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Supporting conservationists' mental health through better working conditions

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Article Impact statement

Conservationists' workplaces are associated with their risk of psychological distress; better supporting them may help protect nature.

Abstract

Biodiversity conservation work can be challenging but rewarding, with potential consequences for conservationists' mental health. Yet, little is known about patterns of mental health among conservationists and its associated workplace protective and risk factors. A better understanding might help improve working conditions, supporting conservationists' job satisfaction, productivity, and engagement, while reducing costs from staff turnover, absenteeism, and presenteeism. We surveyed 2311 conservation professionals working across 122 countries, asking about experiences of psychological distress, working conditions, and personal characteristics. Over half were from and worked in Europe and North America, and most had university-level education, were in desk-based academic and practitioner roles, and responded in English. Heavy workload, job demands, and organizational instability were linked to higher distress, but job stability and satisfaction with one's

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contributions to conservation were associated with lower distress. Respondents with low dispositional and conservation-specific optimism, poor physical health, limited social support, women, and early-career professionals were most at risk in our sample. Our results flag important risk factors that employers could consider, though further research is needed among groups under-represented in our sample. We suggest ways employers and others might promote the positives and manage the risks of working in the sector, potentially supporting conservationists' mental health and abilities to protect nature.

Introduction

Nature and its capacity to support human well-being are being lost at unprecedented rates (IPBES 2019). Conservation professionals are at the forefront of efforts to reverse this loss but can face challenging working conditions that may threaten their mental health and capacity to protect nature (Boon 2022). Mental health is a “state of well-being in which the individual realizes [their] own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to [their] community” (WHO 2004). In contrast, poor mental health can cause substantial suffering and disrupt social relationships and daily activities (Patel et al. 2018).

Recognizing this, the World Health Organization has called on all sectors of society to create conditions that promote mental health (WHO 2022b), including at work (WHO 2022a). This study aims to increase understanding of the workplace factors associated with psychological distress – a state of emotional disturbance that impairs social functioning and daily activities (Drapeau et al. 2012) – among conservation professionals. Psychological distress indicates poor mental health but is not a mental illness. We consider conservation professionals to be an occupational group intending to establish, improve, or maintain good relations with nature (Appendix S1, Mieg 2009; Sandbrook 2015). We focus on working conditions as an area where employers, funders, and others might effectively support conservationists' mental health, while controlling for personal characteristics. Our article seeks to encourage and inform these efforts. However, we also recognize the need for other forms of support for those dealing with the emotional impacts of nature loss.

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Environmental change can be a source of anxiety and grief among the general public (e.g., Hickman et al. 2021), partly arising from the current and anticipated loss of valued places, things, knowledges, and relationships (Cianconi et al. 2020; Clayton 2020). Environmentalists who are deeply aware of this loss, tasked with preventing it, and with strong emotional connections to nature might face acute feelings of grief, anxiety, or solastalgia (Clayton 2018; Gordon et al. 2019; Boon 2022). (Solastalgia is the “distress that is produced by environmental change impacting on people while they are directly connected to their home environment”, Albrecht et al. 2007.) These feelings might be a natural and legitimate response to perceived societal inaction, public and political denialism, feelings of powerlessness, and the expectation that future environmental targets will not be met (Cunsolo et al. 2020; Hickman 2020). For some, these feelings may be exacerbated by the “gloom-and-doom” narrative of hopelessness that Swaisgood and Sheppard (2010) claim is prevalent in some conservation discourse. The causes of this emotional toll are complex and multi-faceted but partly stem from concerns about future outcomes for nature (Clayton 2018; Boon 2022; Pienkowski et al. 2022a). Optimism movements such as *Conservation Optimism* have emerged in part to help alleviate the emotional toll of environmental work (de Lange et al. 2022). In general, situational optimism is the expectation of positive outcomes within a specific context (Tusaie & Patterson 2006). Pienkowski et al. (2022a) examined patterns of situational optimism about conservation in a companion study. Here, we extended this analysis to examine if conservation optimism was negatively associated with psychological distress, controlling for dispositional optimism (the general expectation of good outcomes in life, Conversano et al. 2010; Carver & Scheier 2014).

Beyond this emotional toll, conservationists can also face challenging workplace conditions, the primary focus of the current study. For example, conservation spending is estimated to be an order of magnitude smaller than is required to meet critical global biodiversity targets (Barbier et al. 2018). This underfunding may partly explain the apparent prevalence of precarious, inadequately compensated, and poorly resourced conservation jobs, as reported by conservationists in a second

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companion study by Pienkowski et al. (2021). Furthermore, many might choose to work in conservation out of care for nature and all people who depend on it (Sandbrook 2019; Pienkowski et al. 2021). But in some cases, the vocational nature of conservation may encourage exploitative practices, such as long-term unpaid or low-paid work, that disproportionately affect those from disadvantaged backgrounds and at early-career stages (Fournier & Bond 2015; Vercammen et al. 2020). Many conservation roles can blur the boundary between personal and professional lives. For instance, conservationists often work outside regular office hours, might be based in remote locations, and spend significant time away from friends and family (Campos-Arceiz et al. 2013; Ramos et al. 2017). Some in the sector can have conflicting responsibilities and loyalties, which can be distressing. For instance, protected area rangers can come from or live in the same communities they are required to police, which may create tensions with friends, neighbors, and family (Moreto 2016). These challenges are not equally experienced within the sector and can vary by job role, geography, race and ethnicity, sexual orientation, religion, gender, and other identities and social relations (Jones & Solomon 2019; Chaudhury & Colla 2021). For example, multiple recent studies examine workplace stressors – such as isolation from family, poor health and safety, and inadequate compensation – experienced by conservation rangers (e.g., Moreto 2016; Belhekar et al. 2020; Singh et al. 2020; Gao & Li 2021; Anagnostou et al. 2022). In a further companion study, Pienkowski et al. (2023) surveyed 280 conservationists in three organizations in India, South Africa, and Cambodia, finding that field-based employees were more likely to report imbalances between workplace efforts and rewards associated with higher psychological distress. Furthermore, many conservation professionals train and work in higher education institutions. Excessive workloads, job insecurity, lack of organizational support, and other factors threaten the mental health of academics across disciplines (Hamilton 2019; Hodge et al. 2020; Urbina-Garcia 2020). Many of these challenges have parallels with those found in other sectors. The effort-reward imbalance (ERI) model developed by Siegrist (1996) is a consistent workplace predictor of poor mental health (Rugulies et al. 2017; Duchaine et al. 2020; van der Molen et al. 2020). According to the ERI model, people work with the expectation that their efforts will be

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compensated with rewards; an imbalance occurs when efforts exceed rewards (Siegrist 1996). Many of the items in the ERI instrument correspond to the workplace challenges described above. For example, the instrument includes questions about workload, job demand, job security, and compensation. We draw on the ERI model to understand workplace challenges associated with psychological distress, aiding comparison with other sectors. Additionally, we controlled for a range of covariates, including gender, age and years of experience, physical health, social support, and physical security, which are expected to be associated with psychological distress (Davey et al. 2001; Uchino 2006; Drapeau et al. 2012; Ohrnberger et al. 2017; Viertiö et al. 2021).

Working in conservation can also be rewarding. Many people across numerous sectors seek work that aligns with their values or contributes to societal causes (Berg et al. 2010). Doing value-aligned work is also important for many conservationists, such as those motivated by their love of nature and its perceived intrinsic and instrumental values (Papworth et al. 2018). Engaging in value-aligned work can provide satisfaction and meaning in conservationists' lives (Pienkowski et al. 2021). Some types of conservation work also provide beneficial opportunities to spend time in nature, travel, learn, and interact with colleagues and other groups. Generally, work can be a source of social support, personal development, social status, and other benefits, while unemployment and poverty are major risk factors for poor mental health (Ridley et al. 2020). We capture several of these positive aspects by adapting the ERI instrument, as described in the methods.

These workplace challenges and rewards, and the balance between them, are likely to play a role in conservationists' mental health. There are multiple reasons why the conservation sector should care about the working conditions and mental health of its members. For individuals, good working conditions can enhance job satisfaction and quality of life beyond work (Waddell & Burton 2006). Such conditions are often associated with better job performance and career advancement and might help those who want to remain in the sector to do so (Kahya 2007). There are also pragmatic reasons why organizations should care about staff mental health. In the United Kingdom (UK) alone, poor

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mental health was predicted to cost employers between £33 billion and £42 billion in 2016 (Monitor Deloitte 2017). Good working conditions can increase staff engagement, creativity, and productivity while reducing costs from absenteeism (habitually missing work), presenteeism (working while unwell and unproductive), and staff turnover (Stevenson & Farmer 2017). Good work conditions may also ease stress-induced workplace conflict and reduce incentives for misconduct (Lau et al. 2003; Moreto 2016). In many countries, employers have a duty of care towards their staff; failure to fulfill this duty might pose liability risks. Across the sector, a more productive and innovative workforce might be better able to deliver conservation action.

Substantial evidence suggests that good working conditions benefit mental health (Waddell & Burton 2006). Efforts to support mental health at work can involve promoting the positive, preventing harm, and helping manage poor mental health regardless of the cause (Lamontagne et al. 2014; Stevenson & Farmer 2017). Healthcare, education, emergency services, and other sectors have a history of investigating and acting to support workers' mental health. For example, numerous reviews and meta-analyses explore risk factors for poor mental health among healthcare workers and interventions to support them (e.g., López-López et al. 2019; Petrie et al. 2019). In contrast, there is little empirical research linking working conditions to the mental health of conservationists. Among the few empirical studies, Belhekar et al. (2020) and Gao and Li (2021) examine psychological well-being and stress among rangers in India and China, while Pienkowski et al. (2023) examine how risk factors for psychological distress vary between job roles. Yet, there is growing recognition of the need to better support those in environmental sectors, including regarding their mental health. For example, the *International Ranger Federation* aims to professionalize ranger roles and plans to develop minimum standards around working conditions and welfare (URSA 2021). Recent editorials in *Nature Ecology and Evolution* (2022) and *Nature Climate Change* (2018) have called attention to environmentalists' mental health, including the effects of working conditions.

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Our study seeks to provide empirical evidence to help inform such efforts by examining the workplace factors associated with psychological distress among conservation professionals. We reiterate that psychological distress is not a mental disorder, and high levels of distress cannot be used to diagnose mental illness (Drapeau et al. 2012). However, severe psychological distress is “indicative of impaired mental health” (Viertiö et al. 2021) and may be found along stages of mental illness (Patel et al. 2018). Specifically, we evaluated *a priori* hypothesized associations between workplace conditions, personal characteristics, and psychological distress (Table 1, see Appendix S2 and S3).

Methods

An *Ethical Review Board* at the *University of Oxford* approved the study protocol (R62487/RE002).

The ethical protocol included obtaining informed consent from participants (see Appendix S4).

We used snowball and self-selection approaches to sample conservation professionals through an internet survey (see Appendix S2 and S5). A draft survey was piloted among 23 researchers and practitioners in the United Kingdom, India, and Uganda. Minor adjustments were made to the survey wording, instructions, and structure following piloting.

We recruited participants in three ways between July 2019 to August 2020, with two recruitment drives in July 2019 and May 2020. First, we created a list of 216 conservation organizations operating in countries speaking the survey languages. This list was developed by searching websites and social media for active organizations with email addresses using keywords. We then emailed this list, asking for the survey to be shared among staff and networks. In parallel, we shared the survey through relevant mailing lists and newsletters identified through professional societies and elsewhere. For example, we shared the survey through the mailing lists of all *Society for Conservation Biology* thematic groups and regional chapters. We also disseminated the survey through social media, principally *Twitter* and *Facebook*. Finally, the survey was advertised to attendees at the *International Congress for Conservation Biology 2019*.

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The survey was forward-translated by a professional translation service and then back-translated into English by members of the research team. Discrepancies were discussed, and forward translations were corrected. The survey was translated from English into French, Spanish, and Portuguese because these are the most commonly spoken languages by country. These languages poorly represented East Africa, so the survey was translated into Kiswahili. The Khmer translation of the survey was available when the survey was deployed, so it was also included, but no respondents completed the survey in this language.

Data from the current study, Pienkowski et al. (2021) and Pienkowski et al. (2022a) were collected through the same online survey described above but answering separate research questions and presenting distinctly different results. Pienkowski et al. (2021) examined how satisfied respondents were with the progress to conservation and personal goals important to them and how this satisfaction varied between groups. Pienkowski et al. (2022a) explored respondents' expectations about future outcomes for nature, used as an explanatory variable in the current study (see below). Finally, recognising the sampling limitations of the current study, Pienkowski et al. (2023) explored associations between workplace stressors and psychological distress and how these varied between job roles among staff at three practitioner organisations in the Global South.

Variable description

Psychological scales can include sets of items used to measure cognitive, emotional, or behavioral variables. Psychological distress scales are often used in epidemiological studies on the correlates of poor mental health. The Kessler Psychological Distress Scale (Kessler-10) is a well-validated (i.e., measuring what it is designed to measure), easy-to-interpret, and quick-to-administer instrument and has been widely used across multiple populations (e.g., Kessler et al. 2002; Dingwall & Cairney 2010; Min & Lee 2015; Easton et al. 2017). The Kessler-10 consists of ten Likert-scaled items asking how frequently symptoms are experienced, each with five response levels from "None of the time" (scored 1) to "All of the time" (scored 5). Scores across each item are added to provide a total score, ranging

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from 10 (indicating no distress) to 50 (indicating severe distress). Those scoring 25-29 are likely to be moderately distressed, and those scoring 30 or above are likely severely distressed. Rather than using these raw scores, we used the scale to estimate latent psychological distress.

Latent dispositional optimism was estimated using the Life Orientation Test-Revised, using the factor structure described in other literature (see Appendix S6) (Scheier et al. 1994; Pienkowski et al. 2022a). The Life Orientation Test-Revised instrument includes three positively worded (scored 0 to 4) and three negatively worded (scored 4 to 0) items with five response levels ranging from “Strongly disagree” to “Strongly agree” (Scheier et al. 1994).

Latent situational optimism was estimated using a ten-item instrument developed by Pienkowski et al. (2022a). In summary, the five Strategic Goals of the *Convention on Biological Diversity’s* Aichi Biodiversity Targets were considered to represent broadly held conservation aspirations (CBD 2010). Pairs of statements were developed based on each of these Targets. Respondents were asked about the likelihood that each statement would be achieved in the next decade. Response levels ranged from “Definitely won’t” (0) to “Definitely will” (4). This latent variable was estimated using the factor structure described in Pienkowski et al. (2022a) (see Appendix S7).

The ERI instrument is an established and validated tool used in numerous studies examining occupational health worldwide (Rugulies et al. 2017; Siegrist et al. 2019; van der Molen et al. 2020). The original ERI instrument includes three Likert-scaled items describing efforts and seven describing rewards (Siegrist et al. 2004). We adapted this instrument by adding three new effort items and two reward items specific to the conservation sector, derived from relevant literature (see *Introduction*) (see Appendix S8). The three new effort items sought to capture challenges linked to individual and institutional under-resourcing and concerns about organizational survival. The two new reward items related to respondents’ satisfaction with their contributions to conservation and belief that their friends and family were proud they worked in the sector. ERI scores are calculated following Equation 1.

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

Equation 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 number of effort items divided by the number of reward items. Other covariates identified as potentially important from the literature are described in Table 1.

Statistical analysis

All analysis was performed using the R statistics software (version 4.0.2) (R Core Team 2020). After coding missing categorical data as “Unknown,” 1.3% of values in the survey data were missing, mostly where individuals did not complete the survey or chose not to disclose their age or years in conservation (see Appendix S9). Missing values were replaced with synthetic ones following multivariate imputation by chained equations using the mice package, creating ten imputed datasets (version 3.9.0, Appendix S10) (van Buuren S & K 2011). Five observations from those reporting non-binary gender identities were removed from the statistical analysis, as their inclusion introduced statistical separation.

Two multivariate structural equation models were fitted. The first (ERI-score model) included the total ERI score for each respondent but excluded individual instrument items. The second model (ERI-item model) included each item of the ERI instrument but excluded total imbalance scores. The ERI-score model and ERI-item model were estimated for each of the ten imputed datasets using the robust weighted least squares estimator and polychoric correlation. This approach was robust to the inclusion of ordinal and other non-continuous data types. Both models fit the data well (Appendix S11). For each model, estimates and variances were pooled using Rubin’s Rules, and coefficient estimates were presented in standardized units (Rubin 1987). The *post hoc* supplementary analysis (presented in Appendix S12 to Appendix S20) used the same general modeling approach described above.

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Results

Prevalence of psychological distress among respondents

Our survey was completed by 2311 respondents from 107 nationalities working in 122 countries (Table 2). Of these, 2213 were completed in English, 55 in French, 24 in Portuguese, 17 in Spanish, and 2 in Kiswahili. Most respondents had university-level education. Over half were from and worked in Europe or Northern America, but only 32 respondents were from Northern Africa & Western Asia. Respondents had a mean Kessler-10 score of 20.9 (standard deviation (SD) = 7.0) and a median score of 20.0 (inter-quartile range = 9.0, see Appendix S12 for the distribution of scores). Among the respondents, 14.8% had scores suggesting moderate distress (25-29), and a further 13.0% had scores indicating severe distress (> 30).

Workplace conditions associated with psychological distress

Two structural equation models were implemented with 2306 observations (five respondents with non-binary gender identities were excluded from the sample for reasons described in the methods). Workplace characteristics were associated with psychological distress in both models (Figure 1.a.). For instance, those reporting one SD higher ERI scores had 0.27 SD higher psychological distress than those at the mean (ERI-score model). Many of the individual ERI instrument items were also associated with psychological distress. Notably, those who agreed with the statement “I am satisfied with the contribution I make to conservation” reported 0.24 SD lower psychological distress than those who disagreed (ERI-item model). This effect represented the second largest negative association with psychological distress, following dispositional optimism. As another example, those who agreed with the statement “I have constant time pressure due to a heavy work load” reported 0.11 SD higher psychological distress than those who disagreed (ERI-item model). Those who agreed with the statement “Considering all my efforts and achievements, I receive the respect and prestige I deserve at work” reported 0.07 SD lower distress than those who disagreed with the statement (ERI-score model). Personal insecurity was positively associated with distress in both models. For example, those

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who agreed that they did not feel safe, even where they lived, reported 0.23 SD higher distress than those who disagreed (ERI-item model).

Personal characteristics associated with psychological distress

Likewise, many of the covariates related to respondents' personal characteristics were also associated with psychological distress. Dispositional optimism was negatively associated with distress in both models (Figure 1.b.). For instance, those with one SD higher dispositional optimism reported 0.29 SD lower distress than those at the mean (in the ERI-score model). Situational optimism about conservation outcomes was negatively associated with psychological distress, but the effect size was comparatively small. Those with one SD greater situational optimism than the mean reported 0.05 SD lower distress (ERI-score model). Men reported lower distress than women. For instance, men reported 0.21 SD lower psychological distress than women (ERI-score model). Years of experience in conservation were negatively associated with distress in both models. For instance, those in conservation for five years reported 0.19 SD higher distress than those in conservation for 15 years (ERI-score model). The results also suggested co-morbidity between physical health and psychological distress in both models; those who said their physical health was bad reported 0.18 SD higher distress than those who said their health was fair (ERI-score model). All three social support measures (relating to satisfaction with personal relationships and support from and time spent with friends and family) were negatively associated with psychological distress in both models. For example, those satisfied with the support received from their friends and family reported 0.25 SD lower distress than those who said they were dissatisfied (ERI-score model).

Sensitivity analysis included using a more conservative definition of conservation professionals (Appendix S13), removing dispositional optimism (Appendix S14), replacing situational optimism with a measure of collective conservation goals progress (Appendix S15), exploring the role of age (Appendix S16), disaggregating the analysis by gender (Appendix S17), and using the original ERI instrument (Appendix S18). This supplementary analysis suggested that our findings were insensitive to different modeling assumptions. Further supplementary analysis found no significant difference in

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the levels of psychological distress between those who responded before and during the COVID-19 pandemic or that it had a confounding relationship with ERI scores (Appendix S19). Finally, we explored associations between psychological distress and the region where respondents worked or were nationals (Appendix S20). Including this regional variable did not strongly influence the other results.

Discussion

More than one in four in our sample of conservationists had scores suggesting moderate or severe distress. Workplace challenges (such as high job demand and organizational insecurity) and rewards (such as feeling as if one is contributing to conservation), and imbalances between them, were associated with this distress risk. Individuals with low dispositional and situational optimism, poor physical health, limited social support, women, and at early career stages were most at risk. However, most of our sample had a university-level education, worked in desk-based academic and practitioner roles, and responded in English. Half the sample was from and worked in North America and Europe. Consequently, our results flag potentially important factors that employers and others in the sector could consider. Future work could examine these risk and protective factors among other groups of conservation professionals under-represented in our sample. This research could involve, for example, creating databases of all conservation organizations in target countries from which employees could be sampled. The following discusses our primary findings on working conditions, examines the associations between personal characteristics and psychological distress, and outlines the study limitations.

Workplace mental health in conservation

Workplace challenges and rewards found in other sectors – such as heavy job load or the expectation of an undesirable job change – appeared to be important determinants of distress in our sample. For example, multiple independent meta-analyses spanning multiple sectors found negative associations between indicators of mental health and ERI and high job demands, among other factors (e.g., Duchaine et al. 2020; van der Molen et al. 2020). One meta-analysis of eight cohort studies and

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84,963 employees found that workers exposed to higher ERI had a significantly greater subsequent risk of poor mental health (Rugulies et al. 2017). Furthermore, the positive association between ERI and distress was observed in a companion study among 280 field-based, office-based, and research staff working in three conservation organizations in Cambodia, India, and South Africa (Pienkowski et al. 2023). As such, the observed associations between the ERI score (and many of its constituent items) and psychological distress may be widely relevant for the conservation sector.

This result has several implications. First, improved worker well-being may not be solely conditional on addressing the global biodiversity crisis or associated feelings of ecological grief. In other words, conservationists may be supported to thrive at work, even when environmental trends look dire.

Second, it implies that some of the workplace challenges faced by our respondents are not unique to the sector. Consequently, conservation organizations can probably learn much from how other sectors have identified and managed these issues (e.g., López-López et al. 2019; Petrie et al. 2019). For example, one randomized controlled trial in an Australian fire and rescue service found that brief mental health training for managers significantly reduced sickness absence and offered large returns on investment (Milligan-Saville et al. 2017).

Overall, ERI scores were one of our study's most important predictors of distress. Tackling imbalances between challenges and rewards requires a holistic approach, which could be supported by evidence-based guidelines for understanding and improving working conditions. Many generic guidelines exist across the world to help organizations manage staff mental health and well-being. Among these, the UK Government's *Thriving at Work* mental health core standards provides up-to-date and accessible advice applicable across organizational sizes and contexts (Stevenson & Farmer 2017). The *Thriving at Work* report is an independent review based on consultations with experts, employers, those with lived experience of poor mental health, and other stakeholders. Stevenson and Farmer (2017) suggest that users tailor these standards to specific sectors. We combined these standards with insights from interviews and written feedback to offer possible ideas for how

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employers might support the mental health of their staff (Table 3, see Appendix S21 for further details on our approach, links to resources, and limitations around each option). Our ideas are also summarized in a brocher for employers available from [redacted]. These ideas require further evaluation and testing in conservation. However, conservation-specific guidelines could be offered through organizational development platforms such as *Capacity for Conservation* (www.capacityforconservation.org). These guidelines could be combined with other resources, such as the action plan to professionalize ranger roles developed by the *Universal Ranger Support Alliance* (URSA 2021).

When further developing these guidelines, particular attention could be paid to key risk factors identified in our study. For example, issues of heavy workload and job demand might be managed through participatory job design, flexible working arrangements (including flexitime and teleworking), and ensuring that employees do not work beyond contracted hours (WHO 2022a). Managers and leaders might be trained in time management, organization, and planning to help reduce employee workloads, though evidence of their effectiveness remains uncertain (WHO 2022a). Other apparent risk factors related to organization and job instability. Systemic underfunding across the conservation sector presents inherent difficulties for employers (Barbier et al. 2018). Therefore, funders might evaluate how and where they direct their resources, including making good workplace practices and policies a condition of receiving grants and providing capacity-building funds. Funders might also consider providing funding over longer times, with a greater share of budgets used for staff overheads, and helping organizations build rainy day funds to enhance institutional and employment stability.

Personal characteristics and mental health

Swaisgood and Sheppard (2010) suggest there may be a culture of hopelessness within the conservation sector, potentially leading to demotivation and distress (Pienkowski et al. 2022a). Our results suggest that those in our sample with lower situational optimism about conservation tend to report higher levels of distress, but this effect size was relatively small when controlling for

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dispositional optimism. In contrast, respondents' satisfaction with their individual contributions to conservation was one of the largest predictors of distress. This contrast suggests that respondents may be less distressed by the "bigger picture" of ongoing nature loss but more concerned about their individual contributions. This point corroborates other research suggesting that ecological grief emerges partly from feelings of individual and collective powerlessness to prevent environmental degradation (Hickman 2020). In one study among climate experts, Jovarauskaite and Böhm (2021) found that some cope with the emotional stresses of climate work by focusing on their direct personal actions to tackle climate change. However, this was only one of many observed coping strategies, with others including seeking social support and avoiding stressful situations. Similarly, qualitative results from a companion study of the same sample of respondents found that many focus on their contributions to stay motivated in the face of the ongoing loss of nature (Pienkowski et al. 2021). Further research is needed to understand the causal relationships between individuals' satisfaction with their contributions to conservation and their experiences of distress. However, nature would be worse off without conservationists. Optimism movements that share examples of positive conservation outcomes, like *Conservation Optimism*, *Earth Optimism*, and *Ocean Optimism*, may help illustrate this point (de Lange et al. 2022). Some individuals struggling with the "bigger picture" may find it helpful to engage with these movements and concentrate on their positive roles within collective conservation efforts.

Those with low dispositional optimism appeared to be at greater risk of psychological distress, consistent with other findings in other populations (Conversano et al. 2010; Carver & Scheier 2014). Dispositional optimism is generally stable over an individual's life course (Carver & Scheier 2014). Therefore, individuals struggling with low dispositional optimism might benefit most from support when working in challenging roles or avoid such positions altogether, where feasible (Pienkowski et al. 2022a).

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Women tend to report higher rates of psychological distress than men for multiple and complex reasons, regardless of their profession (Drapeau et al. 2012; Viertiö et al. 2021). Within conservation, women can face unequal compensation, exclusion, harassment, institutional injustice, assumptions of inadequacy, and other forms of discrimination (Jones & Solomon 2019; Jones et al. 2020). Efforts to address these issues might include offering women mentoring and career development opportunities, improving organizational justice and transparency, and addressing salary inequalities (Jones & Solomon 2019). Conservation employers might also look at how other sectors address these issues. For example, Smith et al. (2015) propose seven strategies for supporting women in science, engineering, and medicine, including implementing flexible family care, recruiting gender-balanced external review committees, developing implicit bias statements, and creating institutional report cards for gender equality. Furthermore, we removed five respondents with non-binary gender identities for statistical reasons. Non-binary and genderqueer people often face marginalization and be at greater risk of poor health outcomes than cisgender individuals (Scandurra et al. 2019). Further research could examine the relationships between working conditions and mental health among this group, potentially through in-depth qualitative approaches similar to those used by Jones and Solomon (2019); Jones et al. (2020).

Those involved in conservation for longer were expected to be more established in their careers, with more secure and better compensated roles, than early-career conservationists (Pienkowski et al. 2021). Moreover, people tend to become less distressed with age, which was strongly associated with experience in our study (Drapeau et al. 2012). Consequently, our results suggest the need for targeted support for early-career conservationists with profiles similar to our sample. Relatedly, lack of experience can be a barrier to entry for those wanting to enter the conservation sector, particularly for those from disadvantaged backgrounds (Fournier & Bond 2015; Vercammen et al. 2020; Pienkowski et al. 2021). While unpaid volunteer positions can help some individuals gain experience, employers should ask if their use of unpaid labor propagates inequity and undermines meritocracy in the sector.

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They might also examine their hiring practices and adopt competency rather than experience-based recruitment approaches (Pienkowski et al. 2021), especially for junior positions and when evaluating candidates with significant volunteer experience.

Work and non-work factors can also interact to affect psychological distress. Our results corroborate other research illustrating how poor general health, inadequate social support, and feeling in danger can be linked to poor mental health (Davey et al. 2001; Uchino 2006; Ohrnberger et al. 2017).

Employers can support employees' work-life balance by, for instance, adopting sustainable career management approaches, such as allowing career breaks, part-time or flexible working patterns, and investing in employees' development (Kossek et al. 2014). They can also reduce incentives to overwork, such as training team leaders in time management and organization (Green & Skinner 2005). This training may help leaders set realistic deadlines, value quality over quantity, and increase employees' control of their day-to-day activities.

Nearly half of our sample were from those working or training in academic settings. Previous research highlights the challenges faced by academics, including those related to ERI, job insecurity, heavy workloads, and perceived lack of institutional support (Hamilton 2019; Hodge et al. 2020; Urbina-Garcia 2020). However, we did not find strong evidence of differences in distress between academics and practitioners in our sample, suggesting the need to manage workplace risk and protective factors across the sector.

Over half of the respondents were from and worked in North America and Europe. While our results were insensitive to the inclusion of regional variables, there were differences in distress between regions (see Appendix S20 for details). Future research could explore the reasons for this variability and if conservation organizations can play a role in tackling these potential regional mental health inequalities.

Our study primarily focused on some of the workplace risk factors associated with psychological distress. However, many other factors – including the experiences of ecological anxiety, grief, and

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solastalgia, are also expected to play an important role (Clayton 2018; Gordon et al. 2019; Boon 2022). The causes and consequences of this emotional toll are likely to be complex and vary between individuals, groups, and geographies, highlighting important topics for further investigation.

Study limitations

There is no comprehensive list of conservation professionals, either at national or global scales. As a result, we do not know what proportion of the target population we sampled. Furthermore, probability sampling approaches, such as random sampling from a comprehensive pre-defined list, were not possible. This point highlights inherent difficulties in studying dispersed, poorly defined, but nonetheless important populations. Recognizing this challenge, we sought to maximize the number of responses across the target population using snowball and self-selection sampling. These sampling approaches are useful when it is difficult to identify candidate respondents or where there is no way of directly contacting participants, as was the case in the current study. However, this approach has several limitations. First, our sampling approach was vulnerable to self-selection bias. Those wanting to share stronger opinions may have been more likely to participate, potentially biasing some results towards more extreme responses. We used neutral and non-specific language when inviting participants to help reduce this bias (see Appendix S5). Second, not all people in the target population had an equal probability of being presented with the survey. Those subscribed to conservation mailing lists and newsletters, active on social media, or affiliated with the organizations we contacted were most likely to have seen the survey invitation. Though the exact profile of the target population is unknown, it is evident that the study under-represented non-English speakers and those working in frontline roles or without university-level education.

These factors are likely to bias our prevalence estimates, such as the levels of psychological distress. Therefore, we only briefly discuss these prevalence estimates, which should not be generalized across the study population. However, the generalizability of regression estimates from non-representative convenience samples to target populations depends on the heterogeneity of the treatment effect within a population (Coppock et al. 2018). In other words, the generalizability of coefficient estimates

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depends on how much they vary between different samples of a population. The above section (*Workplace mental health in conservation*) illustrates how many of our results regarding working conditions are consistent with findings across occupational groups and other samples of conservation professionals. Therefore, there is good reason to believe that our findings regarding working conditions are widely applicable. However, we cannot say this definitively. Therefore, our results flag potential opportunities and issues that employers of staff and other actors might consider when seeking to better support workers.

Evidence suggests the rates of common mental disorders have increased during the COVID-19 pandemic (Santomauro et al. 2021). We were surprised to find no statistically significant difference in psychological distress between those who responded before and after 1 January 2020 when controlling for covariates and that the pandemic was not associated with ERI scores. However, understanding why this was the case is beyond the scope of the study. Furthermore, our study was cross-sectional and observational and did not allow for causal inference. As a result, these exploratory findings should be treated cautiously, particularly considering uncertainty about the direction of causation (i.e., the risk of bi-directional and reverse causation). Future longitudinal studies could help evaluate the causal relationships suggested by our study.

Conclusion

We provide the first large study examining mental health and its workplace predictors in an international sample of conservation professionals. Our research contributes to a growing number of studies turning the figurative conservation science lens onto conservationists themselves, shedding light on possible new approaches to help protect nature (Pienkowski et al. 2022b). Our sample is unlikely to be representative of conservationists globally. However, our results call attention to potential workplace protective and risk factors that employers – especially of staff with similar characteristics to our sample – might think about in their organizations. These workplace risk and protective factors should be considered alongside the increasingly well-documented emotional toll of

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working in the environmental sector. Indeed, providing good working conditions might be essential to help offset the acute ecological grief and anxiety that many conservationists may experience. Equally, respondents' satisfaction with their contributions to conservation was one of the largest predictors of distress. Further research could examine why this is, and if helping individuals to recognize their contributions supports their mental health.

Some social groups in our sample were at particular risk of psychological distress, particularly women, early-career professionals, or those with low dispositional and situational optimism.

Individuals, employers, funders, professional societies, and others should support groups known to have a higher risk of poor mental health in the general population. Moreover, they might examine the root causes of this distress at work, such as by tackling workplace discrimination or avoiding practices that might propagate social inequalities.

Employers, funders, and professional societies should seek to reduce workplace risks like overwork and job instability. Simultaneously, they can promote the positives, such as celebrating individual and collective contributions to conservation efforts. Identifying workplace mental health interventions that lead to positive returns on investment would help justify using scarce resources to support conservationists. Adequately supporting conservationists might be increasingly critical going forward, given their essential roles in addressing the global biodiversity and climate crises.

Acknowledgements

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Supporting Information

Additional supporting information may be found in the online version of the article at the publisher's website.

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Table 1. Personal characteristics and occupational risk factors that were expected to be associated with psychological distress in two models (see Appendix S3).^{||}

Association	Name	Model	Description or statement
-	Dispositional optimism	Both	A latent variable derived from the Life Orientation Test – Revised (Scheier et al. 1994).
-	Situational optimism	Both	A latent variable describing situational optimism about conservation outcomes over the next decade (Pienkowski et al. 2022a). A correlation between situational and dispositional optimism was included in the analysis.
-	Gender	Both	Female or male (RL = female).
?	Age*	Both	Age in years.
?	Years in conservation	Both	Years working in conservation.
?	National / non-national	Both	Working in one's country of nationality or not (RL = national).
?	Education	Both	University or non-university education (RL = non-University).
-	Physical health [†]	Both	"How is your physical health in general?"
-	Personal relationships [†]	Both	Satisfied with "your personal relationships?"
-	Friends and family support [†]	Both	Satisfied with "the support you get from your friends and family?"
-	Friends and family time [†]	Both	Satisfied with "the amount of time you are able to spend with friends and family" [†]

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+	Effort-reward score	ERI-score model	The adapted effort-reward imbalance score (Siegrist et al. 2004).
+	Heavy workload [†]	ERI-item model	"I have constant time pressure due to a heavy work load."
+	Many disturbances ^{*,†}	ERI-item model	"I have many interruptions and disturbances while performing my job."
+	Increasingly demanding job [†]	ERI-item model	"Over the past few years, my job has become more and more demanding."
+	Not enough resources ^{†,‡}	ERI-item model	"I do not have the resources I need to achieve my work goals."
+	Not enough funding ^{†,‡}	ERI-item model	"The organization I work for does not have enough funding to achieve its main aims."
+	Organizational instability ^{†,‡}	ERI-item model	"The organization I work for may not exist in five years' time."
-	Respect I deserve ^{*,†}	ERI-item model	"I receive the respect I deserve from my boss and work colleagues."
-	Job advancement prospects ^{†,‡}	ERI-item model	"My job promotion or advancement prospects are poor" [§] .
-	Do not expect undesirable job change [†]	ERI-item model	"I have experienced or I expect to experience an undesirable change in my work situation" [§] .
-	Good job security [†]	ERI-item model	"My job security is poor" [§] .
-	Respect and prestige [†]	ERI-item model	"Considering all my efforts and achievements, I receive the respect and prestige I deserve at work."
-	Job advancement [†]	ERI-item model	"Considering all my efforts and achievements, my job promotion or advancement prospects are adequate."
-	Income is alright [†]	ERI-item model	"Considering all my efforts and achievements, my salary or income is alright."
-	Contribution to conservation ^{†,‡}	ERI-item model	"I am satisfied with the contribution I make to conservation."
-	Social pride ^{†,‡}	ERI-item model	"My friends and family are proud that I work in conservation."
?	Position	Both	Academia and research or practice and policy (RL = academia and research).
+	Dangerous at night ^{†,‡}	Both	"It is dangerous to go outside at night alone."
+	Dangerous situations [†]	Both	"My work puts me in dangerous situations."
+	Not feeling safe [†]	Both	"I do not feel safe, even where I live."
+	Working hours	Both	Work hours per week.

* Variables moderately correlated with other explanatory variables ($\rho > 0.6$) were removed from the statistical analysis post-hoc.

[†] Ordinal exogenous variables were treated as numeric.

[‡] Conservation-specific items added to the original effort-reward imbalance instrument.

[§] Reverse coded, meaning the response scale for this item was inverted.

^{||} The ERI-score model includes the effort-reward imbalance score but excludes each item of the effort-reward imbalance instrument. The ERI-item model includes each item of the instrument but excludes the effort-reward imbalance score. Key: RL = reference level; + = expected positive association; - = expected negative association; and ? = ambiguous or unclear expected association.

Table 2. Respondent characteristics by gender. Continuous variables are described with means (and standard deviations), and categorical variables are described with counts (and percentages).*

Characteristic	Overall	Women	Men	Non-	Unspecified
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	N = 2311	N = 1208	N = 969	binary N = 5	N = 129
Kessler-10 score	20.9 (7.0)	21.7 (7.3)	19.8 (6.5)	30.8 (7.2)	21.9 (6.7)
LOTR score	15.0 (3.9)	15.1 (3.9)	15.1 (3.8)	9.0 (5.8)	14.2 (3.5)
Age	37.0 (11.2)	35.1 (9.5)	39.2 (12.7)	29.6 (2.9)	37.8 (10.7)
Years in conservation	12.2 (10.5)	10.2 (8.2)	14.3 (12.1)	7.8 (3.1)	26.6 (17.1)
National / non-national					
National	1704 (77%)	920 (76%)	755 (78%)	5 (100%)	24 (75%)
Non-national	509 (23%)	287 (24%)	214 (22%)	0 (0%)	8 (25%)
Unknown	98	1	0	0	97
Education					
Non-university	141 (6.1%)	50 (4.1%)	78 (8.0%)	0 (0%)	13 (10%)
University	2069 (90%)	1158 (96%)	888 (92%)	5 (100%)	18 (14%)
Unknown	101 (4.4%)	0 (0%)	3 (0.3%)	0 (0%)	98 (76%)
Position					
Academic	1094 (47%)	584 (48%)	491 (51%)	3 (60%)	16 (12%)
Practice	729 (32%)	393 (33%)	323 (33%)	2 (40%)	11 (8.5%)
Unknown	488 (21%)	231 (19%)	155 (16%)	0 (0%)	102 (79%)
Working hours	43.5 (13.2)	43.2 (12.9)	44.0 (13.6)	49.0 (10.8)	43.2 (10.1)
ERI (original)	1.2 (0.5)	1.3 (0.5)	1.2 (0.4)	1.4 (0.6)	1.3 (0.5)
ERI (new)	1.1 (0.4)	1.1 (0.4)	1.1 (0.3)	1.2 (0.4)	1.1 (0.4)
Nationality (region)					
Central & Southern Asia	249 (11%)	117 (9.7%)	129 (13%)	0 (0%)	3 (9.4%)
Eastern & South-Eastern Asia	116 (5.2%)	79 (6.5%)	37 (3.8%)	0 (0%)	0 (0%)
Europe & Northern America	1308 (59%)	752 (62%)	526 (54%)	5 (100%)	25 (78%)
Latin America & the Caribbean	157 (7.1%)	80 (6.6%)	76 (7.8%)	0 (0%)	1 (3.1%)
Northern Africa & Western Asia	32 (1.4%)	11 (0.9%)	21 (2.2%)	0 (0%)	0 (0%)
Oceania	131 (5.9%)	72 (6.0%)	57 (5.9%)	0 (0%)	2 (6.2%)
Sub-Saharan Africa	220 (9.9%)	96 (8.0%)	123 (13%)	0 (0%)	1 (3.1%)
Unknown	98	1	0	0	97
Work country (region)					
Central and Southern Asia	233 (11%)	104 (8.6%)	127 (13%)	0 (0%)	2 (6.2%)
Eastern and South-Eastern Asia	179 (8.1%)	112 (9.3%)	67 (6.9%)	0 (0%)	0 (0%)
Europe and Northern America	1,187 (54%)	680 (56%)	478 (49%)	5 (100%)	24 (75%)
Latin America and the Caribbean	158 (7.1%)	78 (6.5%)	78 (8.0%)	0 (0%)	2 (6.2%)
Northern Africa and Western Asia	30 (1.4%)	10 (0.8%)	19 (2.0%)	0 (0%)	1 (3.1%)

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Oceania	152 (6.9%)	87 (7.2%)	63 (6.5%)	0 (0%)	2 (6.2%)
Sub-Saharan Africa	274 (12%)	136 (11%)	137 (14%)	0 (0%)	1 (3.1%)
Unknown	98	1	0	0	97

* Key: LOTR = Life Orientation Test – Revised; ERI (original) = scores from the original effort-reward imbalance instrument; Work country = the country in which respondents were currently working; ERI (new) = scores from a modified effort-reward imbalance instrument that includes five new items specific to conservation.

Table 3. Ideas for employers to support staff mental health and wellbeing, demonstrated through hypothetical but illustrative vignettes.*

Ideas	Hypothetical vignettes
Understand experiences, attitudes, and knowledge among staff.	<i>Asili na Watu</i> is a Tanzanian organization with 20 employees. They asked their staff to complete a short anonymous survey describing the things they found most challenging and rewarding in their jobs. They used the survey results to guide the development of their wellbeing at work plan.
Produce, implement, and update a well-being at work plan.	<i>Bugs Benevolence Society</i> is a medium-sized non-governmental organization with mostly office-based staff. They found high rates of sickness absence due to staff burnout. So, they formed a committee led by the human resource manager to investigate this issue. The committee found that these issues stemmed from poor work planning and a culture that rewarded overwork. So, they designed a six-month plan with senior management for how they would address these issues. This plan included specific, measurable, achievable, relevant, and time-bound (SMART) goals to implement the other suggestions presented in this table.
Develop awareness of mental health and resources among all staff.	The <i>National Nature Agency</i> is a governmental organization with over 1000 staff. They have resources on mental health and support available to staff on their intranet. However, these resources are rarely used. In response, senior leadership asked their human resource teams to tailor the resources for each office. They also launched an awareness-raising campaign at their all-staff meeting, which included anonymous stories and clear guidance on available support.
Encourage open conversations about well-being and mental health and the support available.	As part of their awareness-raising campaign, the <i>National Nature Agency</i> also encouraged office managers to set aside informal spaces where staff could socialize within each office. In parallel, they suggested that team leaders set an example by being open about their struggles and the resources and support that helped them cope.
Provide good working conditions – promoting the positives.	Many of <i>Asili na Watu's</i> staff started working in conservation because they love natural history and spending time in nature. However, many of the office-based staff do not have opportunities to spend time in nature. So, the executive director organized bird-watching and hiking activities on the last Friday of every month, open to all staff members. They also produce an annual internal report that shares achievements while recognizing and reflecting on problems and issues. This report emphasizes the positive contributions of individuals and teams, ensuring that the contributions of all staff are recognized.
Provide good working	<i>Bugs Benevolence Society</i> identified a set of actions for addressing

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conditions – removing the risks.

burnout and overwork within their mental health at work plan. This included implementing policies around flexible working, not working beyond a maximum number of hours, and opportunities to take career breaks. They also evaluated whether they met statutory requirements around work hours, minimum wages, holiday, sick, and maternity pay, and workplace discrimination. Moreover, they recognized that organizational instability was a source of distress among staff. So, the leadership team commissioned a working group to evaluate the organization's resilience and long-term sustainability. One of the working group's conclusions was the need to grow their rainy day fund, amassed from 2.5% of every grant application.

Promote effective team leadership.

Bugs Benevolence Society recognized that issues of overwork stemmed from the organization's culture and management approaches. They organized training for team leaders in strategic planning, time management, and effective leadership. They also altered employee performance evaluations to focus on impacts (like achieving on-the-ground project goals) rather than inputs (like the amount of time spent at work) and outputs (like the number of reports produced).

Routinely monitor employee mental health and well-being.

The *National Nature Agency* subscribed to a mood tracker app, which employees can voluntarily choose to use. The app allows staff to indicate their feelings and provide anonymous feedback. These anonymized and aggregated data are used by human resource personnel to track staff morale. Furthermore, struggling employees can use the app to ask the human resource team for help.

*See Appendix S21 for details, resources and risks, links to resources, and a description of our approach to tailoring the *Thriving at Work* mental health core standards to the conservation sector (Stevenson & Farmer 2017).

Figures

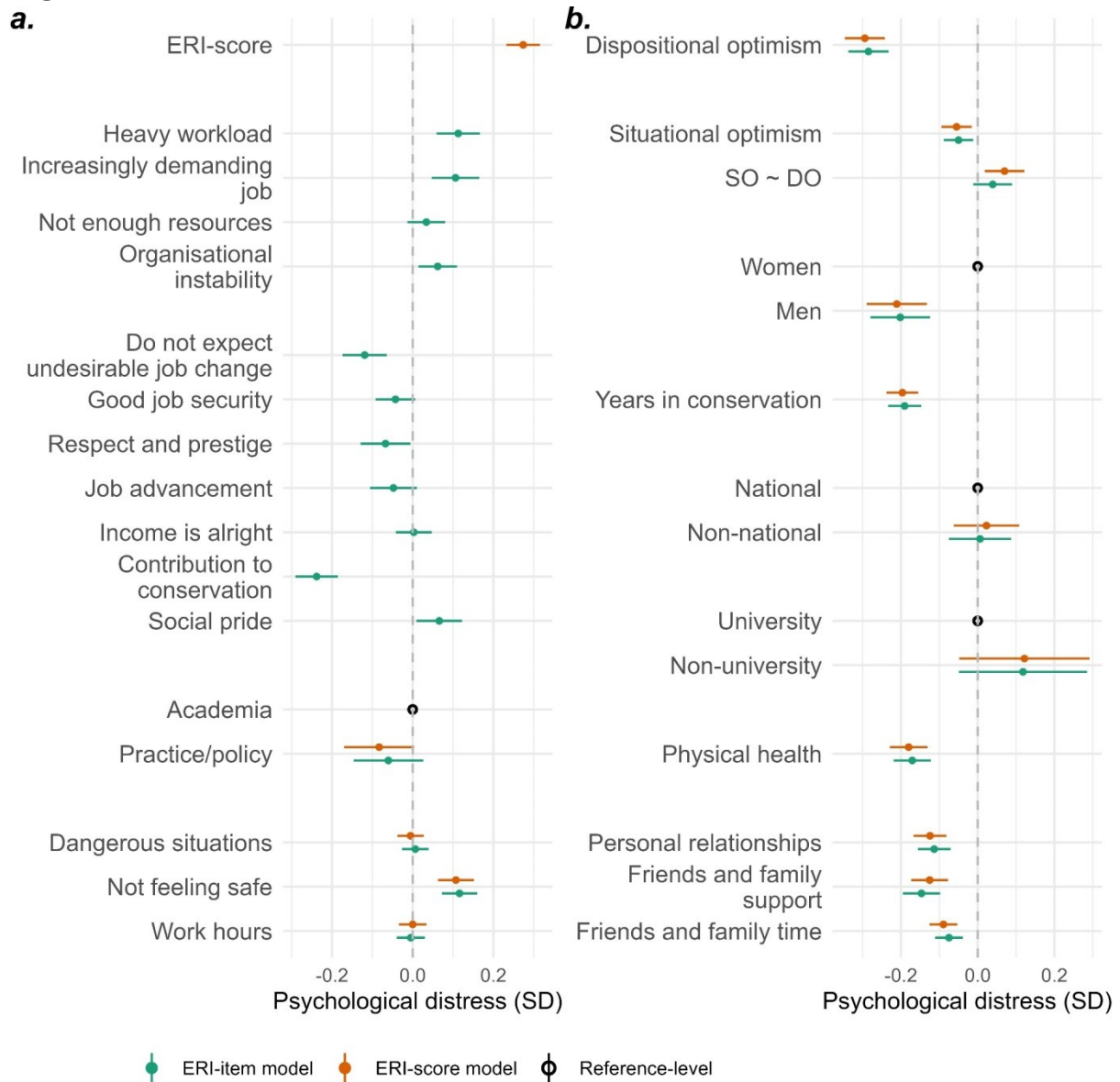


Figure 1. The estimated association in standard deviations (SD) between latent psychological distress and (a) occupational risk factors and (b) personal characteristics among 2306 respondents. The ERI-score model included the effort-reward imbalance score but excluded the individual instrument items, while the ERI-item model included these items but excluded the score. “SO ~ DO” indicates the correlation between situational and dispositional optimism. Continuous variables were scaled and centered. “Unknown” response levels are not shown.