

STUDENT OUTLIERS

How Do They Do It?



Text and photos by Daryl Lin and Dr Kenneth Lyen

Outliers are exceptional people who stand at the extreme outer edge of what is statistically plausible. An unspoken accomplishment of outliers is that they are self-made and although they may have had some initial help, they achieve their success largely by themselves.

Medical student outliers

We present two recently graduated NUS Yong Loo Lin School of Medicine (NUS Medicine) students who fit this definition. They are prolific researchers and writers, and one has even represented Singapore in international CrossFit competitions. How do they achieve their successes despite their heavy medical school schedules?

The first student is Nicholas Syn, then a fifth-year student with 127 publications, including 41 original research papers spanning basic, translational and clinical research, several of which were published in prestigious peer-reviewed international medical journals.¹ One of his notable publications, “De-novo and acquired

resistance to immune checkpoint targeting”, in *The Lancet Oncology*, has been cited 311 times. He has also won a number of awards and research grants, including Singapore Health Services’ (SingHealth) Medical Student Talent Development Award, National University Hospital Department of Medicine’s Junior Research Award, and an Honors with Distinction on a recent clinical informatics clerkship with Harvard Medical School, among others.

The second is Ian Wee, a friend of Nicholas’, who was a fifth-year student with a keen interest in research. He has more than 50 review papers published in peer-reviewed international journals, including the *Journal of the American Medical Association*, *Annals of Surgery* and *Gastric Cancer*. Like Nicholas, he has also undertaken original research and four of these papers have been published.² He has also been awarded research grants from SingHealth and has won awards from international conferences, such as the Asia Pacific Federation of Coloproctology. Not only is he active in his research with many collaborations, he is a top CrossFit athlete who represented Singapore in the 2019 CrossFit Games in Madison, Wisconsin, US.

How did they start?

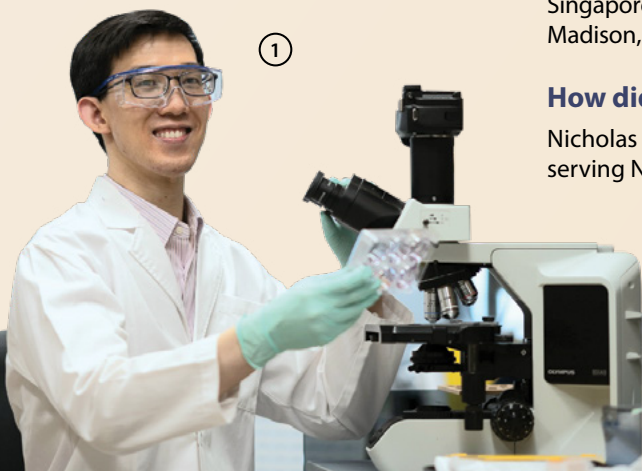
Nicholas was fortunate that while serving National Service, he was posted

to the Military Medicine Institute’s Psychological Care Centre where he was involved in managing the emotional problems of fellow servicemen. Interacting with the psychiatrists looking after them motivated him to explore research in this area. During this period, Nicholas also found an opportunity to engage in some medical research and was mentored by Prof Goh Boon Cher, a haematology-oncologist.

Ian took a slightly different path. He began his medical education at the University of New South Wales, where the culture strongly encouraged medical students to engage in research. He too was fortunate to meet with mentors who started him on his research quest, a journey which continued when he transferred back to Singapore.

Both students agreed that the role of mentors was absolutely critical to their entry into research. “You want to find a mentor who truly wants to see you grow to become an independent and successful scientist, rather than simply getting the immediate projects done. I was absolutely fortunate to have started out with Prof Goh, who wanted me to pick up a variety of research skills for my own benefit (beyond the projects I was helping with), so he kept introducing me to more and more people whom I learnt a variety of skills from”, said Nicholas.

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Both Ian and Nicholas are overachievers. It is true that medical students are usually very hardworking, and most are overwhelmed by the mountain of facts they have to memorise. What were their strategies for combining research and surviving medical school?

Research difficulties

Not all was smooth sailing. They were thrown into the deep end of research, and according to Ian, they “had to quickly assimilate the purpose of the study, do background reading which meant trying to decipher the myriad of technical jargon, and then outline a plan for their project. Next, [they] had to do the actual hands-on research, collect the raw data, then apply statistical analyses to determine the p-value significance. With all the data analysed, the hardest part was to write the research paper.”

Writing

According to them, it takes about two to six months to start writing an article from scratch. It also depends on the type of work they are working on – whether it is a review or translational research. With such a large time investment needed, total commitment is key.

Ian remembered his first review taking about six months as he had to familiarise himself with the process of analysis and writing. To increase their efficiency, both have developed various frameworks and protocols which suited them. This streamlined the research process, which got easier with each succeeding publication, and built up momentum which kept them going. As for coming up with new ideas, Ian had this to say: “It pays to read widely, including research and review papers, go to international conferences, and spend time exploring new topics that are still incompletely understood”.

“Another way to increase the pace at which our papers are pushed out is by working in groups, delegating each part of the paper to different members”, said Ian. Information was then shared freely among the members during meetings. With COVID-19’s safe-distancing measures, face-to-face meetings suffered and most

meetings were via Zoom. This meant that some members were unable to enjoy the “full experience” of collaborative research, but it is up to the individual to take the initiative to step up the interaction.

Time management

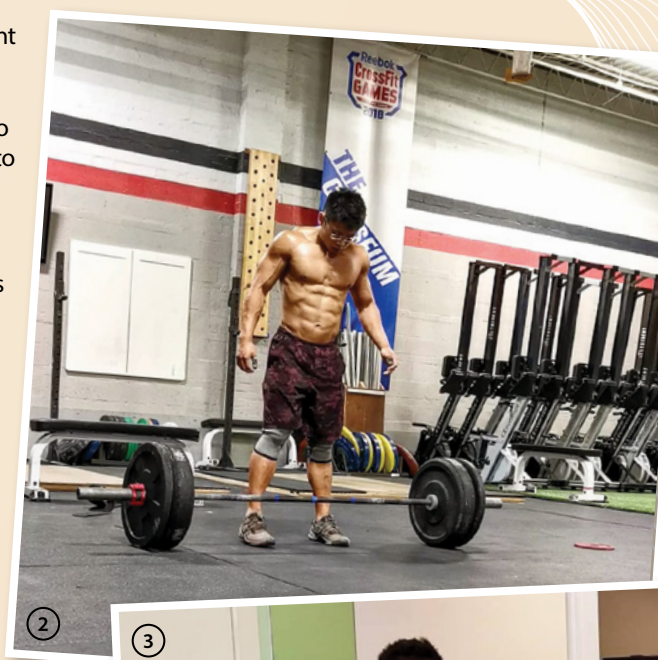
“Sometimes we received updates and revisions of our research at 3 or 4 am”, shared Ian. Indeed, sleep is one of the things that must be sacrificed to fit their tight schedule. Sometimes, they would stay up all night just to write a paper!

Be it waking up early to complete a paper or to train at the gym, discipline is important when it comes to completing their work and studies. “Lots of coffee”, Nicholas declared. They had to prioritise and manage their time well, while remaining task-focused. That said, the majority of their work was done over weekends, something that most medical students are not willing to sacrifice. “I don’t feel like I’m sacrificing my weekend though – it is more like a leisurely hobby for me,” quipped Nicholas.

Rejections

Rejections by medical journals are part and parcel of getting published. Some reviewers rejected their papers without giving any comments. Ian and Nicholas suspected that the reviewers did not really understand their analysis, and probably rejected them on that basis. Other reviewers were kind enough to give a reason for their rejection, showing they did try to make sense of their paper, which both were thankful for.

The majority of Ian and Nicholas’ publications were meta-analysis reviews. This genre of reviews, where one analyses and compares a number of published original research papers on one topic, is becoming increasingly popular in the research community as large numbers of researchers are pushing out mountains of papers at breakneck speed. Sometimes Ian and Nicholas are unlucky as the topic which they were working on has been recently reviewed by someone else, and they



get rejected because journals were no longer interested in the same topic.

Support for student research and publishing

Should medical students do research and publish articles? “Yes!” answered both Ian and Nicholas. Reasons include building connections with professors, mentors and colleagues to discuss the research topics, planning, and executing the research. They are also made to think creatively and critically. They learn skills and knowledge that might not be taught in medical school. “In research, you’re judged by how good your questions are, not how good your answers are,” Nicholas pointed out. Before the COVID-19 pandemic, they were even able to travel overseas to present their papers and make international friends.



Legend

1. Nicholas doing laboratory research
2. Ian at his crossfit training
3. Ian receiving the Society of Vascular Surgery scholarship in 2019
4. Nicholas during his clinical elective at Boston Children's Hospital

The Ministry of Health has a published policy of promoting undergraduate medical research.⁴ All three local medical schools encourage their students to do original research and publish medical writings.⁵⁻⁷ It fosters critical and creative thinking, and some students may continue research work after they graduate.

A survey of British medical schools showed that about 49% of students had taken part in a research or audit project, and about 17% have submitted a paper for publication.⁸ We do not have comparable information for Singapore, but personal impressions from NUS Medicine and the Lee Kong Chian School of Medicine suggest that it is unusual for students to publish more than a couple of medical papers, if any, before they graduate.

One other reason that medical schools advocate research and writing papers is that it can help students understand and critically evaluate medical publications. This will be useful for future doctors in determining which research publications are valid and which can be ignored.

Publications can also further their career prospects.^{9,10} Research work may be intimidating due to the steep learning curve, but with a nurturing and knowledgeable mentor to guide and teach them, one can expect to overcome the challenges. For Ian and Nicholas, they understand the need to be wary not to fall into this trap of "racking up the numbers". Of course, there must be a genuine interest at heart, or it would just be another laborious task to complete for that residency position that they desperately want.¹¹

Conclusion

Both Ian and Nicholas invest almost all their free time into their research, analysis and publication of papers. They were truly outliers as undergraduates. They openly admit that they owe a debt of gratitude to their mentors and to their collaborators. Time management is of critical importance, and to achieve a work-life balance is doubly difficult for medical students. Incredibly, Ian and Nicholas have succeeded and deserve the label "outliers"! ♦

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Dr Lyen is a paediatrician in private practice. He is the founder of the Rainbow Centre which runs three schools for intellectually challenged and autistic children.



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