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## ТЕНДЕНЦИИ ИССЛЕДОВАНИЙ ГЕННОГО ДОПИНГА НА ТАЙВАНЕ

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**Аннотация.** За последние три десятилетия мир изменился с неуправляемой скоростью. Индустрия генных технологий стала высокопроизводительным бизнесом в течение одного поколения. Это также влияет на развитие повлиало в том числе на спорт и привело к изменениям в спортивной культуре и этике. Из-за широкого спектра генных технологий, которые могут быть задействованы в спортивной сфере, и существующих исследований, преимущественно в Европе и Северной Америке, существует потребность для других стран в разработке тем, методов и целей исследований для улучшения нашего понимания. В этой статье за отправную точку для изучения этих вопросов использованы две журнальные статьи, которые я опубликовала на Тайване. В качестве примера взята одна из новых форм допинга, генный допинг, и исследовано глобальное управление и практики его применения, а также рамки, в которых тайваньские ученые проводили исследования. Я кратко расскажу о текущих тенденциях исследований генного допинга.

га на Тайване и проанализирую их возможные причины. Кроме того, мной утверждается, что усилия спортивных гуманитарных и социальных наук по исследованию генного допинга и генной технологии все еще недостаточны. В этой статье предполагается, что возможно использовать более широкие перспективы для анализа текущих явлений, таких как «Этические, правовые и социальные последствия» или «Наука, технологии и общество».

**Ключевые слова:** Тайвань, генный допинг, генные технологии, этическая дилемма, направление исследований.

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## THE RESEARCH TRENDS OF GENE DOPING IN TAIWAN

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**Abstract:** The world has changed at an uncontrollable rate in the past three decades. The gene technology industry has become a business with great output value during this generation. It also influences sports and has led to changes in sport culture and related ethical concepts. Because of the wide range of gene technologies that may be involved in the sports field, and existing studies mostly originating from Europe and America, there is a demand for the development of research topics, methods, and objectives to enhance our understanding elsewhere. This article will take two journal articles I published in Taiwan as the starting point to explore related issues.<sup>1</sup> In these two articles, I took one of the new forms of doping, gene doping, as an example, and explored the global governance and practice of

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<sup>1</sup> Please refer to the articles listed below: (1) Sun, C. T. (2021). Gene Technology/Gene Doping Research: The Frame of Comprehension in Taiwan's Sports Field. *Sports Coaching Science*, 61, 41-51. (2) Sun, C. T. (2021). The Governance of Gene and Cell Doping: An Investigation Using the STS Approach. *Sport Studies*, 39, 33-78.

it, and the framework that Taiwanese scholars conducted studies within to comprehend it. I will briefly discuss the current research trends of gene doping in Taiwan and analyze the possible reasons for these trends. Furthermore, I will suggest the efforts of sports humanities and social sciences research on gene doping and gene technology are still insufficient. This article suggests that we may apply more perspectives to analyze current phenomena, such as “Ethical, Legal, and Social Implications (ELSI)” or “Science, Technology, and Society (STS).”

**Keywords:** Taiwan, Gene Doping, Gene Technology, Ethical Dilemma, Research Trend

## Introduction

**G**ene technology not only involves scientific and medical breakthroughs, but also affects human health, quality of life, thinking patterns, and the way we face life and death. Gene technology allows us to overcome the threat of disease but also brings new problems. Technology often shows the conflicting relationship between different powers, and also shapes a new way of life.

The way people see and use gene technology in different social contexts and states determines its nature. For example, the original intention of gene therapy was to enable people to recover from diseases and restore physical functions. But it may also be used for eugenics purposes, while in the field of sports it has become a form of doping. In view of the eager attention that gene technology has received in the market and the trend of "Direct to Consumer (DTC)", it is now a well-known industry with extremely high benefits. Many countries also set the cultivation of the biomedical industry as the focus of their policies and industry developments and regard it as a competition for strength among different countries.

Based on these backgrounds, I began to investigate how gene technologies have been used recently in sport and related fields. Many studies and essays emerged in academic journals, columns, and news items from the 1980s onwards and some projects, such as the "Human Genome Project", attracted many people's attention. Sport is an important experimental field of technology, there is never a lack of relevant discussions. For example, Loland (2002), Miah (2004), Mehlman (2009), Epstein (2014), Camporesi and McNamee (2018) all described and discussed the debates, dilemmas, challenges, and chances of gene issues in sport.

Some publishers launched ethical series to include related books, such as “The Ethics and Sport Series” of Routledge. The World Anti-Doping Agency (2021) and other international sports organizations also regularly announced restrictions and guidelines following trends and events globally. As we can see, many existing studies originated from Europe and America and gene technology is also involved in a wide range of sports. There is a demand for developing the research topics, methods, and objectives for enhancing our understanding of gene technology from different perspectives and areas.

Based on this idea and extensive reading, I started my search for research from Taiwan. I wondered if there was any research focused on gene technology in sports or gene doping issues in this region. How was this research conducted? How were the trends of related research demonstrated? How do Taiwanese scholars know about gene technology and gene doping? To explain the results I found and to compare the status between international communities and Taiwan, I also analyzed the governances and practices that international society imposes on gene and cell doping and the difficulty of governance. The findings included the files launched by the International Olympic Committee (IOC) and the World Anti-Doping Agency (WADA) such as the Prohibited List.

I proposed some initial answers in my previous publications, but I think deeper exploration into some concepts is still needed for our better understanding of the ethical and social issues. This is especially important when technological developments continue to make rapid progress, and gene doping has become a serious problem that is difficult to prevent. Therefore, this article will first describe the current research results I have at hand and the status of Taiwan’s research on gene technology/gene doping, and then further discuss and explain related concepts from a viewpoint of “Metathinking”.

## Method

To begin with, I will take two articles that I have published in journals from Taiwan in 2021 as examples to illustrate three points. First, what are the current research trends of gene doping in Taiwan? Second, what are the possible causes of the trends? Third, how effective are the current governances and practices that international society applies in doping? The articles can be found on the Internet through the topics “Gene Technology/Gene Doping Research: The Frame of Comprehension in Taiwan’s Sports Field” and “The Governance of Gene and Cell Doping: An Investigation Using the STS Approach”. I presented the conceptual prototype of the papers orally at the annual meeting of the Taiwanese Sociological Association in 2020 with the topic “Gene technology/Gene doping: The cognitive framework, development, and governance in the field of sports”. The Taiwanese Sociological Association is an important organization of sociology in Taiwan. To a certain extent, the admission of this topic for an oral presentation meant that it is an important subject. Anyway, it will be my starting point. Both in these studies and this research, document analysis and text analysis are the main methods, and I will adopt a critical social research approach to discuss related issues.

## Research Trends in Taiwan

I searched for publications written in traditional Chinese resulting from the keywords “gene doping,” “sports talent identification by gene,” “sports genes,” and “gene technology” via multiple Taiwanese academic platforms on 29 October 2020. Most studies with the term “gene technology” in the title were from the medical, ethical, law, and business fields, rather than sports fields. Thirty-seven studies were connected to the other three keywords as shown above and humans were the main research subject. Eight of them were theses and 29 were journal papers. However, there were only 10 articles directly related to gene doping (Sun, 2021a).

The studies mostly focused on the mechanism and function of candidate genes that may improve athletic performance and sports talent identification. Very few mentioned gene doping, editing, modifying, or other gene technologies. More than 80% of the research came from sports physiology and specific laboratories using experimental methods. Fewer studies worked through interdisciplinary cooperation. From the viewpoint of humanities and social sciences, studies conducted from the perspectives of science, technology, and society (STS) and ethical, legal, and social implications (ELSI) were still lacking. Risk governance, ethics, regulation, and topics or analysis from the angles of media, education, and international policy were insufficient (Sun, 2021a).

However, for Taiwan, which has highly developed medical capabilities and information systems, it is paradoxical that there is no mature and adequate research in the sports field. I think this is mainly affected by several factors listed below (but not limited to these).

(1) Strong goal orientation and funding allocation. The purpose of most existing research is to promote athletic performance. Researchers have to allocate their limited time, money, resources, and energy towards solving specific questions or reaching some emergent goals. The promotion of an athlete's performance and competition results normally becomes a very important target.

(2) Academic systems and requirements. Even the Taiwanese government encourages people to carry out interdisciplinary research which benefits science development in different fields, but many scholars and academic workers are required to meet specific working standards set by the departments and units they serve. Some standards indicate the accredited publication fields and journals. This means that some interdisciplinary research may not be recognized or approved at the time of promotion. It does not mean that Taiwanese scholars in the sports field were not aware of gene issues or had no knowledge of them, but they may not have received much attention or many attempts to engage in research on this topic, which is not often seen in life.

(3) The situation of sports sociology in Taiwan. Some people still



believe that the natural sciences are more valuable and useful than the social sciences in the sports field, the results of studies in natural sciences are easier to transform into a materialized form and can be profitable. At the same time, the distinctiveness of the sports field, and the crisis that academic theory development is facing both affect the academic distribution. Not many people are engaged in sports humanities and social science research. Scholars in the field of social science rarely study the field of sports. Even if they invest in research, the quality of the research is slightly inadequate due to a lack of practical in-depth experience. In essence, this is related to the status of sports culture and the position that sports occupied in the educational system in Taiwan. The sub-fields of sports have long been concerned with different aspects and inherited research topics of "sports", and they follow different models. They also have their own strengths in the research methods and theories adopted. In addition, the field of sports is a unique and dynamic research field, these factors have all caused this kind of fracture.

(4) The existence of institutions. The Taiwan Anti-Doping Association is responsible for Taiwan's doping control, and it is supported by the Republic of China Sports Federation and the Chinese Taipei Olympic Committee. However, Taiwan does not have an internationally certified doping testing center and also Taiwan does not have enough cases to meet the criteria for establishing a certified testing center. When a suspected case occurs, the sample needs to be sent to other nearby testing centers which are in Beijing, Seoul, Tokyo, etc. Due to the political issues and the specific "Chinese Taipei" model it is not easy to apply to host any large-scale international competitions in Taiwan.

Of course, there are still many factors that may affect Taiwan's research trends. It is necessary to compare the situation in Taiwan with the rest of the world for deeper exploration. After checking and analyzing the official documents, academic papers, and provisions of IOC, WADA, Chinese Taipei Olympic Committee (CTOC), United Nations (UN), and other medical or international organizations, it is easy to find that the international code of biological ethics and WADA's "Prohibited List" are the main basis

for gene and cell doping governance. These regulations usually changed with specific events that happened, for example, the success of the “Human Genome Project” in 2000 and the case of the gene editing of twins in 2018. They all indicated the new progress or attempts in gene technology. The revision of the contents and categories of the Prohibited List section M3, Gene and Cell Doping is in parallel with the development of gene technology. People, especially athletes, coaches, officers, or presenters from sports associations or organizations produced corresponding actions and habitus (Sun, 2021b).

Although the WADA is in charge of doping control, including gene and cell doping, in the world and it decides the framework and scope of global doping control, the practical work is still processed by many different roles with multiple levels, such as International Sport Federations (IFs), the International Testing Agency (ITA), the Institute of National Anti-Doping Organizations (INADO) or individual nations. They often report the status of different aspects based on their practical work, such as doping control, inspection, reporting, education, analysis, comparison, handling disputes, and developing inspection capabilities at different times and locations (Sun, 2021b).

These will all improve the WADA’s adjustment of guidelines and outlines. However, many factors will affect the use of gene and cell doping in sport, including people’s interests, market prevalence, and the country’s attitudes and actions. These are also the reasons why it is difficult to control doping, especially gene and cell doping (Sun, 2021b). International commercial gene companies have long invested in gene testing for the purpose of selecting excellent athletic talent. But Taiwan’s commercial gene market has not yet become so popular, and they have yet to enter the sports field, so the related ethical and social issues caused by using gene testing, editing, or treatment in the sports field have rarely appeared. These situations are all reflected in the research. People’s attitudes and concerns will also affect the direction of research, there is a mutual shaping effect between the laboratory and the public.

Compared with researchers, the public does not seem to be aware of the possible impacts of gene technology in the next few decades. The rare cases of the use of doping in Taiwan, and the lack of attention to sports and doping issues makes relevant discussions less frequent in ordinary conversations. Even if there were organizations in Taiwan and ways that they could receive anti-doping information, Taiwan still has practical obstacles and cannot respond to the current international situation in real-time.

## Conclusions

In summary, the research trends of gene doping in Taiwan in some ways demonstrate Taiwan's current society and culture. The system of doping governance, education, training, biomedicine development, and regulation all influence and show the interaction of results in research trends. Gene and cell doping governance is network-style governance that has many interactions between various actors and society. So, much more research is needed, especially from the viewpoints of sociology and ethics. Based on existing research and Taiwan's fruitful resources of biomedicine and medicine, it is necessary to localize the theory, development, and study of gene technology and gene doping in the sports field. The research trends of gene doping in Taiwan now point out the research directions that can be pursued in the future.

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