NATIONAL TAIWAN NORMAL UNIVERSITY NEWSLETTER

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OPEN THE MIND AND BRAIN WITH A SINGLE BOUT OF EXERCISE

EMPOWERING STUDENTS AND ATHLETES TO REACH THEIR ULTIMATE POTENTIAL

NTNU NEWSLETTER

A Word from the Publisher

Cheng-Chih Wu
President, National Taiwan Normal University

We live in an era of incredible advancements in science and technology. Despite the progress we have made, however, the world is still faced with countless problems: dwindling resources, COVID-19, and climate change, to name just a few. None of these problems can be solved without input from institutions of higher learning, and they are a forceful reminder to us of the inestimable value of universities to our world.

Founded almost a hundred years ago, National Taiwan Normal University has set four major goals for itself as it approaches its centenary: strengthening our competitiveness in the international arena, accelerating the pace of our digital transformation, promoting interdisciplinary cooperation, and working with society on behalf of the greater human good. In the future, we will keep our friends from around the world posted on our progress in these four main areas. We also look forward to cooperating with our international partners so that jointly we can help to overcome our challenges.

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2020 RANKINGS

THE WORLD UNIVERSITY RANKINGS

- 1st in International Outlook among Taiwanese Universities
- 20th in Education
- 119th in Asian University Rankings

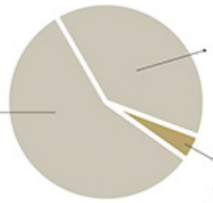
QS WORLD UNIVERSITY RANKINGS RANKED 2020

331 Overall

- 31st in Education
- 50th in Library and Information Management
- 51st—100th in Linguistics
- 61st in Asian University Rankings

STUDENTS

Total / 14391



8173 Undergraduates (893 intl. students)

5618 Graduates (604 intl. students)

600 Overseas Chinese Students in Preparatory Programs

FACULTY

Total / 1511

3 Nobel Prizes held by current faculty

16.79 : 1 student to faculty ratio

CAMPUS

131 acres

3 campuses

ACADEMICS

- **9** Colleges
- **63** departments
- **1** affiliated senior high school

A Word from the Editor-in-Chief

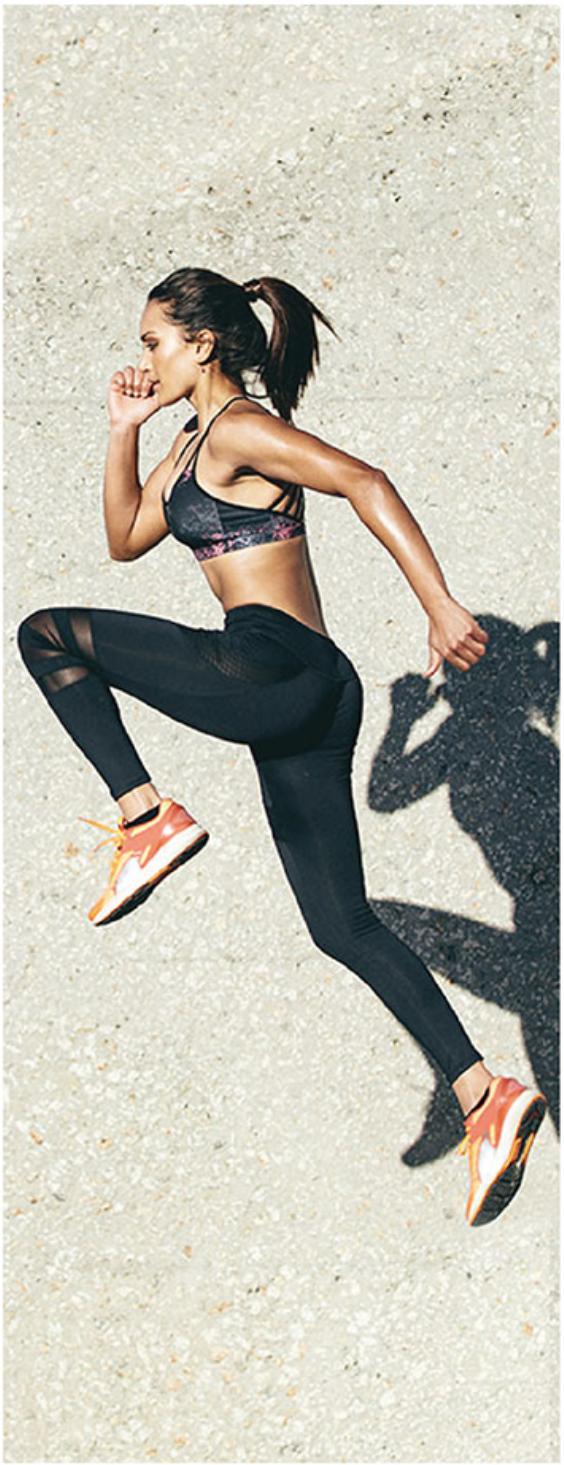
Frank Yung-Hsiang Ying (EVP)

In this issue, we explore the importance of sports and personal health. In "Open the Mind and Brain with a Single Bout of Exercise," we learn of NTNU's extensive research into the links between exercise frequency and personal health. While "Empowering Students and Athletes to Reach Their Ultimate Potential" highlights NTNU's prodigious strength in the field of sports science thanks to its celebrated faculty. We also see how NTNU athletes become champions through training regimes targeting both body and mind. Throughout this issue, readers will learn how academics and research find their application in daily lives, and how NTNU students become empowered to create and achieve their own personal values and goals.

NTNU Newsletter is distributed to alumni, faculty, and friends of NTNU.

OPEN THE MIND AND BRAIN WITH A SINGLE BOUT OF EXERCISE

In 2019, Scientific American published an article entitled "Humans Evolved to Exercise," which highlighted the importance of exercise to humans. A large number of scientific studies on public health and sports have suggested that regular exercise can reduce all-cause mortality and the risk of heart disease, stroke, cancer at multiple sites, Type 2 diabetes, and osteoporosis, as well as increasing aerobic capacity, muscle strength, and muscle endurance. Not only that, exercise is known to reduce negative psychological characteristics such as stress, anxiety, and worry, as well as improving positive mental states such as optimism and happiness. Moreover, the latest research has shown that the benefits of exercise can extend to our cognitive function, and even to our brain health!



Exercise and the cognitive functioning of the brain

Cognitive function, originated from brain, is an important component of mental health. It refers to the mental capacity of people to process information or apply knowledge. For example, attention, memory, learning, planning, reasoning, and even problem solving, decision-making and judgment are all subordinate to them. Given that these cognitive functions of the brain play an important role in daily life, how to enhance and strengthen them has become an important issue of academic concern. Unexpectedly, exercises that seem to be oriented toward "body muscles" may enhance cognitive functions of the brain toward this "mental" side!

Research Chair Professor Yu-Kai Chang at the National Taiwan Normal University carried out a series of studies on the topic of exercise and cognitive function, innovatively including cognitive neuroscience in the hopes of achieving "brain science" through cross-field integration and developing an "exercise prescription" based on the evidence of "brain strength."

A new type of brain exercise: Scientific evidence from Taiwan

During this study, Professor Chang's team found that although regular exercise could strengthen the brain's cognitive function, it was not easy for the public to commit to long-term participation. Therefore, it was important to find other, simpler forms of exercise. Fortunately, Professor Chang's research team conducted an integrated analysis, determining in 2012 that a single exercise (called "acute exercise" in science) could improve cognitive function. Specifically, regardless of the particulars, a single bout of exercise could significantly increase cognitive function. This study identified a new form of exercise for people who do not have time to dedicate to exercise. The study was published in Brain Research and has been cited thousands of times by the international community. It has also been included in the authoritative "Physical Activity Guidelines from the Advisory Committee's Scientific Report" published by the US government, as well as the "US National Physical Activity Guidelines" published in 2018.

After the "US National Physical Activity Guidelines" first proposed that acute exercise could promote cognitive function, Professor Chang's research team also developed a research model on the future direction of this topic, which was published in the top journal in sports science, Sports Medicine, in 2019 (see Figure 1).

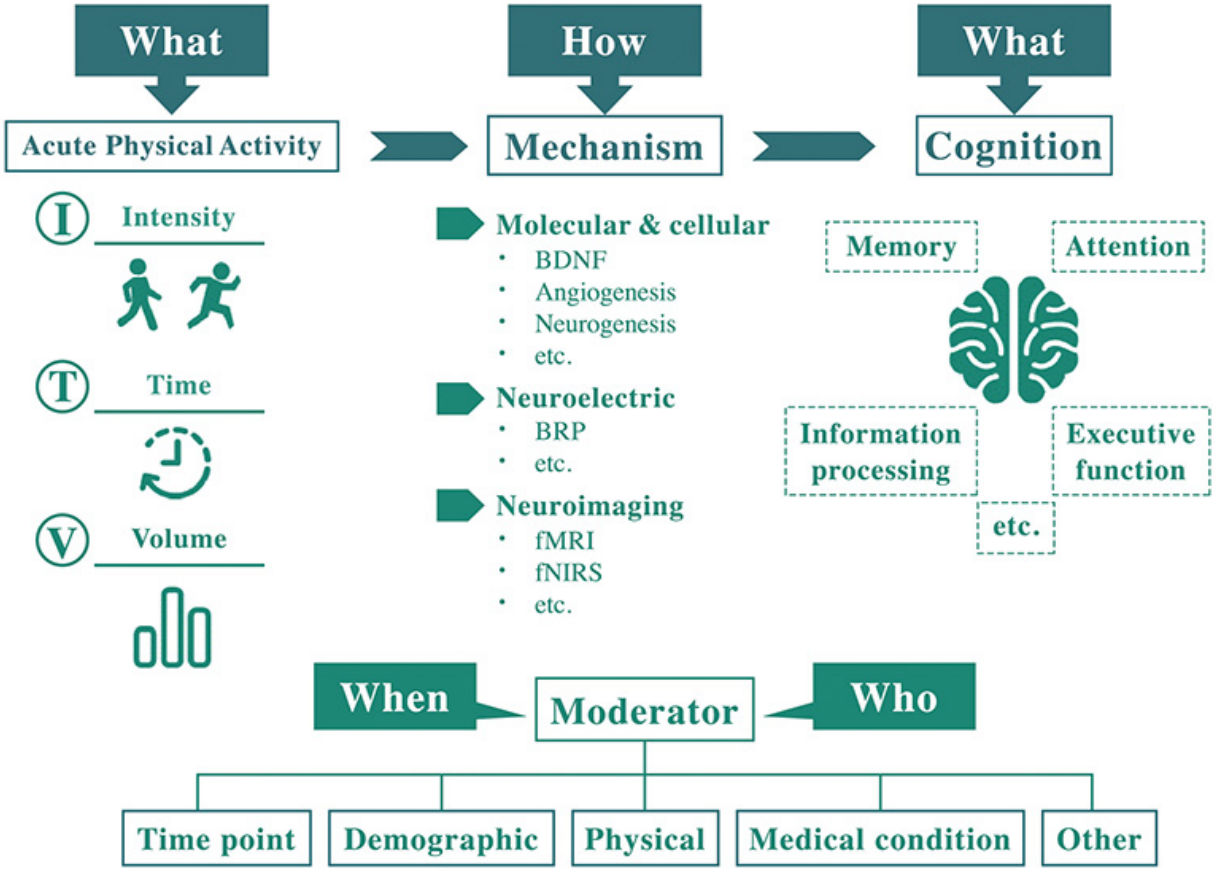


Figure 1. Chang's research team proposed a research model for acute exercise and brain cognitive function

Professor Chang's team first explored the possible mechanisms of multiple event-related potential components (a special form of brain potential measurement index) and brain neurotrophic serum factors, publishing their work in Psychophysiology in 2017. The results showed that a single exercise not only had a holistic effect on different cognitive tasks, but also induced a larger P3 and smaller N450 amplitude compared to the control situation. This result means that a single moderate-intensity exercise can improve a variety of cognitive functions, and the benefit may be related to increased brain attention or nerve resource allocation, as well as the process of conflict detection reflected by endogenous nerve potential components such as P3 and N 450 (see Figure 2).

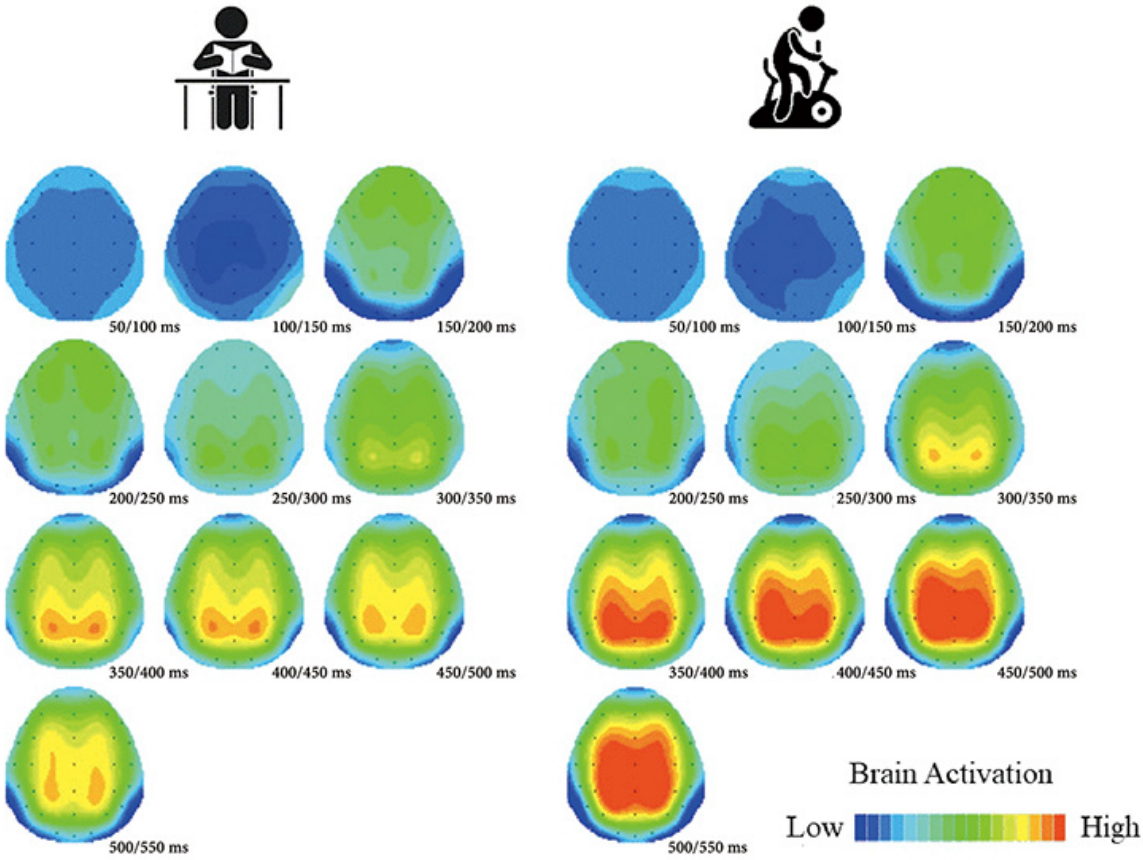


Figure 2. Compared to the static control reading situation (left), acute exercise group (right) could induce higher brain activation. Modified from Psychophysiology

Another aspect of future research is to move towards a more efficient single exercise prescription, such as, which acute exercise is the most effective in terms of intensity, time or total amount? What kind of brain cognitive function benefits the most from acute exercise? Does acute exercise need to be changed for individuals with different physical conditions and characteristics? The core of these questions points to the need for future research to design optimized and personalized exercise prescriptions based on personal perspectives. Such investigations will not only enhance the cross-domain knowledge of sports science and brain cognitive neuroscience, but more importantly, propose a scientific basis that can be practically applied to industry, and broaden the greater influence of exercise in society through the combination of academia and industry.

Optimize life through exercise and change both the mind and brain

Einstein once said: "Life is like riding a bicycle. If you want to maintain balance, you must keep exercising." The research team led by Professor Chang will make us all better through their cross-field exploration of exercise and brain neuroscience. Exercise for your "mind, brain, and life!"

Yu-Kai Chang, Ph.D., Research Chair Professor in the Department of Physical Education, National Taiwan Normal University and the Director of the Physical Activity and Cognitive Neuroscience Laboratory. Dr. Chang is currently managing council member of both the International Society of Sports Psychology (ISSP) and the Asian-South Pacific Association of Sport Psychology, and the mental consultant for the Chinese Professional Baseball League (CPBL).

EMPOWERING STUDENTS AND ATHLETES TO REACH THEIR ULTIMATE POTENTIAL

Figure 1 : Yi Hng Tew - 2019 UFA Golden Glove Award Winner

With its long and storied history in the field of physical education, it should come as no surprise that many of Taiwan's top athletes call National Taiwan Normal University (NTNU) their alma mater. Yi Hng Tew (see Figure 1), an international student hailing from Malaysia, is currently a senior in NTNU's Department of Physical Education. In 2019, Yi Hng was awarded the Golden Glove Awardfor his outstanding on-field performance within the University Football Association (UFA). Despite playing soccer seriously for only two years, a passion for the sport and the professional training protocols at NTNU were enough to vault Yi Hng into the top echelons of the field.

Yi Hng Tew attributes much of his success to the environment fostered by NTNU, which allowed him to work with football in its truest and most professional form. It also motivated him to persevere in his practice come rain or shine.

Besides their performance on the pitch, athletes need to understand how to take care of themselves off the field so as to keep their bodies in top condition. Therefore, in addition to striving to become a professional footballer, Yi Hng is also preparing to sit for an athletic trainer certification exam. Thanks to the athletic training curriculum found in the Department of Physical Education, Yi Hng says he feels well prepared. His two-pronged approach—athletics and the science and training behindit—will ensure that his sports career goes far. "If you are interested in enrolling in teacher training related curriculums, I highly recommend studying at NTNU," said Yi Hng. "It should be your first choice."

Figure 2 : Professor Lee assisted our student athletes with post-injury assessment, surgical rehabilitation, muscle strength, and physical health courses.

NTNU is one of Taiwan's premier public universities. Along with being a natural leader in academics, it also plays an oversized role within the world of sports and athletics. NTNU's students and alumni shine bright in both domestic and international sporting events. Of particular note has been the university's performance at the yearly National Universiade, with NTNU bringing home the most medals of any university six years running. In 2020 alone, NTNU athletes won 27 gold, 39 sliver, and 49 bronze, breaking 21 conference records and setting eight national records. A similar story can be found at the 2019 Summer Universiade in Napoli, where athletes from NTNU's Department of Athletic Performance and Department of Physical Education accounted for one-third of Taiwan's total medals with three gold, seven silver, and one bronze.

NTNU's performance in competitive sports settings has been nothing less than stellar. There is a clear reason for this. Besides providing student athletes with solid training and abundant resources, NTNU keeps abreast of new advances in the field by gathering and refining the newest knowledge and training regimes being released by different sports-related programs. This ensure that every athlete at NTNU is given the chance to realize his or her potential though efficient programs and protocols.

One example would be the sports science team led by Department of Physical Education Associate Professor Heng-Ju Lee . Professor Lee uses science-based practice and training regimes, combined with strength and conditioning protocols to improve the self-training regimes of professional baseball players and assist them in recovering from injuries so they can quickly return to peak form. (Figure 2,3)

Figure 3 : The athletic trainer of the sports science team guides a student athlete in posture alignment.

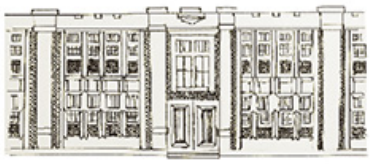
Other NTNU luminaries include Department of Physical Education Professor Tsung-Min Hung, himself a graduate of NTNU's Department of Physical Education master's program. Professor Hung has spent many years researching sports psychology and in 2018 was inducted as a fellow into the National Academy of Kinesiology, one of the world's most prestigious organizations in the area of kinesiology and physical education.

Professor Hung's work addresses the fields of competitive and recreational sports through research into athletes, the competitive or fitness environment they play in, and their team history. Through his work, he looks to improve performance, health and wellness, as well as promote psychological growth in athletes. Professor Hung's work also plays a large role in helping to develop new academic research methods or experiment designs. He is an enthusiastic proponent of the study of sports psychology, which he sees as an important avenue towards improving athletic performance.

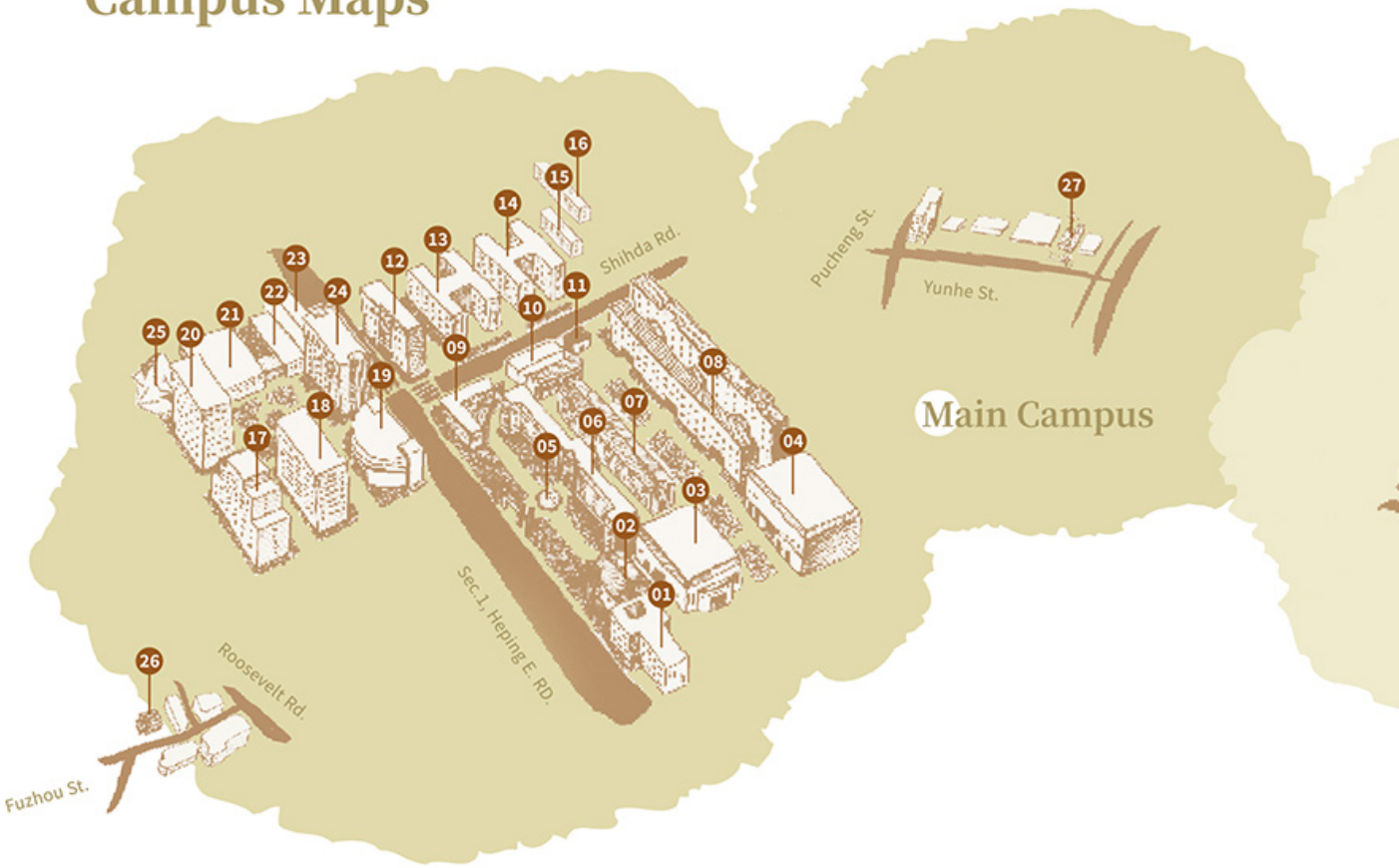
Figure 4 : NTNU student athlete Ying-Shin Lin is qualified for 2021 Tokyo Olympics in archery.

Home to Taiwan's most-renowned physical education program, NTNU has the contacts and resources that allow its department and faculty to keep up with the latest research and methodology, all of which goes a long way to helping its students realize their dream of playing sports at the professional level. To date, NTNU has four students who have qualified for the Tokyo Olympics in the sports of artistic archery (see Figure 4), gymnastics (see Figure 5), karate,and swimming—a clear sign that NTNU's strength in the fields of physical education and competitive sports remains top-notch. By accompanying these elite athletes through their learning and training, NTNU continues to help generation after generation of athletes transform their dreams into reality.

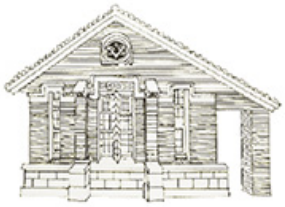
Figure 5 : NTNU student athlete Chia-Hung Tang is qualified for 2021 Tokyo Olympics in artistic gymnastics.



Campus Maps



01	Music Building
02	Audiorium
03	Gymnasium
04	Swimming Pool
05	Circle
06	Administration Building
07	General Building
08	College of Liberal Art
09	Yaojhih Building
10	Wen-Huei Hall
11	Health Center
12	Fine Arts Building
13	Men's Dorm 1
14	Women's Dorm 1
15	College of Management
16	College of Music
17	In-sevice and Continuing Education Building
18	Bo-Ai Building
19	Library
20	Educational Building
21	Science and Technology Building
22	Mechanical Engineering Building
23	International Conference Center
24	General Building
25	NTNU Museum
26	Japanese-style dormitory at 11 Fuzhou Street
27	Liang Shiqiu's former residence



Gonguan Campus

Linkou Campus

01	Administration Building
02	Jhongjheng Hall
03	General Hall
04	Mathematics Building
05	Science Education Building
06	Branch Library
07	Graduate Student Dormitory
08	Cheng Building
09	Applied Science Building
10	College of Science Building
11	Student Dorm 7
12	Parade Platform
13	Gymnasium
14	Lecture & Research Building

01	Administration Building
02	Audiorium
03	Belfry
04	Gymnasium
05	Lecyun Intruction Building
06	Jingye Intruction Building
07	Teacher Research Center
08	Science Building
09	Liberal Education Building
10	Atrium Garden
11	Library
12	Student Dorm (Cin Building)
13	Student Dorm (Pu Building)
14	Student Dorm (Chen Building)
15	Student Restaurant
16	Health Building
17	Student Dorm (Jheng Building)
18	Visiting Scholars Guest House
19	Faculty Residence
20	Information and Academic Building

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