

Towards sustaining a culture of mental health and wellness for trainees in the biosciences

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Addressing the mental health of graduate and postdoctoral trainees in the biosciences will substantially benefit the scientific community at large.

The challenges faced by the current biosciences research enterprise have been extensively discussed and reviewed by many^{1–4}. These include the current hypercompetitive environment for obtaining federal research funding, long training periods for graduate and postdoctoral trainees, the existing publishing model, the grim academic job market, the challenges of navigating opportunities outside of academia, financial responsibilities and mentorship, among others. Such information is now increasingly common knowledge to many trainees in the pipeline. Evidence exists showing detrimental effects on trainees, including substance abuse, sleep disturbances and substantial depression. However, what is particularly concerning is the lack of detailed mental health data on the full extent to which biosciences trainees are affected by these challenges. This is important, as trainees in the biosciences constitute the largest fraction of the 417,251 graduate and the estimated 60,000 postdoctoral trainees in various science fields in the United States⁵ (<http://ncesdata.nsf.gov/gradpostdoc/2013>). As such, many questions emerge. Do graduate and postdoctoral trainees have adequate mental health resources? Which groups of trainees have the greatest need for mental health services? What types of mental health services are required? For those trainees who do have access to mental health

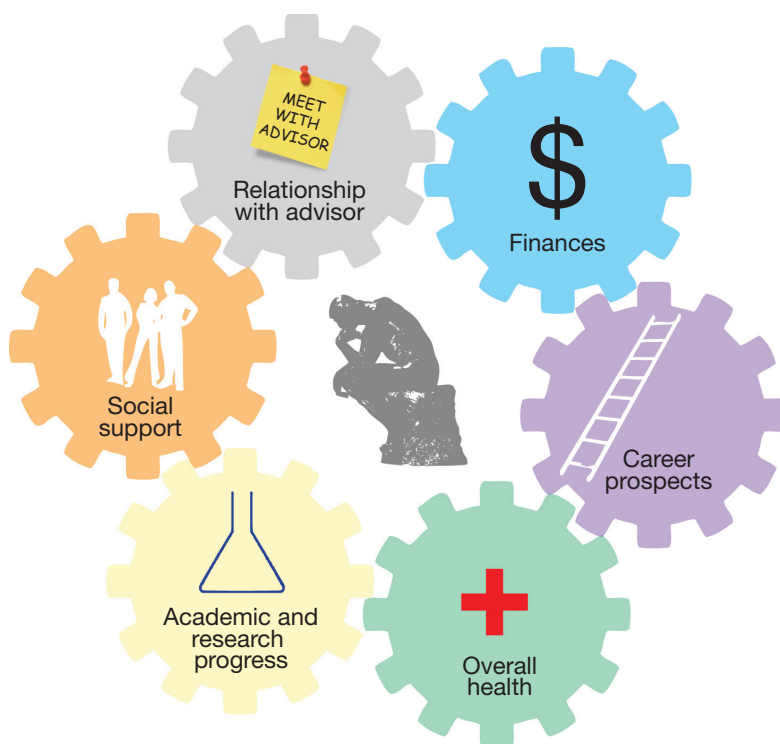


Figure 1 Reported top predictors for trainee well-being from the 2014 University of California at Berkeley mental health report.

resources, what are the barriers to obtaining such support?

The need for more data

A dearth of high-quality data and research hinders a comprehensive understanding of the mental health of trainees. Limitations of existing data include paucity of information on postdoctoral trainees, limited sample sizes, lack of follow-up studies and inadequate data on the success of interventions. Despite these shortcomings, there are several examples of needs assessments from a number of

universities focused specifically on graduate students (**Table 1**). Driven in large part by graduate students, University of California at Berkeley conducted a notable needs and utilization assessment in 2004 (ref. 6). In that study, 44.7% of respondents reported having an emotional or stress-related problem in the past year. Moreover, the number of students reporting mental health service utilization was lower than those reporting need, and roughly 25% of graduate students were unaware of the mental health services provided on campus. Nearly a decade later,

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Table 1 Available published studies on the mental health of graduate and postdoctoral trainees

Authors and year	Institution surveyed	Graduate or postdoctoral	Sample size	Main findings
Hyun <i>et al.</i> (2006) ⁶	UC Berkeley	Graduate	3,121	44.7% of graduate students self-reported emotional or stress-related problems and 57.7% reported knowing a colleague with emotional or stress-related problems. Mental health needs were negatively related to financial security, functional advisor relationship and contact with friends. 40.4% of respondents were in science and engineering.
Hyun <i>et al.</i> (2007) ⁸	UC Berkeley	International graduate	551	44% of international graduate students self-reported emotional or stress-related problems affecting well-being or academic performance in the last year.
Han <i>et al.</i> (2013) ⁷	Yale University	International graduate (Chinese)	130	45% reported symptoms of depression, 29% reported symptoms of anxiety.
Garcia-Williams <i>et al.</i> (2014) ⁹	Emory University	Graduate	301	7.3% of respondents reported thoughts of suicide. 2.3% with plans for suicide.
The Graduate Assembly UC Berkeley (2014)	UC Berkeley	Graduate	790	43–46% of graduate students in the biosciences were considered to be depressed. In contrast to prior study, PhD students fared worse than Master's students. In addition, graduate students expressed less awareness of resources.
Gloria and Steinhardt (2014) ¹⁰	University of Texas at Austin	Postdoctoral	200	13% of the postdoctoral trainees were flourishing, 58% were languishing and 29% were depressed.
Smith and Brooks (2015)	University of Arizona	Graduate	309	Doctoral students reported worse exercise routines, worse diets and more than average stress.

Berkeley released a more comprehensive follow-up study that again focused on better understanding graduate student mental health (<http://ga.berkeley.edu/wellbeingreport>). Top predictors for graduate student well-being included financial stability, career prospects, advisor relationship, overall health and social support (Fig. 1).

Other reports do exist and vary substantially in numbers of participants, metrics assessed and where they are published (Table 1; http://nagps.org/wordpress/wp-content/uploads/2015/06/NAGPS_Institute_mental_health_survey_report_2015.pdf)^{7–9}. Among these limited studies, nearly all show that about half of graduate students surveyed expressed significant emotional or stress-related issues, including depression and anxiety. Continued re-assessment of mental health needs with repeated surveys is extremely useful for evaluating existing mental health services and approaches, such as what Berkeley has done with their two surveys. We suspect that mental health reports and recommendations from several other institutions probably do exist, but may not be formally published.

As some have noted, the lack of data on the prevalence of mental health issues among postdoctoral trainees is particularly concerning given the immense diversity of this population in the biosciences, including women, parents, racial and sexual minorities, international trainees, and dual-degree trainees. Our search revealed only one publicly available study on the mental health of postdoctoral trainees (Table 1)¹⁰. A large number of those sampled reported struggling with high levels of anxiety. The study raised a number of important questions requiring further investigation.

Clearly, the assessment of mental health is an important task for this growing population given the pivotal role of postdoctoral trainees in contributing new scientific knowledge and mentoring both graduate and undergraduate trainees. At the end of the day, an infrastructure of mental health support is critical to ensure trainees affected by mental health issues obtain the support that they need.

What can be done?

To bring about the needed change in mental health wellness, we believe that bottom-up approaches must be matched with top-down approaches. One suggestion for a top-down approach is to create an office at the national level similar to or as part of the recently created diversity office at the National Institutes of Health (NIH). Such an office would provide a strategic vision and comprehensive approaches to expand support for mental health and wellness nationwide across the entire biosciences community. As the largest funder of research in the biosciences, the NIH is in the best position to improve the mental health climate. Similarly, another suggestion is to establish a mental health innovation fund to fuel projects and ideas that seek to improve mental health of trainees in new ways. We believe that such efforts are likely to provide much needed data about successful approaches that can then be shared with the rest of the biosciences research community. Other top-down suggestions include having increased accountability and commitment to mental health through incorporation of a mental health wellness needs section in training grants to further embed the concept of mental health at the level of individual

research investigators. Perhaps individual and institutional training grant funding could include explicit statements that detail a commitment to supporting the mental health of trainees.

Bottom-up strategies that can be used include programs and initiatives such as Cornell University's Let's Talk Program, the University of California at San Francisco's Student Peer Support Center, Stanford University's Community Associate program for graduate student housing and the Massachusetts Institute of Technology's group counseling sessions for graduate students, which highlight some of the many ongoing efforts across several university campuses. Some of these efforts are identical in design and some are unique. Furthermore, we should not be afraid to look outside of academia for innovative programs supporting mental health and wellness. Alternative approaches using the arts, meditation¹¹ and the sharing of wellness messages through social media should be encouraged. Ideally, a central online portal sharing the full list of cost-effective resources and best practices could be useful moving forward. Again, a central office at the level of the NIH could manage such a portal. Nevertheless, an essential first step for institutions is to accurately identify the needs of trainees in the biosciences to provide effective and targeted mental health resources. Special attention is required for international and postdoctoral trainees for which limited information exists. In the end, we believe a combinatorial approach from the top and bottom is likely to prove effective at strengthening and maintaining a culture of mental health wellness in the biosciences community.

Shared responsibility

As biosciences trainees, we expect that there will be substantial stress in our work environment, as in many other fields. However, the institutions that have been tasked to mold and shape us to become better scientists also have a responsibility to uphold our well-being. Of course, as trainees, we must also share in that responsibility by being mindful of our mental health needs, asking for help when we need it and supporting each other throughout our training. University administrators, research mentors and trainees all have a shared interest in collaborating to make mental health one of the core focus areas in designing the next

generation graduate and postdoctoral programs. In the end, we believe it is in the best interest of the scientific enterprise to ensure that its trainees are given the support and infrastructure needed to do outstanding science.

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1. Muindi, F. & Keller, J.B. *Nat. Biotechnol.* **33**, 775–778 (2015).
2. McDowell, G.S. *et al. F1000Res.* **3**, 1–20 (2015).
3. Schillebeeckx, M., Maricque, B. & Lewis, C. *Nat. Biotechnol.* **31**, 938–941 (2013).
4. Alberts, B., Kirschner, M.W., Tilghman, S. & Varmus, H. *Proc. Natl. Acad. Sci. USA* **111**, 5773–5777 (2014).
5. Committee to Review the State of Postdoctoral Experience in Scientists, and Engineers, Committee on Science, Engineering, and, Public Policy, Policy and Global Affairs. *The Postdoctoral Experience Revisited*. National Academy of Sciences, National Academy of Engineering, Institute of Medicine (National Academies Press, Washington, 2014).
6. Hyun, J.K., Quinn, B.C., Madon, T. & Lustig, S. *J. Coll. Student Dev.* **47**, 247–266 (2006).
7. Han, X., Han, X., Luo, Q., Jacobs, S. & Jean-Baptiste, M. *J. Am. Coll. Health* **61**, 1–8 (2013).
8. Hyun, J., Quinn, B., Madon, T. & Lustig, S. *J. Am. Coll. Health* **56**, 109–118 (2007).
9. Garcia-Williams, A.G., Moffitt, L. & Kaslow, N.J. *Acad. Psychiatry* **38**, 554–560 (2014).
10. Gloria, C.T. & Steinhardt, M.A. *J. Postdoc. Aff.* **3**, 1–9 (2013).
11. Muindi, F. *Science* **345**, 350 (2014).