

Teen launches research career, wins awards using CHILD Cohort Study data

When 15-year-old Laura Wang opened her laptop and typed a message to Tim Takaro, a professor at Simon Fraser University (SFU), she never imagined that email would lead her to the CHILD Cohort Study, a budding research career, and an award-winning science project.

Passionate about science since middle school, the Grade 10 student from Burnaby, BC, decided to find someone who could help her learn what it takes to become a “real” researcher.

“I googled Simon Fraser University and looked through their faculty,” says Wang. “Dr. Takaro’s bio said he had an interest in child health and chronic diseases, so I emailed him out-of-the-blue. I never really expected him to write me back.”

But Takaro did. And he invited Wang to come to the SFU campus to meet with him and graduate student Jaclyn Parks.

“I was impressed by this enterprising young student who clearly stated what she wanted to do related to my research on

disease susceptibility factors in environmental health,” says Takaro, a professor and the Associate Dean of Research for the Faculty of Health Sciences at Simon Fraser University.

“I wanted to meet her in person to see what was behind this.”

“They were both so encouraging and generous with their time to answer my questions about how to get started in research,” Wang explains.

“When Dr. Takaro told me about the CHILD Cohort Study and the incredible things the study is teaching us about child health and development, I was hooked!”

That meeting led to a 12-month collaboration in which the teen worked side-by-side with Takaro and Parks using CHILD data to study the effects of house dust on the development of childhood allergies and asthma.

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Photo at top, L to R: Jaclyn Parks, Laura Wang and Dr. Tim Takaro

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"We came up with the research question together," says Wang. "This area has been controversial because scientists aren't sure whether early-life exposure to the toxins in household dust protects a child against developing asthma and allergies or contributes to it. There is evidence on both sides of the question, so we decided to find out more through the CHILD Cohort Study."

With no formal training in research, Wang spent the summer after Grade 10 becoming familiar with RStudio, an open-access statistical software program that can be used to analyze the complex CHILD data.

Takaro and Parks then gave Wang access to dust samples collected from CHILD Study homes when the children were three months old, as well as coding and models produced by Parks. With their supervision and guidance, Wang analyzed the data and compared it to the results of the children's allergy skin-prick tests at age three, as well as wheezing data, which indicated how often a child experienced repeated episodes of a whistling sound in the chest during early childhood.

The CHILD Cohort Study has been following 3,500 Canadian children from before birth, and has a rich repository of clinical, environmental,

genetic and microbiome data that can be analyzed.

"My supervisor Dr. Takaro and I study the effects of early-life exposures on the development of childhood asthma and allergic disease, so the endotoxin project seemed like the perfect complement to previous work done with environmental data from CHILD," says Parks, a Master's student and Research Associate at Simon Fraser University.



Laura exhibiting at the 2019 Canada-Wide Science Fair

"Laura is bright, enthusiastic and hard-working, and we knew that with support and training in research methods and analysis, Laura could become an excellent young researcher."

Throughout Grade 11, Wang balanced her academic and

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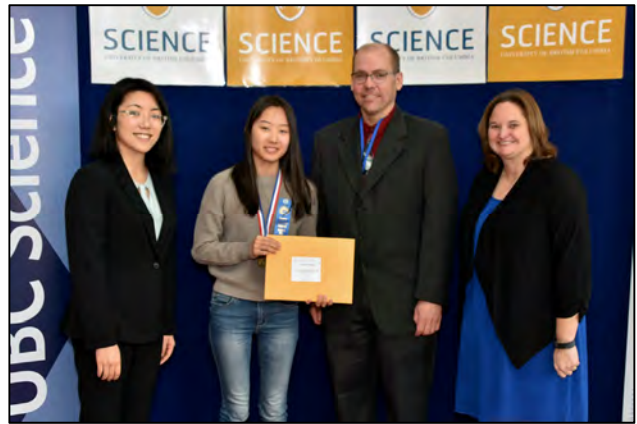


extracurricular activities with her research, which involved conducting a literature review, completing ethics training, and learning basic data analysis. She met with Takaro and Parks regularly for guidance on methodology, using and interpreting the data in RStudio, and understanding the impact and limitations of the results.

In April 2019, nearly a year after she first emailed Takaro, Wang summarized her research results into a paper titled "Endotoxin's Association with Wheeze and Atopy" and submitted it to the Greater Vancouver Regional Science Fair (GVRSF).

"I was so excited, and actually surprised, about our findings," says Wang. "We showed that dust endotoxin at three months of age is associated with a protective effect for asthma and allergies. In other words, it's good for babies to be exposed to endotoxin in house dust, which may help to train the immune system, resulting in a reduced risk of allergies and asthma by age three."

Wang's project won a Gold Medal at the competition and she received a \$2,000 Entrance Scholarship to The University of British Columbia's Health and Life Sciences program.



Laura wins gold at the Greater Vancouver Regional Science Fair

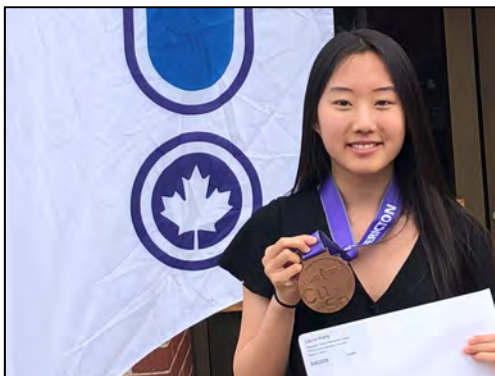
"I was overwhelmed by the judges' interest in the project and particularly in the CHILD Cohort Study as the data source," notes Wang. "Their feedback was extremely positive; they said that the project demonstrated 'a complex analysis of the data' and a 'clear explanation of the discoveries.'"

Wang's top ranking at the GVRSF earned her a spot in the national Canada-Wide Science Fair (CWSF), held in Fredericton, NB, from May 11 to 17, 2019.

There, Wang showcased her work alongside 500 of Canada's top young scientists. Her project won a Bronze medal and garnered her entrance scholarships to the University of Ottawa and Western University.

She was also recognized with a Canadian Young Researcher Award and a cash prize of \$1,000.

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Laura with her bronze medal from the national CWSF

Wang says she had a great time at the national fair, where delegates participated in cultural tours and science workshops. They even had the opportunity to live chat with astronaut David Saint-Jacques on the International Space Station.

"The entire week was simply incredible and it's amazing to think that although I'm still in Grade 11, working with the CHILD Cohort Study has meant that I now have entrance scholarships to three top Canadian universities!"

Wang credits her research success to the steady supervision and mentorship provided by Takaro and Parks. "Their guidance and support have provided me with such a rich learning experience – I can't thank them enough."

This fall, Wang will continue her collaboration with her mentors to prepare the data for peer review, leading to an open-access publication

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by the *STEM Fellowship Journal*, offered as part of her CWSF award.

Publishing one's first peer-reviewed paper is an important milestone in the career of every researcher – and is especially impressive at such a young age – according to Takaro.

"Laura's goal was to publish a paper before she finished high school. When I first heard this 14 months ago, I thought that it was very unlikely. Given all that she has accomplished so far, I'm confident now that Laura will publish before she graduates."

Takaro says the collaboration has also been a rewarding experience for him and Parks: "I'm extremely proud of Jaclyn, who is an outstanding student, teacher and mentor. Working with Laura has helped consolidate Jaclyn's analytic abilities and she has become a gifted mentor that young scientists look up to."

"I am so pleased that Laura's inter-action with the CHILD Study nurtured her zest for scientific exploration," comments Dr. Padmaja Subbarao, a respirologist at Toronto's Hospital for Sick Children and the CHILD Cohort Study's Director.

"All of the CHILD researchers across the country look forward to hearing more about her future accomplishments. She truly represents the next generation of outstanding Canadian researchers."