

## **Carly A. Busch**

Ph.D. Candidate  
School of Life Sciences  
Arizona State University  
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### **EDUCATION**

#### **Arizona State University, Tempe, AZ (2020 – present)**

Ph.D. in Biology, expected May 2024

Concentration: Undergraduate Biology Education

Advisors: Drs. Katelyn Cooper and Sara Brownell

#### **Whitman College, Walla Walla, WA (2011 – 2015)**

B.A. in Biology, Minor in Mathematics

#### **School for Field Studies, South Caicos, Turks & Caicos Islands (Spring 2014)**

Center for Marine Resources Studies

### **GRANTS AND AWARDS**

National Science Foundation Graduate Research Fellowship Program 2020-2025, \$138,000

Arizona State University Institute for Social Science Research (ISSR) Graduate Student Poster Contest, Second Place in Completed Research Category, \$1000

American Association for the Advancement of Science (AAAS) Social Sciences Graduate Student e-Poster Competition Honorable Mention, 2023

AAAS Social Sciences Graduate Student e-Poster Competition Winner, 2022, \$500

American Physiological Society Teaching of Physiology Research Recognition Award, 2021, \$500

Arizona State University College of Liberal Arts and Sciences, Graduate Excellence Award, 2021-2022, \$100

Arizona State University College of Liberal Arts and Sciences, Graduate Excellence Award, 2020-2021, \$100

#### **Travel awards to attend meetings or to visit other institutions**

Gordon Research Conference Travel Award, Summer 2023

Arizona State University Graduate and Professional Student Association Travel Grant, FY 2022-23, \$950

Arizona State University School of Life Sciences Graduate Student Travel Award, Q1 2023-24, \$400

Arizona State University School of Life Sciences Graduate Student Travel Award, Q1 2022-23, \$400

Society for the Advancement of Biology Education Research (SABER) DBER-SiT Travel Grant, Summer 2022, \$600

Arizona State University Graduate College Travel Award, Q1 2023-24, \$300

Arizona State University Graduate College Travel Award, Q3 2022-23, \$100

Arizona State University Graduate College Travel Award, Q1 2022-23, \$300

Arizona State University Graduate College Travel Award, Q3 2021-22, \$170  
Arizona State University Graduate College Travel Award, Q2 2021-22, \$125  
Arizona State University Graduate College Travel Award, Q1 2021-22, \$186.50  
Arizona State University Graduate College Travel Award, Q4 2020-21, \$70

## **PUBLICATIONS**

### **In press**

10. Wiggins BL, Lily LS<sup>#</sup>, **Busch CA<sup>#</sup>**, Landys MM<sup>#</sup>, Shlichta JG<sup>#</sup>, Shi T<sup>#</sup>, Ngwenyama TR<sup>#</sup>. (2023). Public exams may decrease anxiety and facilitate deeper conceptual thinking. *Journal of STEM Education: Innovations and Research*. <sup>#</sup>These authors contributed equally.

9. **Busch CA**, Cooper KM, Brownell SE. Women drive efforts to highlight concealable stigmatized identities in U.S. academic science and engineering. In press at *PLOS ONE*.

### **Peer Reviewed Journal Articles**

8. **Busch CA<sup>\*</sup>**, Weisenthal NJ<sup>\*</sup>, Mohammed TF, Anderson S<sup>^</sup>, Barstow M<sup>^</sup>, Custalow C<sup>^</sup>, Gajewski J<sup>^</sup>, Garcia K<sup>^</sup>, Gilabert C<sup>^</sup>, Hughes J<sup>^</sup>, Jenkins A<sup>^</sup>, Johnson M<sup>^</sup>, Kasper C<sup>^</sup>, Perez I<sup>^</sup>, Robnett B<sup>^</sup>, Tillett K<sup>^</sup>, Tsefrekas L<sup>^</sup>, Goodwin EC, Cooper KM. [The disproportionate impact of fear of negative evaluation first-generation college students, LGBTQ+ students, and students with disabilities in college science courses](#). *CBE-Life Sciences Education*, 22(3), ar4. <sup>\*</sup>These first authors contributed equally. <sup>^</sup>These authors contributed equally.

### **Commentary**

LaNoüe, M. (2023). [Time zones not an issue for ASU Online undergrads in research program](#). *ASU News*.

7. Araghi T<sup>\*</sup>, **Busch CA<sup>\*</sup>**, Cooper KM. [The aspects of active learning science courses that exacerbate and alleviate depression in undergraduates](#). *CBE—Life Sciences Education*, 22(2), ar10. <sup>\*</sup>These authors contributed equally

### **Commentary**

Perkins, D. (2023). [ASU study finds active learning can alleviate depression for undergraduates](#). *ASU News*.

6. **Busch CA**, Mohammed TF<sup>#</sup>, Nadile EM<sup>#</sup>, Witt ML<sup>\*</sup>, Vargas C<sup>\*</sup>, Tran M<sup>\*</sup>, Gazing Wolf J<sup>\*</sup>, Brister D<sup>\*</sup>, Cooper KM. (2023). [Costs and benefits of undergraduates revealing depression to online science instructors](#). *CBE—Life Sciences Education*, 22(1), ar9. <sup>#</sup>These authors contributed equally. <sup>\*</sup>These authors contributed equally.

5. Abraham AE, **Busch CA**, Brownell SE, Cooper KM. (2022). [Should I write about mental health on my med school app? Examining medical school admissions committee members' biases regarding mental health conditions](#). *Advances in Physiology Education*, 46(4), 526-539.

4. **Busch CA**, Mohammed TF, Nadile EM, Cooper KM. (2022). [Aspects of online college science courses that alleviate and exacerbate undergraduate depression](#). *PLoS ONE* 17(6): e0269201. doi:10.1371/journal.pone.0269201

3. **Busch CA**, Supriya K, Cooper KM\*, Brownell SE\* (2022). [Unveiling concealable stigmatized identities in class: The impact of an instructor revealing her LGBTQ+ identity to students in a large-enrollment biology course](#). *CBE-Life Sciences Education*, 21(2). doi:10.1187/cbe.21-06-0162 \*These senior authors contributed equally.

### Commentary

Whitby, L. (2022). [Study indicates perceived impact of a STEM instructor revealing LGBTQ identity to students](#). *ASU News*.

Compton, J. (2022). [This professor is making biology education more inclusive for LGBTQ undergrads](#). *NBC News*.

Featured by The College of Liberal Arts and Sciences at ASU in their [Pride Month social media campaign](#), 2022.

Featured in the NSF-funded [STEM for all Video Showcase](#), 2022.

2. Abraham AE, **Busch CA**, Brownell SE\*, Cooper KM\* (2022). [Instructor perceptions of student incivility in the online undergraduate science classroom](#). *Journal of Microbiology & Biology Education*, e00271-21. \*These senior authors contributed equally.

1. Mohammed TF<sup>#</sup>, Nadile EM<sup>#</sup>, **Busch CA**<sup>#</sup>, Brister D\*, Brownell SE, Claiborne CT\*, Edwards BA\*, Gazing Wolf J\*, Lunt C\*, Tran M\*, Vargas C\*, Walker KM\*, Warkina TD\*, Witt ML\*, Zheng Y, Cooper KM. (2021). [Aspects of large-enrollment online college science courses that exacerbate and alleviate student anxiety](#). *CBE–Life Sciences Education*, 20(4). doi:10.1187/cbe.21-05-0132 <sup>#</sup>These first authors contributed equally. \*These authors contributed equally.

### Manuscripts under re-review after revision

**Busch CA**<sup>#</sup>, Nadile EM<sup>#</sup>, Mohammed TF, Gin LE, Brownell SE, Cooper KM. The scientific rules, roles, and values that life sciences graduate students want to see upheld by undergraduate researchers. Under review at *The Journal of Research in Science Teaching*. <sup>#</sup>These first authors contributed equally.

### Manuscripts invited for revision after peer review

Ghosh A, Cohen KA, Jans L, **Busch CA**, McDanal R, Yang Y, Cooper KM, Schleider JL. [A digital single-session intervention \(Project Engage\) to address fear of negative evaluation among college students: a pilot randomized controlled trial](#). *JMIR Preprints*. 11/05/2023:48926. Under review at *JMIR Mental Health*.

### Guest Blogs

**Busch, CA.** (2021, September) Creating More LGBTQIA-Inclusive Biology Learning Environments. American Society for Microbiology article.  
<https://asm.org/Articles/2021/September/Creating-more-LGBTQIA-inclusive-biology-learning-e>

### **Scientific Conference Proceedings**

**Busch CA.** (2022). [Disclosure Decisions: Science and Engineering Instructors as Role Models with Concealable Stigmatized Identities](#). European Science Education Research Association (ESERA) Summer School eBook of Synopses.

## **PRESENTATIONS**

### **Invited talks and seminars**

7. **Busch CA.** Exploring the Importance of Instructors' Concealable Stigmatized Identities. Arizona State University Online Webinars. Tempe, AZ. February 2023.
6. **Busch CA.** Inclusion is not about just gender and race: The diversity of identities that are important to consider. Natural Sciences Inclusion Summit. Research for Inclusive STEM Education Center. Arizona State University. Tempe, AZ. November 2022.  
*Recording available [here, from minutes 1:03:25 - 1:12:53](#)*
5. **Busch CA.** Disclosure decisions: Exploring the concealable stigmatized identities of science instructors. ROSE Network. University of Alabama, Birmingham. Virtual presentation. October 2022.
4. **Busch CA.** Disclosure decisions: Exploring the concealable stigmatized identities of science and engineering instructors. Biology Learning and Teaching Community. Department of Biology. University of Washington. Seattle, WA. Virtual presentation due to COVID-19. April 2022.
3. **Busch CA.** Coming Out to the Class: Students Benefit from an Instructor Revealing her LGBTQ+ Identity in a Large-enrollment Biology Course. School of Life Sciences Graduate Honors Symposium. Arizona State University. Tempe, AZ. March 2022.
2. **Busch CA.** Disclosure decisions: Exploring the concealable stigmatized identities of science and engineering instructors. Biology and Society Seminar. Arizona State University. Tempe, AZ. March 2022.
1. **Busch CA.** Coming Out to the Class: Students Benefit from an Instructor Revealing her LGBTQ+ Identity in a Large-enrollment Biology Course. Scientific Queeries, University of Alberta. Edmonton, Canada. Virtual presentation due to COVID-19. June 2021.

### **Peer-reviewed talks**

10. **Busch CA.** Revealing an LGBTQ+ identity improves student-instructor rapport among undergraduate biology students in a randomized study. Society for the Advancement of Biology Education Research (SABER). Minneapolis, MN, USA. July 2023.
9. **Busch CA.** Disclosure Decisions: Science and engineering instructors as role models with concealable stigmatized identities. European Society for Education Research Association (ESERA) Summer School. Utrecht, The Netherlands. August 2022.
8. **Busch CA.** Disclosure decisions: Exploring the concealable stigmatized identities of science and engineering instructors. Society for the Advancement of Biology Education Research (SABER). Minneapolis, MN, USA. July 2022.
7. **Busch CA, Mohammed TF.** The Impact of Online College Science Courses on Student Depression. Society for the Advancement of Biology Education Research (SABER) West 2022. Irvine, CA, USA. January 2022. *Conference cancelled due to COVID-19.*
6. **Busch CA.** Coming out to the class: Students benefit from an instructor revealing her LGBTQ+ identity in a large-enrollment biology course. Society for Integrative and Comparative Biology (SICB) Annual Meeting. Phoenix, AZ, USA. January 2022.
5. **Busch CA.** Coming Out to the Class: Students Benefit from an Instructor Revealing her LGBTQ+ Identity in a Large-enrollment Biology Course. Out in Science, Technology, Engineering, and Mathematics (oSTEM). Held remotely due to COVID-19. October 2021.
4. **Busch CA.** Coming out to the class: Students benefit from instructor revealing LGBTQ+ identity in a large-enrollment biology course. American Chemical Society (ACS). Held remotely due to COVID-19. August 2021.
3. **Busch CA.** Coming Out to the Class: Students Benefit from Instructor Revealing LGBTQ+ Identity in a Large-enrollment Biology Course. Society for the Advancement of Biology Education Research (SABER). Held remotely due to COVID-19. July 2021.
2. **Busch CA.** Creating more inclusive biology learning environments for LGBTQ+ individuals. American Society for Microbiology Conference of Undergraduate Educators (ASMCUE). Held remotely due to COVID-19. June 2021.
1. **Busch CA.** Students Benefit from Instructor Revealing LGBTQ+ Identity in an Upper-level Physiology Course. Experimental Biology (EB). Held remotely due to COVID-19. April 2021.

### **Conference poster presentations**

15. **Busch CA.** Stressed out: Identifying the sources of pre-med student stress. Society for the Advancement of Biology Education Research (SABER). Minneapolis, MN, USA. July 2023.

14. **Busch CA.** Undergraduates have few science instructor role models with concealable stigmatized identities. Undergraduate Biology Education Research (UBER) Gordon Research Conference. Lewiston, ME, USA. June 2023.
13. **Busch CA.** An instructor revealing an LGBTQ+ identity improves student-instructor rapport among undergraduate biology students in a randomized study. Undergraduate Biology Education Research (UBER) Gordon Research Seminar. Lewiston, ME, USA. June 2023.
12. **Busch CA.** Women drive efforts to highlight concealable stigmatized identities in U.S. academic science and engineering. Institute for Social Science Research. Arizona State University. Spring 2023 Graduate Student Poster Contest. Tempe, AZ, USA. March 2023.  
*Second place winner in the completed research category.*
11. **Busch CA.** Women drive efforts to highlight concealable stigmatized identities in science. AAAS Annual Meeting. Washington, DC, USA. March 2023.  
*Honorable mention in the graduate social sciences AAAS e-poster competition.*
10. **Busch CA.** Women drive efforts to highlight concealable stigmatized identities in U.S. academic science and engineering. Society for the Advancement of Biology Education Research (SABER) West Regional Meeting. Irvine, CA, USA. January 2023.
9. **Busch CA.** Coming out in academia: Factors that influence instructor decisions to reveal their LGBTQ+ identities to undergraduates. Natural Sciences Inclusion Summit, Arizona State University. Tempe, AZ, USA. November 2022.
8. **Busch CA.** Disclosure Decisions: Science and engineering instructors as role models with concealable stigmatized identities. European Society for Education Research Association (ESERA) Summer School. Utrecht, The Netherlands. August 2022.
7. **Busch CA.** Coming out in academia: Factors that influence instructor decisions to reveal their LGBTQ+ identities to undergraduates. Society for the Advancement of Biology Education Research (SABER). Minneapolis, MN, USA. July 2022.
6. **Busch CA.** The scientific rules, roles, and values that life sciences graduate students want to see upheld by undergraduate researchers. Society for the Advancement of Biology Education Research (SABER). Minneapolis, MN, USA. July 2022.
5. **Busch CA.** Coming Out To The Class: Students Benefit When Instructor Reveals Her LGBTQ+ Identity. AAAS Annual Meeting e-poster. February 2022.  
*First place winner in the graduate social sciences AAAS e-poster competition*
4. **Busch CA.** Coming Out to the Class: Students Benefit from an Instructor Revealing her LGBTQ+ Identity in a Large-enrollment Biology Course. American Society for Cell Biology (ASCB) Cell Bio Virtual 2021. December 2021.

3. **Busch CA.** To what extent do science and engineering instructors reveal or conceal potentially invisible identities to students? Society for the Advancement of Biology Education Research (SABER). Held remotely due to COVID-19. July 2021.

2. **Busch CA.** Students Benefit from Instructor Revealing LGBTQ+ Identity in an Upper-level Physiology Course. Experimental Biology (EB). Held remotely due to COVID-19. April 2021.

1. **Busch CA.** Students Benefit from Instructor Revealing LGBTQ+ Identity in an Upper-level Physiology Course. Institute for Social Science Research. Arizona State University. Spring 2021 Graduate Student Poster Contest. February 2021.

### **Trainee peer-reviewed talks and poster presentations**

14. Barstow M, Busch CA, Cooper KM, Brownell SE. Breaking the Silence: Exploring the disclosure of LGBTQ+ identities among science and engineering instructors. ASU School of Life Sciences Annual Undergraduate Research Poster Symposium. Tempe, AZ. April 2023.

13. Barstow M, Busch CA, Cooper KM. Concealable stigmatized identities of college STEM instructors: Anxiety and depression. ASU School of Life Sciences Annual Undergraduate Research Poster Symposium. Tempe, AZ. April 2023.

*Third prize winner in biology education category.*

12. Barstow M, Busch CA, Cooper KM. Concealable stigmatized identities of college STEM instructors: Anxiety and depression. Online Undergraduate Research Scholars (OURS) Poster Symposium. Tempe, AZ. April 2023.

11. Abraham AE, Busch CA, Brownell SE, Cooper KM. Can I write about my mental health on my medical school application? Medical school admissions committees' potential biases towards mental health conditions (poster). SABER West Regional Meeting. Irvine, CA. January 2023.

10. Araghi T, Busch CA, Cooper KM. Exploring undergraduate students' experiences with depression in active learning science courses (talk). SABER West Regional Meeting. Irvine, CA. January 2023.

9. Araghi T, Busch CA, Cooper KM. Students are reluctant to label depression as a disability despite experiencing limitations in college science courses (poster). SABER West Regional Meeting. Irvine, CA. January 2023.

8. Abraham AE, Busch CA, Brownell SE, Cooper KM. Can I write about my mental health on my medical school application? Medical school admissions committees' potential biases towards mental health conditions (poster). Society for the Advancement of Biology Education Research (SABER) Annual Meeting. Minneapolis, MN. July 2022.

7. Araghi T, Busch CA, Cooper KM, Brownell SE. Students are reluctant to label depression as a disability despite experiencing limitations in college science courses (poster). Society for the

Advancement of Biology Education Research (SABER) Annual Meeting. Minneapolis, MN. July 2022.

6. Araghi T, Busch CA, Cooper KM. Exploring undergraduate students' experiences with depression in active learning science courses (talk). Society for the Advancement of Biology Education Research (SABER) Annual Meeting. Minneapolis, MN. July 2022.

5. Araghi T, Busch CA, Cooper KM. Exploring undergraduate students' experiences with depression in active learning science courses (poster). Barrett, The Honors College Celebrating Honors Thesis Symposium. Tempe, AZ. April 2022.

4. Abraham AE, Busch CA, Brownell SE, Cooper KM. Medical school admission committee members' potential biases towards mental health conditions (poster). Barrett, The Honors College Celebrating Honors Thesis Symposium. Tempe, AZ. April 2022.

3. Abraham AE, Busch CA, Brownell SE, Cooper KM. Instructor perceptions of undergraduate incivility in online science courses (poster). Experimental Biology (EB) Annual Meeting. Philadelphia, PA. April 2022.

*Winner of APS Horowitz Outstanding Undergraduate Abstract Award*

*Winner of APS Research Excellence Award*

2. Abraham AE, Busch CA, Brownell SE, Cooper KM. Instructor perceptions of undergraduate incivility in online science courses (poster). American Association for the Advancement of Science (AAAS) Annual Meeting. Held remotely due to COVID-19. February 2022.

*Finalist in the undergraduate science in society AAAS e-poster competition*

1. Abraham AE, Busch CA, Brownell SE, Cooper KM. Instructor perceptions of student incivility in the online undergraduate science classroom (poster). BioSci Southwest Symposium. Tempe, AZ. October 2021.

## **RESEARCH-RELATED MEDIA APPEARANCES AND INTERVIEWS**

### **ASU press**

- [Time zones not an issue for ASU Online undergrads in research program.](#) ASU News. June 2023.
  - Article highlights the research team – online undergraduate students in a course-based undergraduate research experience (CURE) – in Busch, Wiesenthal et al., 2023 which found that LGBTQ+ students, first-generation students, and students with disabilities disproportionately experience fear of negative evaluation in large-enrollment science courses.
- [ASU study finds active learning can alleviate depression for undergraduates.](#) ASU News. May 2023.
  - Article highlights the findings of Araghi, Busch, Cooper, 2023 that active learning courses can help alleviate undergraduate's depressive symptoms

- [\*Study indicates perceived impact of a STEM instructor revealing LGBTQ identity to students\*](#). *ASU News*. June 2022.
  - Article highlights the findings of our study (Busch et al., 2022) that an instructor coming out in class has a positive impact on students
- [\*Life sciences graduate students awarded NSF fellowships\*](#). *ASU News*. April 2022.
  - Article highlights Cooper lab NSF GRFP winners: incoming graduate student Jynx Pigart-Coleman (2022) current graduate students Tasneem Mohammed (2022), Nicholas Wiesenthal (2022), Carly Busch (2020), and alumnus Logan Gin (2017).
- [\*NSF Graduate Research Fellowship Program \(GRFP\) recognizes 4 outstanding CBS graduate students\*](#). *Center for Biology and Society*. April 2022.
  - Article highlights Cooper lab NSF GRFP winners: incoming graduate student Jynx Pigart-Coleman (2022) current graduate students Tasneem Mohammed (2022), Nicholas Wiesenthal (2022), and Carly Busch (2020).

## **TEACHING EXPERIENCE**

### **Arizona State University, School of Life Sciences (2020 – present)**

- **Instructor of Record**, BIO 494, Biology Education Research, Spring 2023
  - Course-based undergraduate research experience (CURE) for undergraduates in ASU's fully online program
- **Research Assistant**, BIO 494 Biology Education Research, Spring 2022
  - Course-based undergraduate research experience (CURE) for undergraduates in ASU's fully online program
  - Research conducted as a part of the course led to a submitted manuscript with all undergraduate students as co-authors
- **Teaching Assistant**, BIO 360 Animal Physiology, Fall 2020
  - Designed and implemented weekly recitation sessions which incorporated a variety of active learning activities
  - Fostered a sense of community among students in small groups

### **University of Washington, Seattle, Department of Biology (2018 – 2020)**

- **Course Coordinator**, BIO 200, Introductory Biology II: Cell and Molecular Biology, Summer 2020
- **Faculty Teaching Associate**, BIO 180, Introductory Biology I: Ecology and Evolution, Fall 2018, Winter 2019, Fall 2019
- **Faculty Teaching Associate**, BIO 200, Introductory Biology II: Cell and Molecular Biology, Winter 2020, Spring 2020; Course Coordinator Summer 2020
- **Faculty Teaching Associate**, BIO 220, Introductory Biology III: Plant and Animal Physiology, Spring 2019

### **Guest Lectures**

- BIO 494 Biology Education Research, March 2022: Introduction to R

## **MENTORSHIP EXPERIENCE**

### **Trainees mentored as a graduate student in biology education research, Arizona State University**

- Parth Bhandari, 2022 – present
- Margaret Barstow, 2022 – 2023
  - *Mentorship led to 2 publications*
- Anna Abraham, Barrett Honors student, 2021 – 2022
  - *Mentorship led to 2 first-author publications*
- Tala Araghi, Barrett Honors student, 2020 – present
  - *Mentorship led to 2 first-author publications*
- Jingyi He, undergraduate student, 2020 – 2022

### **CURE students who continued conducting research in the lab, Arizona State University**

- Cindy Vargas, Environmental Life Sciences PhD student, 2020- 2022
  - *Mentored research led to 2 publications*
- Madison Witt, undergraduate SOLS student, 2020- 2022
  - *Mentored research led to 2 publications*
- Missy Tran, undergraduate SOLS student, 2020- 2022
  - *Mentored research led to 2 publications*
- Joseph Gazing Wolf, Environmental Life Sciences PhD student, 2020- 2022
  - *Mentored research led to 2 publications*
- Danielle Brister, undergraduate SOLS student, 2020- 2022
  - *Mentored research led to 2 publications*

## **PROFESSIONAL SERVICE**

- Society for the Advancement of Biology Education National Conference 2022, 23 abstract reviewer
- Society for the Advancement of Biology Education West Conference 2022, 23 abstract reviewer
- Distinguished Advisor (2020) - STEM – Office of Distinguished Graduate Fellowships, Graduate College, Arizona State University – for the National Science Foundation Graduate Research Fellowship Program
  - Provided feedback and support for two graduate students applying for the NSF GRFP
  - Specifically helped applicants improve the Broader Impacts and Intellectual Merit of their personal and research statements

## **PROFESSIONAL SOCIETY MEMBERSHIPS**

- Society for the Advancement of Biology Education Research (SABER) (2021 – present)
- American Physiology Society (APS) (2021 – present)
- American Association for the Advancement of Science (AAAS) (2022 – present)
- European Science Education Research Association (ESERA) (2022)
- American Society for Cell Biology (ASCB) (2021)
- American Society of Microbiology (ASM) (2021)

- American Chemical Society (ACS) (2021)