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Psychological distress and workplace risk inequalities among conservation professionals

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Psychological distress and workplace risk inequalities among conservation professionals

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Abstract

Workplaces can be sources of both stress and support, affecting employees' mental health and productivity. Yet, little research has investigated variability in workplace risk factors for poor mental health in conservation. We aimed to explore how patterns of psychological distress—a state of emotional disturbance—and associated workplace risk factors vary between conservation job roles. Working with three case study organizations in India, South Africa, and Cambodia, we surveyed 280 field-based, office-based, and research staff. Moderate or severe psychological distress was reported by 28.9%. Field-based practitioners reported a greater imbalance between workplace efforts and rewards (0.35 standard deviation (SD), 95% credibility interval (CI) 0.03–0.67) than their colleagues, which was associated with greater psychological distress (0.24 SD, 95% CI 0.10–0.39). After controlling for this mediated relationship, researchers reported greater psychological distress than field-based practitioners

(0.37 SD, 95% CI 0.02–0.72). However, when accounting for all direct and indirect effects, there was no overall difference in distress between roles. Employers, funders, professional societies, and other institutions seeking to support conservationists' mental health should understand and offer support tailored to role-specific challenges. Doing so might enhance conservationists' wellbeing while strengthening their ability to reverse global nature loss.

1 | INTRODUCTION

Globally, 280 million people were estimated to have had depression, and 300 million were living with anxiety in 2019 (IHME, 2021). Even when not reaching diagnostic thresholds for specific illnesses, poor mental health can cause substantial suffering and disrupt daily activities (Drapeau et al., 2012). Mental health is a state of mental well-being that enables people to cope with life stresses, realize their abilities, learn and work well, and contribute to their communities (WHO, 2022). Workplaces can be sources of both stress and support, affecting people's mental health (Stevenson & Farmer, 2017). For example, challenging work combined with inadequate rewards (effort-reward imbalances), low control over daily tasks, bullying, and other stressors have been associated with an increased risk of poor mental health across multiple studies (Rugulies et al., 2017; Stansfeld & Candy, 2006; Theorell et al., 2015). Conversely, employment can offer income, social support, and status, thereby supporting mental health (Modini et al., 2016; Ridley et al., 2020).

Poor mental health threatens not only people's quality of life but also their performance at work (Hennekam et al., 2020). For instance, poor working conditions that harm mental health can reduce productivity and increase organizational costs from presenteeism (working while unwell and unproductive), absenteeism (habitual non-presence), staff turnover, and workplace conflicts (Cotton & Hart, 2003; Stevenson & Farmer, 2017). In the United States alone, poor mental health was estimated to cost employers across sectors $198.6 billion in 2018, 70% of which was attributed to presenteeism (Greenberg et al., 2021). Equally, positive psychological states linked to mental health (e.g., resilience and perceived self-efficacy) have been associated with job satisfaction, organizational commitment, citizenship behavior, and performance (Avey et al., 2011; Wu & Nguyen, 2019).

Many sectors have investigated and sought to manage the impacts of working conditions on employees' mental health and performance. For example, numerous reviews and meta-analyses explore the prevalence and risk factors for poor mental health among nurses (Gómez-Urquiza et al., 2017; Monsalve-Reyes et al., 2018; Tung et al., 2018; Varghese et al., 2021). This research has been accompanied by practical efforts to improve working conditions in health-related sectors. For example, the National Health Service in England has adopted a work plan that seeks to improve working conditions, thereby reducing staff turnover and improving patient care (NHS, 2019). In contrast, there is limited empirical research investigating the mental health of nature conservation professionals and the workplace factors influencing it (Anagnostou et al., 2022; Pienkowski, Keane, Castelló y Tickell, et al., 2022). Some exceptions include a study among 42 forest guards from six tiger reserves in India, which found that reported job satisfaction, alongside other factors, was linked to psychological wellbeing (Belhekar et al., 2020). Another study found that personal characteristics (e.g., gender and social support) and workplace challenges and rewards were associated with psychological distress among 2311 conservationists (Pienkowski, Keane, Castelló y Tickell, et al., 2022). Other research explores the risk factors for workplace stress in conservation, which may threaten mental health (Ledford et al., 2021; Moreto, 2016). For example, a study among 286 Chinese nature reserve staff found that age, time with family, income, and other factors were negatively associated with reported stress (Gao & Li, 2021).

Although not specifically focused on mental health, other studies provide valuable insights into conservation professionals' workplace challenges. These include studies describing difficulties in maintaining work-life balances, which can harm personal relationships (Campos-Arceiz et al., 2013; Ramos et al., 2017). It also includes research examining a broad range of issues faced by conservation rangers, including inadequate resourcing, poor health and safety conditions, dangers involved in law enforcement, and poor compensation (Anagnostou et al., 2022; Belecky

et al., 2019; Moreto, 2016; Singh et al., 2020; Spira et al., 2019). Anagnostou et al. (2022) provide a large review of studies on rangers' precarious employment conditions, while Pienkowski, Keane, Castelló y Tickell, et al. (2022) summarize a range of literature on conservationists' working conditions. Collectively, this evidence demonstrates that conservation can be a tough sector to work in for some.

Drawing on definitions by Sandbrook (2015) and Mieg (2009), we consider conservation professionals to be "*an occupational group intending to establish, improve, or maintain good relations with nature*" (Pienkowski, Keane, Castelló y Tickell, et al., 2022). The conservation sector spans diverse job roles and career paths; the challenges and rewards experienced in these different roles may vary significantly. For example, office-based practitioners may spend more time with family than colleagues in field-based roles (Gao & Li, 2021). Yet, limited research explores how mental health and associated risk and protective factors vary between job roles (but see Gao & Li, 2021, who found no significant difference in reported stress between rangers and non-rangers in China). Consequently, there is little systematic understanding of potential mental health inequalities between different roles, limiting efforts to target support to where it is most needed. Furthermore, failing to identify and manage job-specific challenges might limit the effectiveness of efforts to support staff mental health. This lack of comparative research may be because of the difficulties of sampling across the full range of conservation job types, leading to a selective understanding of the stressors faced by different groups. For example, Pienkowski, Keane, Castelló y Tickell, et al. (2022) sampled a large number of conservation professionals through a global internet survey. However, 90% had university-level education, 96% responded in English, and only 8% identified as field-based rangers.

A more comprehensive understanding of potential health inequalities in the conservation sector may assist in targeting workplace interventions for those who need them most and foster good work environments. Moreover, this understanding may help determine what interventions are suitable for addressing the challenges faced in different conservation roles. Therefore, this study aims to explore patterns of psychological distress—a state of emotional disturbance that impairs social functioning and daily activities (Drapeau et al., 2012)—and associated workplace risk factors between conservation job roles. We met our study aim through a survey of conservation professionals working in three case study organizations in South Africa (South African National Parks), Cambodia (anonymous), and India (the Nature Conservation Foundation), answering two research questions:

1. How do reported effort-reward imbalance, social support, and dangerous working conditions vary between job roles?
2. Are effort-reward imbalance, social support, and dangerous working conditions associated with psychological distress?

Psychological distress is not a mental illness, and the former cannot be used to diagnose the latter (Drapeau et al., 2012; Payton, 2009). But psychological distress is associated with poor mental health, especially depression and anxiety (Viertiö et al., 2021) and is often used in epidemiological studies on mental health risk and protective factors (Prochaska et al., 2012). A complex combination of biological and environmental factors can influence people's mental health, including the stressors they experience (Lund et al., 2018; Patel et al., 2018). These external stressors can relate to the social, economic, environmental, demographic, and cultural context of people's lives, collectively termed social determinants of health in public health literature (Lund et al., 2018). Many people spend significant time at work, and their workplaces can play roles in many of these social determinants of mental health (Patel et al., 2018).

To our knowledge, we provide the first study to quantitatively examine how risk and protective factors for poor mental health vary between job roles in conservation. We found that field-based practitioners reported greater imbalances between workplace efforts and rewards than colleagues, which was associated with higher psychological distress. However, we found no overall differences in the level of psychological distress between roles. This information could be used by employers, funders, professional societies, and other institutions to interrogate inequities and design role-specific workplace interventions for those who need them most.

2 | METHODS

2.1 | Study population and sampling approach

An Ethical Review Board at the University of Oxford approved the study protocol (R62487/RE002), which was also reviewed by the partnering organizations (see Supplementary Information [SI] 1 for details).

The study was designed to capture experiences from those in field-based roles with non-university level education who operated in the Global South. The target population included all staff working in 10 sites in three case study conservation organizations in South Africa, Cambodia, and India. The total population included

440 staff, comprising 115 from organization one, 84 from organization two, and 240 from organization three. These organizations were purposefully chosen to capture a range of conservation contexts, including spanning governmental and non-governmental settings (see SI 2 for details).

The Nature Conservation Foundation was established as a non-governmental organization in the mid-1990s. This organization's mission focuses on understanding and conserving the natural world across landscapes in India through scientific research, community-based projects, monitoring, education and outreach, and other activities. Field-based practitioners in this organization were not directly involved in protected area law enforcement. South African National Parks is a governmental organization established in the early 20th century. This organization's mission focuses on sustainably managing national parks for biodiversity, cultural heritage, tourism, socio-economic transformation in rural landscapes, and other purposes. It pursued this mission through protected area management, community engagement, eco-tourism, and other activities. Field-based practitioners in this organization were responsible for protected area law enforcement. The final anonymous partner was established in the late 1990s as a branch of an international conservation non-governmental organization. This organization's mission focuses on protecting biodiversity, which it does so through a combination of protected area management (including law enforcement), livelihood-based projects, and other activities. This organization worked closely with government agencies, and some field-based respondents were government representatives supported by the partner organization. All three operate at a national level and are primarily staffed by citizens, with multiple offices across their respective countries. The order in which these organizations are presented does not correspond to the organization numbering.

Study participants were asked to indicate their job roles. These responses were aggregated into the categories of field-based practitioners (rangers and field workers), office-based practitioners (managers, administrators, consultants, and interns), and researchers (researchers and students), with a final category, called unknown. Across organizations, field-based practitioners were involved in conservation area management (though not all were involved in law enforcement, as discussed above), biodiversity monitoring and evaluation, and community engagement. Office-based practitioners had administrative or programme, project, or team management responsibilities. Researchers across organizations did both office and field-based work.

Staff in organizations one and two were surveyed from September 2019 to January 2020. An external research consultant surveyed field-based practitioners in person, and office-based practitioners were invited by email to complete an internet survey (see SI 3). The third organization was surveyed from March to April 2021. Staff in this final organization were only offered the internet survey because of restrictions associated with the COVID-19 pandemic. Where possible, field-based conservation staff were provided access to devices for completing the internet survey during their workday. The survey was translated from English to Khmer and Tamil to ensure that all members of the surveyed populations could complete it in a language they felt comfortable using. Multiple languages are spoken in South Africa, but all target staff within the participating organization were proficient in English.

2.2 | Variable description

The response variable in the statistical analysis was psychological distress (Figure 1). This variable was measured using the Kessler Psychological Distress Scale (Kessler-10) (Kessler et al., 2002), which is easily interpreted, brief, well-validated and widely used (Bougie et al., 2016; Dingwall & Cairney, 2010; Easton et al., 2017; Kessler et al., 2002; Kessler et al., 2003; Min & Lee, 2015; Oakley Browne et al., 2010). The Kessler-10 scale contains 10 Likert-scaled items exploring the frequency of symptoms associated with psychological distress. Each item has five response levels, ranging from "*None of the time*" (scored 1) to "*All of the time*" (scored 5), which are added together to provide a total score. Scores between 10 and 19 indicate minimal psychological distress, 20–24 suggest mild distress, 25–29 imply moderate distress, and 30–50 indicate severe distress (Yiengprugsawan et al., 2014). Raw Kessler-10 scores are reported in response to research question one.

A latent variable describing respondents' levels of psychological distress was estimated and used within the statistical analysis. Six of the Kessler-10 items were used within this analysis (Kessler-6). One set of plausible values was extracted from a graded responses model fitted with the Kessler-6 (see SI 4 for details) to each of 10 imputed datasets (discussed below) (Von Davier et al., 2009). These plausible values of latent psychological distress were used as the primary outcome variable within the Bayesian structural equation model (Table 1, see SI 5 for details). Additionally, raw Kessler-6 scores are presented to allow for comparison with studies where it is also used.

The primary exposure variable was job "*role*." This variable included the categories of field-based practitioners, office-based practitioners, researchers, and unknown, as described above.

FIGURE 1 Hypothesized associations between workplace and personal characteristics and psychological distress (see Table 1 for details). RL, reference level.
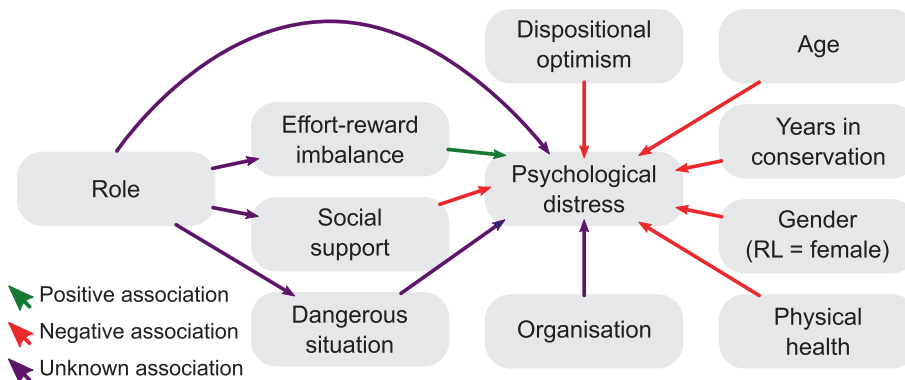
The analysis included three mediator variables; effort-reward imbalance, social support, and whether respondents felt their work put them in dangerous situations (see below for details). Within the effort-reward imbalance theory, people work on the understanding that their efforts will be compensated by rewards (Siegrist, 1996). When efforts outweigh rewards, an imbalance occurs. Siegrist et al. (2004) developed an instrument to measure employees' perceived experiences relating to this balance. This original instrument includes three Likert-scaled items describing efforts and seven regarding rewards. In this instrument, efforts relate to workload, disturbances and interruptions, and job demand, while rewards relate to financial compensation, career prospects and job security, and esteem and recognition (Siegrist, 2017). However, we adapted the instrument to capture additional efforts and rewards specific to conservation (see SI 6). These additions included three new effort items (relating to adequate resourcing and organizational stability) and two reward items (regarding satisfaction with contributions to conservation and esteem from friends and family). The analysis was repeated with both the original and adapted effort-reward imbalance instrument, yielding similar results (see SI 6). Effort-reward imbalance scores are calculated following Equation (1).

$$ERI_i = \frac{e_i}{r_i c_i} \tag{1}$$

where i is the individual, e is the sum score of effort items, r is the sum score of reward items, and c is the difference in the number of items in the numerator and denominator.

Social support can be an important predictor of mental health and is influenced by multiple factors (Drapeau et al., 2012). For example, previous evidence suggests that conservation work can limit interactions with friends and family (Belecky et al., 2019; Moreto, 2016; Singh et al., 2020; Spira et al., 2019) and thus perhaps feelings of social support. Social support was estimated using a fixed composite variable derived from three questions adapted from the World Health Organization Quality of Life survey (WHO, 2004). This adapted instrument asks respondents how satisfied they are with their personal relationships, their support from friends and family, and the amount of time spent with family. Response levels ranged from "*Very dissatisfied*" (scored 1) to "*Very satisfied*" (scored 5). Scores across the three items were added together to provide a total score, which was scaled and centered, and treated as numeric data within the analysis.

Finally, research suggests that traumatic experiences, including at work, can harm mental health (Davey et al., 2001; Keinan & Malach-Pines, 2007). Therefore, respondents were also asked to what extent they agreed with the statement, "*My work puts me in dangerous situations.*" What constituted a dangerous situation was not pre-defined, allowing respondents to evaluate the phrase according to their perceptions of danger. Response levels ranged from "*Strongly disagree*" (scored 1) to "*Strongly agree*" (scored 5) and were assumed to be approximately evenly spaced along an underlying normally distributed latent variable, so these scores were scaled and centered and treated as numeric in the analysis.

In addition to the mediated relationships, we also included direct effects between job roles and psychological distress. These direct effects allowed us to account for relationships not captured by the mediating variables. Additionally, the analysis included several covariates expected to be associated with psychological distress. These covariates were selected based on variables identified as important within the companion study by Pienkowski, Keane, Castelló y Tickell, et al. (2022) and previous literature (Drapeau et al., 2012). The covariates included dispositional optimism (scores from the Life Orientation Test—Revised (Scheier et al., 1994)), gender, age, years in conservation, subjective self-reported physical health (adapted from ONS, 2007), and a dummy variable corresponding to each organization.

TABLE 1 The a priori hypothesized associations between exposure and outcome variables in the Bayesian structural equation model, a description of the exposure variables, and a summary of prior evidence.

Outcome	Association	Exposure	Exposure variable description	Prior evidence	Prior
Effort-reward score	?	Role	A categorical variable that includes field-based practitioners, office-based practitioners, researchers (RL), and unknown.	None	All $N(0,10^2)$
Social support (composite)	?	Role	As above	None	All $N(0,10^2)$
Dangerous situations	?	Role	As above	None	All $N(0,10^2)$
Distress	?	Role	As above	None	All $N(0,10^2)$
Distress	+	Effort-reward score	An adapted effort-reward imbalance score (Siegrist et al., 2004).	In general, effort-reward imbalances are often positively associated with psychological distress (Kinman & Jones, 2008; Lau, 2008), as was found in the companion study.	$N(0.274,0.021^2)$
Distress	−	Social support (composite)	A fixed composite variable made from responses to three social support questions.	Social support is often negatively associated with psychological distress (Uchino, 2006), as found in the companion study.	$N(-0.113,0.022^2)$
Distress	?	Dangerous situations	"*My work puts me in dangerous situations.*"	Exposure to dangerous situations has been positively associated with psychological distress (Davey et al., 2001; Keinan & Malach-Pines, 2007). However, the companion study found no significant evidence of an association among a sample of conservation professionals.	$N(-0.005,0.017^2)$
Distress	−	Dispositional optimism	Scores from the Life Orientation Test—Revised (Scheier et al., 1994).	Dispositional optimists tend to report lower psychological	$N(-0.124,0.022^2)$

TABLE 1 (Continued)

Outcome	Association	Exposure	Exposure variable description	Prior evidence	Prior
			Dispositional optimism is the general expectation of good outcomes in life (Carver & Scheier, 2014).	distress (Conversano et al., 2010), as observed in the companion study.	
Distress	−	Age	Age in years	In general, people's risk of psychological distress can change over their life course (Drapeau et al., 2014). The companion study found a negative association between age and psychological distress among conservationists.	$N(-0.136, 0.033^2)$
Distress	−	Years in conservation	Years working in conservation	The companion study found that, after controlling for age, there was a negative association between years in conservation and psychological distress.	$N(-0.088, 0.034^2)$
Distress	−	Gender	Female (RL) or male	Gender-differentiated stressors are expected to affect men and women, with evidence that women can face barriers in conservation work (Jones & Solomon, 2019). The companion study found that women conservationists tend to report greater psychological distress than males.	$N(-0.211, 0.04^2)$
Distress	−	Physical health	*"How is your physical health in general?"*	Physical and mental health tend to be strongly related	$N(-0.18, 0.025^2)$

(Continues)

TABLE 1 (Continued)

Outcome	Association	Exposure	Exposure variable description	Prior evidence	Prior
				(Ohrnberger et al., 2017), and the companion study found a negative association between psychical health and psychological distress.	
Distress	?	Organization	A categorical variable corresponding to the three organizations (RL = organization one).	None	All $N(0, 10^2)$

Note: The priors are directly derived from a companion study by Pienkowski, Keane, Castelló y Tickell, et al. (2022) (see SI 5 for details). Key: +, positive association; −, negative association; ?, uncertain direction of the association; RL, reference level; and N, normal distribution (where the first argument is the mean and the second is the variance). All continuous variables are scaled and centered.

2.3 | Statistical analysis

All analyses were performed using the R statistics software (version 4.0.2) (R Core Team, 2020). First, 35 respondents who did not complete all Kessler-10 questions were removed from the analysis, and missing categorical data were coded as unknown. After this, 1.5% of the values of explanatory variables used in the statistical analysis were missing, mostly when individuals did not disclose their age (see SI 7). Missing values were substituted with synthetic ones through multivariate imputation by chained equations, using the mice package (version 3.9.0), creating 10 imputed datasets (van Buuren & Groothuis-Oudshoorn, 2011). Ordinal variables were imputed using proportional odds models, numeric variables with predictive mean matching, and unordered categorical variables with polytomous logistic regression (van Buuren, 2012). The pre and post-imputation distributions of variables were inspected and were found to be consistent.

A Bayesian structural equation model was fitted for each of the imputed datasets. The statistical analysis was performed in the Stan computational framework, accessed using the blavaan package (Merkle et al., 2020). The structural equation modeling approach allowed us to evaluate the mediating role of effort-reward imbalance, social support, and exposure to dangerous situations. Furthermore, the Bayesian approach allowed us to incorporate previous information from the companion study by Pienkowski, Keane, Castelló y Tickell, et al. (2022), assessing associations between workplace factors, personal characteristics, and psychological distress. The companion study uses the same survey questions, which were used to create variables comparable to the ones used here. Coefficient estimates and standard errors from this companion study were used to create strongly informative normally distributed priors; the estimates were used as the means, and the squares of the standard errors were used as the variances in these priors (see SI 5). A diffuse normally distributed prior with a mean of 0 and a variance of 100 (SD = 10) was used for all variables with no prior information from the companion study.

An arbitrary seed value of 123 was used, and the models were run for 5000 burn-in followed by 5000 post-burn-in iterations (10,000 total). The posterior distribution was estimated with the Markov Chain Monte Carlo sampler, across four Markov chains, following McElreath (2016). The models were evaluated according to the 10 steps in the "When to worry and how to Avoid the Misuse of Bayesian Statistics" Checklist (WAMBS)-Checklist (see SI 8) (Depaoli & Van de Schoot, 2017). This evaluation includes repeating the analysis with only diffuse priors, a summary of the results of which is discussed below. The posterior distributions from each model applied to each of the 10 imputed datasets were combined. Point estimates were the median of this pooled posterior distribution, and 95% CI's were equal-tailed. Direct, mediated, and total effects were calculated using probability addition and multiplication rules.

Additionally, we investigated the variation in responses to effort and reward questions between job roles. This exploration was accompanied by a series of Kruskal–Wallis tests, with ordinal response variables corresponding to each effort-reward item and job role used as the explanatory variable.

TABLE 2 Respondent characteristics.

Characteristic	Overall N = 280	Field-based N = 76	Office-based N = 60	Research N = 75	Unknown N = 69
Kessler-10 score	20.6 (7.6)	19.5 (8.1)	21.0 (8.0)	20.8 (7.4)	21.1 (6.9)
Kessler-6 score	12.5 (4.8)	11.7 (5.1)	12.9 (5.1)	13.0 (4.1)	12.7 (4.9)
ERI (original)	1.1 (0.4)	1.2 (0.4)	1.1 (0.5)	1.0 (0.3)	1.2 (0.5)
ERI (adapted)	1.0 (0.3)	1.0 (0.3)	0.9 (0.3)	0.9 (0.2)	1.1 (0.4)
Social support	0.0 (1.0)	0.2 (1.0)	0.1 (0.8)	0.0 (1.1)	−0.2 (1.1)
Dangerous situations					
Strongly disagree	49 (18%)	8 (11%)	13 (22%)	15 (20%)	13 (19%)
Disagree	72 (26%)	13 (17%)	20 (33%)	22 (29%)	17 (25%)
Neither	44 (16%)	12 (16%)	12 (20%)	12 (16%)	8 (12%)
Agree	71 (26%)	30 (39%)	8 (13%)	17 (23%)	16 (24%)
Strongly agree	42 (15%)	13 (17%)	7 (12%)	9 (12%)	13 (19%)
LOTR score	14.8 (3.7)	13.8 (3.2)	15.7 (4.3)	15.0 (3.9)	14.8 (3.2)
Age	38.1 (10.2)	37.3 (9.6)	37.8 (9.1)	35.3 (9.8)	43.0 (10.9)
Years in conservation	10.2 (8.1)	9.5 (7.1)	11.0 (8.9)	9.9 (8.3)	10.6 (8.8)
Gender					
Female	79 (28%)	8 (11%)	27 (45%)	22 (29%)	22 (32%)
Male	178 (64%)	68 (89%)	33 (55%)	46 (61%)	31 (45%)
Physical health					
Very bad	2 (0.7%)	0 (0%)	0 (0%)	1 (1.3%)	1 (1.5%)
Bad	11 (4.0%)	2 (2.6%)	2 (3.3%)	3 (4.0%)	4 (6.0%)
Fair	85 (31%)	31 (41%)	12 (20%)	21 (28%)	21 (31%)
Good	121 (44%)	23 (30%)	33 (55%)	34 (45%)	31 (46%)
Very good	59 (21%)	20 (26%)	13 (22%)	16 (21%)	10 (15%)
Organization					
One	97 (35%)	40 (53%)	20 (33%)	21 (28%)	16 (23%)
Two	72 (26%)	15 (20%)	17 (28%)	29 (39%)	11 (16%)
Three	111 (40%)	21 (28%)	23 (38%)	25 (33%)	42 (61%)

Note: Continuous variables are described with means (and SDs), and categorical variables are described with counts (and percentages). Unknown response levels are not shown. Key: LOTR, Life Orientation Test—Revised; ERI (original), original effort-reward imbalance scores; ERI (adapted), adapted effort-reward imbalance scores.

3 | RESULTS

3.1 | Prevalence and variability in psychological distress

A total of 280 respondents across the three organizations completed the survey (Table 2, see SI 7 for details on the response rate and SI 9 for respondent profiles in each organization). Participants had a mean Kessler-10 score of 20.6 (SD = 7.6) and a median score of 19.0 (interquartile range = 12.0) (Table 2). Furthermore, 52.9% reported minimal psychological distress (scores of 10–19), 13.2% had mild distress (20–24), 14.3% had moderate distress (25–29), and 14.6% reported severe distress (30 or above). Participants had a mean Kessler-6 score of 12.5 (SD = 4.8).

3.2 | Job role, workplace factors, and psychological distress

Job role was associated with two of the three workplace mediator variables (Figure 2). Field-based practitioners reported a 0.35 (95% CI 0.03–0.67) standard deviation (SD) higher effort-reward imbalance and 0.43 (95% CI 0.12–0.74) SD greater agreement that their work put
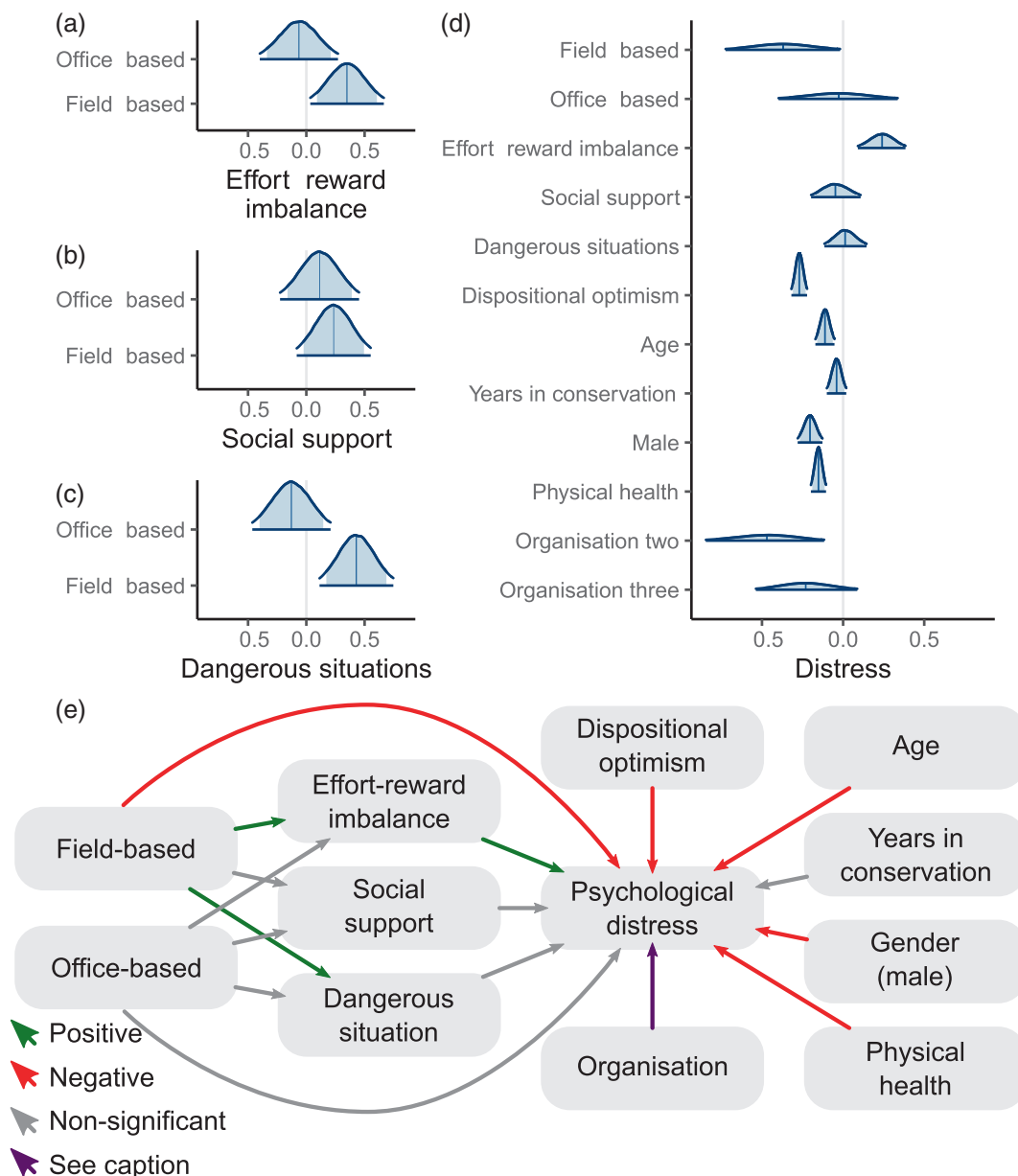
FIGURE 2 Bayesian multivariate structural equation modeling results using data from 280 respondents. Posterior probability distributions associated with effort-reward imbalance (a), social support (b), exposure to dangerous situations (c), and psychological distress (panel d) between job roles (reference level is "researcher"). Vertical blue lines represent point estimates (median of the posterior distribution), and curves represent the 95% credibility interval (equal-tailed). Coefficient estimates are presented in standard deviations. Estimates associated with "unknown" response levels are not shown. Panel (e) illustrates the direction of association between each variable (reference level for job role is "researcher"). The purple line indicates that organization is a categorical variable whose associations are shown in panel (d).

them in dangerous situations than researchers. Those reporting 1 SD higher effort-reward imbalance were estimated to experience 0.24 (95% CI 0.10–0.39) SD higher levels of psychological distress. As such, when examining the indirect mediating role of effort-reward imbalance, field-based practitioners reported 0.09 SD higher psychological distress. Neither social support nor reported exposure to dangerous situations was

significantly associated with psychological distress. Furthermore, when examining the direct (nonmediated) association, field-based practitioners reported 0.37 (95% CI 0.02–0.72) SD lower psychological distress than researchers. Finally, when considering all direct and indirect associations together (i.e., the total effect), there was no statistically significant difference in psychological distress between roles.

Several of the covariates were also associated with psychological distress. For example, those with 1 SD higher dispositional optimism than the mean reported 0.27 (95% CI 0.22–0.32) SD lower distress. Furthermore, respondents aged 50 reported 0.28 SD lower distress than those aged 25. Men reported 0.20 (95% CI 0.13–0.28) SD lower distress than women. Those who said their physical health was good reported 0.19 SD lower distress than those who said their health was fair. Finally, those working in organization two reported 0.46 (95% CI 0.11–0.84) SD lower psychological distress than those in organization one.

The analysis presented here was contrasted against an alternative model with the software's default diffuse priors (see SI 8). In summary, the directions of association between job role, effort-reward imbalance, exposure to dangerous situations, dispositional optimism, and psychological distress were similar to those presented above. However, the associations of age, gender, physical health and one organization with psychological distress became nonsignificant when using diffuse priors. Further supplementary analysis found variation in effort-reward imbalances and social support between organizations (see SI 10).

3.3 | Differences in efforts and rewards between roles

The statistical analysis suggested that field-based practitioners faced greater effort-reward imbalances than their colleagues. To explore this further, we first explored the overall patterns of response to the effort and reward items across all respondents and then how these varied between job roles (Figure 3).

There were notably high levels of agreement and disagreement with some of the items across all roles. For instance, among the effort items, the majority (81.9%) of respondents agreed or strongly agreed with the statement, "*Over the past few years, my job has become more and more demanding*" (Figure 3c). A majority (90.3%) were confident that their organization would still exist in 5 years (Figure 3f). Among the reward items, most (85.7%) agreed or strongly agreed with the statement, "*I receive the respect I deserve from my boss and work colleagues*" (Figure 3g). Furthermore, most respondents were satisfied with their contributions to conservation (81.7%, Figure 3n) and felt their friends were proud that they worked in conservation (89.2%, Figure 3o). A slight majority (58.8%) felt their salary was not commensurate with their efforts and achievements.

Moreover, there was variability in these responses between job roles; the following summary focuses on effort and reward items where there were statistically significant differences (*p*-value <0.05) in responses between roles. In terms of efforts, field-based practitioners were significantly more likely to report inadequate resourcing (Figure 3d) and believe that their organization may not exist in 5 years than those in other roles (Figure 3f). Researchers were significantly more likely to say they received the respect they deserved from colleagues than those in other roles (Figure 3g). Furthermore, field-based practitioners reported significantly lower rewards in the form of job security and undesirable changes at work (Figure 3i,j). However, field-based practitioners were most likely to be satisfied with their contributions to conservation (Figure 3n).

4 | DISCUSSION

To our knowledge, we provide the first study to empirically evaluate how mental health risk and protective factors vary between conservation job roles. We also provide one of the few studies using standardized psychometric instruments to examine the prevalence and correlates of poor mental health among conservationists. Field-based practitioners reported greater effort-reward imbalances than their colleagues, which was positively associated with psychological distress. When examining only the direct effects, researchers reported greater psychological distress than field-based practitioners. However, we found no overall difference in psychological distress between those in different roles when looking at the total effect (which accounts for all mediated and direct effects). In other words, overall psychological distress levels were similar across roles, but the workplace risk factors were different.

4.1 | Levels of psychological distress

Over a quarter of our study participants reported moderate or severe psychological distress (Kessler-10 scores greater than 24). This prevalence was similar to that found in a companion study by Pienkowski, Keane, Castelló y Tickell, et al. (2022), in which 27.8% of 2311 surveyed conservationists reported moderate or severe psychological distress, with a mean Kessler-10 score of 20.9 (SD = 7.0). Though not using comparable instruments, Gao and Li (2021) found relatively low reported stress levels among 286 nature reserve staff in China (mean Cohen's Perceived Stress Scale of 17.3). Several other studies discuss the mental health of rangers (Anagnostou et al., 2022). Many of these provide important insights into rangers' workplace experiences but do
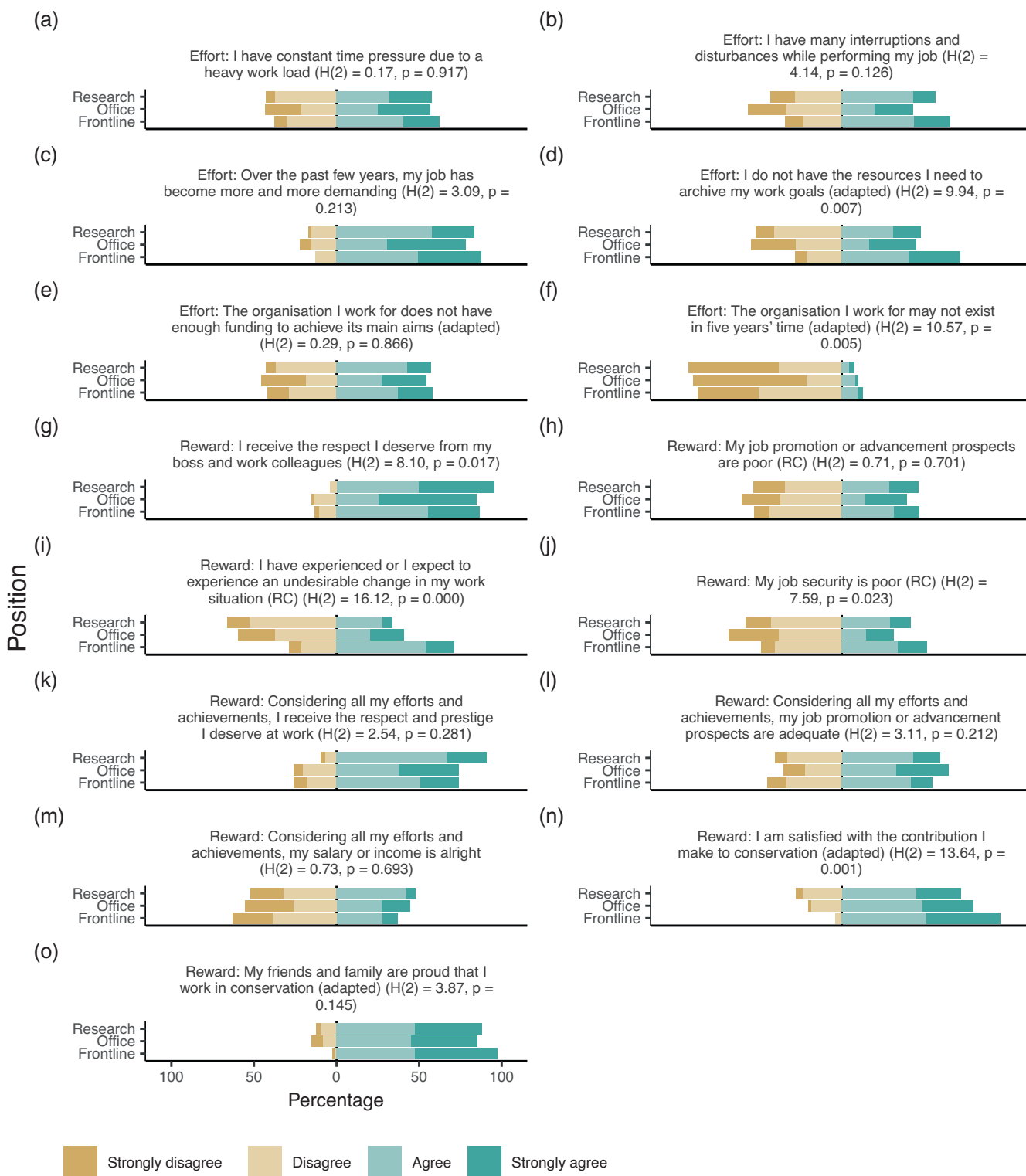
FIGURE 3 Variation in responses to effort and reward questions between job roles. Labels include the results of Kruskal–Wallis tests evaluating differences in responses between job roles. RC, reverse coding, adapted = the items added to the original effort-reward imbalance instrument.

not use methods that provide prevalence estimates (Moreto, 2016; Thakholi, 2021). Further research using standardized instruments can help when comparing studies within conservation and across sectors.

The conservation movement might learn valuable lessons on managing work-induced distress from other sectors. For example, many countries have a shortage of nurses, partly because of high turnover linked to poor

working conditions and stress (Drennan & Ross, 2019; Senek et al., 2020). Recognizing these challenges, the National Health Service in England has implemented measures to increase the retention of nurses and health-care workers (NHS, 2019). These measures include enhancing career development opportunities, adopting flexible working practices, addressing discrimination and bullying, and strengthening support for victims of violence. The International Federation of Red Cross and Red Crescent Societies and the Inter-Agency Standing Committee have developed guidelines for supporting the mental health of staff and volunteers in humanitarian emergencies (IASC, 2007; International Federation of Red Cross and Red Crescent Societies, 2009). These guidelines include practical steps for organizations, including developing concrete plans for supporting staff, facilitating healthy work environments (e.g., ensuring recuperation periods, providing access to appropriate food and hygiene, and monitoring work hours), and addressing work-related stressors (e.g., creating clear and achievable job descriptions and ensuring staff safety). More broadly, the International Labour Organization (ILO) promotes decent work for all through a range of legally binding and non-binding international treaties and conventions (ILO, 2022). Many of these treaties are relevant to the conservation sector, such as the ILO's Forty-Hour Week Convention, the Protection of Wages Convention, the Violence and Harassment Convention, and the Occupational Safety and Health Convention (Anagnostou et al., 2022). Yet, many countries where rangers work have not ratified these ILO conventions, limiting their role in ensuring decent work for conservationists (Belecky et al., 2019). In collaboration with the ILO, the World Health Organization released guidelines on mental health at work (WHO, 2022). These guidelines provide evidence-based advice on organizational interventions (e.g., flexible work, participatory job design, and adjusting workloads), manager and worker training (e.g., mental health literacy and awareness training) and individual interventions (e.g., mindfulness, contemplative, and physical activity interventions).

While much can be learned from other sectors, conservationists may face unique challenges and rewards. For example, Pienkowski, Keane, Lange, et al. (2022) suggest that many in the sector are pessimistic about society meeting crucial conservation goals over the next 10 years. In turn, low conservation optimism was associated with slightly higher rates of psychological distress in a companion study (Pienkowski, Keane, Castelló y Tickell, et al., 2022). Efforts to improve working conditions could be tailored based on evidence specific to the experiences of conservation professionals. In aid of this, Pienkowski, Keane, Castelló y Tickell, et al. (2022) offer ideas for

conservation organizations might manage the mental health of their staff, drawing on best practice guidelines tailored through input from key informants. These ideas include taking steps to remove workplace threats to mental health. For example, many respondents in the current study highlighted the challenges of increasingly demanding workloads. Interventions to reduce workload might include reducing weekly work hours (Schiller et al., 2018), hiring additional staff if feasible, and training team leaders and staff in time management and organization (Green & Skinner, 2005).

Equally, employers might also promote the positives of working in conservation. These measures might include tackling areas where staff feel under-rewarded. For example, some respondents across roles reported poor job advancement prospects. Therefore, employers might consider supporting equitable career development through mentoring schemes, training access, and qualification opportunities (Jones & Solomon, 2019). Where there are limits on the number of advanced job roles, employers might look for ways to provide higher compensation for those taking on new responsibilities within their existing roles. Promoting the positives might also involve recognizing and upholding existing aspects of work that employees value. For example, many of our respondents were satisfied with their contributions to conservation. Papworth et al. (2018), Pienkowski et al. (2021), and Loffeld et al. (2022) found that some conservationists reportedly maintain motivation by recognizing their individual contributions to conservation and wider examples of success. Further research is needed to evaluate if these strategies increase motivation, reduce psychological distress, and contribute to better conservation outcomes. However, employers might consider ways to celebrate individual and team efforts and positive outcomes of their work while recognizing the risks of creating an "only good news" culture.

4.2 | Patterns of risk factors between job roles

This study asked how effort-reward imbalances, social support, and exposure to dangerous situations vary between job roles and if these factors were associated with psychological distress. Our results suggest that while there might not be differences in overall psychological distress between job roles in our sample, risk factors vary. Therefore, there may be no one-size-fits-all solutions for supporting mental health in the conservation sector. Instead, measures should be tailored based on understanding experiences across different roles. Again, lessons can be learned from other sectors. For example, the Talk

Health and Care platform was launched to allow National Health Service staff in England to share challenges and post ideas, notionally helping inform management planning (Iacobucci, 2018). Similar tools could help conservation staff across organizational roles share their job-specific challenges. Such tools may be particularly useful when staff are spread over multiple locations, especially where field-based workers have limited direct contact with head offices and human resource personnel.

Our results corroborate other studies finding associations between effort-reward imbalances and mental health. For example, one meta-analysis of eight cohort studies encompassing 84,963 employees found that individuals exposed to effort-reward imbalances had a significantly greater risk of depressive disorders (Rugulies et al., 2017). Rebalancing efforts and rewards could involve mitigating workplace challenges while promoting the positives of conservation work, as discussed above. However, our results also illustrate how patterns of effort and reward can vary depending on job roles. In particular, field-based practitioners in our study reported greater under-resourcing and job insecurity than office-based practitioners and researchers. Some of our results echo those found in other studies among rangers. For example, Moreto (2016) describes numerous stressors reported during interviews with rangers in Uganda. These include inadequate resourcing, low financial compensation, difficult relationships with residents, colleague misconduct, and dangerous working conditions (Moreto, 2016). Many of these themes are also reflected in other studies among rangers (Belecky et al., 2019; Singh et al., 2020; Spira et al., 2019). Other research suggests that job satisfaction, time spent with friends and family, and financial compensation may be associated with lower stress and better psychological wellbeing (Belhekar et al., 2020; Gao & Li, 2021).

Recognizing the challenges faced by rangers, participants at the 9th World Ranger Congress in November 2019 endorsed the Chitwan Declaration (IRF, 2019). This declaration calls on conservation leaders to improve health and safety conditions, provide decent life insurance, and support work-life balances (such as providing sufficient annual leave) among rangers. The Universal Ranger Support Alliance supports the implementation of this declaration through a targeted action plan that includes promoting minimum standards for ranger welfare and employment (URSA, 2021). Our results—particularly around effort-reward imbalances and exposure to dangerous situations—provide further evidence supporting this call.

Yet, our results also highlight how non-field-based workers, such as researchers, might face challenges affecting their mental health that were not captured in the three mediator variables in our study. For instance, many conservationists, including office-based and field-based practitioners alike, are motivated to work in conservation because they enjoy nature and the outdoors (Papworth et al., 2018; Singh et al., 2020). However, office-bound staff might face daily evidence of conservation's failure to reach its goals but have fewer opportunities to spend time in nature than colleagues in field-based roles. Consequently, employers might provide opportunities for those who spend significant time in the office to visit natural areas and perhaps create opportunities to directly contribute to conservation activities.

Furthermore, we found differences in the prevalence of psychological distress among the three partner organizations. These differences could result from organizational factors not captured in our study, such as leadership style, management support, or group cohesion and supportiveness (Bronkhorst et al., 2015). Alternatively, some organizations are likely to operate in places with more severe conservation and social challenges than others, which may be distressing for those caring about nature and people (Fraser et al., 2013; Pihkala, 2020). For instance, Pienkowski, Keane, Castelló y Tickell, et al. (2022) found that those in countries with a higher proportion of threatened species tend to report lower optimism about conservation, which has been associated with greater psychological distress (Pienkowski, Keane, Castelló y Tickell, et al., 2022). Further research investigating these differences could identify organizational risks and protective factors and where resources to support mental health should be directed.

A full discussion of the study limitations can be found in SI 11, but they are summarized as follows. First, our sample was from a limited number of purposefully selected sites and organizations. As a result, care should be taken when generalizing our findings to other settings. Second, organization three had lower response rates than the other two, partly because of constraints linked to the COVID-19 pandemic. The association between effort-reward imbalance and psychological distress should be considered a lower-bound estimate for reasons discussed in SI 11. Third, we used a cross-sectional study design, which did not allow for causal inference and presented uncertainties associated with reverse or bidirectional causation. Fourth, our approach did not allow us to untangle the impacts of the COVID-19 pandemic from organizational-level effects. Fifth, our results were sensitive to the use of informative priors. However, our primary conclusions regarding the relationship between job roles, mediator variables, and psychological distress would have been the same if only diffuse priors were used.

5 | CONCLUSION

Our study explored patterns of psychological distress and associated workplace risk factors between roles within three conservation organizations. We did not find overall differences in psychological distress between researchers and field-based and office-based practitioners. However, these groups may face different challenges at work, with field-based practitioners reporting higher effort-reward imbalances while their colleagues experienced psychological distress for unknown reasons. These findings highlight the need for employers to understand and offer tailored support to different groups within organizations. This research adds to a growing number of studies looking at how practitioners' personal characteristics and experiences might influence their contributions to conservation outcomes (Pienkowski, Kiik, Catalano, et al., 2022). Ultimately, alleviating potential workplace sources of psychological distress could help employers meet their duty of care while supporting conservationists' efforts to reverse the loss of nature.

AUTHOR CONTRIBUTIONS

Thomas Pienkowski: Conceptualization; Methodology; Software; Formal analysis; Investigation; Resources; Data Curation; Writing—Original Draft; Writing—Review & Editing; Visualization; Project administration; Funding acquisition. **Aidan Keane**: Conceptualization; Methodology; Formal analysis; Investigation; Writing—Original Draft; Writing—Review & Editing; Visualization; Supervision. **Emiel de Lange**: Conceptualization; Methodology; Investigation; Writing—Original Draft; Writing—Review & Editing; Visualization. **Vena Kapoor**: Conceptualization; Methodology; Investigation; Writing—Review & Editing. **Munib Khanyari**: Conceptualization; Methodology; Investigation; Writing—Original Draft; Writing—Review & Editing; Visualization. **Roshni Ravi**: Conceptualization; Methodology; Investigation; Writing—Review & Editing. **Izak P. J. Smit**: Investigation; Writing—Review & Editing. **Sofia Castelló Tickell**: Conceptualization; Methodology; Investigation; Writing—Original Draft; Writing—Review & Editing; Visualization. **Mirjam Hazenbosch**: Conceptualization; Methodology; Investigation; Writing—Original Draft; Writing—Review & Editing; Visualization. **William N. S. Arlidge**: Conceptualization; Methodology; Investigation; Writing—Review & Editing. **Gergő Baranyi**: Conceptualization; Methodology; Investigation; Writing—Review & Editing. **Stephanie Brittain**: Conceptualization; Methodology; Investigation; Writing—Review & Editing. **Sarah Papworth**: Conceptualization; Methodology; Investigation; Writing—Review & Editing. **Sonakshi Saxena**: Investigation. **Vimean Hout**: Investigation. **E. J. Milner-Gulland**: Conceptualization; Methodology; Investigation; Resources; Writing—Original Draft; Writing—Review & Editing; Visualization; Supervision; Funding acquisition.

CONFLICT OF INTEREST STATEMENT
VK, IPJS, and RR work in the participating organizations.

DATA AVAILABILITY STATEMENT
Anonymized and redacted data is available at: 10.6084/m9.figshare.20254449. The dummy variable used to distinguish each organization has been removed from the dataset to completely eliminate the risk that organizational anonymity might be compromised. The study code is available at: https://github.com/Pienkowski/workplace-inequalities-conservation-professionals.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.