predicting symptom trajectories in Chapter 3, female sex was a commonly found risk factor for belonging in the worsening trajectory for anxiety and depression, and the ill health trajectory the depression. This is consistent with higher prevalence rates of anxiety and depression among females found among military personnel (Jones et al., 2020) and among HAWs (Ager et al., 2012). However, unlike in other literature (Olf, 2017), female sex did not predict a worsening PTSD trajectory (Chapter 3) or PTSD symptom changes in general (Chapter 4). This could be because we

mainly found sub-clinical levels of PTSD symptoms, or because female coping strategies like emotional coping (Olf, 2017) worked out better in the context of a humanitarian aid setting compared to other context (e.g., the aftermath of a traffic accident). Further, as discussed earlier, in Chapters 4 and 5 we showed a higher incidence of sexual and general harassment among female iHAWs. Altogether, these results attest to the importance of taking a gendered approach when considering the mental health and wellbeing of HAWs (Strohmeier, 2019). Compared to the inconsistent findings about the impact of sex and/or gender on the mental health and well-being of HAWs thus far (Brooks et al., 2015), our findings suggest a clearer and more unambiguous picture.

When looking at the protective factors that could be identified in Chapter 3, we found biological sex, assignment duration, SOC, coping self-efficacy and social support to be associated with at least some of the symptom trajectories. SOC was by far the most consistent predictor of belonging to the healthy trajectory for all outcomes, with strong SOC decreasing the odds of belonging to any of the other trajectories. In Chapter 3, we showed that social support and coping-self efficacy were also protective factors, as both variables were associated with decreased chances of belonging in the 'ill health' trajectory. This finding echoes earlier research stating that social support appears to predict well-being (Brooks et al., 2015); it has been associated with, for example, lower depression, psychological distress, burnout, and greater life satisfaction among iHAWs (Lopes Cardozo et al., 2012).

### **Considerations for Preventive and Curative Interventions for Improving the Mental Health and Well-Being of Humanitarian Aid Workers and Other High-Risk Professionals**

One of the questions we hoped to shed light on with our research was whether iHAWs may need prevention and treatment approaches adapted to their unique needs and context or whether we can apply what we know about the prevention and treatment of work stress and its consequences from elsewhere. Our findings indicate that the knowledge of unique needs and the humanitarian aid work context should guide humanitarian organisations in their prevention and intervention efforts.

First, as we showed in Chapter 5, the accumulation of different stressor types is associated with a higher mental health symptom burden. Whilst iHAWs reported several PTEs during their assignment, it was the multiple (chronic) fieldwork-related stressors and harassment that were associated with worse mental health and well-being. Therefore, minimising and addressing these types of stressors should be at the forefront of organisational prevention and intervention efforts. Second, our findings indicate a level of resistance of HAWs towards accessing mental health services, as evidenced by the relatively low levels of mental health service utilisation in the two



months following an aid assignment (Chapter 2). Third, the elevated prevalence of alcohol abuse problems among iHAWs warrants attention. Centring prevention and intervention efforts on these three topics may be important for this occupational group. Another set of questions related to the treatment of occupational trauma. What could we learn from the police PTSD treatment study about treating occupational traumatic stress? Could we draw some lessons from that that would apply to HAWs, too? We will discuss our findings regarding both sets of questions in a later section of the Discussion.

### ***Harassment and Stressors Amenable to Change***

We showed that field stressors, as well as general and sexual harassment, are associated with worse health outcomes, including burnout (Chapter 5). Emotional exhaustion – the core element of burnout – was one of the few health outcomes where on average, iHAWs had increased symptomatology from pre-assignment to post-assignment (Chapter 2). Increased emotional exhaustion can serve as an early warning signal, predicting the emergence of other burnout symptoms (Taris et al., 2005). Considering the negative impact of the abovementioned stressors on emotional exhaustion in particular, reducing (and monitoring) modifiable stressors is a key action that humanitarian organisations can make in trying to prevent and mitigate negative health outcomes. Below, we will use the example of sexual harassment to exemplify some of the issues relating to mitigating these modifiable stressors.

Recent research on the content of sexual harassment survivor testimonies from the field of humanitarian aid suggests that reasons that organisations are hesitant to address the issue include legal ambiguities, barriers to accessing justice, and organisational mismanagement (Sauter et al., 2024). These reasons are seen to contribute to the permissive environment in the aid industry, where organisational cultures that permit relatively lower levels of misconduct create an environment where higher levels of misconduct are also likelier to occur (Stoddard et al., 2019). Yet, as employers have the duty of managing and addressing foreseeable risks (Sauter et al., 2024), the importance of proactively addressing power dynamics and organisational cultures in trying to improve the situation has been highlighted (Cortina & Areguin, 2021; Sauter et al., 2024). A recent socio-ecological investigation into the roots of sexual violence within the aid industry further pointed out that aid organisations could address the issue by organising formal trainings and adjusting the current informal socialisation practices and social geographies governing life on a shared living compound (van Koeijer et al., 2023). For example, the lack of private spaces beyond the office and bedroom can blur boundaries during informal socialisation. Whilst the nature of humanitarian aid fieldwork – with people’s work and private life intermingling and constantly rotating staff – may make upholding policies more challenging, setting up collective norms and behavioural expectations can still be achieved.

### ***Stigma for Accessing Mental Health Support Services***

The task of gathering reliable information on mental health problems, including alcohol and other substance abuse and sources of stress, has been described as challenging within the humanitarian aid sphere (MacPherson & Burkle, 2020). This assertion arises from the idea that aid workers are reluctant to report such issues due to fears about repercussions to their careers. Furthermore, the ‘cowboy’, ‘macho’, and ‘martyr’ cultures attached to humanitarian aid work emphasise toughness and serve as barriers for accessing psychological support (Cockcroft-McKay & Eiroa-Orosa, 2020; Stevens et al., 2022). Whilst our cohort study with researchers external to the humanitarian organisation seems to have succeeded in gathering reliable information, our findings do indeed suggest a level of stigma regarding accessing mental health services, at the very least. Only 6.9% of iHAWs utilised assignment-related mental health services two months after an assignment (Chapter 2), despite a much higher percentage having clinically significant symptoms. This may indicate potential fears about accessing mental health services in case this may negatively affect their future career prospects within humanitarian aid organisations (Stevens et al., 2022). Or it could be that there are other barriers to accessing care.

According to a recent qualitative study among HAWs, some of the major issues affecting help-seeking include fears about lack of trust and confidentiality with internal mental health services on the one hand and the lack of shared understanding of the humanitarian work context among external service providers, on the other hand (Stevens et al., 2022). Similar findings about concerns regarding confidentiality and negative impacts on careers have been reported by first responders (Haugen et al., 2017). Indeed, up to a third of HAWs have reported experiences of stigma regarding mental health in their workplace, and for 10% it has impacted their help-seeking behaviour (Haugen et al., 2017). Research findings regarding HAWs’ attitudes towards help-seeking and self-awareness about the need for support are contradictory (Cockcroft-McKay & Eiroa-Orosa, 2020; Stevens et al., 2022), potentially reflecting variations in mental health and self-stigma-related attitudes between different organisations. These findings are not unique to the humanitarian aid world but reflect similar issues found among various high-risk occupational groups, showing the importance of addressing self-stigma about mental health among high-risk occupations (Trompeter et al., 2023).

Other thus far identified barriers to accessing mental health services among HAWs include but are not limited to unsupportive management, lack of recognition of mental health symptoms, limited access to services, or services that do not meet the needs of HAWs (Cockcroft-McKay & Eiroa-Orosa, 2020; Nerenberg & Kia-Keating, 2022; Stevens et al., 2022). Increasing organisational communications about mental health and standardising training programs relating to it may help in changing the organisational

culture surrounding mental health and service utilisation (Cockcroft-McKay & Eiroa-Orosa, 2020; Craw & Miller-Day, 2023). A further suggestion from the literature includes the idea of cost-sharing psychological support programmes between humanitarian aid organisations so that providers would not be internal only (Cockcroft-McKay & Eiroa-Orosa, 2020).

### ***Alcohol Abuse: The Most Common Clinical Issue***

Mild alcohol abuse was the most common clinically significant mental health issue among iHAWs in our study, according to a clinical diagnostic interview (Chapter 2). The finding calls humanitarian aid organisations to evaluate their policies concerning alcohol consumption whilst on assignment and for more psychoeducation about the effects of excessive alcohol use. A more open organisational culture about mental health problems, including alcohol and substance use issues, was suggested earlier in this discussion, as a proactive approach that may help mitigate alcohol misuse among the staff and make it easier for staff members to ask for help regarding their alcohol use behaviours. However, it is important to note that the legislation regarding alcohol use in the workplace varies largely between countries, as do the sanctions relating to it, which means that the same organisational policies may not work everywhere (Borrelli et al., 2022).

Research from the military – another high-risk occupation associated with increased alcohol use (Fear et al., 2007; Stevelink et al., 2018; UK Government, 2017) – shows that while alcohol may be used to cope with the stressors of the job (Fear et al., 2007), it is also associated with reintegration to the ‘normal life’ and alcohol abuse is likely to persist following the service (Jones & Fear, 2011; Stevelink et al., 2018). Considering that HAWs are also known to struggle with returning to their usual life (Roth, 2015), it is good to be aware that alcohol problems in iHAWs may also persist beyond the field assignment time period. Further, research on military populations may give us ideas about potential ways that can help modify the alcohol use behaviours of iHAWs. Traditional brief alcohol use interventions, which typically include personalised feedback as well as cognitive and/or behavioural strategies, do not seem effective among military populations (Doherty et al., 2017). However, technological innovations might provide better solutions: In United Kingdom, a smartphone app aimed at reducing alcohol use of help-seeking veterans is deemed usable (Williamson et al., 2023) and is currently being tested for effectiveness (King et al., 2023).

If humanitarian aid organisations wish to monitor the alcohol use behaviours of their staff in order to provide them with timely support when needed, an important issue remains to be clarified among this population: What is the optimal cut-off for self-report instruments like the AUDIT-C? Research from military personnel shows that

conventional cut-off points based on general populations grossly overestimated the prevalence of hazardous and harmful alcohol usage, making effective screening and monitoring without adapted cut-off points challenging (Duffy et al., 2023). More work is needed to examine the long-term associations of alcohol use and well-being among iHAWs.

### **Lessons Learnt from Treating Occupation-Related PTSD**

In our study examining the Routine Outcome Monitoring (ROM) data of a highly specialised police day clinic, we found significant, medium effect-size improvements in PTSD symptom severity (Chapter 8). As nearly half of the participants reliably improved on their symptoms in this previously treatment-resistant group of police officers, we concluded that intensifying treatment for police officers with PTSD who have not responded to previous trauma-focused treatment appears beneficial. This finding is in line with recent developments in the field of psychotrauma to intensify treatment for patients who insufficiently benefit (or are expected to benefit) from regular outpatient treatment (Ragsdale et al., 2020; van Gelderen et al., 2020; Zepeda Méndez et al., 2018). Whilst these findings were positive and showed the promise of interventions tailored to specific occupational groups, there were still a substantial number of patients who did not benefit from the treatment or even experienced worsening symptoms over the course of treatment. As a result of this and other similar evaluations, the day clinic ARQ Centrum'45 where this research took place is no longer offering the treatment in this format; they have moved on to trial a new treatment method in an attempt to serve their clients even better. What is notable is that had the clinic not collected its ROM data, there would have been no way to ascertain the level of treatment response overall and what may or may not predict it. The same logic applies to humanitarian aid organisations: Without monitoring the mental health and well-being of staff, they cannot ascertain how well their staff are doing and if their mental health is worsening, where special attention is required, nor can they offer appropriate services at the right time.

If standard evidence-based interventions do not appear sufficiently beneficial for HAWs suffering from work-related PTSD, intensifying or, in another suitable way, tailoring the treatment to suit the needs of HAWs may be a viable opportunity to improve their treatment response, too. For example, HAWs affected by moral injury and experiencing PTSD may require a tailored treatment approach (Dewar et al., 2023b; Griffin et al., 2019). However, the challenge of applying this finding may be that iHAWs, particularly, are a mobile group. This has implications for effectively organising mental health services for this occupational group, not only because of the practicalities of a geographical location but also due to different legal systems governing occupational health services and access to mental health services through health insurance. Furthermore, due to

the many barriers HAWs face in utilising organisational mental health services, it is crucial to focus on reducing those barriers, as well as ensuring access to mental health services also after the end of an aid assignment. After that – or in tandem – piloting adapted forms of evidence-based treatments to suit the needs of HAWs may be a more attainable goal.

## Reflections on the Research Process

### **Strengths & Limitations**

#### ***Strengths***

Our research on iHAWs had several strengths methodologically and conceptually. One of the major strengths was using a prospective longitudinal design with a large, well-representative cohort of international staff of MSF-OCA. Another strength was our broad battery of measurement instruments, covering multiple health indicators and potential sources of stressors. Our research was the first to systematically study sexual harassment and general harassment in a cohort of iHAWs, therefore providing the first estimates of their incidence on a humanitarian assignment. Additionally, unlike previous research, we incorporated clinical interviews to examine whether any experienced mental health symptoms denoted clinically significant distress.

Another strength is that we supplemented our examinations into the mental health and well-being of iHAWs by including a clinical sample from another high-risk occupational group, i.e. police officers. It provided insights into treatment response in a naturalistic setting, as opposed to a highly controlled experimental design like a randomised controlled trial. At the onset of this thesis research, our study was one of the first to examine predictors of treatment response among police officers.

The central strengths identified above are what lead to the unique contributions of this dissertation. The use of a representative cohort, combined with a wide battery of instruments and the use of a clinical interview, allowed us to gather data and insights that have changed the way that MSF-OCA approaches the mental health and wellbeing of their staff. Additionally, the focus on previously insufficiently examined topics like sexual and general harassment broadened the current understanding of the stressors that impact the mental health and well-being of iHAWs, identifying prevention and intervention topics that the organisation can address.

#### ***Limitations***

As we have reflected in the discussion sections of the previous chapters, several limitations exist to the studies presented in this thesis. Here, we will focus on the most

central limitations that apply to the thesis research as a whole.

**Generalisability of the Findings.** Perhaps the most crucial issue regarding generalisability is the fact that the research was conducted among international humanitarian staff. Whilst our study sample was representative of all international staff at MSF-OCA, the findings may not generalise to all international NGOs and it was not representative of most HAWs, who are national staff. Although many of the findings are likely relevant for national staff as well, the differences cannot be ascertained before replications with national staff samples. Previous research has demonstrated that the primary needs of the two groups can differ due to their different contexts and resources (Strohmeier et al., 2019). A further limitation on generalisability concerns international nature of the sample: The research took place in English, and although all participants were reasonably fluent in English, they may not have felt entirely comfortable with all the terminology used in the study. Furthermore, the study utilised a Western-based diagnostic system, and did not consider other potentially relevant cultural idioms of distress.

**Method limitations.** Although we had an extensive battery of questionnaires, we missed some relevant information. We did not enquire about race or ethnicity, prohibiting us from examining if and how race and the intersection of race and sex, for example, were associated with the experiences of different kinds of stressors and health outcomes. We also did not enquire about the psychiatric history of participants, disallowing us to use that as a control variable to consider when seeing who ended up developing mental health symptoms during the aid assignment. Further, we did not ask the participants about other highly stressful events that may have happened outside of the work context and affected their mental health or well-being, like a breakdown of a relationship or the loss of a loved one. Finally, our study did not include true well-being outcomes. Our goal at the outset of the project was to see the positive side of iHAWs' health as well, yet our measures still focused mostly on psychopathology.

### **Reflecting on my Role as a Researcher**

Looking back at the six and half years that it took me to complete the work described in this thesis, I have had many opportunities to consider what I may do differently if I were to start this research again, and what I am satisfied with. At the start of my period as a PhD student, I viewed integrity, excellence, and inclusivity as the key values to impactful research. Yet, by the end of this research journey, I came to realise that I had lived up to some of these values better than others, and some may not have served me in an ideal manner, prompting me to expand my value system.

For one, my own insights based on identifying as a female and my history in the workplace meant that I could see that sexual and general harassment may play a big role in the well-being of HAWs, and I advocated for inclusively inquiring about the sex and gender of participants. At the same time, my own background meant I had some weak spots: I did not question the existing demographics instruments and did not think about adding questions on race, religion, or ethnicity, for example. The demographics questionnaire utilised was based on an instrument routinely used at MSF-OCA, and the omission of the above-mentioned characteristics may also reflect how Western-based the international staff used to be – terminology even changed from the start of this study period from ‘expats’ to ‘international (mobile) staff’ by 2024, reflecting changing attitudes and awareness around colonialist pasts and how these were echoed in the vocabulary used at MSF. My understanding of inclusivity in research was greatly influenced over the past few years by generous feedback from peer reviewers and would prompt me to consider the set-up of any new study differently.

Integrity was and remains the cornerstone of my (research) values. While it, together with striving for excellence in terms of high standards for quality and rigour, was instrumental for the success of this research project, too much striving for excellence was also my largest personal challenge and point of growth throughout the past six and half years. I put myself under immense pressure to produce impactful and publication-worthy articles, with as little assistance as possible. In hindsight, this notion was simply a result of perfectionism and fear of failure. Compounded by the stressors caused by being isolated during a worldwide pandemic, I was not in a place to recognise the stress I was putting on myself was the largest hindrance in trying to complete a PhD dissertation. As it would happen, my saving grace in this regard ended up being my daughter. Whilst a pregnancy is not typically seen as something that expedites the progress of a PhD dissertation – for various valid reasons – it, and the months following the birth of my daughter, taught me many lessons about the futility of perfectionism and about the joy of completing something *well enough*.

Finally, perhaps the most significant value I found myself leaning on during this research, in the end, was empathy. While I was conducting clinical diagnostic interviews or simply discussing with the participants when they came to complete their self-report questionnaires, the participants often shared difficult work-related experiences with me. At times, it was challenging to simply empathise and bear witness to violations of the code of conduct in particular, or to the heartbreaking things they had witnessed. Although it was outside of the scope of my role to support these individuals further with their experiences, I always offered a listening ear, and the possibility to connect them with any relevant services or people that could support them, should they want that.

## **Implications and Recommendations**

### ***Research***

Most urgently, we recommend that future research on the mental health of HAWs either utilises clinical diagnostic interviews in addition to self-report instruments or examines more appropriate self-report instrument cut-off points. Furthermore, we recommend creating a more standardised field stress measurement for the humanitarian aid context. Currently, studies vary largely in how they conceptualise fieldwork-related stress (e.g., Foo et al. 2021 vs. de Jong et al., 2021), making comparisons and replications challenging. Finally, including true well-being measures in future research is recommended, as is considering the full context of humanitarian aid work in selecting instruments.

Additionally, we recommend researching the effects of staff care practices in relation to mental health complaints in humanitarian organisations. Current best practices surrounding high-risk, routinely trauma-exposed occupational groups, such as active monitoring and watchful waiting or peer support, are typically talked about in relation to PTEs only. As also pointed out by earlier research in other high-risk occupational groups, developing best practices for dealing with non-traumatic work stress would be important (Gouweloos-Trines, 2019), in particular for iHAWs' since other stressor types had an impact on their mental health and well-being.

### ***Public Health Policy within Humanitarian Aid Organisations***

Based on our results, we recommend that humanitarian aid organisations focus on reducing the exposure of HAWs to stressors, particularly modifiable stressors, such as organisational communication or harassment. As these stressors had the strongest impact on the mental health and well-being of HAWs, focusing on mitigating these stressors provides a good avenue for preventing mental health issues. Furthermore, reducing stigma surrounding mental health issues in the workplace is recommended, as this may reduce the barriers for HAWs to utilise needed mental health services.

### ***Mental Health Care of Humanitarian Aid Workers***

Realising that most HAWs remain healthy or develop mental health symptoms that improve soon after the end of a field assignment, can help guide the support activities offered by humanitarian organisations. At the same time, whilst most HAWs are resilient and able to manage the stressors of their work, a substantial number still experience distress, suggesting the utility of implementing a follow-up system. Creating a health monitoring system is strongly recommended, as this makes it possible to identify HAWs with increasing mental health symptoms or those who are going on a new assignment with already elevated symptoms. The proportion of participants in our research who showed chronically high or worsening mental health symptoms over time indicates the importance of a sufficiently long rest and recovery period between humanitarian



field assignments. After a health monitoring system is established, it is also possible to establish a follow-up and referral system for those who may need additional support. As our results demonstrate that different stressor types most frequently act additively, it is recommended to include this as psychoeducation when preparing HAWs for their assignments. It is also good to realise that female iHAWs may be at additional risk of developing mental health complaints and that they are likelier to be exposed to sexual and general harassment.

**Valorisation of Findings.** MSF-OCA has adjusted their staff health monitoring based on the findings presented in this dissertation (Ch 2-7): their pre- and post-assignment health monitoring includes the most central identified health outcomes measures based on our study. The results inform the pre- and post-assignment health-related discussions with internal health service providers: the idea is to give the iHAWs more insight into their own well-being and give them psychoeducation based on their scores. These discussions also provide an opportunity to offer low-threshold support or to set up follow-up appointments (following the ‘watchful waiting’ ideology) for those iHAWs who have decreased mental health and well-being after an assignment. In addition, MSF-OCA will provide psychoeducation to the managerial level and other staff regarding the role of SOC, its connection to health, and, in particular, the role of managers in ‘protecting’ the SOC of their staff by making work challenges more comprehensible and manageable. MSF-OCA has also taken steps to tackle excessive alcohol use among staff on field assignments.

## Conclusion

The work described in this dissertation provides valuable insights into the mental health and well-being of HAWs, the various stressors present in their occupational context, and how they remain healthy despite their highly challenging working environments. The findings of this thesis emphasise that the majority of iHAWs remain healthy during and following their field assignments but that a minority experience worsening mental health or already suffer from moderate mental health symptoms before beginning their field assignment. A strong SOC is a consistent predictor of remaining healthy, and it can buffer the negative strain that various stressors place on HAWs. Furthermore, the results highlight the importance of chronic work-related stressors, as well as workplace harassment, for the mental health and well-being of aid workers. Finally, the thesis also presented encouraging results of an adapted intervention for treating occupational trauma among police officers.

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## **Addendum**

Samenvatting (Dutch summary)

Acknowledgements

About the author

List of publications

## Samenvatting (Dutch summary)

Met het toenemend aantal complexe humanitaire crises groeit het aantal mensen dat humanitaire hulp nodig heeft. Daardoor is ook het aantal humanitaire hulpverleners (HHV's) dat mensen in nood helpt, toegenomen. HHV's worden geconfronteerd met een veelheid aan uitdagingen tijdens de uitoefening van hun beroep. Dit leidt tot een verhoogde blootstelling aan stress en potentieel traumatische gebeurtenissen (PTE's), wat op zijn beurt een belasting kan vormen voor hun geestelijke gezondheid en welzijn. In dit proefschrift hebben we een cohort van internationale HHV's (iHHV's) van Artsen zonder Grenzen (AzG) bestudeerd om (veranderingen in) hun geestelijke gezondheid en welzijn te onderzoeken. We wilden nieuwe manieren vinden om de nadelige effecten van werkgerelateerde stress bij deze beroepsgroep, die met een unieke reeks uitdagingen wordt geconfronteerd, te verminderen en te voorkomen. Aangezien sommige professionals uit hoog-risico beroepen posttraumatische stressstoornis (PTSS) ontwikkelen als gevolg van werkgerelateerde PTE's en bijbehorende werkstressoren, hebben we ook een deel van dit proefschrift gewijd aan het onderzoeken van de behandeling van werkgerelateerde traumatische stress. Hiervoor hebben we de behandelrespons onderzocht van een uitgebreide PTSS-behandeling voor eerder behandelingsresistente politieagenten.

### Deel I: Veranderingen in Geestelijke Gezondheid

Het eerste deel van dit proefschrift richtte zich op de algemene vragen met betrekking tot de geestelijke gezondheid en het welzijn van iHHV's: blijven iHHV's gezond, of verslechtert hun gezondheid na een hulpverleningsuitzending? En, kunnen we verschillende symptoomtrajecten onderscheiden en wat voorspelt de kans dat een iHHV tot een specifiek symptoomtraject behoort? In **Hoofdstuk 2** vonden we weinig negatieve gemiddelde veranderingen in de gezondheid van iHHV's van pre-uitzending tot post-uitzending. We toonden aan dat de symptomen van verschillende veelvoorkomende geestelijke gezondheidsklachten zoals depressie en PTSS stabiel bleven. Hoewel we vonden dat de symptomen van emotionele uitputting toenamen en het sociale functioneren en emotioneel welzijn afnamen van pre-uitzending tot post-uitzending, verbeterden deze symptomen tussen post-uitzending en de follow-up meting na twee maanden. De aanwezigheid van DSM-5-stoornissen was laag vergeleken met normpopulaties, behalve in het geval van de stoornis in het gebruik van alcohol. Daarnaast vonden we dat de gewoonlijk gebruikte cut-off waarden van zelfrapportagevragenlijsten de gerapporteerde kans op klinisch significante niveaus van geestelijke gezondheidsproblemen bij iHHV's aanzienlijk verhoogden. We identificeerden verschillende risicofactoren voor afname van de zelfgerapporteerde gezondheid na de uitzending, maar geen van deze risicofactoren waren significant aanwezig bij de follow-up na twee maanden of voor klinische niveaus van geestelijke gezondheidssymptomen.

In **Hoofdstuk 3** onderzochten we verschillende symptoomtrajecten van iHHV's en vonden drie trajecten voor emotionele uitputting, werkbetrokkenheid, angst en depressie en vier trajecten voor PTSS. De meeste iHHV's bleven gezond, zoals blijkt uit de 73-86% die tot het 'gezonde/normatieve' traject behoorden voor elke uitkomst. Verder vonden we een stabiel 'slechte gezondheid/verhoogde symptomatologie' traject (7-17%) voor alle uitkomsten behalve angst. Een 'verbeterende' traject werd gevonden voor PTSS en angst (5-14%). Daarnaast werd een 'verslechterend' traject (4-15%) gevonden voor alle gezondheidsindicatoren. Een lage Sense of Coherence (SOC) bleek de meest consistente voorspeller te zijn voor het behoren tot het verslechterende traject voor alle uitkomsten, terwijl een sterke SOC iHHV's beschermde tegen het behoren tot de verbeterende of slechte gezondheidstrajecten. Vrouwelijk geslacht was daarentegen gerelateerd aan hogere kansen om tot het verslechterende traject te behoren bij depressie en angst. Ten slotte was een langere duur van de uitzending gerelateerd aan een grotere kans om tot de verslechterende depressie categorie te behoren.

## Deel II: Stressoren

Het tweede deel van het proefschrift keek nader naar verschillende soorten stressoren waarmee humanitaire hulpverleners tijdens hun veldwerk geconfronteerd kunnen worden. **Hoofdstuk 4** richtte zich op de incidentie van seksuele intimidatie tijdens een enkele humanitaire veldwerkuitzending. We vonden dat 18% van de vrouwelijke en 7% van de mannelijke iHHV's aangaven ten minste één soort seksuele intimidatie te hebben ervaren tijdens hun uitzending, waarbij niet-fysieke vormen van seksuele intimidatie het meest werden gemeld. Lagere leeftijd was geassocieerd met ernstigere gerapporteerde intimidatie, evenals het voor de eerste keer deelnemen aan een humanitaire uitzending. Seksuele intimidatie voorspelde variatie in toegenomen post-uitzending symptomen van depressie en angst bij vrouwen, maar niet bij mannen, en het voorspelde toegenomen post-uitzending symptomen van PTSS bij mannen, maar niet bij vrouwen.

In **Hoofdstuk 5** onderzochten we verschillende verwachtingen over hoe vier soorten stressoren samenkomen om psychologische stress (angst & depressie), emotionele uitputting, werkbetrokkenheid en organisatorische betrokkenheid te voorspellen. We vonden dat algemene intimidatie en veldwerkstressoren de meest consistente voorspellers waren onder mannelijke en vrouwelijke iHHV's. Daarnaast voorspelde seksuele intimidatie elk van de vier uitkomsten bij vrouwelijke iHHV's, maar geen van de uitkomsten bij mannelijke iHHV's. We vonden dat stressoren meestal op een additieve manier samenkomen, waarbij elke extra soort stressor die wordt ervaren een extra belasting vormt voor de geestelijke gezondheid en het welzijn van de iHHV. Bovendien vonden we een verergerend effect bij het voorspellen van psychologische stress bij vrouwelijke iHHV's, wat aantoont dat bij een hoge mate van seksuele

intimidatie, traumatische stressoren een significante relatie hadden met psychologische stress. We vonden ook een 'inurement' (afstomping) effect bij het voorspellen van werkbetrokkenheid bij vrouwelijke iHHV's. Dit geeft aan dat het ervaren van meer dan één type stressor geen verder nadelige associatie had met werkbetrokkenheid.

### **Deel III: Sense of Coherence: Een Kader om te Begrijpen Hoe iHHV's Gezond Blijven?**

In **Hoofdstuk 6** onderzochten we de rol van SOC en de relatie ervan met de geestelijke gezondheid en het werkgerelateerde welzijn van iHHV's. Door middel van padanalyse probeerden we het mechanisme te ontrafelen dat iHHV's in staat stelt hun welzijn te behouden. We vonden dat pre-uitzending gezondheid van cruciaal belang was voor post-uitzending niveaus van angst, depressie, emotionele uitputting, PTSS en werkbetrokkenheid, en dat veldstressoren, maar niet PTE's, een negatief gezondheidseffect hadden op geestelijke gezondheids- en werkgerelateerde welzijnsuitkomsten. De verschillende SOC-componenten fungeerden als mediator voor de relatie tussen veldstressoren en post-uitzending gezondheid, en werkten tegen de schadelijke impact van de veldstressoren.

We onderzochten de longitudinale meetinvariantie van het SOC-13 instrument in **Hoofdstuk 7** om te achterhalen of het instrument psychometrisch stabiel is in de context van humanitaire hulpverlening. We konden volledige metrische invariantie vaststellen, evenals gedeeltelijke schaal- en strikte invariantie, wat aangeeft dat de meetinvariantie sterk genoeg was om de SOC-13 scores over tijd te vergelijken. Gezien het bewezen belang van SOC voor de geestelijke gezondheid en welzijn van iHHV's en de relatieve stabiliteit van het bijbehorende meetinstrument, concludeerden we dat SOC een belangrijke kandidaat is voor gerichte preventie, interventie en routinematige uitkomstmonitoring.

### **Deel IV: Behandeling van Beroepsgerelateerde Stress en Trauma**

We wijdden **Hoofdstuk 8** aan het onderzoeken van een uitgebreide vorm van traumagerichte behandeling bij een andere hoog-risico beroepsgroep, namelijk politieagenten. Door Routine Outcome Monitoring (ROM) data te onderzoeken, vonden we dat bij ongeveer de helft van de eerder behandelingsresistente politieagenten hun PTSS-symptomen betrouwbaar verbeterde met de aangeboden behandeling. We vonden geen klinische of demografische voorspellers van behandelrespons, maar beroepsmatige PTSS-erkenning en compensatiezoekende status hadden een significante associatie met behandelrespons, in die zin dat degenen die bij aanvang van de behandeling betrokken waren bij een erkennings- en compensatieprogramma een veel slechtere behandelrespons hadden dan degenen die niet bij een dergelijke procedure betrokken waren.

In **Hoofdstuk 9** hebben we de meest centrale bevindingen van het proefschrift samengevat en de bevindingen geïntegreerd in bestaande literatuur. In dit hoofdstuk merkten we op dat de meeste iHHV's geen achteruitgang in hun geestelijke gezondheid en welzijn ervoeren tijdens onze onderzoeksperiode, en dat het gebruik van zelfrapportagevragenlijsten de schattingen van klinisch significante symptomen aanzienlijk verhoogde in vergelijking met klinische interviews. Tegelijkertijd benadrukten we het belang van aandacht voor de redelijk grote groep iHHV's die subklinische geestelijke gezondheidssymptomen ervaart na hun velduitzending. Verder merkten we op dat humanitaire hulporganisaties baat zouden kunnen hebben bij het verminderen van beïnvloedbare organisatorische stressoren, aangezien deze sterkere verbanden hebben met welzijn dan traumatische stressoren. We bespraken het nut van SOC als een leidend kader om te begrijpen hoe iHHV's gezond blijven. Op basis van de bevindingen van ons uitgebreide, longitudinale onderzoek gaven we aanbevelingen voor toekomstige onderzoeksrichtingen en voor het verbeteren van het gezondheidsbeleid en de geestelijke gezondheidszorg in humanitaire hulporganisaties.

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## About the author

Saara Martinmäki was born in 1990 in Finland. She obtained a Bachelor of Psychology from the University of Glasgow in 2014. During her undergraduate degree, she spent a year at the University of California San Diego, where she first got acquainted with the world of research relating to work-related stress and trauma by working as a research assistant at a veterans' healthcare institute. From Scotland, she moved to Maastricht, where she obtained a Research Master in Cognitive and Clinical Neuroscience at Maastricht University in 2017, with Clinical Psychology as her specialisation.

Over the years, research on stress and trauma had only grown on her, which eventually led her to ARQ, first as a research intern and thereafter as a PhD researcher (affiliated with Utrecht University) from mid-2017. Next to her PhD research that was mainly conducted on behalf of Médecins sans Frontières at their Amsterdam office, Saara has worked as a researcher and policy adviser, first at Impact and currently at ARQ International. As a result, she has contributed to a great variety of projects ranging from building new guidelines for supporting emergency personnel after a terror attack to international research on the effectiveness of scalable psychological interventions for refugees. In her current role, she manages a variety of international projects across continents, focusing in particular on staff care, and provides capacity-building trainings to a variety of actors in the mental health and psychosocial support sphere. She also serves as a co-chair for the staff and volunteer care thematic group of the IASC Reference Group on Mental Health and Psychosocial Support.

What Saara enjoys the most in her work is bridging research and practice. In particular, she wishes to conduct research that can help create better systems to support and protect the mental health and well-being of people, whether they are people in high-risk occupations or people in a humanitarian emergency context.

# List of publications

## Articles in Peer-Reviewed Journals

- de Jong, K., **Martinmäki, S. E.**, te Brake, H., Haagen, J. F. G., & Kleber, R. J. (2021). Mental and physical health of international humanitarian aid workers on short-term assignments: Findings from a prospective cohort study. *Social Science & Medicine*, 285, 114268. <https://doi.org/10.1016/j.socscimed.2021.114268>
- de Jong, K., **Martinmäki, S.**, te Brake, H. T., Kleber, R., Haagen, J., & Komproe, I. (2022). How do international humanitarian aid workers stay healthy in the face of adversity?. *PLoS One*, 17(11), e0276727. <https://doi.org/10.1371/journal.pone.0276727>
- de Jong, K., **Martinmäki, S. E.**, te Brake, H., Komproe, I., Kleber, R. J., & Haagen, J. F. (2023). Health trajectories of international humanitarian aid workers: growth mixture modelling findings from a prospective cohort study. *BJPsych Open*, 9(3), e83. <https://doi.org/10.1192/bjo.2023.58>
- Martinmäki, S. E.**, de Jong, K., Komproe, I. H., Boelen, P. A., & Kleber, R. J. (2023). Incidence and severity of sexual harassment, and its impact on mental health in a cohort of international humanitarian field-workers. *Journal of Interpersonal Violence*, 38(11-12), 7426-7456. <https://doi.org/10.1177/0886260522114595>
- Martinmäki, S. E.**, van der Aa, N., Nijdam, M. J., Pommée, M., & ter Heide, F. J. J. (2023). Treatment response and treatment response predictors of a multidisciplinary day clinic for police officers with PTSD. *Psychological Trauma: Theory, Research, Practice, and Policy*, 15(2), 349-358. <https://doi.org/10.1037/tra0001128>

## Manuscripts Submitted for Publication

- Martinmäki, S. E.**, de Jong, K., Kleber, R. J., Komproe, I. H., & Boelen, P. A. Longitudinal Measurement Invariance of the SOC-13 Sense of Coherence Scale in International Humanitarian Aid Fieldworkers
- Martinmäki, S. E.**, de Jong, K., Komproe, I. H., Kleber, R. J., & Boelen, P. A. The accumulation of stressors among international humanitarian workers: Examining the combined effects of four stressor types.

## Book Chapters

- Geschwind, N., **Martinmäki, S.**, & Garland, E. L. (2019). Facilitation of positive emotions through mindfulness-based therapy. In J. Gruber (Ed.), *The Oxford Handbook of Positive Emotion and Psychopathology* (pp. 561-574). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780190653200.013.34>

**Saara Martinmäki**

## **From Stress to Strength**

**Investigating Mental Health in Humanitarian Aid  
and High-Risk Occupations**

With the number of complex humanitarian crises increasing worldwide, the number of humanitarian aid workers has also increased. Aid workers, like those in other high-risk occupations, face increased exposure to stress and potentially traumatic events, which in turn places a burden on their mental health and well-being.

This PhD dissertation explores the mental health and well-being of international humanitarian aid workers in a longitudinal cohort study, aiming to identify new pathways for mitigating and preventing the adverse effects of work-related stress among this occupational group. In the first part, we examined overall health changes in the cohort and explored different symptom trajectories. In the second part, we investigated the relationship between various stressors that humanitarian workers may face in their work and their relationship to health and work-related well-being. In the third part, we considered the role of Sense of Coherence for health and well-being of humanitarian workers. Finally, as some high-risk professionals end up developing post-traumatic stress disorder, we also devoted a part of this dissertation to exploring the treatment of work-related traumatic stress. In the fourth part, we studied an augmented form of trauma-focused treatment among another high-risk occupational group, namely police officers.

Overall, this dissertation suggests that most humanitarian aid workers maintain their mental health and well-being despite their job stressors. However, we also emphasise the need to focus on the relatively large group of aid workers with sub-clinical levels of mental health symptoms, and on decreasing the most impactful stressors of their work. The findings bear important implications for future research and for the improvement of health policy and mental health care within humanitarian aid organisations.

Saara Martinmäki works as a researcher and policy adviser at ARQ National Psychotrauma Centre.

