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Raising awareness on mental health in the heliophysics community

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To foster greater diversity, equity, and inclusion within the field of space sciences, it is crucial that we recognize and proactively address the mental health challenges experienced by our community. The purpose of this article is to raise awareness about mental health, assess the current state of our community in this regard, and explore ways to better safeguard and support our community members. We present a compelling argument for conducting surveys to evaluate the mental health and overall wellbeing of our community. Additionally, we offer several recommendations aimed to improve the mental health within our research community such as promoting honest conversations and programs on stress management and resilience building, training to notice and respond, and rethinking sick days. We recommend reevaluating our definition of success and reconsidering the existing strategies aimed at addressing the issues related to power imbalances. By promoting mental health awareness, fostering an open and supportive culture, and implementing policies that prioritize the wellbeing of all individuals, we can create an environment that is more inclusive and conducive to the thriving of every member.

KEYWORDS

mental health, heliophysics community, burnout, harassment, psychological safety, work-life balance, stress management, culture change

1 Introduction

Our community spans various institutional types, from academia to government agencies to industry, covering a wide range of constituents, including graduate students, postdocs, tenure track or tenured faculty, research faculty, and scientists and engineers at different career stages. Many researchers in our community, whose careers depend on winning research grants, experience great distress about the prospects of their careers, workload and workplace culture, among other issues.

While a career in research and academia can be enriching, the associated challenges can negatively impact the mental health of anyone, regardless of their career stage. Recently, more than ever, there has been a surge of mental health issues related to increasing pressure, anxiety, and burnout. A recent study by the National Academies of Sciences and Medicine [1] on mental health for students in higher education found a deteriorating landscape in all areas of mental health among college students, even before accounting for recent strong stressors such as the COVID-19 pandemic.

To foster greater diversity, equity, and inclusion within the field of space sciences, it is crucial that we recognize and proactively address the mental health challenges experienced by our community. By developing comprehensive strategies, we can effectively tackle these issues and create a supportive environment for all individuals involved. In Sections 2, 3 and 4, we highlight the importance of addressing the stigma surrounding mental health and provide a brief overview of various challenges that can negatively affect mental wellbeing, including burnout, job insecurity, and harassment, which can be exacerbated by our work environment. In Section 5, we present a compelling argument for conducting surveys to evaluate the mental health and overall wellbeing of our community. Additionally, we offer several recommendations aimed at enhancing the mental health of our research community. We provide suggestions to revisit our measure of success and devise ways to address challenges associated with power imbalances. These suggestions can serve as practical measures to foster a supportive and thriving environment for all individuals involved. It is crucial that we strive for a research community in which researchers can freely express their concerns without fear of reprisals, prejudice, and/or fear of judgment or discrimination from their peers, supervisors, or colleagues. In such a community, there should be zero tolerance for bullying, abuse, harassment, and discrimination.

We note that this article does not aim to provide an exhaustive review of all mental health issues that we face in our science community. Rather it serves as an initial step to raise awareness about mental health. We provide a few general practices that can help alleviate these issues. However, we recognize that delving into specific practices and implementation approaches is beyond the scope of this current work and will be the subject of future endeavors.

2 Where are we on mental health now?

There have been a few studies, mainly for graduate students and postdocs in university settings (not specific to Heliophysics), to evaluate mental health status, the prevalence of mental health issues, and interventions and their respective effectiveness (e.g., [2–6]). Some of these studies were conducted within specific institutions. For example, a 2015 University of Arizona report found that the majority of doctoral students' experience "more than average" or "tremendous" stress and recognized school and education-related issues as the largest contributors to their stress [3]. Data from the 2018–2019 Healthy Minds Study of more than 300,000 students at ~ 300 colleges and universities, which was conducted before the COVID-19 pandemic, highlighted that 40% of students reported significant mental health challenges, while 60% of undergraduates reported increasingly difficult challenges in accessing mental health support [6]. A survey of 2,279 individuals (90% Ph.D. students and 10% Master's students) from 26 countries and 234 institutions demonstrated that anxiety and depression have a considerable prevalence within the graduate student community [5].

Unfortunately, these impacts do not stop at universities, they go well beyond education and into the workforce. The COVID-19 pandemic exacerbated the general public's mental health through illness, grief for loved ones, unsustainable workload, isolation, absence of supportive community, inability to access mental health resources, etc. (etc. [7–9]). A 2020 survey of 5,247 graduate students in STEM showed the number of students with depression doubled, and the prevalence of anxiety rose by 50% [10].

3 Stigma around mental health

Several studies have shown that one in five people experience a mental health issue in their lifetime [7]. Those suffering from clinical or minor conditions often hide it. At work specifically, they fear that they may face discrimination from peers and supervisors or be viewed as incompetent and incapable of performing their work or completing their studies [11].

Recognizing and addressing our own mental health-related concerns fosters a deeper sense of self-awareness. This heightened self-awareness within our community can have a positive ripple effect, contributing to increased authenticity and enabling individuals to grow as better human beings, employees, and leaders [12]. Studies have shown that feeling authentic and open at work leads to better performance, engagement, retention, and overall wellbeing [13]. Employees can significantly boost their performance and professional relationships if they can openly express their struggles and concerns to their managers/supervisors. Neglecting to acknowledge the mental health challenges experienced by members of our scientific community will inevitably lead to a decline in productivity [14].

4 Burnout, isolation, poor work-life balance, and negative consequences of power imbalances

Burnout was included in the international classification of diseases of the World Health Organization in 2019 and is defined as "a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed" [15]. This definition acknowledges that burnout is more than just an employee problem; it is an organizational problem that requires an organizational solution [16]. The COVID-19 pandemic has further intensified the experience of burnout for numerous individuals, including those in the research community. The blurring of boundaries between work and home has contributed to this heightened sense of burnout. Within our scientific community, there is often a culture that celebrates working overtime. However, studies have consistently shown that the risk of occupational burnout significantly rises when employees consistently work more than 50 h per week, and this risk further escalates at the 60-h mark. It is important to note that working longer hours does not necessarily lead to increased productivity, highlighting the need to reevaluate our approach to work-life balance (e.g., [17,18]).

The workaholism and poor work-life balance that exists in our community has been worsened by the challenges of the pandemic leading to increased burnout. Several studies have shown that more junior and historically underrepresented (including LGBTQ+, Black and Latinx) employees struggled more severely partly due to less autonomy at work, lower level of seniority, and feelings of loneliness

and isolation (e.g., [16,19,20]). Parents with young or school-aged children faced unique challenges during the pandemic. With limited child care options available, they were compelled to juggle the responsibilities of homeschooling their children while simultaneously working from home. Additionally, the increased household chores stemming from having everyone under the same roof 24/7 added further pressure on these parents.

Most, if not all, of the career-related mental health issues addressed here are ultimately caused by financial stress (e.g., [10]) and the uncertainty caused by the soft-money funding scheme. For many, the sole-reliance on "soft money" exerts tremendous pressure and anxiety to secure grants, publish papers, and to maintain their reputation in the research community (e.g., [21]). To fully fund one's self often requires submission of at least three plus proposals per year to increase the likelihood of being fully funded in a given year (considering the typical proposal winning rate of ~20%). This means more time is consumed by proposal writing and less time on actual science and publications, which is even more damaging to our careers. Working longer hours in a culture in which stress and anxiety are normalized will jeopardizes our health at every level (mentally and physically).

Sexual harassment is yet another big factors that disproportionally affects women in science. In a survey of 474 astronomers and planetary scientists, Clancy et al [22] found that 30% of women felt unsafe because of their gender (compared with 2% of men). Pervasive and damaging sexual harassment in science has been reported in by a special committee appointed to examine this issue by National Academies of Sciences, Engineering, and Medicine [23].

5 What to do to improve mental health?

In this section, we present a set of simple yet impactful recommendations aimed at bolstering support for our community members, addressing their needs on both an individual and institutional level. These suggestions offer practical steps to foster a more supportive and inclusive environment for everyone involved.

5.1 Comprehensive surveys of the heliophysics community

The first step towards a positive change and improve mental health is to better understand the current state of affairs. For this, we must better analyze and assess the state of wellbeing in our specific scientific community. We need mental health studies and surveys among researchers and scientists at all career stages across the Heliophysics field. These surveys should be conducted over all types of constituents (students, postdocs, tenure-track and research faculty, and research scientists in academia, research institutions, and industry). These surveys should be thorough and conducted under the guidance of mental health professionals. They should cover a wide array of topics, including mental health, stigma, job security, workplace culture, work arrangements and locations, pandemic-related challenges, racial injustices, bullying, harassment, and more [24]. Moreover, it would be valuable to conduct additional surveys to identify existing interventions supporting researchers, assess their effectiveness, explore areas for improvement, and propose additional provisions that can be implemented.

The results of such surveys should prompt academic institutions, organizations, and policymakers to consider intervention strategies and evaluate the effectiveness of those strategies. This is an essential requirement to ensure a healthy workplace and the accessibility to mental health resources for all researchers.

5.2 Need for a culture change: Honest conversations and a psychologically safe environment

Our scientific community members should feel safe while discussing and/or expressing their challenges without the fear of being judged, excluded, or passed up for the next opportunity or for a promotion. To help set a culture of openness, mental health needs to become a mainstream topic and conversation (e.g., [20]) and to achieve that we need to have open and honest conversations about it within the community. A practice that has already been implemented and we encourage to continue is to hold sessions on mental health and diversity, equity, and inclusion (DEI) at major scientific events such as CEDAR, GEM, SHINE, and AGU. These sessions can include panel or general discussions from mental health experts as well as heliophysics community leaders and members.

When individuals engage in open discussions about their mental health challenges, several positive outcomes arise. Firstly, it normalizes conversations surrounding mental health, creating an environment where those struggling find it easier to speak up and seek assistance. Secondly, it signifies an acknowledgment that careers in science and engineering come with unique stressors, while demonstrating our commitment to addressing these issues and striving for improvements.

In addition, open conversations enable us to recognize the areas where our community falls short, paving the way for implementing positive changes that continuously enhance the wellbeing of everyone involved. To have meaningful impact, these conversations can be greatly supported by data on the state of the profession and mental health, obtained through surveys. Such data allows us to address problems in the most meaningful and effective ways.

Cultivating a culture change requires a comprehensive approach that involves both top-down and bottom-up efforts, extending beyond the purview of Human Resources (HR) and involving everyone [25–32]. Leaders and supervisors play a crucial role as allies in fostering an open culture. They can actively contribute to creating an environment of psychological safety, where individuals feel comfortable expressing vulnerability. This entails demonstrating compassion, flexibility, and providing sustainable solutions or work practices [33]. In a psychologically safe environment, people are at ease being themselves and expressing their thoughts and emotions [34].

5.3 Programs and education on stress management and resilience building

Until recently, self-care has been prescribed as the cure for burnout. While some tools can be used for improving wellbeing

(e.g., meditation or yoga), they are not effective when it comes to preventing burnout [16] or other mental health issues that may require professional therapy or medical treatment. Similar to a culture change, we need top-down as well as bottom-up approaches. To this end, we recommend that institutions examine the systematic causes of burnout and investigate ways to relieve it, offer and advertise the use of programs, resources, and education on stress management, building resilience, and address work-life imbalances apparent in their own organizations. Some practical programs include mental health resource pages, flexible hours and working arrangements, peer to peer outreach programs such as mental health employee resource groups, and direct check-ins on employees (e.g., [35,36]). Two additional approaches adapted from [11] are briefly described in 5.3.1 and 5.3.2.

5.3.1 Training to notice and respond

It is also important to train people, including management, to notice and recognize the signs of someone who might be struggling with a mental health challenge, to assess the risk of suicide or self-harm, identify when a colleague is suffering from panic attacks, for example, and connect them to support resources such as mental health first aid, workplace mental health training and strategic advising [37,38]. Mental health policies, practices, culturally competent benefits, and other resources must be put in place and (over) communicated.

5.3.2 Rethinking sick and personal days

Arguably, the most effective approach to addressing burnout is for individuals experiencing it to take a break from work and reconnect with their personal lives. The prevailing work culture in the US often emphasizes over-achievement, which is frequently linked to overworking. To combat this, it is essential that we become more comfortable with the notion of taking time off to prioritize and improve both mental and physical health.

Unfortunately, not all institutions offer adequate paid sick leave or personal days to their employees. To support this necessary shift, funding agencies can play a role by incorporating explicit language in grants and contracts, emphasizing the importance of work-life balance and mental wellbeing. Such measures can help create an environment where individuals have the necessary support and resources to prioritize their mental health alongside their professional responsibilities.

5.4 Revisit measures of success/ performance

Many of the challenges faced by our community are interconnected and cannot be effectively addressed in isolation. One common thread among these challenges is how success is defined and perceived in our field. Given the intensely competitive nature of our profession, researchers at all stages of their careers often experience immense pressure to excel in multiple areas at the expense of their personal wellbeing.

It is essential for us to recognize and address these pressures within our community, working collectively to redefine success and foster a healthier work environment that allows individuals to prioritize their wellbeing without compromising their career prospects. To accomplish this, it is imperative that we acknowledge the diverse roles our members play in advancing our field. Metrics such as principal investigator (PI)-ship or h-index heavily influence our careers, impacting promotions, committee assignments, grant success, and job opportunities. It is important to acknowledge that not all roles or positions yield the same number of publications or grant successes in the PI role. Individuals who dedicate substantial time and effort to developing instruments or scientific models should receive due credit, similar to those who utilize these tools to publish new insights and discoveries. Leadership in projects should not be the sole determinant of success. Furthermore, as careers progress, individuals may find their passion lies in public outreach and communication rather than leading missions or large research projects.

Organizations should strive to move beyond simplistic metrics like h-index or the number of funded PI proposals and instead focus on assessing contributions to projects as collaborators, co-investigators, or other indicators of community involvement, service, and broader scientific impact. By broadening our evaluation criteria, we can foster a more inclusive and supportive environment that recognizes the diverse ways in which individuals contribute to the advancement of our field.

We must also acknowledge and respect that each individual's journey to success is unique. Foreign students and employees attending universities or institutions in the US often encounter additional challenges, such as language and cultural barriers, as well as the difficulties of being separated from their families and loved ones. Additionally, students from lower-income families, both international and domestic, may face financial hardships. These factors can significantly impact their experiences and trajectories in the field. Furthermore, it is important to acknowledge that some individuals may take a "break" from their careers and re-enter the field later, which can result in the loss of valuable "early-career" years. We must be mindful of the diverse circumstances and choices individuals face, understanding that their path to success may deviate from conventional timelines.

5.5 Policies to address power imbalances in the community

Regrettably, it is not uncommon for researchers in leadership positions to engage in unethical and abusive practices, including harassment, bullying, and making decisions that can adversely impact team dynamics. Such behaviors can stem from individual personality traits or a lack of training on effective leadership practices.

While institutions and conferences are strengthening their value statements, codes of conduct, and rules of the road, more efforts are required to address these issues. Funding agencies should take a proactive role by implementing direct supervision and providing specific guidelines on how PIs, project scientists, and leadership should treat individuals working on projects. Additionally, it is essential to offer leadership training to PIs at every stage of their

career to equip them with the necessary skills to create inclusive and supportive work environments.

6 Conclusion

To improve the mental health of our science community, we, strongly advocate for a culture change that actively reduces the stigma surrounding mental health and fosters an open and accepting environment. Furthermore, we address several common mental health issues that are highly prevalent in our community, such as burnout, isolation, and poor work-life balance. We recognize the need to reevaluate policies and practices to alleviate these issues and improve overall wellbeing. Our recommendations, in broad, toward achieving this goal include: more open discussions on mental health both at work and scientific conferences, building a culture of connection through frequent check-ins, training to respond, rethinking sick days, offering more work flexibility, reevaluating the measure of success, and reconsidering policies to address power imbalances at work places. Specific implementation strategies and the best practices for each of these topics can be accomplished through collective efforts from scientists, managers, mental health experts, and human resource professionals. Through these collective actions, we can continue to make strides towards a research community that upholds principles of diversity, equity, and inclusion, while also prioritizing the mental health and wellbeing of its members.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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