



# Introducing plant biology graduate students to a culture of mental well-being

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## Abstract

Currently, an estimated 20%–40% of graduate students have depression and anxiety. In addition, more than half report experiencing high chronic stress. Thus, organizations such as the Plant Science Research Network have highlighted the need to prioritize trainee well-being. This has led to a search for strategies to introduce this cultural change into scientific training. However, for faculty who do not have experience with this topic area, there are few readily available resources from which to draw. In this paper, we describe how two graduate groups, one focused on plant biology and the other on genomics and genetics approached this challenge together by introducing a course on mental and emotional well-being to their incoming first-year graduate students. We describe the research on workplace mental and emotional well-being and disability prevention which served as the basis for the course content. We review the course curriculum, student reflections about what they learned, and implications for future classes.

## KEYWORDS

graduate student education, mental health, mental well-being, plant biology

## 1 | INTRODUCTION

Among a convenience sample of graduate students from 234 universities in 26 countries, 39% of respondents suffered from depression and 41% from anxiety (Evans, Bira, Gastelum, Weiss, & Vanderford, 2018). The 2019 American College Health Association-National College Health Assessment (ACHA-NCHA) II graduate and professional student survey found 20% of respondents were diagnosed with depression and 25% with anxiety during the past 12 months (American College Health Association, 2019). Furthermore, 65% of respondents described their overall 12-month stress level as being either “more than average” or “tremendous” (American College

Health Association, 2019). These trends have drawn attention to the mental health of graduate students (Evans et al., 2018).

This awareness has led to a call for strategies to “improve the culture of mental health and well-being among graduate students” (Mousavi et al., 2018). Organizations such as the Plant Science Research Network (PSRN) have prioritized trainee well-being to become one of its core principles (Henkhaus, Taylor, Greenlee, Sickler, & Stern, 2018). With this, the PSRN recognized that a shift in training culture is needed (Henkhaus et al., 2018). Yet, there are few examples of effective strategies from which to draw for faculty who do not have limited experience with this subject area.

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## 2 | A POTENTIALLY EFFECTIVE APPROACH

The body of research on workplace mental and emotional well-being offers a potential starting point that can serve as a knowledge base. Since the 1980s, occupational health and work disability prevention research globally began to focus on the mental and emotional well-being of workers (Van der Doef & Maes, 1999). From this literature emerges a useful framework to understand psychosocial factors that graduate students face at school and that could contribute to mental ill health and chronic high stress (Hausser, Mojzisch, Niesel, & Schulz-Hardt, 2010; Nieuwenhuijsen, Bruinvels, & Frings-Dresen, 2010; Theorell et al., 2015). These psychosocial factors include an environment with high demands and low control. Graduate students have unique positions in which their educational programs expose them to situations where they have limited flexibility and autonomy; they face the dual responsibilities of teaching and research under continuous evaluation while being required to master new knowledge (Grady, Touche, Oslawski-Lopez, Powers, & Simacek, 2014; Levecque, Anseel, Beuckelaer, Heyden, & Gislef, 2017). They are in the nebulous position of being students at the same time they are expected to be researchers and teachers. This lack of role clarity leads to feelings of unworthiness and self-doubt (Stubb, Pyhalto, & Lonka, 2011). It also can amplify the fear of failure and put them at risk for feelings of exclusion (Stubb et al., 2011). In turn, these feelings could create a state of chronic high stress that can lead to mental illness (Wang, Schmitz, Dewa, & Stansfeld, 2009).

Two major types of stress management strategies for the general population have been described in the literature: (a) emotion-focused coping and (b) problem-focused coping (Folkman, 1984). The American Psychological Association (2018) defines emotion-focused coping as “a stress management strategy in which a person focuses on regulating his or her negative emotional reactions to a stress.” In contrast, problem-focused coping is defined as “a stress management strategy in which a person directly confronts a stressor in an attempt to decrease or eliminate it” (American Psychological Association, 2018).

A recent literature review suggests that many of the approaches used for graduate students focus on emotion-focused self-care practices such as mindfulness, meditation, breathing, and yoga (Stillwell, Vermeesch, & Scott, 2017). There is evidence that they are effective at reducing stress (Stillwell et al., 2017). However, problem-focused coping techniques also have been identified as effective in the workplace environment (e.g., Dewa, Loong, Bonato, & Joosen, 2015). This suggests that based on the workplace health literature, problem-focused coping techniques could also be effective strategies for graduate students to address school-based stressors. Introducing students to both emotion- and problem-focused techniques and the context in which they can be effective would provide a broader range of tools from which they could choose throughout their graduate and professional careers.

## 3 | THE CHALLENGE FOR GRADUATE PROGRAMS

To support graduate student mental health and well-being, it has been suggested that graduate programming support self-care to promote mental health and to protect from mental illness (Evans et al., 2018; Henkhaus et al., 2018). But, there are a number of potential challenges for graduate programming to achieve this because there are few concrete examples of effective strategies. In addition, to be effective, a strategy must: (a) meet a student identified need, (b) be evidence based, and (c) be accessible to students who face a variety of competing demands and time constraints.

## 4 | PILOTING ONE PART OF A SOLUTION

In this paper, we describe one of the ways the Plant Biology (PBI) and the Integrative Genetics and Genomics (IGG) graduate groups at the University of California, Davis are responding to improve graduate student experiences of mental and emotional well-being. A first step was to solicit student input. An informal needs assessment was conducted by the PBI Mentoring and Wellness committee. This faculty (GD) led committee is comprised of graduate students and faculty. They found their graduate students identified a need for skills to address stress related to graduate school and with stressors including: struggles with “imposter syndrome”, differences in expectations with their supervisors, and prioritizing. This information helped to guide the development of a 5-week pilot course. In the following section, we describe the course content, self-identified enrolled student needs, student reactions to the course and its content, and implications for future classes.

## 5 | THE PBI AND IGG GRADUATE GROUPS

The PBI and IGG graduate groups are administered by the College of Biological Sciences. The PBI graduate group draws its 65 faculty from the departments of chemistry and chemical engineering and several departments from the Colleges of Agricultural and Environmental Sciences and Biological Sciences. In 2019, the PBI graduate group welcomed 17 new first-year graduate students and 63 continuing students. The IGG graduate group has 16 first-year doctoral students and 63 continuing students. They have 143 faculty members who are in the Schools of Medicine and Veterinary Medicine as well as the Colleges of Engineering, Biological Sciences, and Agricultural and Environmental Sciences.

The first two years of training are devoted to course work. During this time, students also have six-week rotations through self-selected laboratories to familiarize them with different faculty members and their research. Coursework is followed by an oral qualifying exam. The final phase of study is the dissertation research. Throughout their graduate training, graduate students also have teaching assistant opportunities.

## 6 | DESCRIPTION OF THE COURSE

The pilot course was entitled, *Tools for Becoming a Successful Professional and for Enhancing Your Well-Being and Work Environment*. To facilitate the translation of the workplace mental and emotional well-being and disability prevention literature, a faculty member (CSD) from the medical school was asked to develop the course. The faculty member had two decades of graduate school level teaching and mentoring and is a recognized research expert on work disability prevention and mental health promotion in the workplace. She consulted with another internationally recognized expert (KN) with a similar research focus who was designing a similar activity for her program's graduate curriculum. They were joined by a mental health therapist (KHS) who is an experienced counselor in university settings and working with student groups.

The topics covered in the syllabus were selected based on the PBI mentoring and wellness committee's informal needs assessment as well as those identified in the workplace health and disability prevention literature. The course took a public health perspective focusing on emotional well-being defined as, "A state in which every individual realizes his/her own potential, can cope with normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his/her community." (World Health Organization, 2004). As such, it was emphasized that the course neither was providing treatment nor therapy. Rather, the purpose of the course was to teach evidence-based techniques to manage stress and stressful situations and to help students recognize psychosocial risk factors that they would encounter during their graduate studies. At the first class, a list of the campus programs that provided counseling was circulated and students were strongly encouraged to seek them out if they were having difficulties coping and struggling with their mental and emotional well-being.

The course learning objectives were that by the end of the course, students would be able to: (a) explain the role of stress in work life, (b) identify the potential benefits of the various types of evidence-based self-care tools, (c) appraise the scientific evidence for the effectiveness of the tools, (d) choose the types of problem-solving techniques that fit their needs in daily life, and (e) identify environmental work factors associated with stress. The topics covered both emotion- (i.e., stress reappraisal, diaphragmatic breathing, and cognitive distortions) and problem-based coping techniques (i.e., a structured problem-solving approach, communication, and conflict management) as well as work environment factors that can contribute to stress (Table 1).

Because it was a graduate course, the content not only focused on the techniques but the scientific evidence for them as well. Thus, the course also covered how to evaluate the quality of social science studies. This gave students the skills to be astute consumers of self-help literature.

The course began on the first day of the 2019/20 Fall quarter. It was scheduled for five 75-min sessions. Recognizing student time constraints, the course was required for incoming PBI and IGG students and offered within the regular course schedule. Because this was a pilot, enrollment was limited to the first-year cohorts. In the end, 29 students enrolled. There were also two advanced graduate students who audited the course, one from each graduate group.

## 7 | IDENTIFYING STUDENT NEEDS

Three approaches were used to understand enrolled student needs. The first approach was a pre-course needs assessment. After the course concluded, students were given a post-course evaluation questionnaire. The final course assignment also served to validate the content saliency.

**TABLE 1** Course syllabus and learning objectives

Session	Learning objectives: At the end of the session, learners will be able to:
Introduction to well-being, self-care, stress, and evaluating the scientific literature	<ul style="list-style-type: none"> <li>• Explain the purpose of mental health promotion</li> <li>• Discuss factors to consider when evaluating the quality of a randomized controlled trial</li> <li>• Apply stress reappraisal techniques in daily life</li> <li>• Employ diaphragmatic breathing to control stress</li> </ul>
Perceived self-efficacy and self-care	<ul style="list-style-type: none"> <li>• Discuss the role of perceived self-efficacy in accomplishing goals</li> <li>• Explain what cognitive distortions are</li> <li>• Identify types of cognitive distortions</li> <li>• Describe effective of addressing cognitive distortions</li> </ul>
Coping using effective problem-solving	<ul style="list-style-type: none"> <li>• Discuss the importance of problem definition to problem-solving</li> <li>• Describe a structured problem-solving approach</li> </ul>
Using conflict resolution to address stress	<ul style="list-style-type: none"> <li>• Discuss the relationship between conflict and work stress</li> <li>• Describe types of conflict resolution styles</li> <li>• Explain contexts in which each conflict resolution style could be effective</li> <li>• Describe the steps in a problem-solving conflict resolution style</li> </ul>
The work environment and the role of psychosocial factors in well-being	<ul style="list-style-type: none"> <li>• Discuss work environment characteristics that can contribute to stress</li> <li>• Describe criteria that could be used to evaluate fit with a work environment</li> <li>• Explain the importance of recovery from work</li> </ul>

## 7.1 | Pre-course needs assessment

A week prior to the first session, enrolled students were sent a link to an online questionnaire in which they were asked about their expectations for the course and to collect information about their self-identified needs. The course description on the course webpage read,

*Graduate school can be stressful. Stress from assignments, exams, projects, and negative feelings from imposter syndrome can wear down well-being. This course takes a public health approach to mental health promotion to address common graduate school stresses. The purpose of this course is to introduce learners to the scientific evidence regarding stress and tools for self-care to decrease the negative effects of stress and stressful situations. Learners will also be introduced to skills to evaluate the scientific evidence. The skills introduced in this course can be used both in and out of school as well as contribute to success in professional life.*

The questionnaire response rate was 100% ( $n = 29$ ). About 76% students indicated that they expected the course would give them new ways of taking care of themselves. In addition, 76% believed that the course would help them develop new strengths to handle stress. There were 79% who expected to learn new skills to use in their careers. About 62% expected to gain new insights about themselves.

They were also asked, “What are you hoping to learn in this class?” Responses were grouped into four skills that they wanted to learn: (a) Setting Priorities, (b) Managing Stress and Mental Health, (c) Communicating, and (d) Advancing their Careers.

### 7.1.1 | Setting priorities

Students wanted help to “effectively balance grad school and life”. They were also hoping to learn about “strategies to prioritize mental health”.

### 7.1.2 | Managing stress and mental health

A large group of students wanted, “new methods to cope with stress” and “stress management”. Other students wanted to learn to “make stress a motivator instead of a crippling deterrence...”.

### 7.1.3 | Communication

Communication was another interest. Students wanted to learn new “vocabulary to discuss stress and anxiety in academia” and “ways to communicate with others”. Others wanted to learn how to address potentially stigmatizing topics.

## 7.1.4 | Advancing careers

Students also hoped to learn skills to advance their careers. For example, one student described that they wanted to learn, “Techniques to be a more efficient worker and more satisfied self-motivator. I hope to learn skills to help promote creativity.”

## 7.2 | Post-course evaluation questionnaire

A week after the last class session, students were sent a link to a structured questionnaire. The purpose of the questionnaire was to collect information about what they learned, how they would use what they learned, and any suggestions. There was a 97% response rate. About 59% indicated they learned new ways of taking care of their well-being while 63% learned new strengths to handle stress. There were 74% who learned new skills to use in their careers. About 56% gained new insights about themselves.

When queried about the structure of the course, 44% agreed that it was well constructed. About 82% agreed that the topics that were covered are relevant to graduate students; there were no disagreements. These responses suggested that the content met student needs. But, the course structure could be improved. About 44% rated the course excellent to very good; another 33% indicated they found it satisfactory.

The students were also asked three open-ended questions. The first was, “What was the most valuable aspect of the course?” One student summed it up with, “Knowing I was not alone.” Students found it important to connect with peers about similar struggles and to share experiences. They wanted to be reassured that they were not alone in their doubts and fears. This suggested that the course also addressed a previously unidentified need.

When asked, “How will you use the course material?” there were a variety of responses. Some responded with, “unsure”. Others identified techniques that were covered during the course including reframing, communication strategies, and addressing conflict.

Students were also asked, “What was the least valuable aspect of this course?” Many responses to this question seemed to be associated with improving the course construction. For example, student indicated they wanted more cases and more opportunities for small group discussion. This was in line with the comments about the physical classroom space being too small. That is, the room was not configured to allow students to break into small discussion groups and too cramped for students to easily move around.

## 7.3 | Course assignment

At the end of the course, students were asked to complete one assignment in which they answered two questions: (a) What tools did you develop or what insights did you gain about yourself and/or your well-being? and (b) How will you (or have you) use(d) the tools/insights? They were asked to limit their essay to a page.

Of the 29 students, only two indicated that they did not learn anything. One of these students explained, "I didn't need nor want help with stress management, mental health, nor any other wellness related items." The other student indicated, "To be honest, I haven't really thought about this sort of thing in depth in the past and am not sure how much the things in this class will stick with me in the future."

Among the remainder of the student assignments, the responses to the question about tools and insights gained identified the usefulness of the discussions about the emotion-focused techniques for reframing and cognitive distortions, and diaphragmatic breathing as well as the problem-focused techniques for handling conflict, and problem-solving. The students again reinforced the importance of learning that they not alone or isolated in their struggles. The course also highlighted the unspoken need to receive permission to take time for self-care.

### 7.3.1 | Emotion-focused techniques: Reframing, cognitive distortions, and breathing

These skills helped students find a sense of control in stressful situations. Students described reframing and identifying cognitive distortions as an effective way to address negative thoughts that can become barriers to action. For example, one student wrote, "... it was from this lesson that I have become more aware of missteps and mistaken directions of thinking that might lead me to leap toward a negative conclusion that, ultimately, could sabotage my effort in academia and beyond... As my experience in graduate school begins to demand more work and I begin my second rotation, I will pause to pay mind to identify negative thoughts, keep my worries in proportion, and unpack future instances of 'stinking thinking' into the inaccurate ideas at their root."

### 7.3.2 | Problem-focused techniques: Communication skills and conflict resolution

Some students found the steps to active listening helpful. These skills were as identified as useful to finding resolutions within the lab and at home. One student described, "Having the styles of conflict resolution in the last lecture was extremely instrumental. I may or may not have tried all these styles when resolving conflicts, yet identifying them will definitely help me reevaluate my approaches of dealing with problems..." Another student identified a key insight with, "At the end of the course, I learned that I am not good at handling stress and conflict." They found the normalization of conflict helpful and recognized that, "Conflict is normal, it is important, and it is a part of life."

Learning a process to problem-solve helped students to feel empowered. For example, one student wrote, "This logic based system of identifying and analyzing problems to guide solutions has resonated with me, and I have been doing my best to implement it in various challenges from those that are stress related to interpersonal ones. In doing so, I have felt that it makes such issues seem less urgent, which helps me respond from a better position." Another

student explained, "Finally, I can apply problem-solving skills that I learned in research to propose creative solutions to stressful situations. This will make my stressful days feel less hopeless and more actionable."

### 7.3.3 | Not alone

Student also found the course was useful because they had an opportunity to discuss their concerns with peers. They felt reassured that they do not need to have all the answers and they learned from one another as they shared their experiences. As one student described, "What was most apparent to me was this notion that we often take these concepts for granted as principles of common sense. However, the recognition and open discussion of these ideas (and how to address them) is a reassuring – and in my opinion, a necessary – addition to graduate education."

### 7.3.4 | Importance of self-care

The fact that this course was required also reaffirmed to students that self-care is important. This led them to take breaks which in turn they found led to being more refreshed and ready to take on tasks. Students further identified the importance of self-reflection. One student explained, "Overall, I would say the wellness course didn't necessarily introduce any new concepts or techniques that I have not encountered before in my life. I think the best thing about the course was just being forced to sit down and think about the stress going on in my life and the ways to deal with them in a more organized fashion."

## 8 | UNEXPECTED LESSONS

Unanticipated lessons also were learned during this pilot. Based on the need identification approaches we used, we were reassured that the course topics were relevant to graduate students and they were able to effectively use the coping techniques introduced.

### 8.1 | Clarifying the course purpose

However, the essays and course evaluation responses also highlighted an important consideration. The students were posed the question, "This course helped me to develop new strengths to handle stress." About two thirds indicated that they agreed with the statement. These responses suggested there were about a third of students who did not learn how to apply the course content. Yet, in the essays, students could identify how they used what they learned and that it improved the quality of their lives. This may suggest the need to further clarify the course learning objectives. That is, the skills do not eliminate feelings of stress. Rather, they help students

deal with them by helping with skills that would allow them to gain a sense of control.

In addition, it will be important to underscore that another purpose of the course is also to teach the graduate student skills that they will be able to teach to their students when they are instructors. To emphasize the usefulness of the techniques as teachers, an additional question will be included on the assignment, “How will you use the content in your teaching?” This aspect will also be emphasized throughout the course.

## 8.2 | Timing of the course

There was debate about whether the course should be offered later in the year when the students had time to settle into school. However, one of the advanced graduate student auditors pointed out that the intensely stressful periods are yet to come with the approach of qualifying examinations. But, having the course at the beginning of graduate school is more helpful rather than in the midst of more stressful phases because there is time to learn the new skills.

## 8.3 | Modality of the course

There was also discussion about the possibility of creating an online module for students to access at their convenience. The fact that the course was scheduled and face-to-face achieved two very important things that would not have been possible with a web-based course.

First, class discussion plays an important role in allowing students to talk about their self-doubts and fears. Through this, they realize they are not alone in their feelings of insecurity or stress. It also allows the cohort to develop shared coping techniques as well as a common language. Thus, the opportunities to share are a critical learning modality for this content. Future classes will use this lesson and be structured to optimize time for small group interaction.

Second, because it was part of their curriculum and they receive academic credit, students recognized that their programs value self-care and their mental health. Because they were not expected to attend additional lectures on their own time, they perceived it indicated their mental and emotional well-being are important to their programs. They also interpreted it as permission to devote time to self-care activities. This proved to be a key intervention.

## 8.4 | Opportunity for reflection

The short class length constrained the time for meaningful in-class processing. Thus, the reflective assignment was important to help students digest what they learned. Although at early stages in their graduate school experiences, the majority of students could give

concrete examples of how they used the techniques during the first five weeks of their first quarter as graduate students.

## 9 | ADDITIONAL STEPS

The graduate group faculty also recognizes that the course is not the only solution to promoting trainee well-being. It is only one piece of the solution. In addition to the course, the programs are supporting the mental health gatekeeper trainings for staff and faculty that are part of a larger university initiative. The purpose of the gatekeeper training is to: (a) increase awareness of campus mental health resources, (b) decrease stigma surrounding mental and emotional issues, and (c) help faculty, staff, and teaching assistants to recognize when a student may be struggling with mental and emotional issues. The results regarding the effectiveness of the mental health gatekeeper training initiative will be reported elsewhere.

Both graduate groups have also established committees in which students are involved. The committees identify student needs and help to identify solutions for those needs. For example, the PBI Mentoring and Wellness committee was established in 2016 by GD. The committee addresses current issues faced by graduate students by identifying and cultivating resources and mechanisms for students and faculty. This committee led the initiative to invite a medical school faculty member with expertise in the area to develop this required course. An example of an ongoing challenge is bridge support for a student requiring a medical leave.

## 10 | CONCLUSION

Offering the course for credit was a critical signal to the incoming cohort that their academic programs are concerned about their well-being and support it. Having the structure to talk about their fears and stress gave the students insight to the fact that they were not alone in their struggles as well as tools for coping with stress and stressful situations. The time for sharing in a structured environment where they are learning new skills is important not only for reducing stress but for building a sense of collegiality and reducing isolation. Through these types of courses, we seek to change our university culture. When our graduate students leave, they will have this knowledge to take to the labs they build and the research communities they join. Ultimately, our goal is to contribute to change that will have a ripple effect wherever our graduates go.

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### CONFLICT OF INTEREST

The authors declare no conflict of interest associated with the work described in this article.

### AUTHOR CONTRIBUTIONS

CSD led the conception and design of the work, data collection, data analysis, and writing. KN contributed to the conception and design of the work and writing. KJHS contributed to the conception and design of the work and writing. AKS contributed to the data collection, data analysis, and writing. GD contributed to the conception and design of the work, data collection, and writing.

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