

- Evelyn Lamb: [00:14](#) (music)
- Evelyn Lamb: [00:14](#) Hello, and welcome to The Lathisms Podcast. I'm Evelyn Lamb. In each episode we invite a Hispanic or Latinx mathematician to tell us about their experiences in math. Today, I'm very happy to be talking with Vanessa Rivera-Quiñones. Can you introduce yourself and say a little bit about yourself?
- Vanessa RIVERA-QUIÑONES: [00:36](#) Yes. Hi, I am Vanessa. I'm a recent PhD graduate from the University of Illinois at Urbana-Champaign. I'm originally from Puerto Rico, where I did my undergrad. And I consider myself a mathematical biologist, but I'm sure we will get to my research in the interview in a little bit.
- Evelyn Lamb: [00:56](#) Yeah. So, how did you end up on the mathematical path? Did you start out with a strong interest in math as a child?
- Vanessa RIVERA-QUIÑONES: [01:04](#) Yeah, I think when I reflect back on what started the math journey for me, it's really funny because I only discovered it when teaching an introduction to math class for elementary school teachers. And I realized for me it was very, very young, and not necessarily because of the math. When I was in fourth grade, I think, I had this really cool math teacher with my same last name, Ms. Rivera. And I spent a lot of time after school helping her tidy up her classroom and playing with the puzzles she had. So for me, I think it made a very safe and fun place. And I spent the last few years of my elementary school just, you know, hanging out with math teacher and just playing with her puzzles. And I think that segued into me liking math a lot.
- Evelyn Lamb: [01:57](#) And as you went to high school and college, were you encouraged to pursue math?
- Vanessa RIVERA-QUIÑONES: [02:03](#) Yes, I'm thankful that I went to a specialized school in math and science. So what happened is that we took extra math courses, and extra sciences courses, so two math classes, and two science classes. And that helped me sort of broaden my idea of what math was. We took the usual sequence of pre-calculus and calculus, and geometry, algebra, and stuff like that, but we also had in my senior year a class that was for math research. So we got to pick a problem and work on it as a science fair project. So for me it was my first time seeing untraditional math I guess. So I did a project number theory, and my teachers really pushed me and encouraged me to work on this project. And I think that was part of the reason why in college I decided to pursue math.

Evelyn Lamb: [03:03](#) And you said the problem was a number theory. Do you happen to remember what it was?

Vanessa RIVERA-QUIÑONES: [03:08](#) Oh yeah, so I was studying perfect numbers. A perfect number is a number whose sum of its divisors add up to the same number if you do not include it. So the smallest perfect number is six because you add one, two, three, and six, and get 12. And I was studying if there was the possibility of an odd number existing. So my science fair, I did not discover anything new, but I picked up programming skills and sort of checked cases where we could find even perfect numbers. And sort of my project was investigating what were some conditions that were needed for that to happen. So it was really my first time doing math outside maybe algebra and the calculus sequence for me.

Evelyn Lamb: [04:05](#) Oh, cool. That's funny, I loved perfect numbers when I was a kid, too.

Vanessa RIVERA-QUIÑONES: [04:10](#) Yeah, I think it's one of those things, I think number theory has a lot of those interesting problems that are kind of easy to understand what you're trying to do, but very hard to do. So it's one of my very early experiences with math, or research math I think.

Evelyn Lamb: [04:28](#) Yeah. And as you continued in college then, how did you end up going to math as a career?

Vanessa RIVERA-QUIÑONES: [04:34](#) Yeah, so I always liked to say this because I think my research path in math has been very non-linear. Rivera-Quíñones I think I started in number theory, so the first two years of my undergrad I worked with some of my professors in just sort of open-ended number theory problems. And eventually I went to my first math conference, and there I signed up to do a research experience for undergrads in the University of Iowa. And it was in biostatistics, so the last half of my undergrad was spent doing research with my statistics professor, so more in the biostatistics side. And throughout my undergrad I also did a minor in finance, so before grad school I thought that I would end up doing financial math. But once I got into grad school I met my advisor, and she was working in math biology, and we clicked so well that I just switched tracks. So it's been a very sort of winded road, but it's always been a fun road I guess.

Evelyn Lamb: [05:48](#) Can you talk a little more about your current research?

Vanessa RIVERA-QUIÑONES: [05:51](#) Yeah. So my research is under the branch of mathematical biology, and more specifically disease psychology. And what we're interested is in how a host, someone who gets sick, a parasite who infects them, and the environment interact with each other and sort of what that tells us about disease spread. So most of my work uses different types of mathematical models to keep track of how populations in an ecosystem change over time. The math tools I use for this are mostly based on ordinary and partial differential equations. But the coolest thing for me is that once we have a model, we can compute interesting quantities that biologists can use to assess disease spread. For example, you could compute disease prevalence, which is what proportion of infected individuals are in the population, or the base of your product number, which tells you something about the average number of secondary infections. And hopefully, we can use this to sort of predict what would happen in the system under different conditions, just using our math models.

Evelyn Lamb: [07:04](#) And do you happen to specialize in any particular kind of disease?

Vanessa RIVERA-QUIÑONES: [07:09](#) I never thought I would end up working with this particular disease, but I studied what biologists call Daphnia, which is this little water flea that lives in Midwestern lakes, and it gets infected by consuming a fungal parasite. And biologists like Daphnia because you can track its processes really nicely, they're sort of clear. So you can see their insides, and it makes it really easy to track the infection process. So I mostly work on models that relate to Daphnia epidemics. But what I love about my work is that these models are very general, so they can be used for human diseases too.

Evelyn Lamb: [07:55](#) Oh, cool. So the fact that this, did you say it was a fly, is kind of clear, helps?

Vanessa RIVERA-QUIÑONES: [08:02](#) Yeah, so the fact that it is a water flea, and its sort of physical appearance is clear, it makes it really easy for biologists to keep track of how many fungal parasites they have in their inside, and sort of see what happens overtime. Which is not something we can really do with humans.

Evelyn Lamb: [08:19](#) Yeah, not exactly.

Vanessa RIVERA-QUIÑONES: [08:20](#) Yeah. So even though it's this little water flea, it kind of helps biology see more into what happens within the host during the infection process.

Evelyn Lamb: [08:32](#) Very cool. So I wanted to talk a little bit about mentorship, and the importance of that in your career so far.

Vanessa RIVERA-QUIÑONES: [08:41](#) Yeah. I think there have been so many great mentors that have inspired me through the years. I think, I know I'm not that old, but sometimes it feels like that because I had great teachers in high school. Now my math teachers really pushed me to believing that I could do math, and that sort of translated into my undergrad as well. So I had very early on a lot of mentors that really saw my skills, and really believed in my ability to do math. And even mentors, specifically in undergrads, I didn't see when I, you know, went to the internet I didn't see many female role models, or many Puerto Rican role models.

Vanessa RIVERA-QUIÑONES: [09:25](#) And I was lucky enough to attend a conference that was awarding Dr. Ivelisse Rubio a service award. And that was the first time I met her, and she was in my campus, and I was just completely unaware of her. And after that, it was very inspiring to see all her work that was not only math related, but community oriented. And even in the newspaper, at home at some point I realized we went to the same high school. So I just saw in her a role model, someone with sort of the same background as me, and being successful in math. And that was really important to me.

Evelyn Lamb: [10:08](#) Yeah, we talked to her last season.

Vanessa RIVERA-QUIÑONES: [10:10](#) Yes, I think ... I'm very excited to be able to also say that because not always you can say to your mentors how much they mean to you in a casual conversation. But I think especially in undergrad it was very important, those very early interactions where I got to connect to conferences, or summer programs. That really built my research community, and I think that made all the difference in my career.

Evelyn Lamb: [10:41](#) And can you remind me did you go to undergraduate in Puerto Rico, or in the US, or the mainland?

Vanessa RIVERA-QUIÑONES: [10:48](#) Yeah, I went to my undergrad in Puerto Rico at Rio Piedras. And then I did my PhD in Illinois.

Evelyn Lamb: [10:58](#) So how have you overcome challenges in your research and academic career?

Vanessa RIVERA-QUIÑONES: [11:05](#) I think for me it was a matter of being very perseverant, and sort of being confident in your abilities as well. I think finding what works best for you, or what you need to bring your

best math self to the table is important, but it's also very challenging. Research in itself can be very difficult at times because progress doesn't always happen the way you want it to. And as I said, it's sometimes a very non-linear process. So showing up every day, working hard, and trusting the process has helped me move forward.

Vanessa RIVERA-QUIÑONES: [11:44](#) But I think also it kind of takes a village, and for me that meant being honest about what I found challenging about my work. And seeking the support I needed from either your advisor, from your peer, from your collaborators. And for me also one of the best decisions I made during grad school was starting therapy. And I'm glad to see that mental health in academia is starting to be more of an open topic this day. And I think it should be taught more in our community, in our math community. But having support systems are crucial to overcoming challenges I think.

Evelyn Lamb: [12:26](#) Yeah, it was a tough time in grad school. I definitely felt the same way, and had trouble getting help when I needed it. How have you found those spaces to be safe talking about your needs?

Vanessa RIVERA-QUIÑONES: [12:41](#) Yeah, I think that's a great question because I often times join a lot of groups that align with my interests. So I've been part of the SACNAS Community for a long time. I was involved with sort of the women in math chapter in my school, so the Association for Women in Math Graduate Chapter, as an officer and as a participant. And even in our department, we created teaching and diversity seminars. So we could bring people to talk about not only their math, but what they found challenging about the process to do their math. And I think that has been really eye-opening, and really conduces people to talk about their story. Not just their math, but how they got there, and how they overcame the challenges they had. And that's very inspiring I think to hear.

Evelyn Lamb: [13:42](#) And maybe it sort of segues into the importance of things like SACNAS and Lathisms's and Hispanic heritage month. So yeah, do you want to talk a little bit about that?

Vanessa RIVERA-QUIÑONES: [13:56](#) Yeah, I think for myself, and I know many others, being part of a community it just adds this whole different layer to what it is to do math, at least for me. And being part of SACNAS was one of the first experiences where I saw this giant conference of all people from underrepresented backgrounds. And it signaled to me that there are others like me out there,

there are others pursuing the things I want to pursue that also kind of have the same values. They value community, and they value bringing their identity, whatever that may be, to the science that they're doing. And it's a great experience.

Vanessa RIVERA-QUIÑONES: [14:40](#) I think not everybody is as lucky to find a community, and there is some places where you might find yourself isolated. And I think what was really important to me when I was at Illinois, and the reason we felt the need to create the teaching and diversity seminar is that there were things going on on campus and around us, and there's things going now, it felt like as mathematicians we didn't really have a space to talk about those things that may impact our math indirectly and directly. So I think when you don't have those spaces, also finding ways to create them is important. But it's also hard work, so it's not for everybody.

Vanessa RIVERA-QUIÑONES: [15:25](#) But I encourage others to just find what's out there in their local communities, also connect to social media because I've connected with so many mathematicians that not necessarily met in person, but have similar interests to me on TwitterRivera-Quíñones And that has been eye-opening to me and has really made me feel that this is not something I just care about, it's something the community cares about. And there are many people out there doing the work to make math more inclusive and diverse.

Evelyn Lamb: [15:59](#) And do you have any final advice for students who might be interested in math?

Vanessa RIVERA-QUIÑONES: [16:05](#) Yeah, I think I always believe in pursuing your passions, whatever that may be, and also being flexible about what those passions are. I think your interests might change over time, and I think change is great if you're open to it. Seeking always support from your community is important, joining places where you feel like you can be your full self. And that's not always possible, so make sure to take care of yourself, and prioritize your health and your well-being while you do your math. I think a lot of people sometimes struggle finding what the balance of the work life. But I think instead of trying to make it a balance all the time, just being flexible and allowing yourself to rest and get what you need to do your best work is very important.

Evelyn Lamb: [17:01](#) Well thank you so much for taking the time to talk with me today.

This transcript was exported on Sep 10, 2019 - view latest version [here](#).

Vanessa RIVERA-QUIÑONES: [17:05](#) Oh, you're welcome.

Evelyn Lamb: [17:09](#) Thank you for listening to The Lathisms Podcast. It's produced by me, Evelyn Lamb, and made possible by a Tensor-SUMMA Grant from the Mathematical Association of America. Our music is Volverá by La Floresta. Lathisms is an initiative to celebrate the accomplishments of Hispanic and Latinx mathematicians. It was founded in 2016 by Alexander Diaz-Lopez, Pamela Harris, Alicia Prieto-Langarica, and Gabriel Sosa. You can find more information about the project at Lathisms.org. That's L-A-T-H-I-S-M-S-O-R-G. Join us next time to hear from another inspiring mathematician. (music).