

Occupational health challenges in commercial diving: a qualitative study of psychological risk, training gaps, and organisational responsibilities

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Abstract

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Introduction: Little is known about the occupational health needs of commercial divers, particularly regarding psychological wellbeing, trauma exposure, organisational support, and the adequacy of training for high-risk environments. This study qualitatively explored pathways into commercial diving, experiences of psychological strain and trauma, perceptions of support, and the relevance of training from the perspectives of divers, supervisors, and industry representatives.

Methods: This qualitative study used semi-structured interviews and focus groups with purposively sampled participants ($n = 20$ men). Data were analysed using reflexive thematic analysis.

Results: Three themes were identified: (1) pathways into a high-risk occupation shaped by financial incentives, risk acceptance, and informal entry routes; (2) psychological strain characterised by reported exposure to traumatic events, normalisation of distress, stigma surrounding mental health disclosure, and predominantly reactive organisational support; and (3) perceived inadequacies in training, described as generic, low-fidelity, and insufficiently aligned with the operational realities of offshore and saturation diving, alongside limited opportunities to practise key skills, contributing to feelings of unpreparedness during emergencies.

Conclusions: Participants described commercial diving as associated with substantial and often unaddressed psychological burden, compounded by cultural stigma, structural barriers to help-seeking, and predominantly reactive support systems. Training provision was perceived as outdated and insufficiently aligned with operational demands, with limited organisational investment in development. Findings suggest that industry-wide efforts may be needed to implement proactive mental-health strategies and improve the alignment of training with operational realities.

Introduction

Commercial diving is a highly specialised and inherently hazardous occupation, characterised by significant physical demands, complex technical tasks, and prolonged work in isolated, confined, and pressurised environments.^{1–3} Offshore and saturation diving, in particular, require personnel to live and work under hyperbaric conditions for extended periods, often involving weeks of confinement, separation from family, and limited environmental stimulation. Empirical evidence indicates that saturation divers experience sustained physiological and psychosocial demands during prolonged exposure to these environments, where monotony, work–family conflict, and restricted living conditions contribute to cumulative psychological strain and necessitate substantial mental resilience.^{1,3,4} Evidence from

offshore oil and gas contexts further demonstrates that such environments are associated with fatigue, sleep disruption, and reduced performance, driven by long shifts, irregular schedules, and high operational demands.^{5–7} In addition to these environmental and organisational stressors, divers operate in high-risk settings where exposure to traumatic incidents, including equipment failure, severe injury or fatality, is a recognised occupational hazard. Research on human performance in diving and comparable high-risk domains shows that acute stress responses, such as panic, increased cognitive load and impaired decision-making, can significantly affect operational safety.

Hyperbaric conditions introduce further psychophysiological challenges. Pressure-related factors, including nitrogen narcosis and high-pressure exposure, are known to impair

cognitive functioning, slow reaction times, and disrupt attention and information processing.^{8–10} Experimental and observational evidence also indicates that prolonged dives are associated with physiological stress responses, including oxidative stress and fatigue, alongside adaptive shifts in cognitive performance under sustained pressure.^{3,4} These interacting physiological and psychological stressors influence human performance in complex underwater environments and may amplify risk in already hazardous operational contexts.

Despite these well-recognised stressors, limited research has examined the broader occupational health needs of commercial divers, particularly in relation to psychological wellbeing, trauma exposure, and organisational support. Evidence from recreational diving identifies anxiety, depression, and stress-related responses associated with diving activities,¹¹ while studies in offshore and other high-risk industries report elevated psychological distress, including sleep disturbance and work-related stress, among personnel.^{12,13} These findings highlight the importance of organisational and structural factors, including long shift rotations, isolation, high workload, job insecurity and limited access to support, in shaping mental health outcomes among offshore and high-risk workers.^{12–14} High job demands, low control and inadequate organisational support are consistently associated with psychological distress, fatigue and impaired decision-making, with implications for workplace safety behaviour.^{14–16} In offshore contexts, additional psychosocial hazards such as work–life interference, production pressures and fear of speaking up further contribute to risk and may increase the likelihood of accidents and errors.¹³ Extending these findings to commercial diving, similar risks may be compounded by organisational and psychosocial factors, reinforcing the role of human and organisational influences as key determinants of safety outcomes in complex underwater environments.^{13,15}

Given these gaps, there is a need for qualitative, experience-based research to better understand how these risks are experienced, interpreted, and managed in practice. The aim of this study was to explore commercial diving as a high-risk occupation by examining: (1) pathways into the profession; (2) experiences of psychological strain and trauma; (3) perceptions of organisational and peer support; and (4) the adequacy and relevance of current training for operational and health-related demands.

Methods

This study employed a qualitative design using data from individual semi-structured interviews and focus groups to explore participants' experiences and perspectives. All participants identified as male and were aged over 18 years. They were recruited using purposive sampling to ensure representation across key operational roles within commercial diving, including working divers, dive supervisors, and industry stakeholders involved in

management, training, or safety oversight. Sampling criteria included role, years of experience, and exposure to different sectors of commercial diving (e.g., inshore, offshore, and saturation). Participants' experience ranged from a few years to approximately 40 years in the diving sector. We also sought variation in age and geographical work history to reflect the diversity of operational contexts in which psychological strain and training demands arise. Including both divers and supervisors enabled exploration of perspectives from those undertaking operational work and those responsible for decision-making, while industry stakeholders contributed organisational and policy-level insights.

Recruitment occurred via direct email invitation, and data were collected in April 2024. The divers were all recruited from one company operating in the North Sea, on a voluntary basis. Participants were recruited to take part in a parent study aimed at developing a resuscitation algorithm for divers in difficulty (i.e., to determine optimal approaches to delivering cardiopulmonary resuscitation [CPR] in hyperbaric environments). As part of this study, participants were interviewed about their experiences and perspectives. The present study represents a secondary qualitative analysis of these interview data.

Divers, dive supervisors and industry representatives were invited to take part in individual interviews with one of two researchers (LH, EC) trained in qualitative interview techniques. Additional industry representatives were invited to participate in one of two focus groups facilitated by both researchers. In this study, 'industry representatives' referred to individuals attending to provide senior operational advice on the algorithm for the parent study. They all had substantial prior experience as commercial divers and had all worked in the sector for several decades. At the time of the study, they held senior roles within diving organisations, including operational management, training oversight, and safety governance. Their inclusion allowed us to capture perspectives from those responsible for shaping organisational policies, training standards, and support structures, thereby complementing the lived experiences of divers and dive supervisors.

Sample size was guided by the concept of information power.¹⁷ A total of 20 participants took part in the study (all men). Fifteen participants completed individual interviews, comprising 11 divers, two dive supervisors, and two industry representatives. An additional five industry representatives participated in one of two focus groups (group 1: $n = 2$, group 2: $n = 3$). Interviews were conducted during a week of activities developing an algorithm as part of the parent study. They took place away from the participants' normal place of work (e.g., a bespoke setup, specifically for the project). Participation, including interviews, took place during a dedicated project week and was considered paid work; participants were released from their usual duties by their employer to attend

Interview durations ranged from 11 to 49 minutes (average 24 minutes), and each focus group lasted approximately 85 minutes. All interviews took place in person and followed a semi-structured interview schedule that allowed for probing and follow-up questions. Sessions were audio-recorded with consent, and transcribed verbatim. Data were analysed using reflexive thematic analysis (RTA).¹⁸ RTA was used because it provides a flexible, experience-focused approach suited to exploring divers' subjective experiences and perceptions without imposing predefined categories. The process involved familiarisation with the data, generating initial codes, constructing themes, reviewing and refining themes, and producing analytic narratives. Coding was conducted inductively by two members of the research team, with regular discussions to compare interpretations, refine codes, and develop themes. Differences in interpretation were resolved through iterative dialogue, supporting depth and coherence of the analysis. NVivo software¹⁹ supported systematic data organisation. Reflexive notes and an audit trail of analytic decisions were maintained throughout, alongside regular team discussions, to enhance analytic rigour and transparency.

All participants provided informed consent and were assured of confidentiality and voluntary participation. The data were originally collected as part of a wider project,²⁰ and the interview questions were focused on experiences of and training for medical emergencies during saturation diving (*[Supplementary file 1](#)). Due to arising discussions around psychological risk during the interviews, ethical approval was sought for secondary analysis of this qualitative dataset to explore this further and was obtained from the University of Nottingham Faculty of Medicine and Health Sciences Research Ethics Committee on 26 February 2026 (REC ref no FMHS 118-0226). Confidentiality was protected using pseudonyms and the removal of identifying details during transcription. Audio files and transcripts were stored on secure, password-protected university servers accessible only to the research team. Given the sensitive nature of discussing psychological strain and traumatic operational experiences, participants were reminded that they could pause or stop the interview at any point, and signposting to appropriate support services was provided if distress arose. Participants were informed that they could request withdrawal of their data up to the point of anonymisation, after which removal was no longer possible due to de-identification.

REFLEXIVITY

Interviews were conducted by two female research nurses from a single UK hospital trust who were trained in qualitative interviewing. The interviewers had no prior professional or personal relationships with participants and no previous experience of, or involvement in, the commercial diving sector. This positioning supported a degree of

analytic openness, reducing the likelihood of pre-existing assumptions shaping questioning or interpretation. However, it is acknowledged that differences in gender and professional background between interviewers (healthcare) and participants (commercial diving and industry leadership roles) may have introduced perceived power imbalances in both directions; for example, participants may have viewed interviewers as external to the industry and therefore either moderated or amplified their accounts. To mitigate potential bias and undue influence, interviewers followed a semi-structured guide, used open and non-leading questioning, and encouraged participants to elaborate on their experiences in their own terms. Reflexive practices were embedded throughout, including memo-writing, maintenance of an audit trail, and regular team-based analytic discussions to support critical reflection on coding and theme development. These approaches are consistent with reflexive thematic analysis,¹⁸ where researcher subjectivity is recognised and actively engaged as part of the analytic process rather than treated as a source of error.

Results

Analysis of the data identified three overarching themes: motivation and pathways into the diving occupation; prevalence of psychological strain and its management; and divers' training associated with occupational health and wellbeing. Here, 'divers' refers to the broader diving community and 'participants' or 'interviewees' refers to research participants. While this qualitative study does not represent all commercial divers, the findings reflect patterns of meaning within this sample, which align with known structural features of the commercial diving sector (e.g., employment precarity, trauma exposure, training structures).

THEME 1: MOTIVATION AND PATHWAYS INTO THE DIVING OCCUPATION

Our research participants identified several factors that motivated them to pursue a career in diving. For many, the primary incentive was the high earning potential, particularly in offshore roles. Others were drawn to the demanding and adventurous nature of the work, viewing it as an opportunity to test their abilities and engage in tasks perceived as risky. Additional motivations included the enjoyable and flexible working conditions, as well as the chance to travel and work in diverse locations around the world.

Money was obviously massively enticing, and I was getting a month at home, six weeks at home to do with whatever I wanted. (Diver-3)

[I joined diving] because I enjoy it...Yes, genuinely still enjoy it and the money's great and I don't have a plan b and that's it. (Diver-4)

*Footnote: Supplementary file 1 is available online on our website: <https://www.dhmjournal.com/index.php/journals?id=434>

*I just like being in the water so that's what I do (Diver-2)
I fancied working offshore away from home... So, if you're
going to be away, you may as well get paid more money
for doing it. So that was something I factored in (Diver-9)*

Most participants reported being introduced to diving through a family member or friend already working in the industry. A smaller number learned about the opportunity independently, often through newspapers or magazines. Prior to entering the diving profession some had served in the Royal Navy, while others had gained early exposure through recreational scuba diving during childhood.

*The background of that is my two brothers were divers at
that time as resettlement courses from the marines and the
paras. I was given the opportunity because I couldn't see
me going anywhere significant or exciting with the role I
was taking at that time and so I took the opportunity and
then signed up. (Diver-5)
I spent six years having a bit of fun in the navy and then
decided I needed to grow up, and I left and became a
commercial diver, I've been doing that since then for
years, a long time now. (Diver supervisor-1)*

THEME 2: PREVALENCE OF PSYCHOLOGICAL STRAIN AND ITS MANAGEMENT

Psychological strain among divers was reported as highly prevalent. Both divers and industry providers described offshore diving as frightening and, at times, traumatising - particularly in situations where divers attempted to rescue colleagues during emergencies but were unable to achieve a positive outcome. Participants also noted that divers often work far from their families and are deployed to various parts of the world. In some geographic regions, extreme heat, long working hours (often around 12 hours per day), and poor food and living conditions further exacerbate these psychological challenges.

*I will show you pictures of the third-world hell holes that
I've been to. That's actually trauma. That's more trauma
than anything else that I've experienced working...
Nobody could eat the food. It was 30-degree heat. You
were working 12-hour shifts. It was constant relentless
just hell. (Diver-11)
In my eyes it's not necessarily the physicality of the job,
it's the psychological aspect of the job, away from your
family, you've been away for so long, putting yourself
inside a chamber for 28 days at a time. (Diver-10)*

Participants described that divers form a close-knit community, which intensifies the trauma when they witness a close colleague coming to harm or dying in the workplace. It was noted that divers often experience the so-called 'second victim' phenomenon in such situations (i.e., emotional harm experienced by a responder involved in a traumatic or adverse event); however, awareness of this

issue was perceived to be limited, with support mechanisms largely lacking.

*The more you know someone obviously the more affected
you are, but in this game, you see trauma all the time...
[I] went to a lot of funerals, and you just start getting
upset in the end. (Diver-6)
We never really look at second victim or anything like
that. To be honest, the first time I heard the phrase
second victim was here this week... They were like second
victim. What's that? Honestly, that's the first time I've
ever heard that term, so I probably don't know too much
about that. (Diver-9)*

High levels of stigma appeared to be attached to expressing psychological or mental health concerns in the diving workplace. Participants indicated that divers who disclose such difficulties are often perceived as weak and may be ostracised. Many also feared breaches of confidentiality and worried that raising psychological concerns could jeopardise future employment contracts.

*You've got to remember the diving population is
generally very, not introverted necessarily but they're
a team together and they're very close and they really,
really don't want to admit weakness because admitting
weakness at 200 metres is not a good idea. So, they all
tighten up and they're all Mr bravo and macho and
everything else. (Industry-4)
If you were to go up to the offshore project manager and
say that exact thing, he would say no problem at all. He
would get you the first helicopter off that vessel to go
home. Then you've got the stresses of losing the money
and they've still got bills to pay so that's add its own
element of stress and everything else. (Diver-10)*

Participants described the industry as lacking a strong track record of providing mental health support to its workforce. Our interviewees frequently reported feeling powerless and unheard. Nonetheless, they referred to a small number of individuals within the sector who were actively championing mental health initiatives. These keen and enthusiastic advocates were described to be pushing the agenda forward - for example, one participant referred to a diver who encouraged their colleagues to engage in mental-health-focused journaling. In our sample, there was a recognition of the importance of such support, and how this was growing among diver managers more broadly. However, despite some companies beginning to offer counselling services, participants in our sample believed that divers rarely receive help at the time they need it most. Moreover, it was perceived that mental health support is typically provided only when divers request it, reflecting a reactive rather than proactive or preventive approach across the industry.

I know that there has been posters put up now on two of the vessels that I've been on recently about mental health kind of coaching and stuff. (Diver-1)

I just think it's a bit more open and acceptable now because of the generation thing again, all these closed books dinosaur people with these attitudes are now out the industry and the whole industry is changing for it as well there's a whole new outlook on people's wellbeing yes. (Diver-5)

I think the industry is slowly progressing but it's the whole argument of proactive versus reactive. At the minute we just solely focus on reactive measures and we're not very proactive as an industry. (Diver-10)

Participants reported that divers could be required to recover a colleague who is experiencing serious health difficulties or life-threatening complications. They spoke of a strong expectation that the recovery diver will go above and beyond to rescue the person in danger. However, participants reported that during such operations they often experience intense breathing effort, high stress, and significant performance pressure. In some cases, according to participant's accounts, divers attempting a recovery have themselves become immobilised or "frozen" underwater due to the overwhelming stress of the situation.

It was raised that companies employing divers were largely unwilling to engage in conversations about mental health or post-traumatic stress. Interviewees discussed the common practice following a traumatic incident - to send divers home and occasionally check on them by phone. Participants reported that organisations do not provide pre- or post-job psychological screening and had observed that no structured debriefing is offered to discuss how incidents affect those involved in the recovery.

We're never asked how we feel. Or when you come out of SAT, how are you physically? But we're never asked how do you feel mentally. How was that SAT psychologically? Was it mentally draining the team that you were in? Did you have to look after those divers? Did you have to carry them? They do not care (Diver-10)

In the absence of formal mental health or counselling support, it was perceived that divers are left to manage their traumatic experiences on their own or rely on family members - most often their wives - to discuss their psychological difficulties.

THEME 3: DIVERS' TRAINING ASSOCIATED WITH OCCUPATIONAL HEALTH AND WELLBEING

Participants reported that first aid/health and safety training within the diving industry is insufficient. The equipment used was described as low-tech and lacking fidelity. Compared with previous years, current training was perceived as increasingly theory-based, with minimal opportunities for hands-on experience.

The only training you do is a first aid course or your offshore survival, they are mandatory but it's just a piece of paper at the end of the day, the training is just, it's neither here nor there. (Diver supervisor-1)

Well in an ideal world you would have a setup like this, yes. Some places, some training centres do have a diving bell in there so you can get inside and you can practice but not all of them do. There's maybe just one or two that do. The place I go to, it's close to water. It's a good training centre. It used to be run by a paramedic. He's left now so I don't know what it's like now, but I felt like the trauma side of things, the training for trauma was really, really good. Anything to do with resuscitation, CPR, I thought was great as well. (Diver-8)

In the absence of adequate occupational health and safety/ first-aid training, divers in our sample reported feeling unprepared to deliver effective care or achieve positive outcomes when incidents occur in the diving bell or underwater. It was also noted that, within the saturation environment, there is very little that can be done to assist a diver experiencing a medical emergency.

It's not adequate and it's not job specific. It's almost like your first aid at work. Do you know what I mean? It's as basic as that...It was one of the worst courses for medic training that I've ever been. The guy literally read off a PowerPoint presentation and then spun a few stories that he'd obviously heard about, not experienced himself or anything, very little practical work. They had a doctor come in and talk about diving physiology in a very monotone voice. So, there was nothing interesting about it. You're just sitting there for four hours. (Diver-11)

It was broadly believed by participants that divers generally have limited medical knowledge and are not trained healthcare professionals. Industry providers in our study noted that there is only so much emergency-care training these divers can realistically receive. They also reported that some divers are also reluctant to engage in training involving patients, blood, or first aid. Study participants indicated that, despite the requirement for biennial training refreshers, often completed primarily to secure higher pay, divers have limited opportunities to practise the diver medic technician (DMT) skills they acquire. As a result, these skills can fade over time.

So, over a two-year period, if they've not done anything and then suddenly, they have to do something, it's incredibly difficult. So, on average I would say less than 50% of the time that I ask for an IV to be put up, can one be set up. Indeed, once I ask for a urinary catheter to be put in, they couldn't do that either. (Industry-4)

Across the sample, companies employing divers were described as unwilling to invest in training or research related to the diving industry. Current training provision was

also perceived to offer poor value for money, particularly where courses are delivered online. Although most existing courses, including DMT training, were considered relatively inexpensive and accessible, divers noted that they are often responsible for organising their own attendance. Participants emphasised that employers should allocate dedicated budgets for diver training and make use of periods when divers are off-shift to provide it. Participants observed that the industry is slow to implement change and expressed scepticism about whether companies would invest meaningfully in training. Nonetheless, some remained hopeful that the arrival of a new generation of divers may bring positive developments for the sector.

We try to better it but until they kind of old dinosaurs that are running it move out of the way the new generation can't to change it. I'm hoping that as a new generation comes in, they will change it for the better, like training like this is a massive advancement and that's kind of where we want to be going. (Diver-2)

Participants felt that the current training provision for divers is overly generic and does not reflect the realities of their working environment. They offered several suggestions for improvement, including the need for specialised training in resuscitation within saturation diving, as well as instruction on safely handling an individual in and out of a diving bell. Participants also recommended making the existing DMT training more practical and hands-on. Additionally, they suggested expanding the training content to include topics such as managing burns, responding to trauma, and using chest compression devices.

It needs to be way more practical, way more dive related and practical drills, so the current DMT course definitely needs [to be] reformed. (Diver-3)

You don't just need to be looking at PowerPoints to be absorbing the theory behind it. You could be working a practical and still absorbing that information. We used to, on the DMT course, we used to witness an autopsy. We then used to work in the evenings in A&E [Accident and Emergency]. So again, you're putting that practice into real life situations. You're not asked to do very much, CPR [cardiopulmonary resuscitation], cannulations but still, your experience and the stress, the anxiety that comes with things like that in a real-life incident really. (Diver-10)

Discussion

This study identified several key themes relating to participants' experiences, including pathways into the role and the psychological strain encountered during participation. Given that divers were recruited from a single North Sea operator, these findings should be interpreted within that organisational and geographic context, although they may reflect patterns relevant to similar commercial diving settings. Overall, findings highlight the complex

interplay between anticipated benefits and lived experiences, with participants often negotiating both practical and emotional challenges. Motivations and pathways into the role (e.g., financial incentives and risk acceptance) may also shape participants' tolerance and appraisal of the psychological strain described in later themes. This aligns with prior research showing that saturation divers are motivated by high wages and job prestige, while simultaneously developing psychological endurance and adaptability to manage extreme occupational demands in a high-risk environment.^{1,7}

Participants highlighted substantial structural, cultural, and operational challenges, particularly in relation to psychological wellbeing and training provision. In their accounts, divers depicted working environments characterised by high exposure to physical hazards (e.g., risks of entrapment, barotrauma, decompression related injury, and impact trauma associated with offshore and saturation operations), alongside significant emotional strain and risk of exposure to traumatic events. These findings align with existing commercial diving literature demonstrating the combined physiological and psychosocial demands of offshore and saturation environments, including exposure to multiple physical hazards and sustained environmental stressors, as well as psychosocial challenges such as confinement, monotony, and emotional strain.^{1,7,21}

The close-knit nature of the diving community further intensifies the psychological impact of witnessing or responding to critical incidents, including unsuccessful rescue attempts (or the possibility of this occurring). Despite the clear prevalence of psychological strain described by participants, accounts suggested that a pervasive culture of stigma may discourage divers from disclosing mental-health concerns. This mirrors patterns seen across other high-risk, high-responsibility professions such as the military²² or law enforcement,²³ where safety depends on trust, and cultural norms emphasise toughness, reliability, and emotional control. Fears of being labelled weak, ostracised by peers, or denied future employment were described as contributing to a pattern of silence and under-reporting.

Organisational responses to trauma were described by participants as inconsistent and largely reactive. Within this sample, formal mental-health support was perceived to be limited, often inaccessible at the point of need, and rarely embedded within routine operational practice. The reported absence of structured debriefing, psychological screening, or proactive monitoring was described as leaving divers reliant on informal support networks, particularly family members, to manage the emotional consequences of their work. Although a small number of individuals within the industry were reported to be advocating for improved mental-health provision, systemic change was perceived as slow. These observations are consistent with earlier investigations into occupational diving, which have highlighted a predominant

focus on physiological and physical health risks, with comparatively limited attention to psychological outcomes and mental-health support needs.^{1,7} Commercial diving remains one of the most gender-imbalanced professions. United States workforce statistics broadly indicative of global trends suggest that 96.7% of divers are men;²⁴ this was reflected in our study's sample. A lack of preventive approaches to mental health has been observed in other male-dominated professions such as construction, forestry, mining, transport, and emergency services.^{25,26}

Our findings reveal notable perceived inadequacies in current diver medical and/or first aid training provision. These results are consistent with other studies that have identified both knowledge gaps and a reduction in higher-level training capability,^{27,28} including prior critiques of diver training frameworks and evolving competency requirements within commercial diving contexts.²⁸ Participants in our study consistently reported that current training is experienced as generic, outdated, and insufficiently aligned with the realities of saturation diving. Courses were described as overly theoretical, lacking practical components, and delivered with inadequate or outdated equipment. Divers also noted that limited opportunities to practise DMT skills may contribute to skill decay over time, a concern consistent with broader evidence that low-frequency, high-stakes medical skills are particularly vulnerable to rapid decay in the absence of recurrent practice and refresher training.^{20,30} Skills decay is strongly associated with lack of practice³¹ and has been identified in other medical and high-risk operational fields, such as emergency medicine,³² military medical training,³³ prehospital care³⁴ and first-responder sciences.³⁵

Participants' accounts highlighted not only concerns about the adequacy of current training but also uncertainty regarding the level of medical competence realistically expected of divers. Skills such as establishing an intravenous (IV) line or performing invasive procedures are taught within some DMT courses, yet divers are not trained healthcare professionals, nor are they expected to maintain competencies equivalent to those of an emergency physician, nurse, or land-based paramedic. This tension reflects broader discussions within diving medicine regarding the scope and limits of diver medic capability in hyperbaric environments, where operational constraints may further restrict intervention options. Several participants described feeling unprepared or anxious when required to perform rarely practised skills, suggesting that the challenge may lie as much in unclear or inconsistently defined competency expectations as in the quality of training itself.

These findings indicate that, within this sample, divers may sometimes expect more of themselves than is feasible within the constraints of their role, particularly given the limited opportunities for practice and the unique operational limitations of the saturation environment. Hyperbaric conditions, including cognitive effects associated

with pressure and gas exposure, may further shape performance and decision-making under stress, reinforcing the need for training aligned with realistic operational capability. Accordingly, rather than concluding that training programmes should deliver a specific set of advanced clinical skills, our findings suggest that to improve training fidelity, programmes may need to incorporate clearer definitions of expected competence, more realistic scenario-based practice, and training content that aligns with what divers can reasonably perform *in situ*.

Financial investment from major employers, including oil companies, was described by participants as minimal, with divers often responsible for organising and funding their own training. While some optimism exists that newer generations entering the profession may drive cultural and structural improvements, the current pace of change was perceived by participants as inadequate.

A further complexity shaping the wellbeing and safety experiences of commercial divers relates to the industry's employment structure. Historically, many divers have worked as independent contractors rather than salaried employees, creating a form of precarious work characterised by limited job security, ambiguous employment relationships, and restricted access to social protections such as paid sick leave or income support when removed from duty. This mirrors broader patterns observed across high-risk maritime and offshore sectors, where atypical or contingent employment arrangements are common and have been shown to heighten vulnerability to occupational health and safety risks.³⁶ As participants in this study described, being taken off a vessel for psychological or medical reasons can result in immediate financial loss due to the absence of employer-provided sick pay; an outcome that reflects the structural features of self-employment rather than individual employer misconduct. Although precarious work is associated with higher risk for physical and mental ill-health,³⁷ such arrangements may shift responsibility for health-related downtime onto divers themselves, potentially limiting incentives for companies to invest proactively in psychological support and discouraging individuals from reporting distress.

This dynamic is not unique to diving; offshore oil and gas research identifies work status (particularly insecure or casual employment arrangements) as a significant psychosocial stressor, contributing to feelings of insecurity and vulnerability and occurring alongside a broader workplace culture characterised by fear of speaking up about safety and health concerns.¹³ Precarious employment has also been associated with heightened safety risks in the wider maritime workforce, where uncertainties around scheduling, deployment, and vessel assignment – often involving short-notice placement and insufficient rest – contribute to reduced wellbeing and increased perceived risk to safety.³⁶ From a regulatory standpoint, diving operations are

governed by robust safety frameworks that define minimum standards for operational planning, equipment, emergency preparedness, and medical fitness.^{38,39} However, these regulatory instruments focus primarily on physical risks and operational hazards, and they do not explicitly address organisational responsibilities for supporting psychological wellbeing, reflecting a broader tendency within occupational safety and health frameworks to prioritise physical hazards over psychosocial risks.^{40,41} A clearer distinction therefore emerges between regulatory responsibility – compliance with statutory safety requirements – and moral responsibility, which encompasses the broader duty of care organisations have toward ensuring the mental, emotional, and financial security of those whose labour underpins offshore operations. Evidence from offshore oil and gas research highlights that fear of raising concerns is a key psychosocial hazard affecting safety, while broader organisational research identifies psychological safety as fundamental to maintaining a safe and high-performing workforce.^{13,42} Given divers' exposure to extreme physiological and psychological demands, and the precarious employment context in which many operate, improving workforce sustainability may require employers, particularly major contracting and operating companies, to move beyond minimal regulatory compliance. This includes recognising that wellbeing is not simply an individual responsibility but may also require coordinated organisational and industry-level approaches to support a competent, stable, and psychologically resilient diving workforce.

Based on these findings, Figure 1 presents a conceptual model of occupational health challenges in commercial diving, illustrating key stressors, mediating factors, and outcomes, and the interplay between organisational and individual influences.

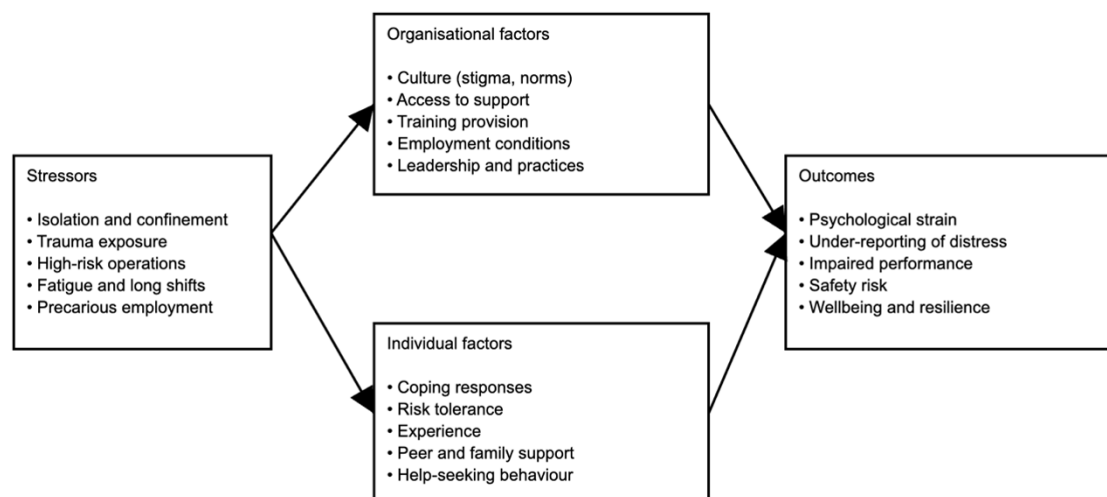
LIMITATIONS

Data were drawn from interviews and focus groups, which enriched the dataset but also introduced differing social dynamics that may have shaped responses.⁴³ The sample was purposively recruited from a single commercial diving company operating in the North Sea, which may limit transferability to other organisations, regions, or types of diving. This context also raises the possibility of selection bias and may have influenced participants' accounts of organisational practices. The dataset was originally collected as part of a broader study focused on resuscitation in diving, meaning psychological issues were not the primary focus of the interview schedule. This may have shaped both the direction of discussion and the salience of medical or emergency-related experiences (contextual priming). Although steps were taken to encourage candid responses, the shared project setting may also have influenced how participants framed their views. The study did not include perspectives from regulators, independent training providers, or employers beyond the participating organisation. As a result, findings may reflect a partial view and should not be interpreted as representative of the industry as a whole. More broadly, the sample was limited to men, reflecting industry demographics but restricting wider applicability, and findings were based on self-reported experiences, which may be influenced by recall or social desirability.

Conclusions

Several recommendations emerge from participants' accounts for strengthening psychological support, improving training quality, and fostering a safer and more sustainable diving workforce. First, findings suggest that the industry may benefit from adopting a more proactive approach to mental-health provision. This could include implementing

Figure 1
Occupational health challenges in commercial diving



routine psychological screening before and after high-risk operations, establishing structured debriefing processes following traumatic events, and improving timely access to qualified mental-health professionals. Normalising conversations about psychological wellbeing and reducing stigma may be supported through leadership engagement, peer-support initiatives, and targeted awareness programmes.

Second, participants' accounts indicate the potential value of greater organisational investment in mental-health infrastructure to move beyond ad-hoc or reactive support. This may involve developing clearer pathways for confidential reporting of psychological concerns, supporting help-seeking without adverse employment consequences, and more explicitly integrating mental-health considerations into operational planning. The development of more consistent standards for mental-health provision across organisations may also help reduce variability in access to support.

Third, findings suggest that medical training provision would benefit from further development to improve relevance, quality, and practical applicability. Training programmes could incorporate more realistic, scenario-based exercises reflecting the complexities of saturation and offshore environments. Particular emphasis may be placed on emergency response, resuscitation in hyperbaric conditions, casualty handling in and out of the bell, and the management of burns, trauma, and decompression-related injuries. Enhancing practical components of DMT training and providing more regular opportunities for skill maintenance may help mitigate skill degradation.

Fourth, participants highlighted the perceived importance of greater investment in diver training and research. This could include improved access to modern training equipment, such as high-fidelity simulation tools, to support preparedness and confidence. Scheduling training during off-shift periods may also improve accessibility without compromising operational demands.

Finally, findings suggest that ongoing cultural and organisational development may be important for supporting long-term improvements in wellbeing, safety, and professional development. As new generations enter the profession, there may be opportunities to further embed more progressive approaches to mental health and safety. Supporting such developments through policy evolution, leadership training, and collaborative industry initiatives may help facilitate sustained change.

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