




Undergraduate behavioral biologists keep science careers in focus through pandemic challenges—but need support

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The coronavirus pandemic presents complex challenges that threaten to pervasively derail careers in science (Ahmed et al. 2020; Byrnes et al. 2020; Cardel et al. 2020; Htun 2020; Inouye et al. 2020; Staniscuaski et al. 2020; Termini and Traver 2020; Turney et al. 2020; Woolston 2020a, b, c). The effects of the pandemic on science education have been described in respect to pedagogical disadvantages of virtual lecture and laboratory learning, technical problems associated with delivering and receiving course content remotely, diminished in-person contact with faculty, reduced opportunities for peer interaction and support, and lack of community (Dhawan 2020; Elmer et al. 2020; Roberts et al. 2020). Although diverse STEM stakeholders have frequently expressed views on the consequences of the pandemic, the voices of undergraduate science concentrators—a demographic that is likely to be significantly impacted by COVID-19 circumstances—remain to be heard.

Undergraduate majors in STEM disciplines are being educated during a critical period of development within a culture that has too often been unsupportive of science, and have been

maturing in post-truth society in an atmosphere of denialism (Traniello and Bakker 2017). For this student cohort, science has been made to seem irrelevant. The maligning of science, exacerbated by ignoring evidence-based expert advice during the pandemic, is not conducive to the personal growth of undergraduates and may affect commitment to STEM careers. Disinformation that devalues the practice of science has been amplified, and contributes to an educationally toxic environment detrimental to student engagement and retention. These influences may have temporary or durable effects.

As undergraduates (and one faculty member) academically specialized in the science of behavior, we view the pandemic from an evolutionary perspective that we find informative and enlightening. Issues at the interface of social life and disease in respect to both infection spread and group-level prophylaxis may seem confusing, but our understanding can be clarified through the optics of a scientific lens. Working in our communities and interacting (at a distance) with peers, we are acutely aware of the complexity of human behavior and its disturbing resistance to change. We have personally witnessed

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bold disregard for the following reasonable measures known to decrease the spread of coronavirus, as well as confrontations in public. We have been ill advised by individuals senior to us in age that masks can cause lung damage, harassed for being compliant with public health guidelines, and have been targets of political slurs. Within our own circles of peers and friends, we see selfishness and inconsistent attitudes toward social restrictions having great benefit in controlling infection. An evolutionary perspective enables us to reflect on the crisis and realize the value of biological insights provided by our academic concentration. Although behavior during the pandemic is often explained in terms of proximate causation, we find that the actions we observe cannot mainly be attributed to age-associated deficits in brain development (Berns et al. 2009; Romer et al. 2017) or mitigation fatigue (Harvey 2020). Rather, with the calibration of behavioral evolution, we recognize how forces of human prosociality may depreciate rational judgement, influence risk tolerance, affect the impulse to congregate with kin and friends, form political identity, and act aggressively toward out-groups (Choi and Bowles 2007; Bacon and Corr 2020; Eaton and Kalichman 2020; Finkel et al. 2020; Rosenbaum 2020; Van Bayel et al. 2020). The doubling down on misinformation represents willingness to conform—a secular ritual demonstrating commitment—that solidifies group identity. Ignoring authoritative data-driven recommendations such as mask wearing and attending gatherings without physical distancing—and flaunting it—are in sociobiological context signals of dedication to political cause.

Additionally, we individually experience the pandemic, day by day, as students who are like other undergraduate science concentrators midstream in a curriculum of demanding foundational and advanced courses. The ability of faculty to develop and maintain pedagogically appropriate and inclusive environments for STEM education impacts us directly. The effectiveness of online instruction has varied, and examinations and other assessments have been problematic at times. Testing has changed. Some exam structures seem designed to contend with issues of academic misconduct. We would benefit from academic study-skill workshops designed to maximize learning in light of changing assessment methods.

We credit faculty who acknowledge our struggles and are sincerely receptive to our needs, but find variability overall in the degree of sensitivity to emotional problems caused by new and unfamiliar demands. Required-related courses and other large-lecture “weed out” classes that can discourage students from continuing in science (Thorp 2020) do not appear consistently to have curricula appropriately modified to current circumstances. Some instructors are empathetic and accommodating; others seem out of touch with or unsympathetic to the world students must navigate during the pandemic. Pedantic teaching styles can be discriminatory. Students lacking economic support do not have access to resources that can

help guide learning in online classes. Family matters may complicate education, further elevating anxiety levels. This confluence of challenges is occurring as we confront issues of social injustice and unprecedented political instability. Taken together, these factors can erode motivation. Although we are encouraged by support and buoyed by success, emotional low points can range from feeling heartbroken to crushed.

Undergraduate training, research, and mentoring experiences that typically occur in the physical environment of the laboratory are critical to STEM retention and building scientific careers (Hurtado et al. 2009; Myers et al. 2020). As universities continue to rely on remote learning formats during the pandemic, more must be done to ensure laboratory skills are acquired through direct hands-on activities while maintaining safety. Innovations in instruction must be made to teach lab skills that are particularly difficult to learn virtually, and clear communication between faculty and students is crucial to promote research opportunities as avenues to acquire technical abilities. We are aware that through the increased use of virtual platforms the pandemic has increased the ability to participate in professional meetings and learn new findings directly from researchers, but this is not a substitute for lab or field experience.

Undergraduate science education is sensitive to issues of gender, diversity, and equality. Women in science have been disproportionately impacted by the pandemic as time for research and child care compete (Brubaker 2020; Guatimosim 2020; Myers et al. 2020), reducing their availability as mentors for female undergraduates. We agree that institutions should extend tenure clocks and make other accommodations (Htun 2020) to retain women as model scientists. Diversity in science is also threatened as individuals from underrepresented groups already coping with disadvantages and discrimination have their difficulties compounded (Maas et al. 2020). Some of us are first-generation students with limited family connections to educational systems, and we hope the scientific community will develop sustained supports that can have positive impacts on our educational outcomes. The task of increasing faculty and student diversity should not be sidetracked during the pandemic. A more equitable and unified scientific community will also be more effective in combating misinformation that can affect responses to public health advisories.

The influences of the coronavirus on science education will only be fully realized in the future. Today, we are uncertain how graduate, medical, and other professional schools will view our applications to extend training, and if and how admissions officers will weigh the impact of the pandemic on academic performance. We have been adjusting to unfamiliar modes of learning and trying to balance maintaining grade point averages hindered by COVID-19 with social stress, family, finances, and fatigue, while on the threshold of adulthood

and the need to meet its requirements. Transcripts will not tell our whole story. Until the crisis is resolved, we hope (and expect) that undergraduate interests will be safeguarded. Appropriate academic, social, and financial accommodations must be made for students most affected by the pandemic. We welcome communication with our teachers and mentors and their receptivity and accessibility, and appreciate that they acknowledge and value our mental wellness. We want to be part of the conversation and have audible and clear voices.

Bearing witness to disappointing and disturbing behavior, coping with anxiety, working through the disadvantages of remote learning, and constraints on engaging in research have not, however, decreased our interest in science. The pandemic and post-truth society would appear to test our resolve, but in fact have strengthened our commitment to continue on career paths in science and medicine. We recognize science as the path forward to knowing, and keep the faith.

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