At the Intersection of Research and Public Health

Sarah Moss
Dordt College, sarah.moss@dordt.edu

Follow this and additional works at: https://digitalcollections.dordt.edu/voice
Part of the Christianity Commons, and the Higher Education Commons

Recommended Citation
Available at: https://digitalcollections.dordt.edu/voice/vol63/iss3/15

This Features is brought to you for free and open access by the College Publications at Digital Collections @ Dordt. It has been accepted for inclusion in Dordt Voice, 2016- by an authorized editor of Digital Collections @ Dordt. For more information, please contact ingrid.mulder@dordt.edu.
Soon after Matt Bolt ('17) decided to major in psychology, he realized that his interests were a little different from those of his fellow majors: He just wasn’t as passionate about clinical or therapeutic psychology. He liked numbers—how psychology uses evidence to make sense of philosophical struggles and daily realities. And he was intrigued by the concept of predicting behavior based on the collection of information.

So Bolt talked with Dr. Luralyn Helming, associate professor of psychology. “Dr. Helming really likes research, and we’d bonded over that,” says Bolt. “She put me in contact with Tintle.”

Dr. Nathan Tintle, professor of statistics, has built his career on research, amassing more than 75 published papers and more than 30 grants on genetics, biostatistics, and statistics education. Tintle told Bolt about a mental health study in Ukraine that he has worked on...
since his graduate school years at the State University of New York—Stony Brook. The data set for the project includes survey results from 5,000 Ukrainians on questions related to depression, panic disorder, generalized anxiety disorder, substance abuse, PTSD, and more. Tintle, Helming, psychology professor Dr. Mark Christians, and history professor Dr. Mark McCarthy had just submitted a grant application for what has since become Dordt’s Ukraine Research Experience for Undergraduates (REU), a program funded by the National Science Foundation.

Bolt applied to work for Tintle as a summer research student. He spent the next summer poring over the Ukraine data, studying variable relationships and researching what experts had to say about Ukrainian mental health issues. Eventually he started researching the Chernobyl nuclear disaster.

"Any man-made or natural disaster causes a lot of stress. Stress can be dealt with in a lot of different ways, but if dealt with inadequately, it can lead to mental health problems," says Bolt.

By the time he graduated from Dordt in 2017, Bolt had landed a job as a research assistant at the University of Colorado Colorado Springs. His first paper on the Chernobyl nuclear disaster was published this spring.

"My research experience with Tintle has completely driven the direction of my career," says Bolt. "He taught me almost everything I know about statistics, which is pretty cool."

IMPROVING HEALTH THROUGH RESEARCH

Tintle is a reputable researcher and academic; he is the author of an innovative textbook on statistical education, and he has won numerous awards for his academic work. What primarily drives him as a researcher and statistician, though, is the opportunity to mentor undergraduate students like Bolt and to work on research projects that make an impact.

"I want to do work that helps people have a better quality of life," says Tintle. "I know where my God-given gifts are, and some of my students have gifts in this same area of making sense of data. Using these gifts and helping students hone their gifts is one way I contribute to the mission of the college and the kingdom in general."

Since completing his Ph.D. in 2005, Tintle has mentored more than 75 undergraduates in statistical research, working with students during the academic year and into the summer months.

"It’s fun to see them get excited about their research and to jump into it with them," says Tintle.

Not all college and university faculty get to work so closely with undergraduate students on research.

"Dordt is an undergraduate-focused institution, so students do research side by side with faculty members," says Tintle. "Undergraduates who work on research at a big research university are often in a lab with a bunch of graduate students, post-docs, and a faculty member, but their time with and access to the faculty member is very limited."

Tintle mentors his undergraduate students through a variety of interdisciplinary research projects. Several of these projects, like the Ukraine study, have public health applications. One focuses on the prevalence of hopelessness in cardiac rehab patients.

"The overarching goal for this project is to mentally and physically support people who’ve had a heart attack," says Tintle. "We know that mental and physical health are interrelated."

Hopelessness is very distinct from depression, Tintle notes.

"It’s saying, ‘My future is bleak; there’s really no point,’” says Tintle. "When you feel hopeless, you’re less likely to say, “Oh, I feel really bad about this, I’m going to do something about it.”"
‘There’s a point to changing my exercise behavior and my diet.’ Once you start down that path and you’re not exercising or eating well, your mental health continues to spiral.”

Tintle, Michigan State University nursing professor Dr. Susan Dunn, and, more recently, Dordt social work and nursing faculty are using their research to find ways to help people exercise and eat well.

“We’ve shown that if mental health starts improving, you’re more likely to exercise, and if you’re more likely to exercise, your mental health keeps improving,” says Tintle. “It’s a cycle.”

Tintle is also researching how the fats people eat impact physical health. Working with the Framingham Heart Study and the Women’s Health Initiative, his team analyzes fatty acid data to see how fats may or may not be associated with future heart attacks, diabetes, cancer, and death.

Partnering with Dr. Bill Harris, professor of internal medicine at the University of South Dakota Medical School, Tintle, recent Dordt graduate Jenna Veenstra, and other Dordt students have made some interesting discoveries.

One recently published study focuses on Omega-3 fatty acids such as fish oils, which were associated with a reduced risk of death and are more predictive of cardiovascular events like heart attacks and strokes.

“Cholesterol is predictive, but our findings show that Omega-3s are more predictive,” says Tintle.

Genetics matter, too.

“Everything is based on genetics,” says Veenstra, a biology major who has worked with Tintle since her freshman year. “Environmental factors and genetic factors put you at risk for cardiovascular disease.”

“The combination of genetic variations and eating a certain way can substantially increase or decrease risk of different kinds of heart functioning,” says Tintle.

A fourth research project that Tintle oversees is improving water quality.
in Fiji, where residents struggle with diarrhea and other waterborne illnesses from contaminated water. Sawyer Products and in-country non-profit organizations have set a goal to ensure that, within a few years, every person in Fiji will have access to clean drinking water. Sawyer has developed a new filtering technology that they claim is extremely effective at filtering out water-quality pathogens.

“The filter is easy to use, lasts a long time, and doesn’t need a lot of maintenance,” says Tintle. Hope College biology professor Dr. Aaron Best and Dordt research students will conduct research that, as Tintle describes, “provides a scientifically objective view of the efficacy of the filters.”

“We’re looking at the rates of diarrhea in adults and children, medical expenses related to diarrhea, days missed of school and work due to diarrhea, and how much money they’re actually spending on medical costs and water,” says Tintle. “We examine these factors before and after the filter is installed.”

Adam Heynen, a recent graduate, is working closely with the statistical research this summer. Heynen, who has been accepted to the University of Iowa’s physician assistant program, says that the Fiji water-quality research project has taught him to think holistically about caring for people’s ailments.

“It’s easy to diagnose diarrhea and say, ‘Take this medicine,’” says Heynen. But if the person goes back to drinking bad water, the medicine hasn’t solved the problem.

“Our research in Fiji creates a holistic picture of how to provide care; we can’t just give medicine—we need to have other interventions like installing a water filter or educating people on hand hygiene,” he says.

Tintle’s team also plans to analyze water data from the Dominican Republic, Nicaragua, Honduras, and Guatemala over the next two years in an expanded version of the study.

FROM ASKING GREAT QUESTIONS TO PUBLISHING A PAPER

How do fatty acids influence physical health? What interventions work for cardiac rehab patients struggling with hopelessness? These questions led to research projects, which have grown into something more complex.

“As researchers, you have an idea, collect data on that idea, test the data, and then share the results with others who are interested,” says Helming.

Tintle’s undergraduates are a vital part of that idea-generation process.

“I think there is a bias that you need to have a Ph.D. or have worked for 20 years to have an interesting question worth studying,” says Tintle. “You don’t. Not every question undergraduate students come up with is worth pursuing, but since they have less preparation, they come up with questions in a less biased and more outside-of-the-box way. That makes it fun.”

How do undergraduate student researchers go from asking a question to publishing a paper? One of the first steps is to conduct a literature review.

“The research literature helps students figure out what other researchers have to say on the idea or topic,” says Helming.

“A lot of the articles I read looked at

NEW DATA-DRIVEN MAJORS

This fall, Dordt will offer majors in data science, statistics, and actuarial science.

The data science major will include courses in statistics and computer science. The statistics major will teach students how to use data to tell stories while focusing on different fields such as psychology and biology. Although Dordt previously offered an actuarial science major, Tintle and others made significant updates to the program so that it now focuses on statistical analysis of past data.

“There is an increasing amount of big data in industries such as finance, healthcare, sports, and education,” says Tintle. “There are also massive data sets available that people use for decision making. These majors prepare students to figure out how to draw conclusions from that data.”

This fall, Dordt will offer majors in data science, statistics, and actuarial science.

The data science major will include courses in statistics and computer science. The statistics major will teach students how to use data to tell stories while focusing on different fields such as psychology and biology. Although Dordt previously offered an actuarial science major, Tintle and others made significant updates to the program so that it now focuses on statistical analysis of past data.

“There is an increasing amount of big data in industries such as finance, healthcare, sports, and education,” says Tintle. “There are also massive data sets available that people use for decision making. These majors prepare students to figure out how to draw conclusions from that data.”

Tintle’s team also plans to analyze water data from the Dominican Republic, Nicaragua, Honduras, and Guatemala over the next two years in an expanded version of the study.

FROM ASKING GREAT QUESTIONS TO PUBLISHING A PAPER

How do fatty acids influence physical health? What interventions work for cardiac rehab patients struggling with hopelessness? These questions led to research projects, which have grown into something more complex.

“As researchers, you have an idea, collect data on that idea, test the data, and then share the results with others who are interested,” says Helming.

Tintle’s undergraduates are a vital part of that idea-generation process.

“I think there is a bias that you need to have a Ph.D. or have worked for 20 years to have an interesting question worth studying,” says Tintle. “You don’t. Not every question undergraduate students come up with is worth pursuing, but since they have less preparation, they come up with questions in a less biased and more outside-of-the-box way. That makes it fun.”

How do undergraduate student researchers go from asking a question to publishing a paper? One of the first steps is to conduct a literature review.

“The research literature helps students figure out what other researchers have to say on the idea or topic,” says Helming.

“A lot of the articles I read looked at

NEW DATA-DRIVEN MAJORS

This fall, Dordt will offer majors in data science, statistics, and actuarial science.

The data science major will include courses in statistics and computer science. The statistics major will teach students how to use data to tell stories while focusing on different fields such as psychology and biology. Although Dordt previously offered an actuarial science major, Tintle and others made significant updates to the program so that it now focuses on statistical analysis of past data.

“There is an increasing amount of big data in industries such as finance, healthcare, sports, and education,” says Tintle. “There are also massive data sets available that people use for decision making. These majors prepare students to figure out how to draw conclusions from that data.”

Tintle’s team also plans to analyze water data from the Dominican Republic, Nicaragua, Honduras, and Guatemala over the next two years in an expanded version of the study.

FROM ASKING GREAT QUESTIONS TO PUBLISHING A PAPER

How do fatty acids influence physical health? What interventions work for cardiac rehab patients struggling with hopelessness? These questions led to research projects, which have grown into something more complex.

“As researchers, you have an idea, collect data on that idea, test the data, and then share the results with others who are interested,” says Helming.

Tintle’s undergraduates are a vital part of that idea-generation process.

“I think there is a bias that you need to have a Ph.D. or have worked for 20 years to have an interesting question worth studying,” says Tintle. “You don’t. Not every question undergraduate students come up with is worth pursuing, but since they have less preparation, they come up with questions in a less biased and more outside-of-the-box way. That makes it fun.”

How do undergraduate student researchers go from asking a question to publishing a paper? One of the first steps is to conduct a literature review.

“The research literature helps students figure out what other researchers have to say on the idea or topic,” says Helming.

“A lot of the articles I read looked at
people’s mental health in relation to nuclear disasters such as those at Chernobyl, Fukushima, and Three-Mile Island,” says Bolt. “I also looked at what researchers have found on the correlation of mental health with disasters such as floods, hurricanes, and chemical plant spills.”

The next step is data collection. It can take years to gather all the data needed for a research project. For his study on fatty acids and cardiac health, Tintle uses data gathered by the Framingham Heart Study, which has studied three generations of families since the 1940s. In that study, family members go for in-depth physicals every two years.

It didn’t take generations to gather data for the hopelessness and cardiac rehab project, though. For the past 10 years, Dunn, Tintle’s main collaborator for the project, has worked with hospitals throughout Michigan to gauge patients’ feelings of hopelessness as they recover from heart disease. It takes less than 10 minutes for a patient to fill out the survey on one of the hospital’s iPads, after which the results are immediately uploaded to the cloud.

“On a daily or weekly basis, the students and I can look at factors such as demographic patterns, trends, who is choosing not to participate, and things like that,” says Tintle. He and Dunn have found gaps in their population sample—gaps that Tintle hopes nursing professor Dr. Deb Bomgaars and social work professor Dr. Kristin Van De Griend can help fill in.

“Michigan hospitals tend to be more middle class and white,” says Tintle. “In Northwest Iowa, we have rural populations; in Sioux Falls, there are Native American and Hispanic populations.”

While doing clinicals, Bomgaars, Van De Griend, and Dordt nursing students will administer these surveys at regional hospitals. With broader data, the researchers hope to explore how ethnic, socio-economic, and rural-urban groups respond differently to interventions throughout the cardiac rehab process.

“My guess is, if you’re in a rural area and you have to drive a long way to the hospital for cardiac rehab, that might affect you differently than someone who doesn’t have to make that long drive,” says Tintle. “We want to look at how effective our interventions are for populations with particular differences and challenges.”

Once students have access to the data, they prepare it to be used in R, a statistical computing software. Although cleaning up data is not the most thrilling process, Lucas Vander Berg (‘17) found the experience valuable.

“I was excited about the opportunity to solve real-world issues using statistical techniques and software that is common within the analytical field,” says Vander Berg, who now works as an actuary in Brookfield, Wisconsin.

Once the research is completed, it needs to be shared with others.

“The goal of research is not just to create new information through scientific study, but to share it. Having your research published in a peer-reviewed journal means that anyone with access can read it, so it could influence future research studies and practice.”

— Dr. Luralyn Helming, psychology professor

While doing clinicals, Bomgaars, Van De Griend, and Dordt nursing students will administer these surveys at regional hospitals. With broader data, the researchers hope to explore how ethnic, socio-economic, and rural-urban groups respond differently to interventions throughout the cardiac rehab process.

“My guess is, if you’re in a rural area and you have to drive a long way to the hospital for cardiac rehab, that might affect you differently than someone who doesn’t have to make that long drive,” says Tintle. “We want to look at how effective our interventions are for populations with particular differences and challenges.”

Once students have access to the data, they prepare it to be used in R, a statistical computing software. Although cleaning up data is not the most thrilling process, Lucas Vander Berg (‘17) found the experience valuable.

“I was excited about the opportunity to solve real-world issues using statistical techniques and software that is common within the analytical field,” says Vander Berg, who now works as an actuary in Brookfield, Wisconsin.

Once the research is completed, it needs to be shared with others.

“The goal of research is not just to create new information through scientific study, but to share it,” says Helming. “Having your research published in a peer-reviewed journal means that anyone with access can read it, so it could influence future research studies and practice.”

And for students applying to competitive graduate schools, having published an article as an undergraduate is a really big
Increasingly, Dordt students are seeing their research in print. Vander Berg, who worked on the hopelessness and cardiac rehab research, is listed as an author on an article in the peer-reviewed journal *Biobehavioral Health Sciences*. Veenstra’s research on fatty acids and cardiac health was published in *Nutrients*; she is also listed as an author on a paper titled “Genome-Wide Interaction Study of Omega-3 PUFAs and Other Fatty Acids on Inflammatory Biomarkers of Cardiovascular Health in the Framingham Heart Study.” Bolt’s article, “The Associations between Self-Reported Exposure to the Chernobyl Nuclear Disaster Zone and Mental Health Disorders in Ukraine,” was published in *Frontiers in Psychiatry*.

“I’m excited about having a published paper,” says Bolt. He plans to apply to graduate programs in statistics or biostatistics and hopes that having a published paper will help his chances of being accepted.

Vander Berg does not plan to go to graduate school, but he still appreciated the paper-publishing process.

“The communication skills required in explaining complex analytics to non-technical audiences is unbelievably important,” says Vander Berg. “This is something Dr. Tintle does extremely well.”

**CHRISTIANS DOING RESEARCH**

Since coming to Dordt in 2011, Tintle has helped elevate how students and faculty think about research. He currently serves as director for research and scholarship; in that role, he encourages the scholarly endeavors of fellow faculty members and helps undergraduate students get involved in research during the academic year and in the summer.

“There was research going on before Dr. Tintle came to Dordt, but he’s brought more attention and more resources to it,” says Christians.

“Dr. Tintle is an excellent mentor and is very supportive of faculty and staff interested in research,” says Van De Griend.

Tintle says he appreciates working at Dordt because he can be explicit about being a Christian while doing research. How that comes through with students and in his own research happens in many ways.

“Sometimes it’s articulated directly through the evangelical message, and sometimes it will be, ‘We’re going to help you understand how to eat better,’ or ‘We’re going to help you think through how to wrestle with your own mortality,’” says Tintle. “That’s not necessarily a spiritual intervention, but helping people think about why they are feeling hopeless and how their physical and mental health work together gives the opportunity to consider what we believe and to engage our faith. We don’t have to be full-time evangelists to live out God’s calling in our life.”

Does research look different for Christians than it does for non-Christians?

“You probably couldn’t tell by methods alone if a researcher is a Christian or non-Christian,” says Christians. “You’re going to do the same correlational design, experimental design, and case study design. What’s different are the questions, beliefs, and assumptions that come before the methodology—how you view the person and how you view the problems or the variables you’re trying to examine. That’s what separates the Christian from the non-Christian researcher.”

“The research is going to produce the same results, but why we do research is different,” says Veenstra. “It’s for the sake of science, but it’s also for God and his glory.”

“My faith influences the kinds of research topics I value and what I want to spend my time working on,” says Helming.

For Tintle, too, working as a statistician and a researcher is part of how he lives his faith.

“Some people wonder if statistics is trying to do God’s job by letting the numbers tell us what to do rather than relying on faith and prayer,” says Tintle. “God has ordered the universe, putting in place natural laws and mathematical rules like the law of gravity. I believe it is appropriate to use these laws to better understand the world God has made.”

---

SARAH MOSS (’10)