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Commentary

COMMENTARY

Intentional mentoring: maximizing the impact of underrepresented future scientists in the 21st century

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One sentence summary: This article discusses how to be an intentional mentor in the 21st Century.

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ABSTRACT

Mentoring is a developmental experience intended to increase the willingness to learn and establish credibility while building positive relationships through networking. In this commentary, we focus on intentional mentoring for underrepresented mentees, including individuals that belong to minority racial, ethnic and gender identity groups in

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Science, Technology, Engineering, Mathematics and Medicine (STEMM) fields. Intentional mentoring is the superpower action necessary for developing harmony and comprehending the purpose and value of the mentor/mentee relationship. Regardless of a mentor's career stage, we believe the strategies discussed may be used to create a supportive and constructive mentorship environment; thereby improving the retention rates of underrepresented mentees within the scientific community.

Keywords: intentional mentoring; mentoring; awfulizing; minority stress; mentor

INTRODUCTION

Although the practice of mentoring has a long history (Garvey 2017), these relationships have not always been inclusive nor effective in Science, Technology, Engineering, Mathematics and Medicine (STEMM; Committee on Effective Mentoring in STEMM *et al.* 2019). In fact, by 1991, there were 15 definitions of mentoring (Jacobi 1991). The science of effective mentoring identified three commonalities: (1) mentoring relationships help individuals accomplish goals, (2) provide professional, career and psychosocial support and (3) these relationships are personal and reciprocal. Interestingly, the definitions of mentoring have evolved. Currently, there are about 50 definitions of mentoring (Crisp and Cruz 2009). Although there are many definitions and tools available, true mentorship begins when a mentor, understanding the overall goals of the mentoring relationship and different types of mentoring approaches, identifies the best strategy for a myriad of circumstances. Intentionality is essential for every type of mentoring relationship (Packard and Fortenberry 2016; Hinton *et al.* 2020b,c; Committee on Effective Mentoring in STEMM *et al.* 2019), triads, group-based or collective mentoring, networking-based, nested or hybrid multi-mentoring models (Sittler and Criswell 2019). A prospective mentor can become an intentional mentor by personalizing their mentoring approach based on their mentee's needs. We define intentional mentoring as making informed decisions and taking the appropriate actions to meet established goals between mentor and mentee. This commentary focuses on the mentoring of underrepresented (UR) mentees in STEMM to broaden access, improve participation and increase retention. We also provide insight on ways mentors can help mentees minimize burnout and minority stress.

MENTORING WITH A PURPOSE

In the past, some groups have been specifically excluded due to racial, ethnic or other identities (Asai 2020), resulting in fewer UR trainees within STEMM fields relative to their proportional representation in the general population. These groups are defined as UR groups (Hinton *et al.* 2020b,c; Asai 2020). UR mentees often face different challenges than their counterparts when pursuing careers in STEMM. Some challenges may include micro- and macro-aggressions (Marshall *et al.* 2021), a lack of support and community, limited access to mentorship, a lack of empowerment and lower success in acquiring funding (Hinton *et al.* 2020b,c; Packard and Fortenberry 2016; Figs 1 and 2; Whittaker and Montgomery 2012; Allen-Ramdial and Campbell 2014), which can all contribute to what is known as minority stress. Minority stress is any stigma, prejudice and discrimination that generates an antagonistic and stressful social setting (Meyer 2003). Minority stress was originally a theoretical and explanatory framework of sexual minority health risk (Meyer 2003). This framework was used to assess lesbian, gay and bisexual individuals and populations, various stressors, coping mechanisms and their proactive or negative impact on their mental health

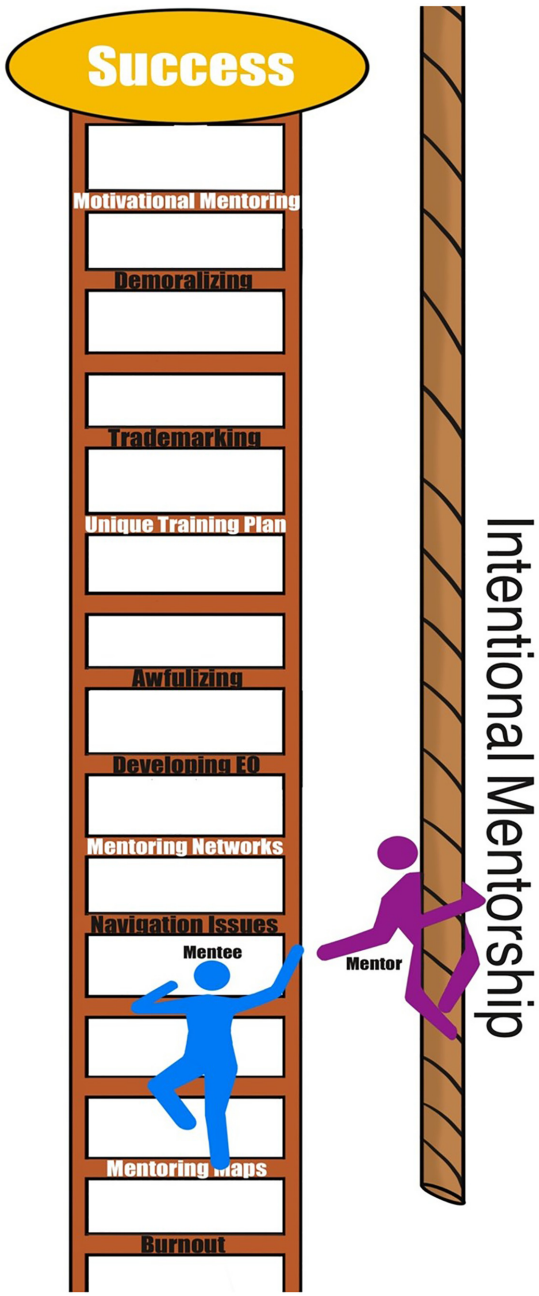

Figure 1. The road to being successful as an underrepresented STEM mentee has many challenges. It often feels as though one is climbing a ladder with several missing steps. An effective intentional mentor can help their mentees navigate these tribulations. UR mentors are especially vulnerable to academic and personal issues such as burnout, awfulizing and demoralization (Hinton *et al.* 2020c; Montgomery 2017). Mentors should seek to help mentees navigate these tribulations while also offering support in developing mentees as a student and a person, through building their networking (Arora *et al.* 2010; Masters and Kreeger 2017).

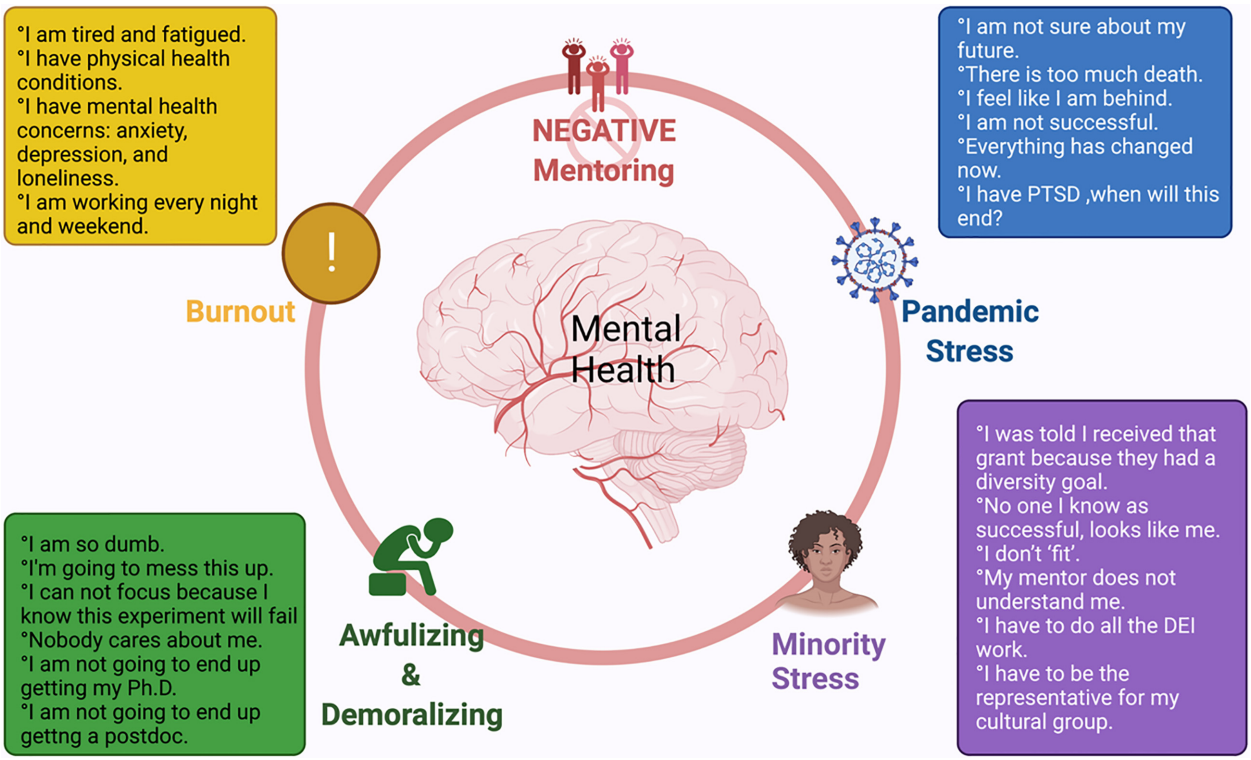

Figure 2. Negative mentoring may have many adverse effects. Negative mentoring can amplify feelings of burnout, pandemic stress, awfulizing and demoralization . Mentors should take care to build a mentees self-esteem and self-compassion to avoid these feelings (Williams, Thakore and McGee 2016a,b; Dryden 2020). This can be done through methods such as carefully thought-out word choice that avoids putting too much pressure on mentees and potentially causing demoralization (Ellis and Joffe-Ellis 2019).

outcomes (Meyer 2003). Notably, the Minority Stress Model demonstrates that social situations characterized by prejudice and stigma predispose marginalized individuals to greater exposure to stress than individuals who are not members of marginalized communities, which may have negative impacts on mental and physical health (Dohrenwend *et al.* 1992; Clark *et al.* 1999; Meyer and Northridge 2007; Hatzenbuehler, Nolen-Hoeksema and Erickson 2008; Pascoe and Smart Richman 2009). Minority stress is long-lasting because it is a chronic occurrence in the lives of UR individuals; high levels of chronic stress can reduce lifespans (American Psychological Association 2018).

Typically, a stressful day at work ends when a person leaves the work environment and goes home. However, for UR individuals living in a racist, sexist, heterosexist or cissexist society, the ability to escape from stressful environments may be minimal. Based on this model, minority stress can result in expectations of rejection, hiding and concealing, internalized homophobia and maladaptive coping strategies (Meyer 2003; Testa *et al.* 2015; Mizock and Hopwood 2018). Additionally, minority stress may also negatively affect the capacity, interest and sense of belonging experienced by UR mentees in STEMM (Estrada *et al.* 2011; Johnson *et al.* 2011; Valantine and Collins 2015).

Importantly, a mentee's fractured sense of belonging greatly impacts the retention of women and men of color at the undergraduate level in science (Hurtado, ERIC Clearinghouse on Higher Education and Association for the Study of Higher Education 1999; Hausmann, Schofield and Woods 2007). Notably, students become disinterested in academic careers as their training progresses and they become more interested in non-academic careers (Fuhrmann *et al.* 2011; Sauermann and Roach 2012; Gibbs, McGready and Griffin 2015; Roach and Sauermann 2017). We believe the practice of intentional mentorship may reduce a myriad of social stressors within the STEMM workforce. For example, 70% of PhDs entering their postdocs do not have a goalsetting discussion with their PI or understand what options are available (Gibbs and Griffin 2013). Therefore, we believe that intentional mentoring can help develop and strengthen career aspirations at any stage through a well-rounded mentoring plan of action. Could UR retention rates in science be linked to a sense of belonging or minority stress? Could chronic social stressors in science deter UR trainees from pursuing academic careers? (Lambert *et. al.* 2020) demonstrated that women and UR postdocs face ongoing challenges that hinder their faculty or equivalent career opportunities (Lambert *et al.* 2020). In particular, the first 2 years of postdoctoral training are critical for career development and require mentors to help create a strong support system. At this career stage, an intentional mentor can provide a strong training program while building a mentee's self-worth and sense of belonging in academia. Ultimately, how can faculty and academic leaders become intentional mentors?

Getting to know each other

Within science, UR mentees are often implicitly expected to limit the expression of their identities in favor of traits that are more palatable to the mentor (Johnson 2007; Prunuske *et al.* 2013). Although this expectation may not be explicitly stated, or outwardly desired by the mentor, this expectation is ingrained within the academic structure and culture. A straightforward way for a mentor to learn about their new mentee is to promote an open dialogue with their mentee. If such a conversation is difficult to have, potential topics associated with communication

styles, greetings, favorite foods, favorite trips or recent experiences can serve as an opportunity to getting to know each other.

Most mentors are open to diversifying their practices to help transform their mentees' performance, enhance their mentees' contribution to society, help their mentees discover a work-life balance and nurture quantifiable maturity. Everyone has a unique personality, strengths and weaknesses and professional goals. Mentors and mentees should strive to understand each other with these differences in mind when developing a personalized mentoring strategy. Blanket strategies applied to all mentee is often an inadequate form of mentorship, which can generate implicit expectations and pressure that the mentee may not be able to meet as expected. Nurturing positive conversations about race, equity and inclusion can foster a non-racist environment. Although conversations about race can be challenging, they are overwhelming necessary when discussing and advocating for UR success (Banerjee-Batist, Reio and Rocco 2019; Bumpus 2020; Chaudhary and Berhe 2020). An intentional approach to building a relationship with the mentee—getting to know who they are, their goals, their learning style and the most effective way to communicate with them—will help with identifying strategies for supporting their UR mentee's success (Banerjee-Batist, Reio and Rocco 2019; Bumpus 2020; Chaudhary and Berhe 2020).

Failure to meet generalized, unachievable or unrealistic expectations that are beyond the mentee's capabilities, or are outside of their experiences and cultural norms, can cause a mentee to develop a sense of otherness and can weaken the mentor's confidence in their abilities. Before believing that the mentee is incapable of success, lazy or unworthy of further training, mentors should consider that a different approach may be necessary to bring out the mentee's potential. Cultural competence can help mentors address cultural differences between mentees effectively (Arredondo 2013). Additionally, Cross *et al.* (1989) emphasized that valuing diversity, cultural self-assessment and adapting to diverse practices are necessary for administrative levels. Cultural competency through specific diversity and inclusion training and workshops can train mentors to be more comfortable around different minority groups and become intentional mentors; thus, mitigating the severity of failure from unachievable expectations. Cultural competency training can also help mentors learn from mentees that are not from underrepresented groups, including those from low socioeconomic backgrounds and rural areas.

Developing a unique training plan

The needs of UR mentees can differ greatly from non-UR mentees and may not be immediately apparent to a mentor. Thus, a valuable exercise for addressing UR needs is the mentoring roadmap and network model developed by Dr Montgomery (Montgomery 2017). This model promotes integrating multiple professional mentoring relationships designed to enhance a mentee's self-reflection, goals, career planning and progress assessment skills (Higgins and Thomas 2001; Montgomery 2017). The roadmap and mentoring network will help a mentee identify their mentor's resources and help lay a foundation for career development and professional development (mentoring networks—Beronda L. Montgomery (berondamontgomery.com). Importantly, the essential elements of a roadmap include *self-reflection* (defining specific goals and the timelines and resources needed to achieve these goals), *establishment* (defining a specific framework or type of mentoring that will support the mentee), *maintenance* (identifying specific actions that will nurture or advance the mentoring relationship) and *moving ahead* (reviewing goals, reaffirming, renegotiating or concluding mentoring relationships, as necessary; Montgomery 2017). Mentors can help their UR mentees build a mentoring network by providing their mentees with access to colleagues or peers with diverse expertise. A mentoring network allows mentees to make well-informed decisions regarding their professional goals through the knowledge gained from informational interviews or the additional support of multiple experts. It is also important for a mentor to share with a mentee that laying a foundation and sifting through one's advice from a network requires reflection (Montgomery 2017). Mentors may also consider talking with their mentees on how to filter advice from their network (Montgomery 2017). Mentors may also consider that a unique plan allows a mentee to have time for self-reflection and a safe zone to process challenges that arise outside the laboratory.

A unique plan may also include constructing a mentor-mentee expectations document, a contract between the mentor and mentee (Haggard and Turban 2012; Eller, Lev and Feurer 2014; Masters and Kreeger 2017). A mentoring 'contract' is an agreement in which both the mentor and the mentee outline their personal and professional goals and responsibilities regarding the relationship. Mentoring contracts also ensure the relationship starts off on a positive note (Haggard and Turban 2012; Eller, Lev and Feurer 2014; Masters and Kreeger 2017). Importantly, a mentoring contract should include the mentor's responsibilities and expectations. For example, mentors may consider including the following in their contracts: to listen and observe, to ask open, constructive critical questions, willingness to be open, to respect the mentees experience and not be judgmental, to be willing to support the mentee when they face problems and encourage them to find solutions, to not abuse the power dynamic and to set boundaries. In other words, the mentoring contract also defines expectations for how the mentoring relationship will work from both parties, including establishing boundaries and determining how best to resolve conflicts (Haggard and Turban 2012; Eller, Lev and Feurer 2014; Masters and Kreeger 2017). Although the mentor can facilitate and initiate a mentoring contract, the execution and continuation of the contract also requires intentional action and attentiveness from the mentee. Additionally, mentees should also be aware of boundaries; for example, not asking their mentor for favors, or asking to overrule a higher ranked laboratory staff member who is directly training them. We suggest the mentoring contract be reevaluated every 6 months. The mentoring contract should also include a supplementary individual development plan (Vincent *et al.* 2015; Masters and Kreeger 2017) that is reevaluated every 3 months. Together, these plans will help to ensure mentee success. Notably, mentors and mentees can consider including mutual respectable areas of interest, such as being honest, being punctual, keeping conversations confidential, being willing to take risks, discussing objectives, a clear understanding of a back plan if the primary plan does not work out well.

Importantly, UR students are often under mentored and may have fewer quality mentorship opportunities in a traditional science environment. As a result, they may be less prepared for intentional mentoring relationships and might require more guidance on what to expect and what is expected of them. This agreement should leave room for future amendments; if both the mentor and mentee continue to believe that their relationship is healthy and beneficial, we recommend that the mentoring contract be amended to include steps that will further their partnership. Additionally, mentors and mentees

can include a clause that allows the mentorship to come to a built-in, natural ending. The literature suggests that proactive mentors who provide positive reinforcement promote a safe zone for their mentees and are more likely to develop a relationship with their mentees that is grounded in trust (Clay Hamner and Hamner 1976; Straus *et al.* 2013; Wei and Yazdanifard 2014).

Evaluating the mentoring relationship

Mentorship can vary in structure and function, and frequent reevaluation is necessary to ensure that the relationship continues to be effective and supportive (Committee on Effective Mentoring in STEMM *et al.* 2019). When evaluating the mentoring relationship, a key question is: Is the mentoring relationship helping to achieve the desired outcome? Mentorship progress can be assessed across four major categories: attitudinal (e.g. an increased sense of belonging), behavioral (e.g. advancing to candidacy in graduate school), professional (e.g. career advancement) and health-related (e.g. reduced stress; Eby *et al.* 2013). Reevaluating the mentoring relationship periodically is important to determine whether modifications are necessary. Changes can be introduced without jeopardizing the ability to reach the desired goal. A straightforward method for assessing the mentoring relationship is through open discussions between mentors and mentees (Coombs and Goodwin 2013; Maton and Mantas 2020), during which they can evaluate how their respective roles and contributions support the desired outcomes across the four major categories outlined above. Open discussions can help build trust and allow mentors to embrace more challenging conversations (Dankoski, Bickel and Gusic 2014).

Additionally, mentors should be connecting with their mentees regularly to gauge which aspects of their professional and personal progress require attention at any given time. Progress can be assessed by asking questions, such as 'What skills have they mastered?' and 'What concepts are they still struggling with?' Taking the time to address areas of improvement can create opportunities to help mentors better understand the challenges faced by their mentees, allowing for training strategies to be adjusted accordingly. Adjustments could include devising opportunities for allowing mentees to practice those skills that need improvement. For example, if a mentee has trouble saying 'no' to others, their mentor might give them an amount of work that is impossible to complete by a particular deadline to teach the mentee how to prioritize the most pressing or essential tasks and to negotiate the unreasonable workload rather than simply accepting the demand from a superior (Hinton *et al.* 2020a). When implemented mindfully, this exercise can provide an opportunity to improve their mentee's professional skills in a controlled, low-stakes environment. We also suggest mentors practice a set of 'no' strategies (Hinton *et al.* 2020a) for early academic career stages (Hinton *et al.* 2020b) because focus is essential to their mentee's career aspirations and taking on too many opportunities further impedes their personal and career development.

MENTORING GONE WRONG—AWFULIZATION, DEMORALIZATION AND BURNOUT

Not all mentoring is effective, and negative or ineffective mentoring can become counterproductive to achieving the intended goals (Fig. 2), resulting in detrimental effects that can lead to feelings of awfulization, demoralization and burnout (Fig. 2). Instead of supporting the UR mentee, negative mentoring can become another obstacle for UR mentees. For example, negative mentoring experiences can diminish job happiness and enhance staff turnover intentions and stress within an institution (Eby and Allen 2002; Eby and McManus 2004; Eby *et al.* 2008, 2010; Eby and Dolan 2015; Eby and Robertson 2020). Sadly, unbalanced mentoring relationships ensue when expectations are not being met, costs outweigh the advantages and the relationship becomes stressful for one or both individuals (Lunsford *et al.* 2013). Although some potential negative behaviors are easily apparent, others may not. For instance, a principal investigator may not be qualified to be a mentor just they have seniority or holds a position of influence or power. We believe that mentors should be individuals who have experienced both adversity and success. That is why 'mentor matching' is so critically important for identifying a good mentor for each UR mentee. Although negative mentoring is not often the sole reason for obstacles within the academic community, the struggles faced by UR mentees can be heightened by negative mentoring experiences (Montgomery 2017). As indicated in Fig. 2, negative mentoring can induce feelings of isolation; therefore, mentors should aim to combat those feelings, as assuring mentees that they have allies can be critical for alleviating these negative feelings. This section will discuss strategies that mentors can utilize to promote mindfulness in their responses to mentees to prevent awfulizing, demoralization and burnout among UR mentees (Figs 1 and 2).

Awfulizing

Awfulizing refers to an irrational thought pattern characterized by the tendency to overestimate the potential seriousness or negative consequences of events, situations, or perceived threats (Dryden 2020; Fig. 2). Mentors can help mentees realize when they are awfulizing and help them challenge or rationalize negative thoughts, by asking questions that help the mentee refocus on their experimental plan or overall project, rather than focusing on the fears of failure or the unknown. Mentors might also contribute to reducing awfulization by offering their mentees positive reinforcement and talking the mentees through their negative feelings. Another strategy is to ask the mentee to evaluate the effects of self-commentary or comments from other people to help the mentees identify negative sources. Mentors can also ask their mentees to identify positive situations and individuals who provide mentees with inspiration and support. Some stress may be relieved if mentors can help their mentees acknowledge negative thought patterns and develop mindful responses to negative thoughts rather than succumbing to self-doubt. Applying these strategies can help create a comfortable space for the mentee to become aware of their thoughts and better equipped to express their negative feelings verbally. An open dialogue can help the mentor can reinforce the mentee's positive attributes and accomplishments. Awfulization can result from the experience of difficulties or troubles in life that are not explicitly linked to the mentee-mentor relationship, such as demanding class loads or interpersonal problems; however, negative mentoring can perpetuate awfulization when unchecked (Fig. 2).

Demoralization

Demoralization is where disappointment, dismay and low confidence are felt when living by a set of absolute and unrealistic demands placed upon oneself, others and the world (Ellis and Joffe-Ellis 2019; Fig. 2). Demoralization can cause mentees to ruminate over disappointment. This mindset occupies the mind

with negatives feelings, such as worry, regret and shame, which can negatively influence the demoralized individual (Ellis and Joffe-Ellis 2019). Within a mentorship relationship, a demoralizing mindset adopted by either the mentor or the mentee is detrimental and can negatively affect the quality of work and performance of the mentee.

Mentors can use a variety of approaches to mitigate their mentees' demoralization-induced stress and anxiety while helping them improve their focus, elevate their thoughts and elicit positive emotions. We recommend that mentors create a safe and non-judgmental environment in which mentees feel comfortable communicating their needs and struggles. Active listening is an essential skill for a mentor to practice during these types of conversations, which involves engaging the mentee's thoughts while visualizing oneself in the mentee's situation to help them. Using words such as 'we' and 'our' can transfer the mentee's stress to the mentorship team while providing support and structure. Information gathered from these conversations can then be used to advocate for the UR mentees in adverse situations. Demoralization results from feelings of inadequacy, that they cannot live up to expectations (Ellis and Joffe-Ellis 2019). Ensuring that mentees have realistic expectations and helping them plan out the necessary steps for accomplishing realistic goals can combat demoralization. The simple act of helping the mentee develop a reasonable timeline can facilitate the management of their responsibilities, making their goals feel attainable. Furthermore, reminding mentees of their successes and, when appropriate, the difficulties faced by their peers can prevent awfulization in response to demoralization by helping the mentee realize that they can overcome adversity and that these challenges are not unique. Finally, if a mentor is consistently observing demoralization among their mentees, they should self-reflect and critically analyze whether they are placing unrealistically high expectations on their mentees.

Burnout

Mentees can experience burnout at any stage of their career. Burnout is the loss of motivation, a growing sense of emotional depletion and cynicism (Bridgeman, Bridgeman and Barone 2018; Al-Alawi *et al.* 2019; Fig. 2). When a support system is not in place, constant fear and anxiety may lead to burnout. Overworking, attempting to be the best at all costs, and excessive worrying about failure can lead to burnout. Burnout is not always evident and can manifest as imposter syndrome–feelings of not having earned one's position—as well as neuroticism, depression or anxiety (Golonka *et al.* 2019). Unfortunately, burnout is prevalent and inevitable within the scientific community, especially combined with outside sources of stress. The 2019 coronavirus (COVID-19) pandemic is an example of worldwide burnout, even within academia. Students and faculty alike have been forced to rapidly adjust their learning and teaching styles to accommodate remote and virtual learning (McReynolds *et al.* 2020).

The COVID-19 pandemic forced institutional lockdowns which forced changes in work schedules and reduced access to resources, including laboratories, libraries and collaborative in-person events. These changes required adjustments in teaching and learning styles. In addition, the pandemic disproportionately affected marginalized groups (Termini *et al.* 2021b; Hildreth and Alcendor 2021). Unprecedented changes to work and life resulted in burnout across the academic spectrum (Moss 2021). Consequently, 'pandemic stress' has resulted in changes in mentoring relationships. Pandemic stress affects the perception of both the present and the future, generating a new clinical condition associated with the pandemic (Anderson and Shannon 1988; Mosheva *et al.* 2020) Haensly and Parsons 1993; Hinton *et al.* 2020b; Fig. 1). The pandemic taught us that mentoring should not be limited to in-person contact. For example, a mentor can schedule wellness calls with their mentees to see how they are coping with the ongoing pandemic. Mentors could also pose reading or activity challenges to their mentees to help keep motivation and productivity up. Mentees can also take the initiative to regularly check-in with their mentors with brief updates. These interactions do not have to be limited to research- or laboratory-related topics, but rather should focus on their mentee's wellbeing. Although virtual mentoring can be an effective strategy, it can also be overused and lead to mental fatigue. Like other mentoring formats, virtual mentoring must be optimized (McReynolds *et al.* 2020) and care must be taken to avoid burnout.

Minimizing burnout and minority stress

Mentors and mentees seeking to promote a healthy and productive mentoring relationship should be aware of awfulization, demoralization and burnout (Fig. 2). Despite having similar causes and overlapping solutions, these phenomena are often ignored. Mentors can help their mentees by asking questions, engaging in active listening, conveying understanding and responding with explanations or solutions. In general, these strategies include assisting the mentee with changing their perspectives to allow for more optimism rather than magnifying negative views.

Extensive research supports that access to the wise counseling of a mentor often positively influences a mentee's life and career success. We also know that it can be difficult to tell others that they may need help. Most mentors are not licensed well-experienced therapists and even those mentors who are qualified to provide counseling should recognize the conflicts of interest. The guiding policy here is that the mentee should feel supported and protected, both during the process of recognizing that they require help and while seeking help. Instead, partake in dialogue, share the importance of responsibility and help the mentee seek balance. Additionally, we recommend sharing with their mentees in a way that makes the mentee feel comfortable. For example, a mentor can say, 'I feel that this circumstance needs more expertise than I possess. What other sources of aid have you considered?' We also suggest that mentors expressing their concern to their mentee is an acceptable and encouraged response when the mentor believes the mentee requires expert assistance. The mentor should avoid placing blame on the mentee. We recommend the following approach: 'I'm worried that this predicament could get more disagreeable if you don't make a plan of action to deal with it.' The mentor can help identify additional resources to address the situation. Importantly, the mentor should reinforce that seeking mental health resources is a sign of strength and long-term health.

Motivational strategies are another technique that the mentor can use. Naturally, mentors desire only the best for their mentees. As a result, mentors motivate their mentees to be excellent, go above and beyond and distinguish themselves from their peers by cultivating the skills and experiences required to succeed in STEM careers. Motivational strategies inspire thru positivity, mutual respect and providing resources to overcome failures using a customized method (Byars-Winston *et al.* 2018). As such, intentional motivation mentoring applies a personalized and tailored approach to each mentee. Importantly, motivational mentoring can also serve as a starting point when

mentees begin to exhibit signs of burnout, awfulizing or demoralization tendencies.

Common negative mentoring experiences include absenteeism (unavailable physically or mentally), abuse of power, interpersonal mismatch (dissimilar personalities, communication preferences or work styles), lack of career and technical support (lack of guidance or disinterest in a mentee's research), lack of psychosocial support (lack of encouragement or unapproachable), misaligned expectations (uncommunicated or unreasonable expectations) and unequal treatment (differential treatment or favoritism; Limeri *et al.* 2019). Some of these patterns, such as absenteeism, can be easy to fall into as the mentor progresses in their career and takes on more responsibilities. Others, such as interpersonal mismatch, can occur with no fault on either the mentee or mentor, but still hinder the maturation and productivity of the mentoring relationship. Recognizing these patterns will take intentionality on the part of both the mentor and mentee. Both should regularly reflect on the relationship and communicate with one another when issues arise. Mentors who continue to engage in negative or ineffective mentoring can create cognitive and emotional obstacles for their mentees, including the sense of lesserness and decreased self-worth, which can perpetuate or induce awfulization, demoralization and burnout (Fig. 2). Mentors should be open and honest with their mentees and themselves while celebrating successes and reinforcing positive and constructive behavior.

Mentoring can be performed using a variety of approaches depending on the goal; some mentoring types may be better for achieving specific objectives than others. In this article, we have outlined tools to help mentors design personalized mentoring relationships for each of their mentees. Mentors may find it challenging to implement change, but we suggest not give in to the urge to have a fixed mindset. We believe learning to say 'no' the right way, like removing time commitments to spend time developing your mentees, can help them truly reach their potential (Hinton *et al.* 2020a). We also believe that supportive changes are necessary to help everyone in the laboratory feel safe, accepted and successful in STEMM, while increasing UR retention (Hinton *et al.* 2020b). Lastly, we believe that mentors who create a safe environment for their mentees to thrive promote allyship (Termini *et al.* 2021a) and decrease bias (Marshall *et al.* 2021).

As we close, it is important to note that mentoring is an art. Negative mentoring can be detrimental to mentee success; thus, mentors should try to address potential negative outcomes as outlined in (Fig. 2) before they start. Additionally, there are many things to look out for, such as biases related to racism (Banerjee-Batist, Reio and Rocco 2019; Bumpus 2020; Chaudhary and Berhe 2020), that may need to be addressed, especially while mentoring. Other mentoring mistakes, such as poor communication styles between the mentor and mentee, poor mentor/mentee matches and distancing, contribute to the poor outcomes for the mentor and mentee. Being intentional about mentoring, by developing a unique training plan for each mentee/mentee, evaluating the mentorship relationship and developing cultural competency, can make a large impact on their mentees' career development.

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