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UD students honored with Horwitz/Horowitz Award for undergraduate research in physiology

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By Bridgett Dillenburg '23

Two University of Dayton students received 2022 Barbara A. Horwitz and John M. Horowitz Undergraduate Research Awards from the American Physiological Society and presented their research at the annual international Experimental Biology Conference, April 2-5, in Philadelphia.

Paige Kompa, a junior pre-medicine major from Upper Arlington, Ohio, and Nicole Hetrick, a senior pre-medicine major from Massillon, Ohio, were awardees for the Outstanding Undergraduate Abstract Award. Both students worked under the guidance of Anne Crecelius, associate professor of health and sport science.

Kompa was among the top 10 finalists for her abstract “Effects of Systemic Hypoxia on Motor Control Performance and Brain Blood Flow in Healthy, Young Humans.” She worked with the Integrative Human Physiology Laboratory and the Empower Lab in the mechanical engineering department. Her work is part of a multi-university research initiative (MURI) project supported by the Office of Naval Research.

Kompa’s research focused on the need of blood flow to the brain for daily functions and motor skills. Hypoxia, or low-oxygen air, is associated with increases in the fight or flight response of the sympathetic nervous system and can impact heart rate, blood pressure and blood flow to the brain. Kompa said few studies have researched these impacts of hypoxia on motor control performance.

Kompa and her team hypothesized that motor control performance would be impaired by hypoxia, despite increased blood flow. She measured motor control performance in 14 participants, including fellow members of the UD EMS squad, through a 90-minute process using a computer joystick.

Subjects performed the task with either hypoxic gas, which is 10% oxygen, or normal air, which is 21% oxygen. Then, they repeated this process with the opposite stimulus to compare effects. Kompa said it was rewarding to obtain data with the advanced measuring tools and techniques.

Kompa said she was fortunate to have the opportunity to work on this project. She praised Crecelius for her mentorship.

“Dr. Anne Crecelius has played a pivotal role in several aspects of my life, even beyond the laboratory setting,” she said. “She has been an extraordinary mentor to learn from and I can sincerely say she has been my biggest influence at the University of Dayton.”

Kompa will continue researching alongside Crecelius and hopes to present at future conferences next year. She plans to attend medical school after graduation.

“Having the experience of working on a prolonged research project, being involved in a grant of this magnitude and Dr. Crecelius’ mentorship has driven me to be a lifelong scientist and pursue research while attending medical school,” Kompa said. “One of the biggest lessons I have learned and a skill I am constantly working on is thinking scientifically and outside the box while problem solving. Research allows me to practice this on a daily basis.”

Crecelius said Kompa has successfully balanced her research with other commitments, including mentoring other students.

“By the end of her time in the lab, she’ll have a vast amount of projects she’s been involved in, particularly for an undergrad,” Crecelius said. “She really has been key to my efforts in our funded MURI work.”

Hetrick focused her research on cognitive differences between competitive gamers and non-gamers regarding fitness and stress responses. Hetrick concentrated on esports, a form of competitive gaming involving video games.

“Nicole really demonstrated her initiative and independence in her project, recruiting a select population of competitive gamers and implementing a new cognitive testing software into the lab,” Crecelius said.

In her esports research, Hetrick’s participants completed six cognitive tests for problem solving, visual tracking, spatial recognition and decision making. Hetrick monitored the stress responses of the sympathetic nervous system through heart rate and pressure.

Participants also were measured based on their fitness skills: muscular strength through a hand-grip tool, muscular endurance through a sit-up test, flexibility through a sit and reach test and aerobic capacity through a treadmill.

Other skills measured included power, balance and hand-eye coordination.

While there were no significant differences seen in the fitness tests, there were significant differences in the cognitive tests. Hetrick said this experience will be beneficial when she attends medical school at Marian University after graduation. She connected her research to her on-campus activities as well, such as working as an EMT and a supplemental instructor for the University.

“These opportunities have allowed me to help others through acquiring new knowledge, caring for others, and helping teach and support other students,” Hetrick said. “This research has given me the opportunity to learn more about the process of acquiring new knowledge and findings, and it has given me a better understanding of the scientific method. I think this will be very important as I plan to continue gaining further research experience in medical school.”

Hetrick credits Crecelius’ guidance for her Horwitz/Horowitz awards recognition.

“Nicole demonstrates true joy and enthusiasm towards research and the learning process,” Crecelius said. “She took what was just an idea and shepherded it to a successful project, working fairly independently most of the time. I’m excited to see what great things lie ahead for her in medical school and beyond.”

Crecelius said experiences such as the Experimental Biology Conference and Horwitz/Horowitz awards help students prepare for their future careers.

“Both students were able to engage with a variety of interviewers and speak about their work, preparing them for future similar interactions with professionals in the field,” she said. “In addition, I think that any time hard work is recognized, it helps to support the dedication and effort that has been put into the project.”

Crecelius said these awards help bring national recognition to the University and related programs. Both students were supported by the Honors Program and the Dean's fellowship awards, which comes from the Dean's Excellence Fund.

"In Philadelphia, during the APS undergraduate poster session, more than a hundred people from some of the biggest and best institutions got to see Paige and Nicole's names, along with 'University of Dayton' when they received their awards," Crecelius said. "It becomes clear that our institution is providing exceptional opportunities to undergraduate researchers."

Photo (left to right): Nicole Hetrick and Paige Kompa