



# The Effects of Interventions on the Physical and Mental Health of Undergraduate Engineering Students in North America

Jillian Prince<sup>1</sup>, Ashton Human<sup>1</sup>, Laura Cameron<sup>1</sup>, Erin K. Howie<sup>1</sup>, Kaitlin M. Gallagher<sup>1</sup>

<sup>1</sup>University of Arkansas, Fayetteville, Arkansas

jrprince@uark.edu

UNIVERSITY OF ARKANSAS

## Background

- Stress-induced mental illnesses are common in many undergraduate engineering students<sup>1</sup>
- These can include anxiety, depression, lack of motivation, poor self-regulation, and poor sleeping habits<sup>1</sup>
- Ailments such as these result in decreased retention, lower grades, less cognitive understanding of material, and poor physical and mental health<sup>2</sup>

## Purpose

To investigate the effects of interventions on the physical and mental health of undergraduate engineering students in North America to determine what interventions are most successful.

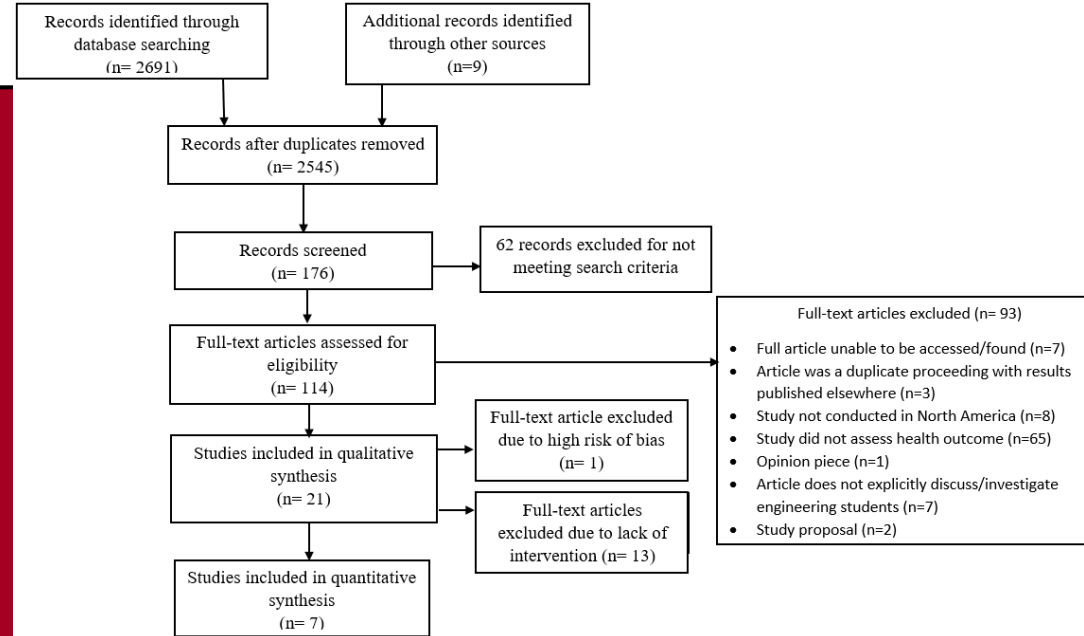
## Search Strategy and Methods

- Paper Inclusion Criteria
  - Conducted in North America
  - Investigated health-related outcomes
  - Investigated undergraduate engineering students
  - Included any type of intervention
- Outcomes
  - Primary: mental/ physical health variables
  - Secondary: variables measuring academic success
- Identification of relevant articles and paper quality assessment
- Data extraction
  - Exposure to interventions
  - Mental health status
  - Physical health status

## Papers

- PRISMA 2009 checklist used to guide methodology and reporting
- 2670 total records identified
- 176 abstracts screened
- 114 full-text records assessed for eligibility
  - 106 records excluded for not meeting search criteria
  - 1 record excluded due to high risk of bias
- 7 studies included in quantitative synthesis

## PRISMA Diagram



## Results

Kames et al. (2019) <sup>3</sup>	Anxiety decreased while self-efficacy, self-regulation, and cognitive and intrinsic values increased when given additional individual resources (mentors and feedback)
Koulanova et al. (2018) <sup>4</sup>	Physical activity breaks during lecture resulted in higher enjoyment of course as well as higher end of course grades
Eren-Sisman et al. (2018) <sup>5</sup>	Peer-led workshops alleviated students' chemistry anxiety as well as improving the cognitive understanding of the course
Senkpeil (2018) <sup>6</sup>	Tutoring sessions lead to an improvement in study habits and reduction in test anxiety
Lynch (2017) <sup>7</sup>	I-C-D implementation improved satisfaction, student motivation, and performance values
Weatherby (2002) <sup>8</sup>	Tutoring programs led to more confidence in learning math, lowered math anxiety, and higher GPAs than control group
Whigham (1986) <sup>9</sup>	After taking a class to provide female undergraduate engineering students with role models in engineering, students reported a greater awareness of women in engineering

## Future Work

- Increased studies regarding interventions based off physical activity and how this can improve retention, motivation, and overall physical and mental health
- Expansion on study to examine the effects of interventions on the physical and mental health of undergraduate engineering students in areas outside of North America
- Increased investigations on how differing engineering disciplines respond to the demands of undergraduate education
  - More focus on the varying course loads and stress levels in each disciplines and which interventions provide the most positive outcomes on learning

## References

1. Danowitz, A., & Beddoes, K. (2018). Characterizing mental health and wellness in students across engineering disciplines. In *2018 The Collaborative Network for Engineering and Computing Diversity Conference Proceedings*.
2. Ohland, M. W., Sheppard, S. D., Lichtenstein, G., Eris, O., Chachra, D., & Layton, R. A. (2008). Persistence, engagement, and migration in engineering programs. *Journal of Engineering Education (Washington, D.C.)*, 97(3), 259-278. doi:10.1002/j.2168-9830.2008.tb00978.x
3. Kames, Elisabeth, et al. "The Implementation of an Intervention Plan to Improve Student Motivation and Performance in Mechanical Engineering Senior Design Capstone." *International Journal of Engineering Education*, vol. 35, no. 3, 2019, pp. 779–794., doi:10.18260/1-2--31971.
4. Koulanova, Alyona, et al. "Fit-Breaks: Incorporating Physical Activity Breaks in Introductory CS Lectures." *Proceedings of the 23rd Annual ACM Conference on Innovation and Technology in Computer Science Education*, 2018, doi:10.1145/3197091.3197115.
5. Eren-Sisman, E. N., et al. "The Effect of Peer-Led Team Learning on Undergraduate Engineering Students' Conceptual Understanding, State Anxiety, and Social Anxiety." *Chemistry Education Research and Practice*, vol. 19, no. 3, 2018, pp. 694–710., doi:10.1039/c7rp00201g.
6. Senkpeil, Ryan. "Understanding and Improving the Non-Cognitive Factors That Affect First-Year Engineering Performance." *Purdue University*, 2018.
7. Lynch, Paul, et al. "The I-C-D-M Methodology Improving Undergraduate Engineering Student Motivation, Satisfaction, and Performance." *2017 IEEE Frontiers in Education Conference (FIE)*, 2017, doi:10.1109/fie.2017.8190693.
8. Weatherby, Dennis Wayne. "Comparative Effects of Mathematics Intervention Strategies on Minority Engineering Students' Success." *Auburn University*, 2002.
9. Whigham, Myrna A. "Variables Related to the Academic Success of Women Engineering Students." *Iowa State University*, 1985.