# The 24th EASESS Annual Congress

## Organizing Committee

President: SUN Qilin (Shanghai Jiao Tong University, China)
Atsushi Saito (Kyushu University, Japan)
NAM Joong- Woong (Korea National University of Transportation, Korea)

Director: CAI Xiaobo (Southeast University, China)
JIN Kai (Southeast University, China)

Members: CHEN Gang (Shanghai Jiao Tong University, China)
HAN Junsheng (Southeast University, China)
OHASHI Mitsunori (Kurume University, Japan)
GOO Kang-Bon (Korea National University of Transportation, Korea)
JI Jingjing (Southeast University, China)
ZHANG Laiming (Southeast University, China)
GU Xunjie (Southeast University, China)

## Date:

August 7-9, 2019

## Place:

Southeast University
No. 38 Jinxianghe Road, Liuyuan Hotel, Nanjing, China

## Sponsor:

East Asian Sport and Exercise Science Society

# Southeast University

Southeast University (SEU), located at Nanjing, the ancient capital city of six dynasties, is a prestigious institution of higher learning renowned both at home and abroad. As one of the national key universities under direct administration of the Ministry of Education of China and jointly established with Jiangsu Province, it is also listed as one of the universities involved in National “Project 211” and “Program 985” financed by the Central Government to build world-class universities. In 2017, SEU was ranked on the list of constructing “Class A first-rate world universities”.

SEU is a comprehensive research-oriented university while 11 disciplines have been listed as national “double first-class” construction disciplines and 5 disciplines obtain A+ in the fourth round of disciplinary assessment, both ranked at No. 8 at the national level; 11 disciplines are ranked among top 1% of ESI internationally, in which, engineering is listed at No. 25 with computer science at No. 22. Both disciplines are ranked among top 1% of ESI internationally. Meanwhile, the school highlights 3 national key laboratories, 4 national engineering research centers, 2 national engineering technology research centers, 1 national professional laboratory, 11 key laboratories of the Ministry of Education, 6 engineering research centers of the Ministry of Education, 30 postdoctoral research centers and 2 key high-end think tanks of Jiangsu Province.

The Department of Physical Education of Southeast University, also has a brilliant history. In 1905, the school setup gymnastics as one of the curricula; establish physical education teachers department in 1916, took the lead in training physical education teachers for the whole country; established the Department of Physical Education in 1923.

There are 74 teaching staff and 69 full-time teachers in the Department of Physical Education, including 5 doctoral degree teachers, 28 master degree teachers, 49 teachers with senior titles, 40 referees at the national level and above. School physical education has made fruitful achievements. In May 1979, school physical education was recognized as the "National Advanced Collective of Physical Education and Health Work"; in 1988, the Department of Physical Education was rewarded by the people's Government of Jiangsu Province; in 1989, the physical education curriculum was awarded the National Teaching Achievement Award; in 2005, the University Physical Education was appraised as the National Excellent Course; in 2016, for the seventh consecutive time, it won the "President's Cup" Outstanding Contribution Award of the National Student Games. In 2017, for the ninth time in a row, it was appraised as the "Advanced Unit for Mass Sports Work throughout the Country."

Entering the new era, school physical education will take the construction of national excellent courses of college physical education as the platform, sports scientific research as the forerunner, physical education teaching and mass sports as the two wings, comprehensively promote the development strategy of school physical education with the goal of "facing all college students" and "looking at the World Universiade", and construct an omni-directional and three-dimensional school physical education work system supported by subject construction, team management and venue construction. Promote the role of school physical education in the cultivation of innovative talents in an all-round way.

# Program

| Date | Time | Contents | Place |
|---|---|---|---|
| August,7th | 16:00-18:00 | Registration(China) | Liuyuan Hotel |
| | 18:30 | Secretariat Meeting | Liuyuan Hotel |
| August,8th | 09:00-09:40 | Registration(Japan, Korea) | Liuyuan Hotel |
| | 09:40-10:00 | Opening Ceremony | Xinhua Hall |
| | 10:00-10:10 | Photo | Xinhua Hall |
| | 10:10-10:50 | Keynote Speech 1<br>Yin Xiaojian<br>（Shanghai Institute of Technology, China) | Xinhua Hall |
| | 10:50-11:30 | Keynote Speech 2<br>Sotaro HAYASHI<br>(Fukuyama City University, Japan) | Xinhua Hall |
| | 11:30-12:10 | Keynote Speech 3<br>Sung-Hee, Hong<br>(Dongyang University, Korea) | Xinhua Hall |
| | 12:10-13:10 | Lunch | Liuyuan Hotel |
| | 13:10-13:40 | Posting | Xinhua Hall |
| | 13:40-14:20 | Keynote Speech 4<br>LIU Weina<br>(East China Normal University, China) | Xinhua Hall |
| | 14:20-14:40 | Tea Break | Xinhua Hall |
| | 14:40-15:20 | Keynote Speech 5<br>Tengfei ZHANG；Atushi SAITO<br>（Kyushu University, Japan） | Xinhua Hall |
| | 15:20-16:40 | Poster Presentation | Xinhua Hall |
| | 16:40-17:00 | Closing Ceremony | Xinhua Hall |
| | 17:00-19:30 | Banquet | Mandarin Garden |
| August, 9th | 08:00-12:00 | Departure | Hotel |

# Greeting

Ladies and gentlemen, friends:

On the occasion of the 24th Annual Congress of East Asian Sports and Exercise Science Society in Southeast University, on behalf of Southeast University, I would like to extend a warm welcome and sincere greetings to sports specialists and scholars from Korea, Japan and brotherly colleges and universities in China!

Southeast University is a long history and profound university, its history can be traced back to 1902 Sanjiang normal School, has a history of 117 years. SEU is a comprehensive research-oriented university while 11 disciplines have been listed as national “double first-class” construction disciplines and 5 disciplines obtain A+ in the fourth round of disciplinary assessment, both ranked at No. 8 at the national level; 11 disciplines are ranked among top 1% of ESI internationally, in which, engineering is listed at No. 25 with computer science at No. 22.

Southeast University has always attached importance to international exchanges and cooperation. We have established friendly relations between universities such as Tokyo Institute of Technology of Japan and Hanyang University of Korea, and have carried out exchanges and cooperation in the field of disciplines for a long time. We also hope to strengthen the sports exchange and cooperation between our school and Japan, Korea colleges and universities with the help of the platform of East Asian Sports and Exercise Science Society.

Finally, We wish the 24th Annual Congress of East Asian Sports and Exercise Science Society a meaningful and great success! May the friendship between the peoples of China, Japan and Korea last forever! I wish all the guests a pleasant stay in Nanjing!

Thank you!

August 8th 2019

ZHENG Jiamao
Vice President of SEU
Professor at Southeast University, China

# Greetings

The 24th Annual Congress of East Asia Sport Exercise Science Society (EASESS) will be held on August 8th to 9th, 2019 in Southeast University, Nanjing, China. On the occasion of the opening of the congress, I would like to extend warm welcome to all friends and colleagues from China, Japan and Korea. To Professor Atsushi Saito, President of EASESS in Japan and Professor Nam Joang-Woang, President of EASESS in Korea, we are honored to have you here with us. I would also like to extend gratitude to Southeast University for their extraordinary arrangement.

Since its foundation in 1996, the annual congress of EASESS has become an occasion where scholars and researchers from China, Japan and Korea exchange academic findings and share views on sports science. Focusing on college students' physique and sports skills, this annual congress goes to the very essence of college sports. We believe EASESS will be greatly developed with our joint efforts.

In closing, I wish the congress a great success and wish you all a good time staying here.

August 8th, 2019

SUN Qilin

President of EASESS, China

Professor at Shanghai Jiao Tong University, China

# Greetings


It is our great pleasure that the 24th Annual Congress East Asian Sport and Exercise Science Society is held in Nanjing, China.

We deeply appreciate the Chinese members who prepared for the opening of this meeting and want to extend a warm welcome and our heartfelt respect to all of the participants in this congress.

It is also a great honor for us to be in the venue that has prospered over and over again as the capital of China, for the 24th anniversary of this congress.

In addition, Southeast University, which has been holding this event, is a wonderful university that is planning to form a university group, like the Ivy League, with eight universities, including Shanghai Jiao Tong University and Fudan University, which have previously held the EASESS.

Thank you very much for your great university.

By the way, UNIVAS (Japan Association for University Athletics and Sport) was born as a new organization for university sports in Japan.

Until now, university sports have played individually in sports associations.

UNIVAS supports university sports by providing "a well-developed learning environment for athletes," "upgrading the system to participate in games with peace of mind," and "making a system that facilitates highly motivated participation in competition."

In addition, with the decision to hold the Tokyo Olympic Paralympics, many universities have established new sports-related departments and the direction of university athlete learning and career education is also changing.

I think the meaning and role of university sports in Japan, China and Korea are different. I hope that each country can best utilize the good points of each other and contribute to the revitalization of university sports in East Asia.

Finally, we hope that this congress will be meaningful for everyone and a great success, as well as an opportunity for mutual information sharing and friendship beyond diplomacy.

August 8th 2019

SAITO Atsushi

President of EASESS

Professor at Kyushu University, Japan

# Greetings

I am glad to see all members from Korea, China and Japan again this year. Last year's conference was held at Kyushu Sangyo University and I received hospitality from Professor Saito Atsushi, President of East Asia Sport and Exercise Science Society(EASESS) in Japan and other Japanese members. I would like to take this opportunity to express my gratitude for the hospitality I received last year.

I would like to express my sincere appreciation to officials of Southeast University, Professor Sun Qilin, President of EASESS in China, and Chinese members who offered this place to hold a successful conference this year. Nanjing is a city of academic and cultural studies and is a place of great historical origin. Recently, it has been growing as an industrial city. I hope there will be more exchanges between South Korea, China and Japan here.

I want this conference to work as trigger that can lead Korean, Chinese and Japanese researchers to work together to bring great development in sports science. During this conference, I would like all members to share new information and knowledge regarding sports science and build strong relationship. And I hope to see you all again in Korea next year.

Thank you very much.

8th August, 2019

NAM, Joong-Woong

President of EASESS

Professor at Korea National University of Transportation, Korea

# Contents

# KEYNOTE SPEECHES

浅兰色纸 插页

K1

# Research on Mental Sub-health of Chinese Han Adolescents with Different Nutritional Statuses

**Xiaojian Yin[1,2], Huipan Wu , YuQiang Li[2], GuoDong Wang[2], Xiaofang Yang[2], Yi Sun[2], Sien Ren[2],CunJian Bi[2], Ming Li[2], Yuan Liu[1,2]**

1. Physical Education Department of Shanghai Institute of Technology, Shanghai 201418, China; 2. Key Laboratory of Adolescent Health Assessment and Exercise Intervention, Ministry of Education, College of Physical Education & Health, East China Normal University, Shanghai 200241, China

E-mail: xjyin1965@163.com

**Abstract: Objective:**Explore the mental sub-health of Chinese Han adolescents with different nutritional statuses; **Method**: 8457 Han adolescents were selected by random case method, and were conducted mental sub-health test by Multidimensional Sub-health Questionnaire of Adolescents (MSQA); **Result**: Detection rates of mental sub-health state among Chinese junior high school students with wasting, normal weight, overweight and obesity were 25.9%, 22.2%, 25.3% and 30.7%, and the detection rates of mental sub-health symptoms were 35.1%, 35.9%, 37.5% and 39.0% respectively. Detection rates of mental sub-health state among senior high school students were 20.5%, 17.7%, 22.8% and 21.8% , and the detection rates of mental sub-health symptoms were 34.7%, 31.4%, 31.1% and 42.3% respectively. and the comparison between different groups has statistical significance . **Conclusion**: obesity group has the most obvious mental sub-health, and then the over-weight,wasting and normal-weight group in sequence.

**Keywords:** adolescents, Chinese Han, nutritional statuses, mental sub-health; over-weight and obesity

## 1 Introduction

Over the past few decades, with rapid development of Chinese economy as well as changes in ecological environment and the people's lifestyle, there is also a constant change in nutritional status of Chinese adolescents. For now, the trend of overweight and obesity among Chinese adolescents is becoming more and more serious, which has become an important problem influencing physical and mental health of such groups (19,p.3-21). As shown by research data on Chinese students' physical fitness and health in 2014, detection rate of overweight and obesity among Chinese Han students between 7 and 18 years old was 19.4%, and the rate of overweight and obesity has been on a high level, which is close to that in developed countries and is slightly higher than the average level in developing countries, and it could be determined that overweight and obesity among Chinese Han adolescents have come into a comprehensive epidemic phase (27,p.300-305). In addition, it is worth noting that the rate of overweight and obesity among

Chinese children and adolescents is still in a state of continuous increase. Data showed that, annual average growth value of detection rates of obesity among both Chinese children and adolescents between 2010 and 2014 has reached the highest value between 1985 and 2014, and due to influence by various factors, such growth trend will continue for some time in the future (24, p.448-453). However, while paying attention to rate of overweight and obesity, it also needs to notice that the malnutrition among Chinese adolescents is still widespread, and in 2014, detection rate of malnutrition among Chinese Han students between 7 and 18 years old was 10.0%, and the overall detection rate was high, with wasting malnutrition as the main symptom (10,p.424-432).

Nutritional status of the individuals in their adolescence is of great significance for their future physical and mental development. Researches show that, overweight and obesity will not only increase the risk of physical health problems and disease development of the adolescents in the future, but also have influence on their mental health(16,p.15-17; 20,p.27-40). It is proved by a clinical mental research that, the obese adolescents have a high level of depression and anxiety as well as poor emotional control ability, which results in their lack of social adaption at last, however, there is a certain difference among adolescents of different age groups (11,p.6-13). There are also researches showing that, obesity and mental factors such as anxiety, depression, etc. may have mutual influence on each other, including, obesity could predict occurrence of some mental symptoms of the individuals, while on the contrary, mental health state of the individuals could also predict occurrence of overweight and obesity( 15,p.220-229; 12,p.744-748; 34,p.1586-1589). In addition, there is research suggesting that there is gender difference embodied in correlation between overweight & obesity and mental health of the adolescents. Researches by Yang Xiuying, et al showed that, for female adolescents in Beijing, there was a positive correlation between their body mass index and their score of depression symptoms and their score of behavior problems, while there was no such difference among the male adolescents (33,p.519-526). There are also scholars who explore the relation between overweight & obesity and mental health of the children and the adolescents from the vertical research perspective, for example, Anderson SE conducted a two-year tracing investigation toward American children and adolescents by *Child Behavior Checklist (CBCL)*, and the results showed that, the problem of mental health would increase the probability of overweight and obesity among the children and adolescents, while overweight and obesity would also increase the probability of anxiety, depression and other symptoms among the children and adolescents, which was a process of mutual influence (3,p.49-55). It was emphasized in the report issued by World Health Organization (WHO) in 2012 that, overweight and obesity of the children and adolescents were significantly related with decrease in quality of life, which is easy to cause the children and adolescents to be teased, bullied and isolated by the society, thus making them fail to integrate with the society effectively (31). However, although most of the researches support that there is a relation between overweight & obesity and mental health, there are also researches showing that, overweight and obesity do not have significant influence on social adaption, anxiety and other mental factors of the children and adolescents (8,p.48).

While paying high attention to the relation between overweight & obesity and mental health, the relation between malnutrition and mental health of children and adolescents is neglected to a certain degree. However, research showed that, malnutrition would cause harms similar with obesity to the school-age children (14,p.437-451). Long-term malnutrition will inhibit the children's growth development and brain development, result in decreased resistance of the

children and increased risk of having infectious diseases, and at the same time have a certain negative effect on their mentality (1,p.e12417; 13,p.690-700). However, there is also research showing that, wasting does not necessarily have negative correlation with mental health of the children and adolescents, and for female adolescents, the wasting ones showed a more positive cognitive attitude than those of normal weight (28,p.214-217).

To sum up, it is obvious that whether there is a correlation between the adolescents' different nutritional statuses and their mental health still needs further verification. In addition, the difference of the relation between the adolescents' different nutritional statuses and their mental health in terms of gender, age, etc. also requires in-depth exploration. It must be noted that, most of the previous mental measurement tools selected for research on correlation between the adolescents' different nutritional statuses and their mental health were "symptom-oriented", and as for the adolescents who have various active mental activities and whose various mental qualities are forming but not yet steady, the assessment accuracy of these measurement tools is worthy of discussion. Based on the above background, in this research, the middle school students in six big administrative region: East China, North China, South-central China, Northwest China, Southwest China and Northeast China were selected as the test objects, and *MSQA*(35,p.237-247) to assess their mental health state, and their nutritional status is analyzed from the perspective of body mass index, thus trying to explore the relation between different nutritional statuses and the adolescents' mental health from the perspective of mental sub-health. This not only has important theatrical significance in revealing the relation between the adolescents' nutritional status and their mental health, but also provides a nursing reference for improving mental health state of the adolescents with wasting, overweight and obesity.

## 2 Research object and method

### 2.1 Research object

The data comes from test data of "development of new assessment methods and evaluation standards for the physical health of Chinese children and adolescents" which is a major project of the key laboratory of the Ministry of Education on "Health Assessment and Exercise Intervention of the Adolescents". In 2015~2016, according to traditional division of administrative regions in China (East China, North China, South-central China, Northwest China, Southwest China and Northeast China), the researchers randomly selected 7 000~7500 middle school students (13~18 years old) from each region, and conducted physical fitness test including height and weight indexes toward total 45538 students, and fill in the *MSQA* at the same time. According to the overall data, total 8457 students including around 100~110 male and female ones respectively from each region at different age groups were included in this research by random case method, with 4216 males and 4241 females in total respectively.

The investigation was made under consent of school principals of the participating students, as well as the *Informed Consent Form* of the participating students and their parents. The research asked the subjects to stay after school, and the trained researchers informed the subjects of the research purpose and procedure, and distributed the questionnaire to the subjects asking them to complete the questionnaire independently, and then collected the questionnaire on the spot.

Ethical approval was obtained from East China Normal University's Human Experiment Ethics Committee. Grant N: HR2016/12055.

2.2 Questionnaire survey and BMI calculation

In order to understand mental sub-health state of Chinese Han adolescents, in this research, *MSQA* was applied to investigate mental sub-health of the adolescents aged 13～18. Assessment indexes of mental sub-health consist of three types: mental sub-health symptom, mental sub-health state and mental health. Mental dimension consists of total 39 assessment items, each having total 6 rating levels (1: last for >3 months; 2: last for >2 months; 3: last for >1 month; 4: last for >2 weeks; 5: last for >1 week; 6: none or last for ≤1 week), and the lower the rating level is, the longer that the sub-health symptom lasts. Besides, mental sub-health could be further divided into 3 dimensions: emotional problem, morality problem and social adaption problem. Among the 39 items, there are total ≥8 items whose mental sub-health symptoms last for > 1 month in accumulation, which are assessed as mental sub-health; meanwhile, 18 of the 39 items belong to the dimension of emotional problem, and if 3 or above items have the symptoms last for more than 1 month, they would be defined as emotional sub-health; there are 8 items belonging to the dimension of morality problem, and if more than 1 items have the symptoms last for more than 1 month, it would be defined as morality sub-health; there are 13 items belonging to the dimension of social adaption difficulty, and if more than 4 items have the symptom last for more than 1 month, it would be defined as social adaption sub-health.

The score is scored by the addition of 39 subjects (each score is 1~6), and the final total score is calculated. The total score of "MSQA" is calculated by the corresponding values of the answers chosen by the subjects. For example, For example, 3 of the subjects were selected, that is, the score of the subject was 3. The higher the score, the better the mental health is.

Height and weight tests were conducted by the test method according to *National Student Physical Health Standard* (17). The body mass index (BMI) (kg /$m^2$) of the subjects was calculated by dividing the square of height (m) from the body mass (km). The overweight and obesity states of the subjects were assessed according to BMI parameters provided by WHO (29). For evaluation for wasting, overweight, and obesity, we adopted BMI-for-age screening [when the body mass index (BMI) was minus 2Z-Score, it was considered as wasting, above or equal to 1Z-Score, as overweight,and above 2Z-Score, as obesity.

2.3 Research method

The data was statistically analyzed by spss19.0: chi-square test was used to compare difference in detection rates of mental sub-health and corresponding dimensions of the students with different nutritional statuses; linear regression model was used to explore the correlation between BMI and adolescents' mental sub-health; multiple logistic regression analysis included the role of influence factors of this research on adolescents' mental sub-health; the examination level was $\alpha$=0.05.

**3 Research results**

Table 1 shows the basic information about nutritional status and mental health state of Chinese Han adolescents aged 13~18. In detection rate of wasting, overweight and obesity, the differences in male students and female students were statistically significant. In various indexes of mental states, whether for detection rates of emotional, morality and social adaption dimensions, or for mental sub-health symptoms and mental sub-health state, the differences in male students and female students had no statistical significance.

Figure 1 shows that, taking $BMI^2$ and BMI of Chinese Han adolescents as independent variables, and taking total score in *MSQA* as dependent variables, it is discovered after making linear regression model analysis that, regardless of the gender, along with the change in BMI value, the score of Chinese Han adolescents in *MSQA* has the distribution characteristic of "first rise and then fall", that is, compared with the groups with wasting, overweight and obesity, the Chinese Han adolescents with normal BMI have the highest score. With increase of weight, mental health state of Chinese Han adolescents becomes worse gradually, and the adolescents with obesity have the lowest score in *MSQA.*

Table 2 shows the detection rate of mental sub-health of Chinese Han adolescents with different nutritional statuses at different age groups. In emotional sub-health, detection rates of junior high school students with wasting, normal weight, overweight and obesity are 34.3%, 29.1%, 32.4% and 41.0% respectively, and the difference among junior high school students with different nutritional statuses has statistical significance. However, the difference among senior high school students with different nutritional statuses doesn't have any statistical significance. In morality sub-health, the differences among the adolescents with different nutritional statuses at both stages have statistical significance. At the overall level, for no matter mental sub-health symptoms or mental sub-health state, the differences among the adolescents with different nutritional statuses at both stages have statistical significance.

Table 3 shows the detection rate of Chinese Han adolescents with different nutritional statuses in emotional, morality and social adaption dimensions. It can be seen from the table that, at the overall level, detection rates of emotional sub-health of the adolescents with wasting, overweight and obesity are 29.9%, 29.9% and 36.4% respectively, detection rates of morality sub-health are 30.1%, 32% and 39.6% respectively, and detection rates of social adaption sub-health are 18.4%, 18.7% and 22.6% respectively, and the detection rates of adolescents with normal weight in the three dimensions are 26.2%, 24.8% and 15.8% respectively, and the differences of both the adolescents with wasting, overweight and obesity and those with normal weight are of statistical significance. In addition, regardless of the gender, the differences of Chinese Han adolescents with different nutritional statuses in emotional sub-health, morality sub-health and social adaption sub-health all have statistical significance.

Table 4 shows the detection rate of mental sub-health symptoms and states of Chinese Han adolescents with different nutritional statuses. At the overall level, detection rate of mental sub-health symptoms of the adolescents with wasting, overweight and obesity are 34.9%, 35.1% and 39.9% respectively, while the detection rate in adolescents with normal weight is 33.5%. In terms of detection rate of mental sub-health state, it is 23.2%, 24.3% and 28.3% respectively among the adolescents with wasting, overweight and obesity, and it is 19.9% among adolescents with normal weight. Whether under mental sub-health symptoms or sub-health state, the differences between adolescents with wasting, overweight and obesity and the adolescents with normal weight all have statistical significance. In addition, regardless of the gender, difference of detection rates among adolescents with different nutritional statuses has statistical significance, which is embodied by that the detection rate of mental sub-health symptom and state of those with normal weight is lower than that of other groups.

Table 5 shows that, multiple logistic regression analysis is carried out by taking whether the Chinese Han adolescents are under mental sub-health and emotional, morality and social adaption

sub-health as dependent variables, and taking their nutritional status and age group as the independent variables. Results show that neither the male nor the female students demonstrate statistically significant difference in emotional, morality and social adaption sub-health dimensions. In terms of different nutritional statuses, detection rates of mental sub-health state, emotional, morality and social adaption sub-health of the adolescents with wasting, overweight and obesity are respectively 1.204 times, 1.163 times and 1.524 times, 1.203 times, 1.205 times and 1.507 times, 1.288 times, 1.331 times and 1.781 times, 1.22 times, 1.258 times and 1.513 times of that of the adolescents with normal weight. In addition, in terms of different age groups, the detection rates of mental sub-health state, emotional, morality and social adaption sub-health of Chinese Han adolescents aged 16~18 are respectively 0.73 times, 0.85 times, 0.652 times and 0.76 times of that of the adolescents aged 13~15.

**4 Discussion**

This research aims to explore the relation between different nutritional statuses and mental health of Chinese Han adolescents from the perspective of mental sub-health. Research results showed that, at the overall level, whether for mental sub-health symptoms and mental sub-health state, or emotional, morality and social adaption dimensions of mental sub-health, detection rates of sub-health among Chinese Han adolescents with wasting, overweight and obesity were higher than that of those with normal weight. Over recent several decades, the relation between different nutritional statuses and the adolescents' physical and mental health has won lots of attention. Especially, with rapid increase of the rate of overweight and obesity, its numerous negative effects on adolescents' development have been attached to great importance worldwide (4,p.60-78) Since the adolescents' mental development is in a state of immaturity, therefore, the negative effect of overweight and obesity on mental health of such group may be more outstanding than on mental health of adults.

Firstly, it is easy for the children and adolescents to form low self-esteem due to overweight and obesity. Research results of Datar et al showed that, with increases in age, social experience and interaction with the adults, weight of the children and adolescents have an increasing influence on their self-esteem, which is more sensitive especially during their adolescence (9,p.804-810). Cross-sectional research conducted by Wang et al showed that, compared with the children and adolescents with normal weight, the adolescents with overweight and obesity are easy to have inferiority complex and reject group activities, thus resulting in lack of social adaption ability (29,p.21-27). In addition, it is discovered in a 3-year prospective follow-up research on the relation between adolescents' self-esteem and BMI that, baseline value of female adolescents' self-esteem level is related with BMI, namely, the low score of self-esteem dimension could predict a high BMI index, but such result is not discovered among male adolescents(23,p.27-33). However, in this research, neither the male nor female Chinese Han adolescents revealed a negative correlation between mental sub-health and BMI, which may be due to difference in the selected research objects, or due to difference in the tools selected for mental test. Therefore, the manifestation of the relation between mental health and overweight & obesity shall be further explored in future researches.

Secondly, researches showed that, overweight and obesity are high-risk factors influencing the adolescents' interpersonal relationship, and they may induce the adolescents' anxiety and

horror toward normal social interaction (6,p.448-455). It is proved by research of Cui et al that, overweight and obesity have a strong impact on the adolescents' quality of life such as making friends, learning, travelling, etc., therefore, the adolescents with overweight and obesity always have the phenomena such as lack of confidence, poor sleep, etc.( 7,p.2139-2150). Some other researches also supported the above opinion, which is especially obvious among the adolescents during their adolescence (25,p.139-146; 18,p.18-23; 32,p.575-582; 30,p.e442-448) In addition, research on adolescents' bullying mentality also showed that (5,p451-471), the adolescents with overweight and obesity during their adolescence are easy to become victims of words and behaviors, and although it still cannot be fully proved that they become victims directly due to their individual obesity, it cannot be denied that, words and behavior violence is an important factor for the adolescents with overweight and obesity to be isolated with the society and the groups.

In this research, the result showed that detection rate of mental sub-health among the adolescents with wasting was higher than that of those with normal weight. It is proved by a research on physiological mechanism of adolescents with malnutrition that, malnutrition has influence on development of the adolescents' brain and nervous system, and there is a significant difference between their cognitive competence, social adaption and language competence, etc. and that among normal adolescents, which is embodied by that they are cowered and hesitated in action and have damaged intellectual development (21,p.1774-1777). Research on physical and mental health development of adolescents showed that, there are many factors causing malnutrition of the adolescents, including uneven nutrition intake, emotional puzzle, unhealthy living habit, masturbation behavior, etc., and these factors take on negative correlation with physical health development of adolescents, and besides, most of the factors have negative impact on adolescents' mental health (22,p.246-261). However, there is also research showing that, adolescents with different nutritional statuses show no significant difference in mental health, which is especially embodied between adolescents with wasting and adolescents with normal weight (2,p.692-693).

At present in China, malnutrition in adolescents are mainly wasting-type malnutrition, and compared with mental health of the adolescents with overweight and obesity, the mental health state of adolescents with wasting was neglected to a certain degree. Since China has a vast territory and unbalanced economic and social development, it will take a long time to reduce and eliminate the adolescents' malnutrition status. Therefore, great importance must be attached to adolescents with malnutrition, especially the mental health status of adolescents with wasting. In the future, it requires strengthening prospective research on mental health of adolescents with wasting, and grasping changes in mental health of adolescents with wasting, thus formulating mental intervention measures conforming to characteristics of adolescents with wasting.

**5 conclusion**

Mental health of Chinese Han adolescents under different nutritional statuses takes on a trend of "inverted U shape", which in details is embodied by the condition that the obesity group has the most obvious mental sub-health, and then the over-weight group, the wasting group and the normal-weight group in sequence.

Table1　Basic information on nutritional status and mental health of Chinese Han adolescents

| Characteristics | Boys (n=4216) | Girls (n=4241) | Total (n=8457) |
|---|---|---|---|
| Age (years) | 15.52（1.7） | 15.52（1.7） | 15.52（1.7） |
| Body mass (kg) | 60.55（12.68） | 51.88（8.85） | 166.38（8.61） |
| Height (m) | 171.11（8.07） | 161.68（6.24） | 56.2（11.76） |
| BMI (kg/m2) | 20.58（3.56） | 19.83（3.07） | 20.2（3.35） |
| Weight status n(%) | | | |
| Wasting | 278（6.6） | 200（4.7）** | 478（5.7） |
| Normal weight | 3156（74.9） | 3665（86.4）** | 6821（80.7） |
| Overweight | 567（13.4） | 308（7.3）** | 875（10.3） |
| Obese | 215（5.1） | 68（1.6）** | 283（3.3） |
| waist（㎝） | 72.43（11.26） | 66.47（9.48） | 69.44（10.83） |
| emotion (%) | 1129（26.8） | 1163（27.4） | 2292（27.1） |
| morality (%) | 1137（27.0） | 1094（25.8） | 2231（26.4） |
| Social adaptation (%) | 698（16.6） | 693（16.3） | 1391（16.4） |
| Mental Subhealth symptoms (%) | 1456（34.5） | 1419（33.5） | 1758（20.8） |
| Mental Subhealth State (%) | 869（20.6） | 889（21.0） | 2875（34） |
| Questionnaire score | 206.35（32.31） | 205.06（32.48） | 205.71（32.4） |

Note: *：<0.05；**：<0.01；***：<0.001

Table2 The detection rate of mental health status of Han nationality adolescents with different nutritional status in different age groups in China

| Nutritional status | wasting | Normal Weight | Over Weight | Obese | $\chi^2$ |
|---|---|---|---|---|---|
| 13~15 year（Junior school student） | | | | | |
| Emotional subhealth | 82（34.3） | 934（29.1） | 178（32.4） | 84（41.0） | 15.98** |
| Morality subhealth | 84（35.1） | 939（29.3） | 189（34.4） | 84（41.0） | 18.71** |
| Social adaptation subhealth | 47（19.7) | 542（16.9） | 106（19.3） | 50（24.4） | 9.217 |
| Mental Subhealth State | 62 (25.9） | 713（22.2） | 139（25.3） | 63（30.7） | 17.07** |
| Mental Subhealth symptoms | 84 (35.1) | 1152（35.9） | 206（37.5） | 80（39.0） | |
| 16~18 year（senior high school student） | | | | | |
| Emotional subhealth | 61（25.5） | 850（23.5） | 84（25.8） | 19（24.4） | 1.34 |
| Morality subhealth | 60（25.1） | 756（20.9） | 91（28.0） | 28（35.9） | 19.47** |
| Social adaptation subhealth | 41(17.2) | 533（14.7） | 58（17.8） | 14（17.9） | 3.51 |
| Mental Subhealth State | 49 (20.5) | 641（17.7） | 74（22.8） | 17（21.8） | 1.481* |
| Mental Subhealth symptoms | 83 (34.7) | 1136（31.4） | 101（31.1） | 33（42.3） | |

Note: *：<0.05；**：<0.01；***：<0.001

Table3　Detection rate of sub-health among Chinese Han adolescents with different nutritional status in terms of emotion, conduct and social adjustment（%）

| | emotion | | $\chi^2$ | P | morality | $\chi^2$ | P | Social adaptation | $\chi^2$ | P |
|---|---|---|---|---|---|---|---|---|---|---|
| Boys | wasting | 81（29.1） | 10.348 | 0.016 | 83（29.9） | 34.104 | 0.000 | 48（17.3） | 6.224 | 0.101 |
| | Normal weight | 809（25.6） | | | 785（24.9） | | | 499（15.8） | | |
| | Overweight | 166（29.3） | | | 184（32.5） | | | 106（18.7） | | |
| | Obese | 73（34） | | | 85（39.5） | | | 45（20.9） | | |
| Girls | wasting | 62（31.0） | 14.218 | 0.003 | 61（30.5） | 15.619 | 0.001 | 40（20.0） | 11.096 | 0.011 |
| | Normal weight | 975（26.6） | | | 910（24.8） | | | 576（15.7） | | |
| | Overweight | 96（31.2） | | | 96（31.2） | | | 58（18.8） | | |
| | Obese | 30（44.1） | | | 27（39.7） | | | 19（27.9） | | |
| Total | wasting | 143（29.9） | 20.962 | 0.000 | 144（30.1） | 51.282 | 0.000 | 88（18.4） | 14.872 | 0.002 |
| | Normal weight | 1784（26.2） | | | 1695（24.8） | | | 1075（15.8） | | |
| | Overweight | 262（29.9） | | | 280（32.0） | | | 164（18.7） | | |
| | Obese | 103（36.4） | | | 112（39.6） | | | 64（22.6） | | |

Note: *：<0.05；**：<0.01；***：<0.001

Table4 Comparison of symptoms and status of mental sub-health among Han nationality adolescents with different nutritional status in China

| | | Mental Subhealth symptoms | Mental Subhealth State | $\chi^2$ | P |
|---|---|---|---|---|---|
| Boys | wasting | 95（34.2） | 63（22.7） | 25.69 | 0.000 |
| | Normal weight | 1071（33.9） | 615（19.5） | | |
| | Overweight | 199（35.1） | 134（23.6） | | |
| | Obese | 91（42.3） | 57（26.5） | | |
| Girls | wasting | 72（36.0） | 48（24.0） | 18.30 | 0.006 |
| | Normal weight | 1217（33.2） | 739（20.2） | | |
| | Overweight | 108（35.1） | 79（25.6） | | |
| | Obese | 22（32.4） | 23（33.8） | | |
| Total | wasting | 167（34.9） | 111（23.2） | 40.51 | 0.000 |
| | Normal weight | 2288（33.5） | 1354（19.9） | | |
| | Overweight | 307（35.1） | 213（24.3） | | |
| | Obese | 113（39.9） | 80（28.3） | | |

Note: *：<0.05；**：<0.01；***：<0.001

Table 5 Logistic regression analysis on mental sub-health of adolescents with different nutritional status in China

| | mental sub-health status | | emotion | | Morality | | Social adaptation | |
|---|---|---|---|---|---|---|---|---|
| | OR（95%CI） | P | OR（95%CI） | P | OR（95%CI） | P | OR（95%CI） | P |
| Gender | | | | | | | | |
| boys | 1 | | 1 | | 1 | | 1 | |
| girls | 1.064（0.965~1.173） | 0.212 | 1.016（0.904~1.142） | 0.787 | 0.985（0.893~1.088） | 0.767 | 1.058（0.951~1.177） | 0.301 |
| nutritional status | | | | | | | | |
| Normal weight | 1 | | 1 | | 1 | | 1 | |
| wasting | 1.204（0.982~1.476） | 0.075 | 1.203（0.945~1.53） | 0.133 | 1.288（1.05~1.58） | 0.015 | 1.22（0.978~1.522） | 0.078 |
| Overweight | 1.163（0.994~1.36） | 0.059 | 1.205（1.003~1.449） | 0.047 | 1.331（1.14~1.553） | 0.000 | 1.258（1.064~1.488） | 0.007 |
| Obese | 1.524（1.185~1.96） | 0.001 | 1.507（1.128~2.014） | 0.006 | 1.781（1.39~2.283） | 0.000 | 1.513（1.156~1.98） | 0.003 |
| Age group | | | | | | | | |
| 13~15 | 1 | | 1 | | 1 | | 1 | |
| 16~18 | 0.730（0.662~0.805） | 0.000 | 0.850（0.756~0.954） | 0.006 | 0.652（0.591~0.72） | 0.000 | 0.760（0.684~0.846） | 0.000 |

Note: *：<0.05；**：<0.01；***：<0.001

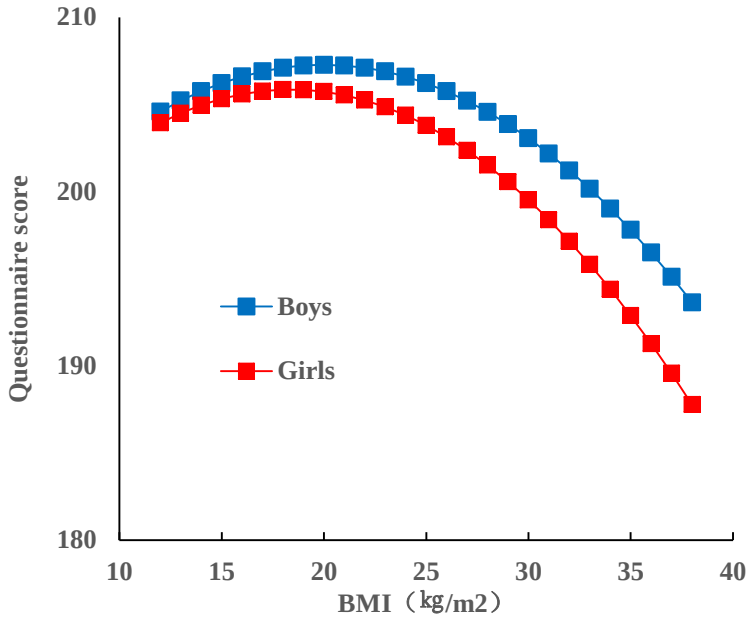



Figure1　Nutritional status of Chinese Han adolescents and score of “MSQA” questionnaire

**Reference**

[1] Akparibo R, Harris J, Blank L, et al．Severe acute malnutrition in children aged under 5 years can be successfully managed in a nonemergency routine community healthcare setting in Ghana[J]. Matern Child Nutr 2017;10:e12417．

[2] AM Khan, MS Flora. Association of Maternal Mental Health with Child Nutritional Status. Annals of Epidemiology 2014;24:692-3.

[3] Anderson SE, He X, Schoppe-Sullivan S, et al. Externalizing behavior in early childhood and body mass index from age 2 to 12 years: longitudinal analyses of a prospective cohort study. BioMed Central Journal Pediatrics 2010;12:49-5.

[4] Anderson SE, Murray DM, Johnson CC, et al. Obesity and depressed mood associations differ by race/ethnicity in adolescent girls. International Journal of Pediatric Obesity 2011;6:69–8.

[5] Bryan AD, Fisher JD, Fisher WA, et al. Understanding condom use among heroin addicts in methadone maintenance using the information-motivation-behavioral skills model. Subst Use Misuse 2000;35:451–71.

[6] Chang Y, Gable S. Predicting weight status stability and change from fifth grade to eighth grade: the significant role of adolescents’ social-emotional well-being. J Adolesc Health 2013;52:448–55.

[7] Cui W, Zack MM, Wethington H. Health-related quality of life and body mass index among US adolescents. Qual Life Res 2014;23:2139–50.

[8] Curtin C，Bandini LG，Perrin EC，et al. Prevalence of overweight in children and adolescents with attention deficit hyperactivity disorder and autism spectrum disorders: a chart review[J]. BMC Pediatr 2005;5:48-9.

[9] Datar A, Sturm R. Childhood overweight and parent- and teacher-reported behavior problems: evidence from a prospective study of kindergartners. Arch Pediatr Adolesc Med 2004;158:804–10.
[10] DongYH, Wang ZH Yang ZG, et al.Analysis of the prevalence and trend of malnutrition among Chinese children aged 7~18 and 2014 from 2005 to 2014 [J]. Journal of Peking University (Medical Edition) 2017;49:424-32.
[11] Halfon N，Larson K，Slusser W. Associations between obesity and comorbid mental health，developmental，and physical health conditions in a nationally representative sample of US children aged 10 to 17. Acad Pediatr 2013;13(1):6－13.
[12] Hong X, Li JQ, Liang YQ ,et al. Survey on overweight, obesity and depressive symptoms among middle school students in Nanjing. Chinese Journal of mental health 2008;22:744-48.
[13] Kant AK，Graubard BI． Family income and education were related with 30-year time trends in dietary and meal behaviors of American children and adolescents[J]. J Nutr 2013;143:690-700
[14] Khanam R, Nghiem HS, R ahman MM. The impact of childhood malnutrition on schooling: evidence from Bangladesh. J Biosoc Sci 2011;43:437-51.
[15] Luppino FS, de Wit LM, Bouvy PF, et al. Overweight，obesity，and depression: a systematic review and meta-analysis of longitudinal studies. Arch Gen Psychiatry 2010;67:220-29.
[16] M. Vos and S. E. Barlow, "Update in childhood and adolescent obesity," Pediatric Clinics of North America, vol. 2011;58:15–17,.
[17] Ministry of Education. National standard for physical health of students [revised in 2014] Available from:http://www.csh.edu.cn/
[18] Morrison KM, Shin S, Tarnopolsky M, et al. Association of depression & health related quality of life with body composition in children and youth with obesity. J Affect Disord 2014;172:18-23.
[19] Popkin，BM，Adair LS，Ng SW. Global nutrition transition and the pandemic of obesity in developing countries. Nutr Rev 2012;70:3-21.
[20] Puhl, R. M., & Luedicke, J. Weight-based victimization among adolescents in the school setting: Emotional reactions and coping behaviors. Journal of Youth and Adolescence 2012;41:27-40.
[21] Rubha S, Vinodha R. Effects of protein energy malnutrition on auditory evoked potential responses in children. Drug Safety An International Journal of Medical Toxicology & Drug Experience 2017;29:1774-77.
[22] S Dorsey, L Berliner, AR Lyon, et al. A Statewide Common Elements Initiative for Children's Mental Health. Journal of Behavioral Health Services & Research 2016;43:246-61.
[23] SA French, CL Perry, GR Leon ,et al. Self‐Esteem and Change in Body Mass Index over 3 Years in a Cohort of Adolescents. Obesity 2012;4:27-33.
[24] Song Y, Ma J, Wang HJ, et al. Secular trends of obesity prevalence in Chinese children from 1985 to 2010: Urban-rural disparity. Obesity(Silver Spring) 2015;23: 448-53.
[25] Taylor VH, Forhan M, Vigod SN, et al. The impact of obesity on quality of life. Best Pract Res Clin Endocrinol Metab 2013;27:139–46.
[26] Wang F, Wild TC, Kipp W, et al. The influence of childhood obesity on the development of self-esteem. Health Rep 2009;20:21–7.
[27] Wang S, Dong YH，Wang ZH，et al. Epidemic trend of overweight and obesity among 7~18 year olds in China from 1985 to 2014. Chinese Journal of preventive medicine 2017;51:300-305.

[28] Wang XG, Liu Z. The relationship between childhood obesity and depression in Beijing [J]. Chinese Journal of food hygiene,2007,19(3):214-217. (In chinese)
[29] WHO Child Growth Standards, Genava. World Health Organisation. Available on http://www.who.int/growthref/en/.
[30] Williams JW, Canterford L, Hesketh KD, et al. Changes in body mass index and health related quality of life from childhood to adolescence. Int J Pediatr Obes 2011;6::442–48.
[31] World Health Organization (2012). Prioritizing areas for action in the field of population-basedprevention of childhood obesity. Geneva, Switzerland: WHO Document Production Services.
[32] Wu YP, Steele RG. Predicting health-related quality of life from the psychosocial profiles of youth seeking treatment for obesity. J Dev Behav Pediatr 2013;34:575–82.
[33] Yang XY, Li XY. Relationship between overweight and obesity and depression and behavioral problems among adolescents. Chinese Journal of mental health 2016;30:519-26.
[34] Yang Y, Chen J, Yang X, et al. Investigation on mental health status of overweight and obese school-age children [J]. Chinese Journal of health psychology 2015;23:1586-89.
[35]Yu-Hui Wan, Shao-Jun Xu, Jing Chen,et al . Longitudinal effects of psychological symptoms on non-suicidal self-injury: a difference between adolescents and young adults in China.Soc Psychiatry Psychiatr Epidemiol 2015;50:237-47.

# K2

# Thermoregulation in disabled person- Prevention of heatstroke in spinal cord injury man

**Sotaro HAYASHI**

Fukuyama City University

**Abstract**

In humans, the hypothalamus in the brain acts as the central thermoregulator. However, in the case of disabled people, the skin blood flow and perspiration are reduced because of the lack of vasomotor control and decline in the ability to perspire. The purpose of this study was to investigate the thermoregulation in disabled person and report the prevention of increase the body temperature in heat environment. Cooling by water immersion is difficult to perform without any assistance, and palm cooling is not practical because the wheelchair needs to be operated using the hands. With respect to the water spray strategy, there are few studies about its effectiveness in reducing the core temperature and the possible resultant improve in exercise performance. External cooling using a cooling jacket and internal cooling through ingestion of cold beverages have been effective in improving exercise performance with hyperthermia. It is therefore thought that internal cooling by ingestion of cold beverages is the most practical method among the currently available cooling strategies for people with SCI. In addition, ACT ingestion may inhibit increase core temperature after exercise and prevent hyperthermia.

**Key Words**: Thermoregulation, Heatstroke, Disabled person, Acetaminophen

**Background and purpose**

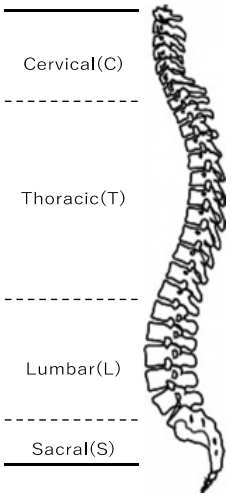
According to the 2015 Annual Report on Government Measures for Persons with Disabilities, there are 393 million people with physical disability in Japan, and the number increases every year. In particular, there are 6 million people with spinal cord injury (SCI), including paraplegia and tetraplegia. SCI is a condition where the spinal cord is damaged by pressure and crushing due to an external force. As a result, the commands of the superior central nervous system are not transmitted or they are incompletely transmitted in the dominant region below the injured site. Therefore, not only do patients develop a movement disorder, but their thermoregulatory responses are also reduced or inhibited. The spinal cord is composed of the cervical spinal cord consisting of C1 to C8, the thoracic pulp consisting of T1 to T12, the lumbar medulla consisting of L1 to L5, the sacrum consisting of S1 to S5, and the tail marrow. SCI is considered to be either complete, where the spinal cord is completely broken, or incomplete, in which the spinal cord is partially damaged and has some residual function. The paralyzed part extends to the nerves and muscles that are below the level of damage. SCI that damages the spinal cord and central nervous system results in sympathetic dysregulation, paralyzing the thermoregulatory function below the injured area (Table 1). The lack of thermoregulatory functions, such as sweating and skin vasodilation, that lead to heat dissipation causes an excessive increase in the core body temperature in a hot environment. The purpose of this study was to investigate the thermoregulation in disabled person and report the prevention of increase the core temperature in heat environment.

**Thermoregulation in disabled person**

The mechanism of thermoregulation driven by warming involves heat dissipation in the form of radiation and conduction, evaporation of sweat, respiration, and urination and defecation. Body heat is dissipated at different rates depending on the process: radiation and conduction, 70%; perspiration, 27%; aspiration, 2%; and egestion, 1%. However, in the case of people with SCI, the skin blood flow and perspiration are reduced because of the lack of vasomotor control and decline in the ability to perspire (Muraki et al., 1995; Muraki et al., 1996; Yamasaki et al., 2000; Yamasaki et al., 2001; Attia and Engel, 1983; Normell, 1974; Tam et al., 1978). A discriminating factor between tetraplegia and paraplegia underlying exchange is that of the availability of the sympathetic nervous system. Sympathetic outflow is generally considered to occur between the first thoracic (T1) and second or therd lumber (L2-3). Thus, as with upper limb function, individuals with tetraplegia exhibit lesion levels above this and are considered to have lost sympathetic nervous system.

Similarly, those athletes with high level thoracic SCI demonstrate the loss of greater amounts of sympathetic nervous system than those with low level thoracic SCI and lumbar or sacrococcygeal injuries. Key functional aspects here relate to cardiac accelerator nerves, skin blood flow, and sweating (Price and Trbovich 2018). Wilsmore (2007) observed the relationship between rectal, esophageal, and aural temperatures during spine rest and transitions from neutral (28℃) to cool (11.5℃) and warm (38.5℃) conditions in both able-bodied persons and those with SCI (C4-L5). In baseline thermo-neutral conditions there was little variation between rectal, esophageal, and aural temperatures for the SCI group whereas for the abled bodied group rectal was warmer than both esophageal and aural temperature.

Table 1 Levels of injury and extent paralysis




| Levels of injury | Extent of paralysis |
|---|---|
| C2 - C5 | Paralysis; Some or all muscle used for breathing and all arm and leg muscle |
| C5 - C6 | Paralysis; Legs, trunk , hand, and wrist<br>Weakness; Muscles that move the shoulder and elbow |
| C6 - C7 | Paralysis; Legs , trunk, and part of the wrists and hands |
| C7 - C8 | Paralysis; Legs, trunk , and hands |
| C8 - T1 | Paralysis; Legs, and trunk<br>Weakness; muscles that move fingers nad hands |
| T2 - T4 | Paralysis; Legs, and trunk<br>Loss; Sansation below the nipples |
| T5 - T8 | Paralysis; Legs<br>Loss; Sansation below the rib cage |
| T9 - T11 | Paralysis; Legs<br>Loss; Sansation below the navel |
| T11 - L1 | Paralysis; Hips, and legs |
| L2 - S2 | Various patterns of legs weakness |
| S3 - S5 | Numbness in perinrum |

***Thermoregulation due to skin vasomotion and sweating***

Mean skin temperature values are often reported in studies of thermoregulation as the skin represents the interface between the body and the environment. In the paralyzed body part where sweating does not occur, the skin dries, and the skin temperature increases under the influence of environmental temperature. Coarctation and dilatation of the blood vessels are controlled by the autonomic nervous system, and heat dissipation is accommodated by changes in the skin blood flow (Edholm et al., 1957). A skin temperature of 33–34℃ is the neutral temperature range of the skin vascular reaction, and the activity level of skin vessels is low around this range. However,

when the skin temperature increases beyond the neutral temperature range, active skin vasodilation occurs and the skin blood flow increases (Kellogg et al., 1991). Cooper et al. (1957) reported a significant elevation in the core temperature due to lack of vasodilatation in the lower limbs of subjects with C5 to T10 level injury. Moreover, there was a slight increase in vasodilatation in patients with T11 to T12 level injury, whereas those with L1 level injury had vasodilation similar to that in able-bodied persons. These results suggest that heat dissipation due to an increase in the skin blood flow rate is observed in individuals with injury at the T12 level or lower, but there is difficulty in heat dissipation in those with injury at the T11 level or higher. These reports suggested that damage at higher than T11 or T12 level results in lack of skin vasomotor function in the sympathetic nervous system, invariable skin blood flow in the femoral area, and an increase in the core temperature.

The sweat glands are controlled by the sympathetic nervous system, which is situated in the lower center of the autonomic nervous system and has cells originating in the spinal thoracolumbar medulla. Therefore, as the control center of the sweat glands in the lower extremities is present in the medial lateral nucleus of the first and second lumbar spines, perspiration is possible in patients with damage below the L2 level, but for patients with damage between the T3 and L2 levels, perspiration is limited to only certain parts of the body. When the injury is at the T5 level or above, perspiration function is impaired due to the dysregulation of the sympathetic nervous system; therefore, these patients have impaired body temperature regulation in comparison with those with injury at the T6 level or lower (Guttman et al., 1958). When the spinal cord in the cervical region is damaged, the whole body is paralyzed. Therefore, since the core temperature fluctuates under the influence of the ambient temperature, the body temperature increase in a hot environment or during exercise is significant in such patients compared with healthy subjects.

**Prevention of heatstroke**

It is important to cool the body in persons with SCI because lack of thermoregulation causes excessive heat injury. There have been many reviews investigating various cooling strategies in order to attenuate the exercise performance decline in hot environments (Stevens et al., 2017). However, Sawka et al. (1989) reported that the cooling strategy (Young et al., 1987) used by able-bodied people should be applied when people with SCI are exposed to heat stress. Body cooling in people with SCI consists of two types: external cooling such as applying cooling garments to the body and internal cooling such as ingestion of cold beverages.

***1) Water immersion***

Cooling by foot water immersion was used by Hagobian et al. (2003) to cool people with SCI during 45 min of arm cranking exercise at 66% VO2peak at a temperature of 32℃. Increase of tympanic temperature in foot cooling trial diminished 15 min from the start of the exercise, and the temperature remained lower throughout the trial compared to that in the control group. Although the exercise performance was not measured in this study, the author suggested that foot cooling may attenuate the increase in core temperature during exercise. Goosey-Tolfrey et al. (2008b) applied palm cooling using cold water at 10℃ for 10 min after 60 min of intermittent exercise using a wheelchair ergometer at a temperature of 31℃ (Figure 1). They reported that

palm cooling elicited a 0.4℃ reduction in the insulated auditory canal temperature. They discussed the fact that there were no significant differences in exercise performance because the participants with SCI had different lesion levels and therefore the results had a large standard deviation.

Based on the abovementioned studies, cooling by water immersion may be effective in attenuating the increase in core temperature and/or improving the exercise performance. However, cooling by palm or foot water immersion may be somewhat impractical during major sporting competitions. For example, wheelchair athletes mostly wear gloves; thus, cooling by palm before or during a play is practically difficult. Goosey-Trolfrey et al. (2008b) suggested that this strategy may not be appropriate for wheelchair sports where hand dexterity is of paramount importance because the thermal sensation was only slightly reduced following hand cooling. Cooling inactive body regions such as the feet may be more effective.

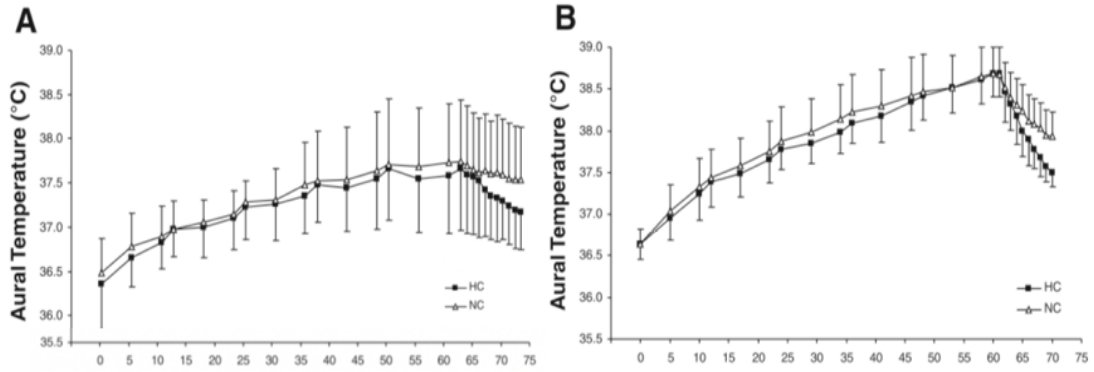



**Figure 1** Comparison between the Tac for wheelchair (WA; A) and able-bodied athletes (AB; B) and the effects of hand cooling (HC) vs. no cooling (NC) for 10 min. *Goosey-Tolfrey et al., J Appl Physiol, 105(2008).*

***2) Water spray***

There are many previous studies investigating the effects of water spray for cooling before and during exercise in able-bodied persons because of its ease of use in athletes. In an SCI study, Pritchett et al. (2010) conducted an arm cranking exercise involving 7-min stages interspersed with 1-min breaks where participants sprayed themselves. The protocol was terminated voluntarily or when the esophageal temperature rose by more than 0.2℃/min. However, no differences were observed in exercise time, esophageal temperature, or rectal temperature between the water spraying and no cooling conditions. The lack of positive findings for exercise performance or body temperature may be due to the air temperature. This could be because exercising at an air temperature of 22℃ is often classified as moderate and trained participants with SCI may be able to regulate heat loss similar to their able-bodied counterparts in the absence of external heat gain (Price, 2006). Cooling by water spray is likely achieved by two types of heat loss: conductive heat loss by cold water directly touching the skin and heat evaporation generated by moving the wheelchair.

### *3) Cooling wear and garments*

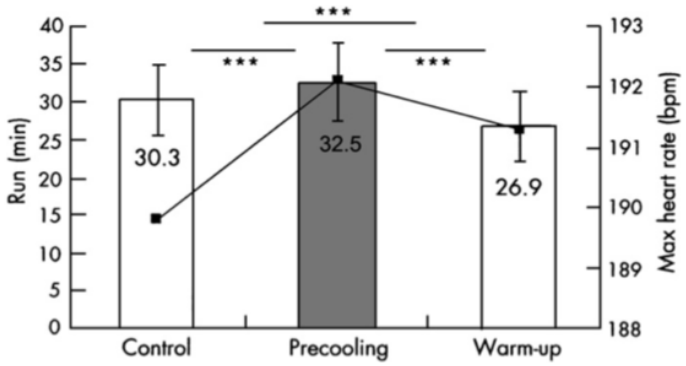



**Figure 2** Esophageal temperature and rectal temperature measures for spray bottle versus control. *Pritchett et al., Eur J Appl Physiol, 109 (2010).*

An advantage of cooling wear is cooling just by wearing it and can be used before, during, and after the exercise. However, the coolant contained in the garment has various volumes and types with different magnitudes of cooling. According to a study on thermal manikins, commercially available cooling wear only extracted 70 W of heat (Bogerd et al., 2010). Adding ice packs to the cooling wear is needed for athletes because the metabolic-induced heat production during exercise may be greater than the cooling potential of garments (Griggs et al.,2015). Trbrovich et al. (2014) studied the use of an ice vest during a 60-min intermittent exercise in wheelchair basketball or rugby athletes in 21.1-23.9℃ conditions. This study classified the lesion levels of the participants and reported that those with high lesion levels had a higher increase rate in core temperature.

Studies on cooling wear and garments in those with SCI have been shown positive effects, similar to studies in able-bodied persons (Uckert and Joch, 2007). External cooling by using cooling wear or garments is simple and may be the most practical strategy (Figure 3). However, Arngrimsson et al. (2004) suggested that participants refused to use cooling wear and garments because they are heavy and rub against the skin. Thus, an investigation into the ergogenic effects and sensations among athletes using these garments in the field is needed.

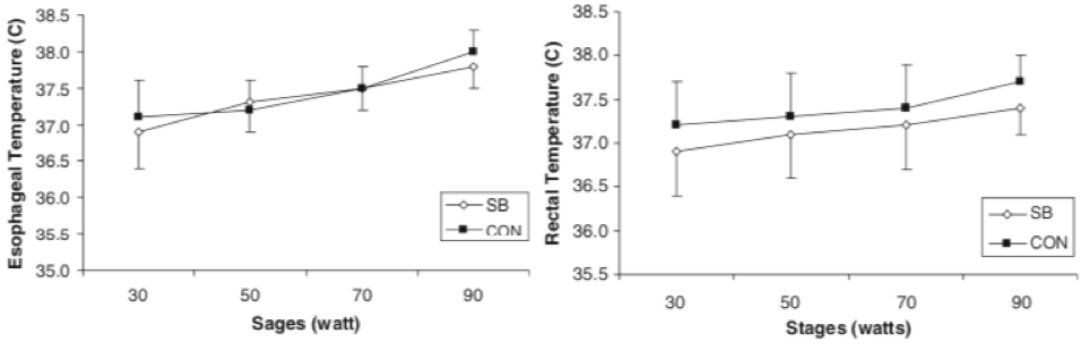



**Figure 3** Effects of warm-up and precooling on endurance performance in the heat. *Uckert S, Joch W. Br J Sports Med. 2007;41:380-384.*

### *4) Cold water and ice slurry ingestion*

Yamasaki et al. (2003) showed that cold water ingestion and wearing an ice jacket during a

30-min arm cranking exercise at 33℃ decreased the tympanic temperature at the end of the exercise compared to that in the control group. In addition, the total sweat volume was lower in the cooling group than that in the control group. Studies in able-bodied persons have normally used 4℃ (Lee et al., 2008) or 1℃ (Byrne et al., 2011) water. Limited findings can be drawn in terms of the prevention of dehydration because the lower temperature of the ingested beverage may promote faster gastric emptying (Costill and Saltin, 1974). There have been many studies on internal cooling in able-bodied persons, but the effect of cold beverage ingestion in persons with SCI is still unclear, as only two studies have been published on this topic to date.

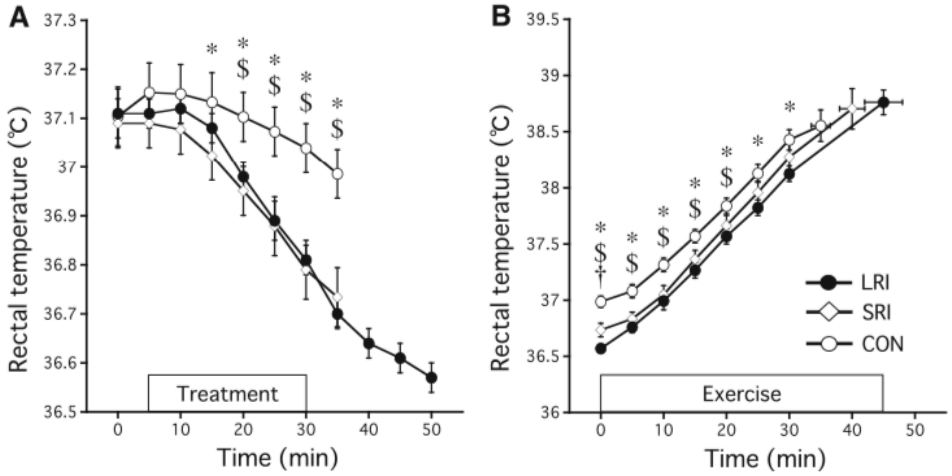



**Figure 4** The rectal temperature before exercise (a) and during exercise (b) under the three experimental conditions. The mean values are expressed as mean ± SEM of seven participants (CON:○, SRI:◇, LRI:●). *Naito et al., Journal of Physiological Anthropology, 36.1(2017).*

### *5) Acetaminophen ingestion*

Acetaminophen (ACT; paracetamol) is a common analgesic/antipyretic used in children. The product became available in USA in 1995 and in UK the following year. ACT works similarly to Non-Steroidal Anti-Inflammatory Drugs but is not classified as NSAIDs. NSAIDs inhibit the synthesis of prostaglandins (pro-inflammatory chemicals; $PGE_2$, $PGI_2$, $PGF_{2\alpha}$) by inhibiting the arachidonic acid cascade cyclooxygenase (COX). ACT, like NSAIDs, exerts vasodilation mainly by suppressing PGE2 synthesis and promotes heat dissipation. The dosage regimen of ACT in Japan is 300 mg to 1,000 mg per a dose, and the administration interval is 4 hours to 6 hours or more. The dose may be adjusted according to age and symptoms, but the maximum daily dose is 4,000 mg.

Mauger et al., (2014) reported that 20 mg of ACT ingestion per kg of body weight prior to exercise in a hot environment extended the time to exercise until fatigue and showed lower core and mean skin temperatures (Figure 5). In addition, it has been reported that the peak power of sprint cycling is increased by intake of ACT (Delextrat et al., 2015). However, Burtscher et al. (2013) reported that ACT 500 mg ingestion prior to exercise in a hot environment and running the treadmill to exhaustion did not affect performance such as maximal oxygen uptake or exercise time (Figure 6). Coombs et al. Reported that 1.5 g of ACT ingestion during incremental loading exercise in a hot and humid environment did not affect core temperature or exercise performance.

Thus, there is no consistent result in the change of physiological index by ACT ingestion. However, to prevent heatstroke, it is also necessary to suppress the rise in core temperature during exercise, but it is also important to promote decreasing core temperature after exercise because onset is also observed after exercise. As mentioned above, since heat production during exercise depends on exercise intensity, it is expected that the effect of ACT ingestion during intense exercise is weak. ACT ingestion may contribute to the decrease in body temperature after exercise or during weak/moderate exercise.

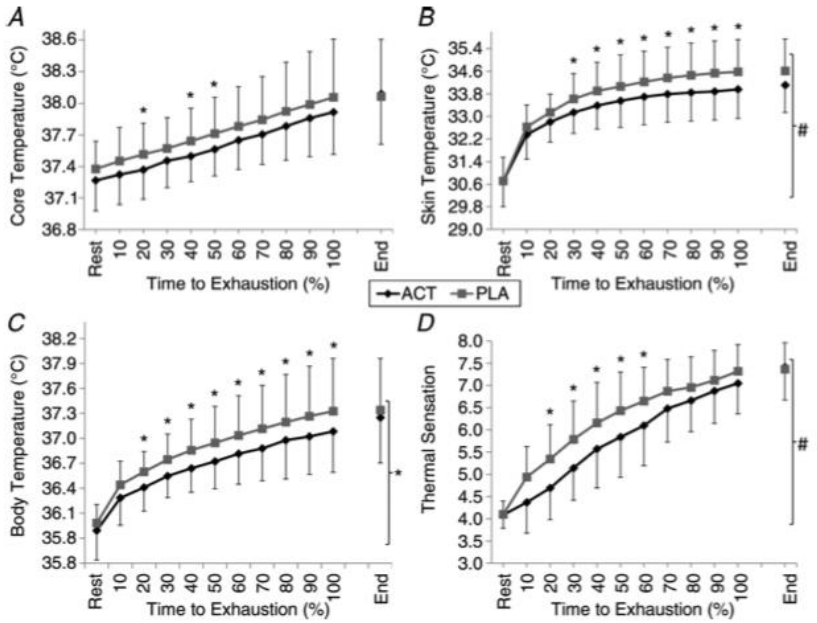



**Figure 5** Mean ± SD values for core temperature, skin temperature, body temperature and rating of thermal sensation as a percentage of time to exhaustion across both ACT and placebo conditions. *Mauger et. al., Exp Physiol 99.1(2014).*

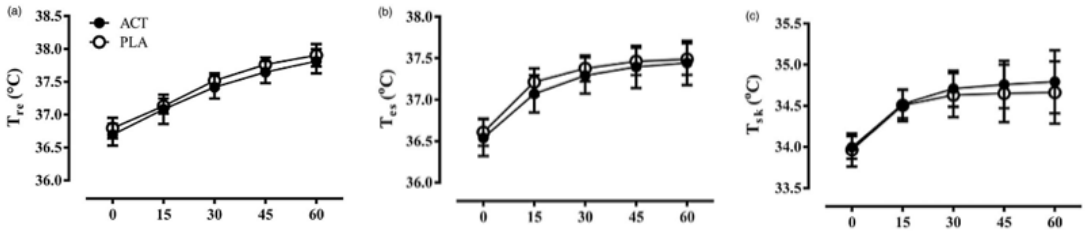



**Figure 6** Rectal temperature (Tre–panel a), esophageal temperature (Tes–panel b), and skin temperature (Tsk–panel c) during exercise in acetaminophen (ACT) and placebo (PLA) trials. *Coombs et. al., Scand J Med Sports, 25(2015).*

## Conclusion

The lack of thermoregulatory functions, such as sweating and skin vasodilation, that lead to heat dissipation causes an excessive increase in the core body temperature in a hot environment. Cooling by water immersion is difficult to perform without any assistance, and palm cooling is not practical because the wheelchair needs to be operated using the hands. With respect to the water

spray strategy, there are few studies about its effectiveness in reducing the core temperature and the possible resultant improve in exercise performance. External cooling using a cooling jacket and internal cooling through ingestion of cold beverages have been effective in improving exercise performance with hyperthermia. It is therefore thought that internal cooling by ingestion of cold beverages is the most practical method among the currently available cooling strategies for people with SCI. In addition, ACT ingestion may inhibit increase core temperature after exercise and prevent hyperthermia.

**References**


Arngrimsson, S. A., Petitt, D. S., Stueck, M. G., Jorgensen, D. K., and Cureton, K. J. (2004) Cooling vest worn during active warm-up improves 5-km run performance in the heat. J Appl Physiol., 96: 1867-1874.

Attia, M., and Engel, P. (1983) Thermoregulatory set point in patients with spinal cord injuries (spinal man). Paraplegia, 21: 233-248.

Bogerd, N., Psikuta, A., and Dannen, H. A. M. (2010) How to measure thermal effects of personal cooling system: human, thermal manikin and human simulator study. Physiol Meas., 31: 1161-1168.

Byrne, C., Owen, C., Cosnefroy, A., and Lee, J. K. (2011) Self-paced exercise performance in the heat after pre-exercise cold-fluid ingestion. J Athl Train., 46: 592-599.

Cooper, K. E., Helen, M. F., and Guttmann, L. (1957) Vasmotor responses in the foot to raising body temperature in the paraplegic patient. J Physiol., 136: 547-555.

Costill, D. L., and Saltin, B. (1974) Factors limiting gastric emptying during rest and exercise. J Appl Physiol., 37: 679-683.

Downey, J. A., Chiodi, H. P., and Darling, R. C. (1967) Central temperature regulation in the spinal man. J Appl Physiol., 22: 91-94.

Downey, J. A., Miller, J. M., and Darling, R. C. (1969) Thermoregulatory responses to deep and superficial cooling spinal man. J Appl Physiol., 27(2) 209-212.

Downey, J. A., Huckaba, C. E., Myers, S. J., and Darling, R. C. (1973) Thermoregulation in the spinal man. J Appl Physiol., 34: 790-794.

Downey, J. A., Huckaba, C. E., Kerrey, P. S., Tam, H. S., Darling, R. C. and Cheh, H.Y. (1976) Sweating responses to central and peripheral heating in spinal man. J Appl Physiol., 40: 701-706.

Edholm, O. G., Fox, R. H., and Macpherson, R. K. (1957) Vasomotor control of the cutaneous blood vessels in the human forearm. J Physiol, 139: 455-465.

Gemmer, H. J., Engel, P., Gass, G. C., Gas,s E. M., Hannich, T., and Feldmann, G. (1992) The effects of sauna on tetraplegic and paraplegic subjects. Paraplegia, 30: 410-419.

Goosey-Tolfrey, V., Diaper, N. J., Crosland, J., and Tolfrey, K. (2008a) Fluid intake during wheelchair exercise in the heat: effects of localized cooling garments. Int J Sports Physiol Perform., 3: 145-156.

Goosey-Tolfrey, V., Swainson, M., Boyd, C., Atkinson, G., and Tolfrey, K. (2008b) The effectiveness of hand cooling at reducing exercise-induced hyperthermia and improving distance-race performance in wheelchair and able-bodied athletes. J Appl Physiol., 105: 37-43.

Griggs, K. E., Price, M. J., and Goosey-Tolfrey, V. L. (2015) Cooling athletes with a spinal cord injury. Sports Med., 45: 9-21.

Guttman, L., Silver, J., and Wydham, C. H. (1958) Thermoregulation in spinal man. J Physiol, 142: 406-419.

Hagobian, T. A., Jacobs, K. A., Kiratli B. J., and Friedlander, A. L. (2004) Foot cooling reduces exercise-induced hyperthermia in men with spinal cord injury. Med Sci Sports Exerc., 36: 411-417.

Kellogg D.L.Jr., Johnson J.M., and Kosiba W.A. (1991) Competition between cutaneous active vasoconstriction and active vasodilation during exercise in humans. Am. J. Physiol., 261(4): H1184-H1189.

Lee, J. K., Shirreffs, S. M., and Maughan, R. J. (2008) Cold drink ingestion improves exercise endurance capacity in the heat. Med Sci Sports Exerc., 40: 1637-1644.

Muraki, S., Yamasaki, M., Ishii, K., Kikuchi, K., and Seki, K. (1995) Effect of arm cranking exercise on skin blood flow of lower limb in people with injuries to the spinal cord, Eur J Appl Physiol., 71: 28-32.

Muraki, S., Yamasaki, M., Ishii, K., Kikuchi, K., and Seki, K. (1996) Relationship between temperature and skin blood flux in lower limbs during prolonged arm exercise in person with spinal cord injury. Eur J Appl Physiol., 72: 330-334.

Naito. T., Iribe Y., and Ogaki, T. (2017) Ice ingestion with a long rest interval increases the endurance exercise capacity and reduces the core temperature in the heat. J Physiol Anthropol., 36:9.

Normell, L. A. (1974) Distribution of impaired cutaneous vasomotor and sudomotor function in paraplegic man. Scand J Clin Lab Invest., 33: 25-41.

Price, M. J. (2006) Thermoregulation during exercise in individuals with spinal cord injuries. Sports Med. 36: 863-879.

Pritchett, R. C., Bishop, P. A., Yang, Z., Pritchett, K. L., Green, J. M., Katica, C. P., and Del Pozzi, A. T. (2010) Evalation of artificial sweat in athletes with spinal cord injuries. Eur J Appl Physiol., 109: 125-131.

Sawka, M. N., Latzka, W. A., and Pandolf, K. B. (1989) Temperature regulation during upper body exercise: able-bodied and spinal cord injured. Med Sci Sports Exerc., 21: S132-S140.

Stevens, C., J., Taylor, L., and Dascombe, B., J. (2017) Cooling during exercise: an overlooked strategy for enhancing endurance performance in the heat. Sports Med., 47: 829-841.

Trbovich, M., Ortega, C., and Schroeder, J. (2014) Effect of a cooling vest on core temperature in athletes with and without spinal cord injury. Top Spinal Cord Inj Rehabil., 20: 70-80.

Uckert, S., and Joch, W. (2007) Effects of warm-up and pre-cooling on endurance performance in the heat. Br J Sports Med., 41: 380-384.

Yamasaki, M., Shimokawa, M., Choi, S. W., and Muraki, S. (2000) Effect of acute heat exposure on skin blood flow of the paralyzed thigh in persons with spinal cord injury. Spinal Cord, 38: 224-228.

Yamasaki, M., Kim, K. T., Choi, S. W., Muraki, S., Shimokawa, M., and Kurokawa, T. (2001) Characteristics of body heat balance of paraplegics during exercise in a hot environment. J. Physiol. Anthoropol., 20: 227-232.

Young, A. J., Sawka, M. N., Epstein, Y., Decristofano, B., and Pandolf, K. B. (1987) Cooling different body surfaces during upper and lower body exercise. J Appl Physiol., 63: 1218-1223.

# K3

# Movement Expression Activities of Children with Intellectual Disabilities using Motion Graphics and Kinect

**Sung-Hee, Hong** (Dongyang University Korea)

**Joong-Woong, Nam** (Korea National University of Transportation)

## Ⅰ. Introduction

The rapid development of the ICT industry in recent years has been widely used in various media such as movies, advertising, broadcasting, the Internet, performance displays, games, and education.

It transforms into a multimedia user environment that provides images, video, graphics, big data, etc., away from the text-oriented user environment, and interacts with the products by interacting with the users.

The characteristics of children with intellectual disabilities are two to four years behind normal children such as physical strength, agility, balance, physical strength, emotional, and social aspects(Taylor, Brady, & Richards, 2005), emotional instability, sudden anger at minor things, and distracted behavior (Geuze, Joungmans, Schoemaker, & Smits-Engelsman, 2001). In addition, there is a lack of visual acuity, lack of body sensation, and delayed feedback. (Kim & Hong, 2016; Hong, 2017b).

Purcell (1994) emphasized that education through physical expression activities is not limited to physical and specific development, but focuses on creativity in which learners express self-expression and self-esteem. In addition, it is difficult to cope with the problem because of the lack of confidence in physical activity and fear of self- expression (Kim & Hong, 2017; Hong, 2017a).

Horvat (1971) found that the physical perception ability for mentally disabled person physical activity education can be strengthened by training rather than being born, and that providing appropriate physical experience helps improve the physical perception ability. In general, the abilities of physical activity movements are characterized by attention and hyperactivity (Fliers, Rommelse, Vermeulen, Altink, Buschgens, Faraone & Buitelaar, 2008; O'Hare & Khalid, 2002), sociality (Kaneko & Okamura, 2006; MacDonald, Lord & Ulrich, 2013), self-concept, and inactivation behavior (Schoemaker & Kalverboer, 1994).

The study of creative and experiential activities based on physical activity has been conducted to investigate the effects of functional games on job training of intellectual disabilities, the use of cash dispensers through the effects of computer-related transition programs, which is based on the results of the study presented only as educational game (Kwon & Kim, 2012). On the other hand, Hong (2017) suggests that the actual relationship between performance and performance is improved by voluntary motions of the disabled children, or by using the content of functional games Studies are very weak.

Motion graphics are the key to the motion expression activity method that can enhance the

human cognitive sensation, and it shows the time, space, sense of movement, speed feeling of the motion graphic image (Ju. 2012), must be expressed, which adds vitality to the graphical elements by adding motion and time flow. Therefore, in a graphic including a motion, message may be emphasized by a motion, may be reduced, may be expressed differently from the original meaning, and may be relaxed due to a feeling of tension (Kim, 2014).

However, Kinects motion recognition has been utilized as a place of learning for users to experience in graphic images by motion and graphic composition expression techniques. A variety of contents creation and expression techniques using motion graphics are motion analysis systems using LMA in game production, all of various movements expressed in virtual space, Linder (1993) led to the discovery of new movements on the basis of elements common to movements, and in the movement analysis of Laban, which analyzes all natural and artificial movements in the world.

Laban argued that 'disability' can be classified as 'natural behavior and unnatural behavior' when approaching with movement, and that humans can understand internal conflict by studying human movements. In the method of expression and communication that expresses by movement, human beings move to satisfy desire. Lee (2016) suggests that movement does not merely present physical activity, but human activity is always a means of conveying the internal attitudes of the mind or internal responses. Shin & Kim (2010) Asking about moving, First, the categories of movement analysis include the body, the effort to express the inner motive of the motion or the inner representation, the shape of the movement, These categories are closely connected to each other in a space where harmonious movements occur. One movement element has the meaning of movement in which the other three elements are always balanced and harmonized.

The purpose of this study is to investigate how the body starts to move from the first part, the second part, how the body moves continuously, and the third, the basic movements of the body. The purpose of Kinect is to improve the performance of movement activities of children with intellectual disabilities

## Ⅱ. Research method

### 1. Subject

The research subject is an intellectual disability son who resides in the disability facility of the Korean municipality and has the consent of the parent or facility leader, the study period is 10 weeks (Jan. ~ Mar. 2018). The age range is from 10 to 18 years old (3 males and 5 females), 20 times in total (twice a week). Table 1 shows the disturbance characteristics of the participants.

| Name(Female, Male) | Age | Intellectual Disability Characteristics |
|---|---|---|
| Go(Female) | 18 | Mild |
| Go(Male) | 16 | Mild |
| Bang(Female) | 18 | Mild |
| Jeon(Female) | 16 | Mild |
| Jang(Male) | 10 | Mild |
| Kim(Male) | 18 | Mild |
| Park(Female) | 14 | Mild |
| Yu(Female) | 18 | Mild |

## 2. Research Methods and Limitations

### 1) Kinect

It is a Microsoft Xbox 360 video console game motion sensor with three cameras and a built-in microphone for user recognition and voice recognition. <Figure 1> shows the Kinect and <Figure 2> shows how the participant goes to the program.

Fig 1Kinect Microsoft Xbox 360. Fig 2. Kinect Action Exercise

### 3) Motion graphics

Motion graphics (professional designer: freelancer, computer language design: Dr. Robotics) has been designed, and a suitable researcher has given meaning to each operation element of the port.

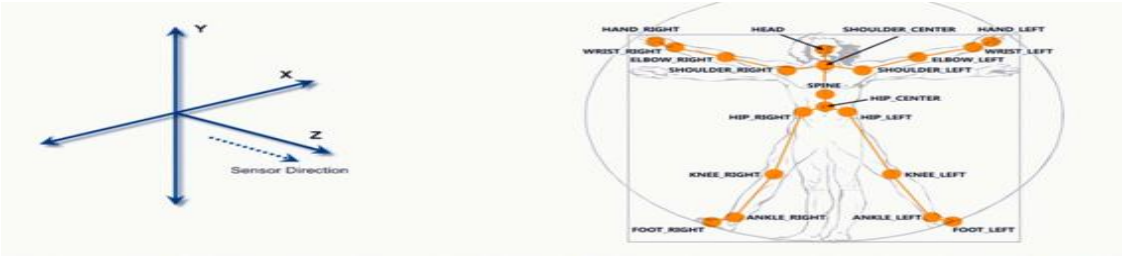



Fig 3. Skeleton Data (출처: google)

In order to observe the accuracy of motion in this study, we observed the movements of the body's ears in all 42 movements.

Table 2. LMA Body Element

| Configuration | Contents | |
|---|---|---|
| Body | Body part | External part: Head, Shoulder. Arms, Legs, etc.<br>Internal part: Heart, Muscle, Bones, Joints, etc. |
| | Body motion | Moving vs Non-moving<br>Lifting vs Unloading<br>Unfolding vs Bending |

<Table 2> Experimentation with movement was set as a private space because of the problem of stability of children. Motion graphics work was created by collaboration with professional designers, and the motion graphics work that was made after the first (researcher) analysis was conducted after a preliminary test <Figure 4>.

Fig 4. LMA (Example behavior)

**4) Limitations of Research**

This study has the following limitations. First, in this paper, we set up the basic operation with reference to musical motion as performing motion. Second, it does not deal with all the 42 movements on the screen due to the characteristics of the disabled children, and it is the limit of the study to select only vertical, horizontal, and sagittal movements. Third, in this study, Laban motion analysis and screen score are used as tools for objective and scientific analysis, but the interpretation of analysis factors can be changed according to the viewpoint of the analyst.

**3. Collecting Data**

In the case of motion graphics, the time given for each motion is set to 20 seconds, and the total score of 42 motions is 42 points, and the motion progress is randomly displayed. The required test time was set within 2 minutes and 30 seconds to 3 minutes. In order to organize the data, the attitude of the movement activities according to the action of the player, which is the object of the game, is collected through the dance expert (one researcher and two doctoral students) and the movement program The score of giving the feedback of the bell sound is presented when the motion is matched,

The score information program on the screen displays the learner's own image moving in the motion graphic image in real time, and through this, his / her moving body And to confirm the expression activity.

**Ⅲ. Results and discussion**

The purpose of this study was to investigate the effects of motion graphics and Kinect on the mobility of children with intellectual disabilities. The children who participated in the program had no experience in games. The activities of physical activities were mainly indoor activities rather than outdoor activities. Educational movement children participating in physical activities were also hard to experience.

Most of the children with disabilities were initially confused by the screen changes due to the difficulty of movement, but when they changed the scene, they began to show confidence and enjoyment with their friends. In the latter part of the experiment, as the friends watched the score increase continuously in front of many friends, the more cheer and applause and the support of encouragement, the more motivated movement body, Showed expression activities.

The average score at the beginning of the experiment was 8.35 in the result of the score displayed on the screen. However, the average score of the experiment (15 times or more) was

31.37, and the score of the 8 children was steadily increased as the game was learned. <Figure 5> shows the early childhood and post-experiment scores of children with disabilities.

Table 3. Movement expression activity Individual score

| Participants | Initial score | Highest score |
|---|---|---|
| G(F) | 9 | 25 |
| K | 6 | 36 |
| B | 12 | 35 |
| JA | 6 | 28 |
| U | 9 | 38 |
| P | 11 | 39 |
| G(M) | 7 | 24 |
| JE | 8 | 26 |
| Average | 8.5 | 31.375 |

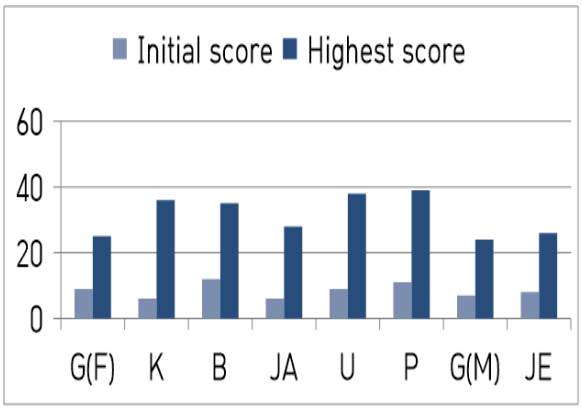



Figure 5. Motion expression activity

Table 4. Vertical, horizontal, and sagittal moving average scores

| | Performance score | Full scale |
|---|---|---|
| Vertical | 8 | 10 |
| Horizontal | 6 | 10 |
| Sagittal | 4 | 10 |

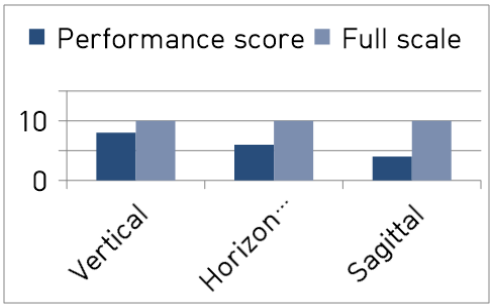



Figure 6. Vertical, horizontal and sagittal movements

Children with disabilities were at first difficult to adjust their movements precisely, with their actions curious about what is shown on the screen. It has been suggested that it is difficult to make head, hand, and leg at the same time. I enjoyed the process of dancing to music <Figure 9>. Children participating in the game were most pleased with the sound of the ringing when expressing the correct movements. When the score was high, they showed confidence to the friends participating in the game and acted to listen to compliments of being good at the teachers gave. As the score shows, it is observed that there is an active will showing the correctness of the action to raise even 1 point. During the experiment, in the latter period, the disabled children participated in the game showed that they could easily follow it with fun as they moved.

Particularly in the body element, the body form surface focuses on the inner movement from the outer body movement in the direction of the movement of the physical activity to the movement direction of the body. In the movement of the intellectual disorder children. The expression of the body form appeared. It was observed that the perfection of motion and the recognition of space were improved and the final score was higher in learning the movement expression activity.

Through the use of motion graphics and Kinect, the movement of body movements can induce changes in internal attitude through the training and practice of body structure and movement direction in daily life. In particular, it was found that the movement activity was different according to the area of interest of the child with a disability regardless of the disability observed in this study.

Figure 7. Scenes participating in motion expression activities

## Ⅳ. Conclusion and Suggestions

The purpose of this study is to increase the effectiveness of motion graphics and kinesthetic activities of children with intellectual disabilities using Kinect. The following conclusions were obtained by observing the progression of children with disabilities as a fusion research with ICT. The question of how to move the body's port, which deals with the qualitative aspects of movement, refers to the 'inner force that starts the movement', that is, the will to act. And the participating children showed their willingness to move. At the beginning of the experiment, the head, fingertip, and toe of the motion appearing on the screen appeared, and active movement activity gradually appeared in the ring that became more accurate in the latter half of experiment.

Although the central part of the body (the body) is not the central nervous part of the body, the will of the fingertip and the movement of the hands are high, but gradually toward the end of the experiment, The results of this study are similar to those of Bonne Bridge Cohen 's movement pattern which suggests the movement step through the spinal column which is the axis of body axis.

Laban is a form of motion movement that is 'body-oriented', 'shape-flow', 'goal-oriented' in 'how the body changes in relation to the environment' 'Directional' that connects with the environment in the form of a human being, and 'shaping' the body as a three-dimensional form of the body that forms the form of interaction with the surrounding environment. For children with disabilities, the shaping movement, which requires a center movement in the screen image, means an active relationship with the surrounding environment. The sagittal movement is more difficult than the vertical movement, it can be seen that children show difficulty in judging reality.

These results show that the movement, movement and movement of the body in the motion movement line that requires concentration and relaxation, as well as movement and curvature, Kim (2008) reported that the movement of physical activity of children with intellectual disability

was hypi-active, and the results of dynamic movement showed that the movement physical activity was motivated more positively and participated in activities This can be a good example of being taught to be able to do so. In order to increase the completeness of the movement motivation, the active will to participate in the activity and to increase the score, and the willingness to solve the problem confidently at the acquisition of the score are also highly correlated with the score, so that the learners themselves have their own internal desires This is consistent with the Levy (1998) claim to make it appear in human expression.

These effects can improve the activity of expressing the movement of children with intellectual disabilities through physical activity, which may indicate the change in the internal attitude of the child with a disability. Thus, it can be seen that the smooth performance of the operation can also help adapt to the external environment.

As a result, it is possible to suggest that ICT can be used for movement expression activities according to the progress of the non-major teacher even if there is no major leader in the field such as the elderly with dementia. Most importantly, it can suggest the development of various contents of movement expression activity through interaction with participant using ICT for on-site experiential learning in which intrinsic expressive movement activity of a child with intellectual disability is positively required.

**References**

Cohen, B. B. (1997, 3rd). Sensing, Feeling, and Action: The Experiental Anatomy of Body - Mind Centering. MA: Contact Edions.

Fliers, E., Rommelse, N., Vermeulen, S. H. H. M., Altink, M., Buschgens, C. J. M., Faraone, S. V. & Buitelaar, J. K. (2008). Motor coordination problems in children and adolescents with ADHD rated by parents and teachers: Effects of age and gender. Journal of Neural Transmission, 11(2), 211-220.

Geuze, R. H., Joungmans, M. J., Schoemaker, M. M., & Smits-Engelsman, B. C. (2001). Clinical and research diagnostic criteria for developmental coordination disorder: A review and discussion. Human Movement Science, 20(1), 7-47.

Guralnick, M. J., & Weinhouse, E. (1984). Peer-related social interactions of developmentally delayed young children: their development and characteristics. Developmental Psychology, 20, 815-827.

Hong, S. H. (2017a). A Study on the Effects of Physical Activity Expression Activity on Self - Expression Ability and Self - Esteem of Intellectual Disability Students. Korea Arts Education Research, 15 (1), 127-140.

Hong, S. H. (2017b). Dance Program Using Kinect for Education Purpose Affect Body Expression of Children with Intellectual. ISSP14TH World Congeress Sevilla.

Horvat, R. W. (1971). Physical education for children with perceptual motor learning disability. Columbus Ohio: Charles E. Merril.

Ji, G. M. & Park, E. H. (2002). A Study on the Effects of Computerized Transfer Transition Program for Mentally Retarded High School Students: Focused on the Use of Cash Dispensers. Special Education Research, 37 (3), 311-330.

Jung. H. S. (2012). A Study on the Representation Techniques of Various Content Production Using Motion Graphics. Korean Computer Games Society, 25 (4), 7-15

Kaneko, F., & Okamura, H. (2006). Study on the social maturity, self-perception, and associated factors, including motor coordination, of children with attention deficit hyperactivity disorder. Physical &Occupational Therapy in Pediatrics, 25(4), 45-58.
Kim, N. Y. (2008). Development of Movement Assessment Scale for Dance/Movement Therapy. Jurnal of Adapted Physical Activity. 16(2). 1-23.
Kim, E. H. & Hong, S. H. (2014). A Practical Application of the Rhythmic Exercise Program for the Disabled in the Future: Focusing on Intellectual Disabilities. Journal of the Korean Rhythmic Movement, 7 (1), 13-24.
Kim, E. H. & Hong, S. H. (2016). The Effects of Rhythmic Exercise Activities on Movement Activities of Students with Intellectual Disabilities. Journal of the Korean Association for Rhythmic Exercise, 9 (1), 7-17.
Kim, H. k. (2014). A Study on the Educational Effect Analysis on Motion Expression in Motion Graphics - Focused on Laban 's Motion Analysis Theory. Digital Design Studies, 14 (1), 427-436.
Kwon, J. M. & Kim, M. Y. (2012). Job Training of Intellectual Disabilities Using Functional Games - A Study on Contents for Vocational Use of Vocational Function Textbooks. Korean Computer Games Society, 25 (4), 35-46.
Lee, C. W. (2001). Effects of Exercise Program Application to Improve Rescue Ability of Educational - grade Mentally Retarded Children. Journal of the Korean Physical Education Society, 9 (1), 103-115.
Lee , K. H. (2016). Meaning of Motion Assessment in Dance Motion Therapy (centered on Laban motion analysis). Korean Dance Research Association, 60 (3), 123-138.
Levy, F. J. (1988). Dance Therapy. Tree and Survey Results. 216-292
Linder, T. W. (1993). Transdisciplinary Play-based Assessment: A Functional Approach to Working with Young Children (eds). Baltimore, MD, US; Paul H Brookes Publishing. 87.
MacDonald, M., Lord, C., &Ulrich, D. A. (2013). The Relationship of motor skills and social communicative skills in school-aged children with autism spectrum disorder. Adapted Physical Activity Quarterly, 30 (3), 271-2.
O'Hare, A., &Khalid, S. (2002). The association of abnormal cerebellar function in children with developmental coordination disorder and reading difficulties. Dyslexia, 8(4), 234-248.
Purcell, T. M. (1994). Teaching Children Dance Becoming a Master Teacher: New Jersey, Human Kinetics.
Schoemaker, M. M., & Kalverboer, A. F. (1994). Social and Affective Problems of Children Who Are Clumsy: How Early Do They Begin. Adapted Physical Activity Quarterly, 11(2), 130-140.
Shin, S. M. & Kim, J. R. (2010). Reading body and movement. Seoul: Ewha Womans University Press.
Skeleton Data. Source: google.
Taylor, R. L., Brady, M., &Richards, S. B. (2005). Mental retardation: Historical Perspectives, Current Practices, and Future Directions. Boston: Allyn & Bacon.
This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2017S1A5B5A07063616)

# K4

# The General Situation of Chinese Adolescent Physical Fitness

**Weina Liu**

Key Laboratory of Adolescent Health Assessment and Exercise Intervention of Ministry of Education, East China Normal University, China

**Abstract**

**Backgrounds & Purpose**

In the past 40 years of reform and opening up, Chinese adolescent physical fitness policy has undergone four stages: adjustment and recovery (1979－1986), perfection and standardization (1987－1996), reform and deepening (1997－2006), top-level design and collaborative innovation (2007－2017), which make Chinese adolescent physical fitness policy gradually improve and become better and better. However, the results of the physical fitness test of Chinese students show that the physical fitness of Chinese adolescent is still facing a severe situation.

**Methods**

This is a review study of papers on Chinese adolescent physical fitness and policy documents in related fields.

**Results**

Research shows that since the reform and opening up, Chinese adolescent' body shape level (height, weight, etc.) has been increasing year by year, while their physical quality (speed, strength, endurance, power, flexibility, etc.) and functional level fluctuate greatly. Compared with Japanese adolescent aged 7-18, the height, weight and BMI of Chinese adolescent are all higher than those of Japanese adolescent of the same age group, while the two indexes of 20mSRT and $VO_2$max, which reflect the cardiopulmonary endurance, are significantly lower than those of Japanese adolescent. In addition, the number of overweight and obese adolescent in China 7-18 year old is significantly higher than that of Japanese.

In 2016, professor Ji Liu from ECNU led the implementation of the model of Chinese fitness physical education curriculum, aiming to solve the problem of unqualified physical education (no exercise, no strategy, no competition) to help improve the physical and mental health of adolescents. Through an experiment of nearly 500,000 adolescent from 22 schools, the results show that the model of Chinese fitness physical education curriculum can effectively improve the physical and mental health of adolescent.

In April 2018, the Standard Test of Sport Skill Level for Adolescents was developed by Shanghai sports university. It is a positive response to implement the national policy for adolescents to be proficient in 1 or 2 sports skills and a necessary component to strengthen the practical guidance value of national physical education and fitness curriculum standards. It can effectively promote adolescents to participate in sports, enrich the connotation of adolescent sports competition and enhance their sense of gaining honor in sports competition and provide strong

data support for the layout of sports talents in China.

On July 8, 2019, the state council further emphasized the importance of improving adolescent' physical fitness through a document, even expressed that physical education should be included in the college entrance examination to promote the physical fitness of adolescent.

**Conclusion**

Under the background of the Health China Strategy, the government has paid much more attention to the physical fitness of adolescents. Colleges and universities cooperate closely with basic education schools to help them develop strategies to face the problems of adolescent physical fitness. All of these have created good conditions for the development of adolescent physical fitness and finally will promote the achievement of the physical fitness goals of Chinese adolescent.

**Key Words:** Chinese adolescent, physical fitness, physical education, health

# K5

# The effects of the combination of green tea extract and brisk walking on blood lipids and body composition in humans

**Tengfei ZHANG[1]; Si CHEN[1]; Atushi SAITO[1]; Ningxia LI[2]; Zhengqing HOU[3]**

1 Health and Sport Science, Graduate School of Human-Environment Studies, Kyushu University, Kyushu, Japan.

2 The center laboratory medicine, Luohe Center of Hospital, Henan, China.

3 Assistant in Post-Doctoral Research Center, Luohe Center of Hospital, Henan, China.

**Introduction**

Sedentary behavior is a major factor that increases the risk of chronic diseases, and it also significantly affects one's body weight. Over the last three to four decades, the prevalence of overweight and obesity has increased dramatically. For instance, in 2015, about 107.7 million children and 603.7 million adults were obese around the world. Obesity is a major risk factor for cardiovascular disease (CVD), type 2 diabetes mellitus (T2DM), hypertension, coronary artery diseases, metabolic syndrome, and some cancers (Malik VS et al., 2013). Walking has been described as a near perfect ''exercise'' and has been recommended by health organizations worldwide (Morris J et al., 1997). Walking programs have a higher level of adherence than other forms of exercise (Siegel PZ et al., 1995). Brisk walking as a simple, economic, and safe form of exercise is the most popular moderate-intensity aerobic physical activity for both men and women, especially for most middle-aged and/or overweight and obese individuals. It is the most likely exercise or physical activity to be chosen to improve chronic diseases, and T2DM as well as to manage body weight (Lee IM et al., 2008). According to the definition of moderate-intensity activity, walking is ''brisk'' at a speed of 2.5 to 4.2 mph on firm ground. Studies have shown that 30 minutes of moderate-to-vigorous walking corresponds to a total of 3100 - 4000 steps (Pillay JD, 2014). Previous studies (Pagels P et al., 2012; Murphy M et al., 2002) have demonstrated that brisk walking can result in improved levels of low density lipoprotein cholesterol (LDL-C), total cholesterol (TC), and high-density lipoprotein cholesterol (HDL-C).

Green tea is a popular beverage in many parts of the world, derived from the unfermented tea plant leaves (Camellia sinensis). The predominant constituents of green tea are the polyphenols, and most of these are catechins (Braicu C, 2013). Epigallocatechin-3-gallate (EGCG) is the major component of tea catechins, and the most pharmacologically active (Namal Senanayake SPJ, 2013). A previous study (Sae-tan S et al, 2011) on green tea and/or green tea extract showed numerous potential benefits for managing obesity and improving TC and LDL-C levels. However, human studies do not strongly support these results and are still inconsistent, especially concerning the combination of green tea and exercise.

# 1 Study 1 The effect of brisk walking on the body weight, body fat, waist circumference and blood lipids in adults: A systematic review

## 1.1 Introduction

It is widely assumed that regular physical activity can help prevent primary and secondary chronic diseases (Warburton DE et al., 2006). Most countries' governments and health organization recommend that subjects engage in regular moderate or vigorous intensity physical activity. However, modern society has changed our approach to work, and the modern lifestyle has also changed our behaviors. Whether while working or enjoying leisure time, we spend a great proportion of our life engaged in sedentary behavior. Sedentary behavior is defined as any waking behavior characterized by an energy expenditure (as well as postural [sitting or reclining] and contextual [waking] of ≤1.5 metabolic equivalents (METs) (Sedentary Behaviour Research Network, 2012). According to this definition, a person may be described as sedentary if they engage in a large amount of sedentary behavior. However, the energy expenditure with behavior differs depending on the context of the behavior. For example, sitting in a classroom is assigned 1.8 METs, while driving a car is assigned 2.5 METs. There is no consistent definition of sedentary behavior; nevertheless, a common phenomenon exists: namely a lack of ambulatory movement in any posture. This is an important characteristic that distinguishes sedentary behavior from physical activity. Physical activity is defined as any body movement generated by the contraction of skeletal muscles, which increase the energy expenditure above the resting metabolic rate. Physical activity is characterized by its modality, frequency, intensity, duration, and context of practice (Thivel D et al., 2018).

However, conflicting results have also been reported, with some studies (Murtagh EM et al., 2005; Tully MA et al., 2005) showing that brisk walking has no substantial effect on the body composition or blood lipid values. The aim of this systematic review was to summarize, analyze, and interpret the health benefits of brisk walking in human with regard to its effects on the body weight, body mass index (BMI), waist circumference (WC), and HDL and TG levels.

## 1.2 Methods

This systematic review followed the Cochrane systematic review guidelines. The online databases Web of Science and PubMed were evaluated through August 3, 2018, for relevant periodicals. The patient, intervention, comparison, and outcome (PICO) approach was used in this review search strategy. Our search eliminated two sets of keywords using the Boolean operator ‘‘NOT’’, and combined two sets of keywords using ‘‘AND’’, with ‘‘OR’’ used to combine the keywords. The quality of the studies was assessed using the Cochrane Risk of Bias Tool. For data extraction and analysis, two researchers extracted all relevant data independently. We estimated the relationship between the brisk walking group and the control group based on the data presented as the mean difference (MD). Mean changes in the body composition, HDL-C, and TG were used to first assess the differences between the trial and control groups. $I^2$was used to assess heterogeneity between studies, and $I^2$ values of <25%, 25%-75%, and >75% were considered to indicate low moderate, and high heterogeneity, respectively. Statistical analyses were performed using the Review Manager 5. $P<0.05$ was considered to indicate statistically significant results.

## 1.3 Results

A total of 523 randomized control trials (RCTs) studies were identified through our initial searches. Following the removal of duplicates, titles, and abstracts were screened, resulting in 72

articles that underwent a full-text screening for inclusion. Overall, 29 RCTs (Hardman AE et al., 1989; Cramer SR et al., 1991; John PF et al., 1993; Stensel DJ et al., 1993; Aldred HE et al., 1995; Santiago MC et al., 1995; Brooke-Wavell K et al., 1997; Coleman KJ et al., 1999; Higashi Y et al., 1999; Brooke-Wavell K et al., 2001; Murtagh EM et al., 2005; Tully MA et al., 2005; Audette JF et al., 2006; Lee MR et al., 2006; Kirkwood L et al., 2007; Tully MA et al., 2007; Coghill N et al., 2008; Pierce GL et al., 2011; Pagels P et al., 2012; Foulds HJ et al., 2014; Kearney TM et al., 2014; Johnson ST et al., 2015; Hui SS et al., 2016; Zhang HJ et al., 2016; Blain H et al., 2017; Herzig KH et al., 2014; Ho SS et al., 2012; McNeilly AM et al., 2011; Blain H et al., 2017) articles were identified (Fig. 1). We excluded 34 articles for the following reasons: 6 were testing studies; 17 were combined with other exercises; 8 studies did not include indices; and 3 had no sedentary control group. This review identified a total of 1697 individuals (brisk walking group, n= 931; control group, n= 766), investigating the long-term health effects of brisk walking. The research duration ranged from 3 - 48 weeks. The health of participants varied among studies, including overweight and/or obese, T2DM, nonalcoholic fatty liver, physically deconditioned, hypercholesterolemic, and eumenorrheic patients. We only analyzed the studies that reported results in standard deviation (MD).

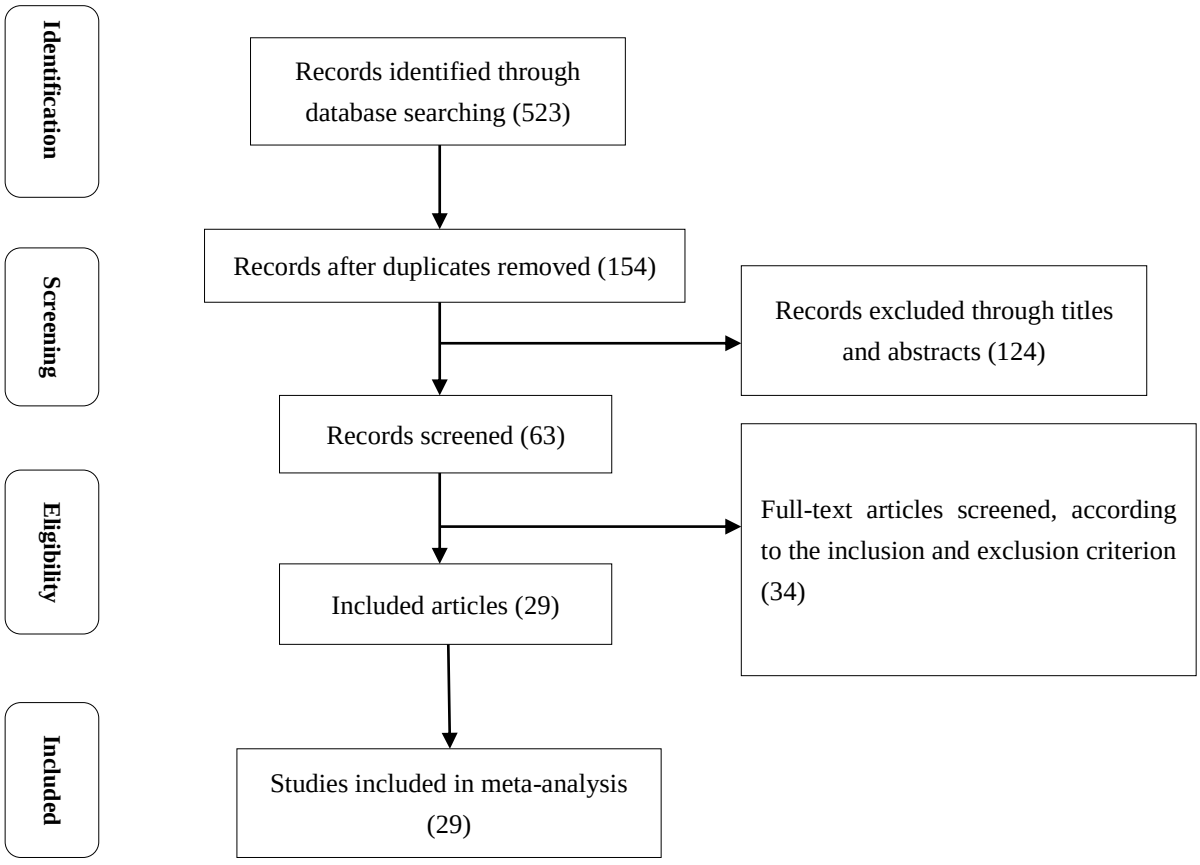



Figure 1 Flow diagram showing the literature search and selection process

1.3.1 Body weight and WC

Four studies did not report the body weight, and 13 did not report waist circumference. Thirteen studies found a significant decrease in the body weight at the end of the study period. Meta-analyses of 14 RCTs failed to show significant differences in the body weight (MD: -1.10kg; 95% confidence interval [CI]: -3.92 to 0.95; $I^2$ = 45%; p = 0.23). Seventeen trials measured the effect of brisk walking on body fat. A meta-analysis of 14 RCTs failed to show significant

differences in the body fat (MD: -0.32; 95% CI: -1.55 to 0.92; $I^2$ = 43%; p = 0.62). Meta-analysis of 7 RCTs did not reveal any significant differences in the WC between groups MD: -0.14kg; 95% CI: -4.19 to 3.91; I = 57%; p = 0.95.

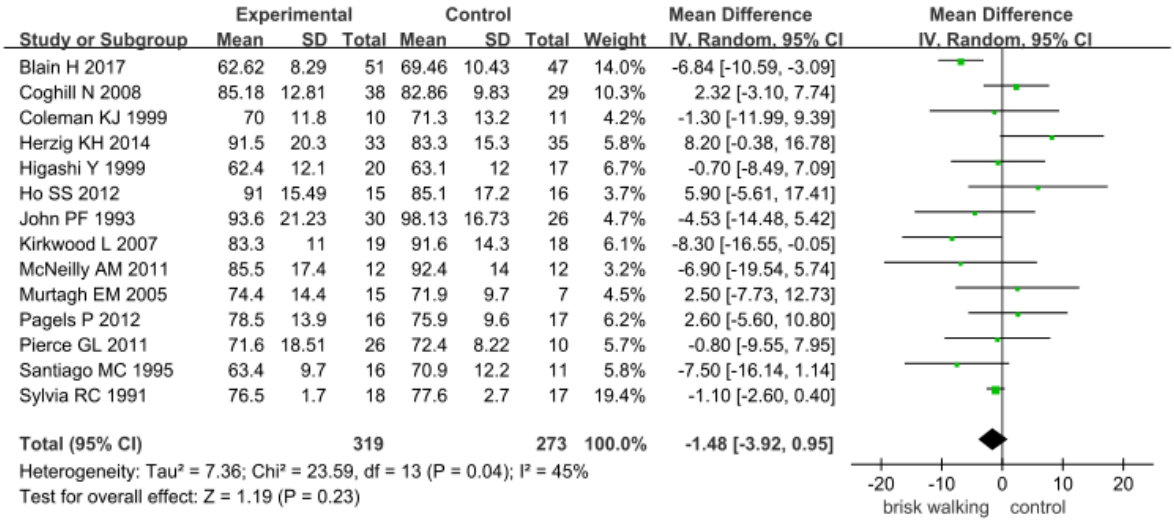



Figure 2 Effect of brisk walking on body weight (kg)

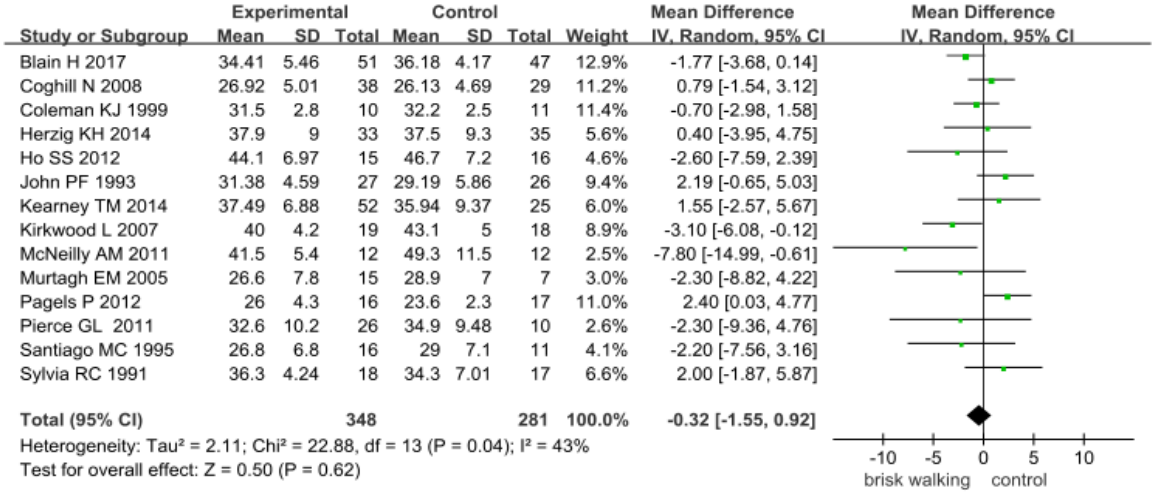



Figure 3 Effect of brisk walking on body fat

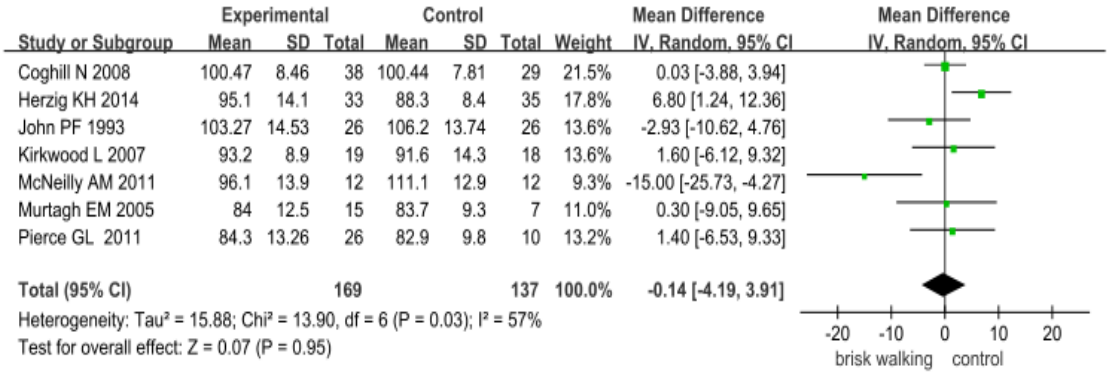



Figure 4 Effect of brisk walking on body waist circumference (cm)

1.3.2 Effects of on the TC levels

Two of 17 studies shown a significant reduction in the TC levels; however, one of these 2 studies included hypercholesterolemic patients, and the other only had a 3-week intervention period. Meta-analyses of 14 RCTs failed to show significant differences in the TC levels (MD: -0.05mmol/L; 95% CI: -0.93 to 0.35; I2 = 43%; p = 0.63).

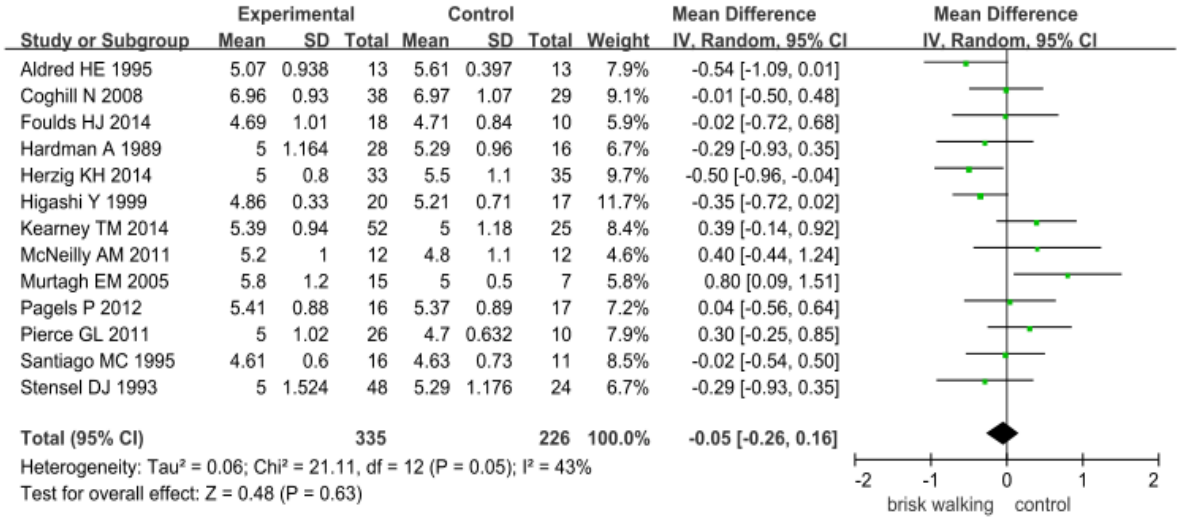



Figure 5 Effect of brisk walking on total cholesterol (mmol/L)

**1.3 Discussion**

The aim of this review was to assess the effect of brisk walking on the body weight, body fat, WC, and blood lipid values in adults. A total of 29 intervention studies met the inclusion criteria and were included in this review. While all of the included trials assessed brisk walking as the modality, the intensity of the exercise varied widely. However, only 7 trials in our review reported that a ≥70% maximum heart rate was achieved. Other studies used self-monitoring to assess the presence of brisk walking (accelerator, pedometer and rate of perceived exertion scale). One of these studies reported that the maximum oxygen consumption should be 62% ±2% for brisk walking, however, another study that assessed the speed and intensity of walkers showed that the threshold was 68.6% ±14.9%.

A systematic review and meta-analysis demonstrated that brisk walking was able to reduce the body weight, body fat and WC in obese adults (Mabire L et al., 2017). Twelve studies in our review reported statistically significant changes in the body weight, and eight reported statistically significant changes in the body fat and WC. The intensity of brisk walking differed markedly among our included studies. Nemotoet al found that brisk walking, defined as a maximum oxygen consumption of 50% - 70%, was able to reduce the body mass (Nemoto K et al., 2007). Blain et al also showed that brisk walking, defined as a maximum oxygen consumption of 60% - 80%, was able to reduce the body mass and body fat of sedentary women (Blain H et al., 2017). Maintaining or increasing the amount of moderate or vigorous intensity physical activity is recommended by a number of health organizations to reduce the risk of chronic diseases in sedentary adults. As one of the most popular physical activities, brisk walking can reduce the body mass, body fat or WC. However, the recommended levels of such physical activities have generally not led to clinically significant body mass loss.

Several studies have shown that physical activity has favorable effects on the blood lipid and lipoprotein profiles. A previous review found that exercise increased the HDL-C levels and reduced those of TG and LDL (Durstine JL et al., 2007). However, few studies have found a significant difference in TC levels based on exercise. Indeed, only six trials among the studies included in our review reported statistically significant reductions in the blood lipid and lipoprotein values, and four of those included chronic disease patients as participants. This finding, along with others, confirmed that physical activity was able to improve the blood lipid and lipoprotein levels. We did not found significant differences in TC levels in our included studies analysis (13 studies). Physical activity can not only improve the health of chronic disease patients, but also reduce the risk of chronic disease altogether in healthy humans. A meta-analysis found that the effect of physical activity on blood lipids was associated with increased levels of such activity, and Duncan et al. found that a difference in the amount of-exercise appears to result in a different effect on the blood lipid values (Kelley GA et al., 2006; Duncan JJ et al., 1991).

## 2. Study 2 Is there evidence that green tea extract combined with physical activity affects the lipid and lipoprotein content in humans? A system review and meta-analysis of randomized controlled trials

### 2.1 Introduction

Green tea (*Camellia sinensis*), which contains several kinds of polyphenols, is one of the most popular beverages in the world. These polyphenols are classified into pyrogallol-type and non-pyrogallol-type catechins. Previous studies (Miyamoto T et al., 2017; Chen XQ et al., 2016; Stangl V et al., 2007) have reported four major catechins in green tea, both pyrogalloland non-pyrogallol-type catechins: epigallocatechin gallate (EGCG), epigallocatechin (EGC), epicatechingallate (ECG), and epicatechin (EC). EGCG is the most pharmacologically active of these catechins. Clinical and epidemiological studies have shown that tea catechins can be used to help prevent numerous kinds of disease, describing their anti-bacteria, anti-obesity, anti-diabetic, and anti-cancer effects (Pang J et al., 2016; Okwuosa IS et al., 2016). Preventing CVD is an important effect of green tea extract (GTE)and can be largely attributed to EGCG, the most abundant tea catechins (Laslett LJ et al., 2012). Several mechanisms of green tea extract that can reduce the risk of CVD have been suggested. One of the main mechanisms involves the effects of antioxidants, which prevent oxidative modification of LDL-C, an important step in the progression of atherosclerosis (Nascimento BR et al., 2014). However, some studies of GTE combined with physical activity have obtained conflicting findings, reporting that human intervention has relatively little effect on the LDL-C and TC content (Tseng ML HC et al., 2013). Although many systemic reviews and/or meta-analyses have summarized the effects of the consumption green tea on CVD and the total mortality, blood pressure, and lipid profile, no meta-analysis has assessed the effects of GTE combined with physical activity on the serum lipid content. Therefore, the aim of this meta-analysis was to compile evidence on the effects of physical activity combined with GTE on the serum lipid and lipoprotein content in humans.

### 2.2 Methods

This review was preformed and reported while adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline, 2009. We searched for English-language articles published through June 2017 in the following databases: PubMed, Web of Science, and Cochrane Library. Two researchers extracted all relevant data independently. We

estimated the relationship between the GTE combined with physical activity group and the control group based on the data presented as the standardized mean difference (SMD). Due to the different units of measurement used in each study, we converted all measures of mg/dl to mmol/L. We therefore used a random-effects model meta-analysis. Subgroup analyses (based on the daily dosages of EGCG[≤150mg or ＞150mg] in trials, and based on exercise intensity in studies). $I^2$ was used to assess heterogeneity between studies, and $I^2$ values of <25%, 25%-75%, and >75% were considered to indicate low moderate, moderate, and high heterogeneity, respectively. Egger's tests were used to assess the publication bias (P<0.1 was considered to indicate significant publication bias). Statistical analyses were performed using the STATA version 15.0 software program (Stata Corporation, College Station, TX, USA). P<0.05 was considered to indicate statistically significant results.

**2.3 Results**

The results of our electronic literature search and the study selection process are shown in Figure 6. We searched 271 articles and identified 31 potentially eligible trials. We included 7 of the trials (Marjan Rostamian NB, 2017; Miyazaki R et al., 2013; Osami Kajimoto YK et al., 2003; Stendell-Hollis NR et al., 2010; Gahreman D et al., 2016; Nagao T HT et al., 2007; Belcaro G et al., 2013) that enrolled a total of 608 participants in the meta-analysis. All of the studies were of random design, with four showing a double-blind random design, one RCT reporting a single-blind design, and two reporting only a random design. Physical activity included aerobic exercise alone as well as resistance training combined with aerobic exercise. Two studies used an activity level assessment. Only one study did not report the main component of GTE, and only one used decaffeinated GTE.

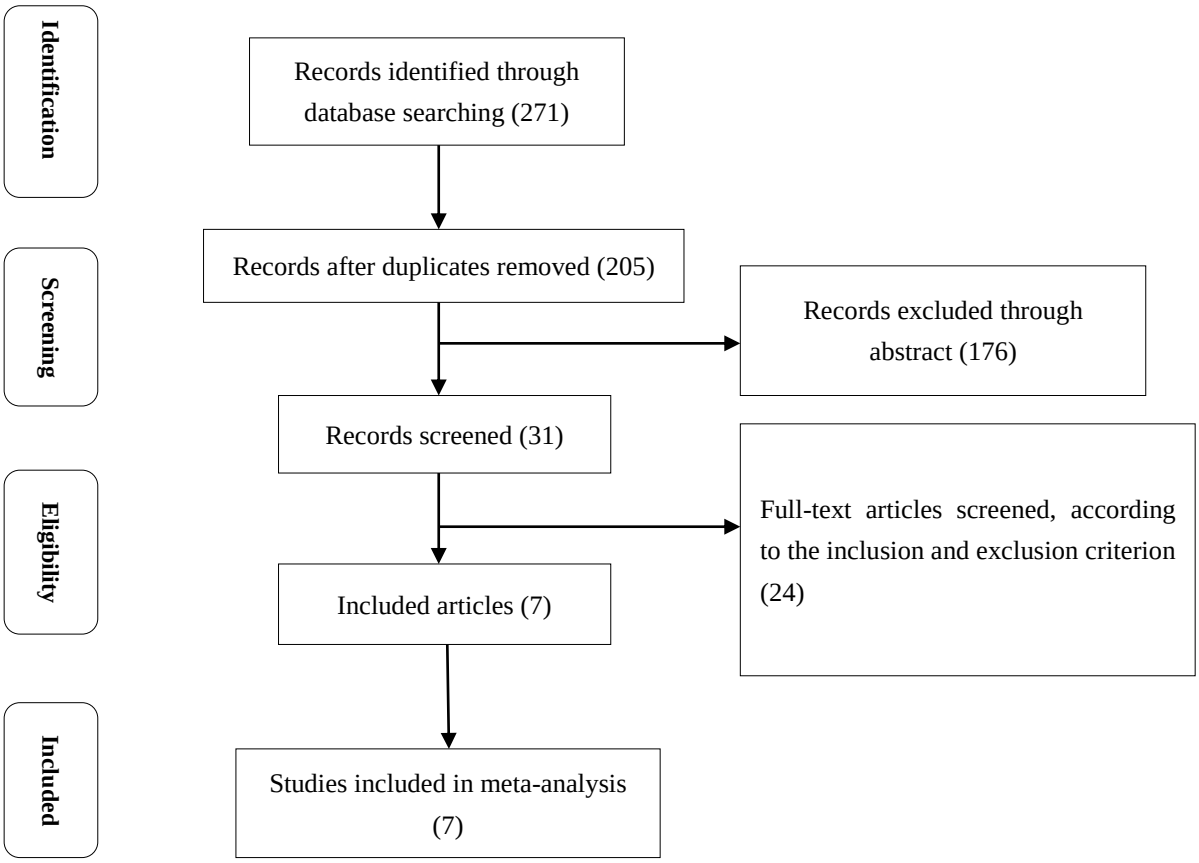



Figure 6 Flow diagram showing the literature search and selection process

A meta-analysis of six trials (Figure 7) failed to show a significant decrease in the LDL-C level in the GTE group compared with the placebo group (SMD:-0.169; 95% CI:-0.414 to 0.076; $I^2$=22.7%; *p*=0.177). No significant differences in the LDL-C values between the subjects receiving higher and lower doses of EGCG were noted on a subgroup analysis, with a similar relationship observed for the physical activity subgroup analysis (daily activity = physical activity subgroup; plan = exercise subgroup). However, the heterogeneity in the higher-dose EGCG group was $I^2$=61.9% (*p*=0.105). Because only two studies were included, we were unable to perform a sensitivity analysis. There was no publication bias according to Egger's test (*p*=0.895).

The results of a meta-analysis of all of the included studies showed that GTE combined with physical activity not associated with the serum value of TC (SMD:-0.219; 95%CI:-0.533 to 0.094; $I^2$=48.1%; *p*=0.170). There was no publication bias according to Egger's test (p=0.239).We divided the studies into subgroups for an analysis, and found a non-significant decrease in the lower- and higher-dose GTE groups compared with the placebo group, with the same results obtained in the physical activity subgroups. Due to the higher heterogeneity in the subgroup analysis, we performed a sensitivity analysis by removing each study from the meta-analysis (SMD:-0.594; 95%CI:-1.012 to -0.177; $I^2$=0%; *p*=0.005) as well as overall (SMD:-0.353; 95%CI:-0.673 to 0.032; $I^2$=16.5%; *p*=0.031) (Figure8), with significant decrease noted in both the lower-dose EGCG group and overall.

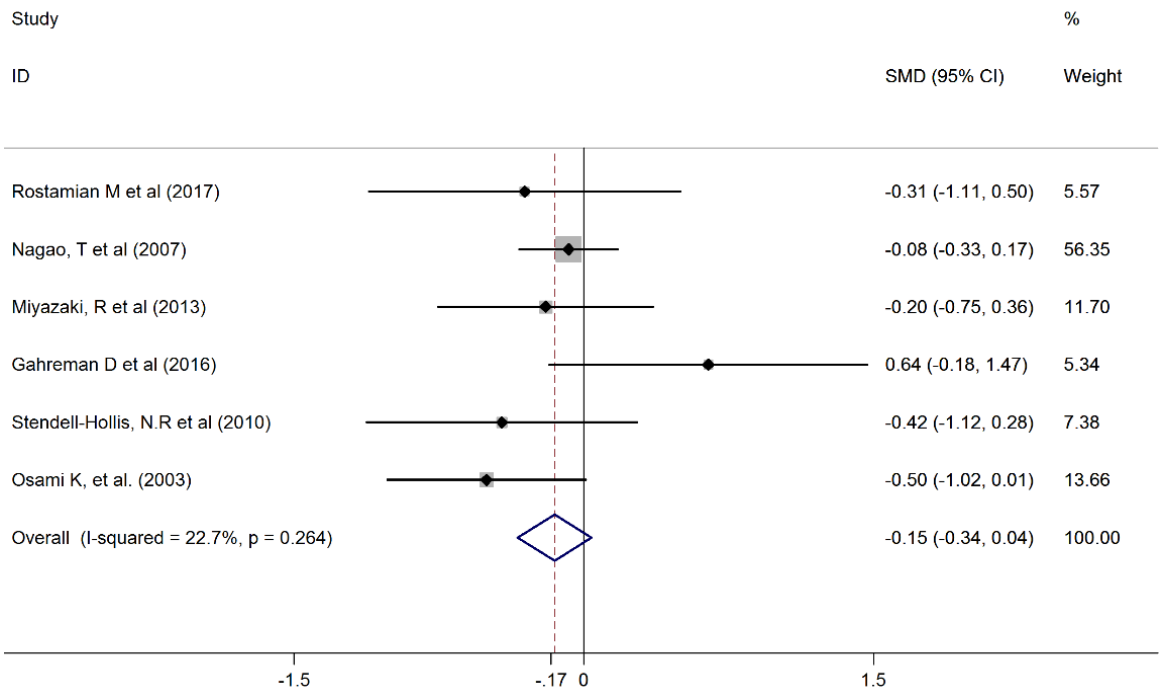



Figure 7 Results of evaluating the effect of GTE combined with exercise on LDL-C(mmol/L). Sizes of data markers indicate the weight of each study in the analysis.

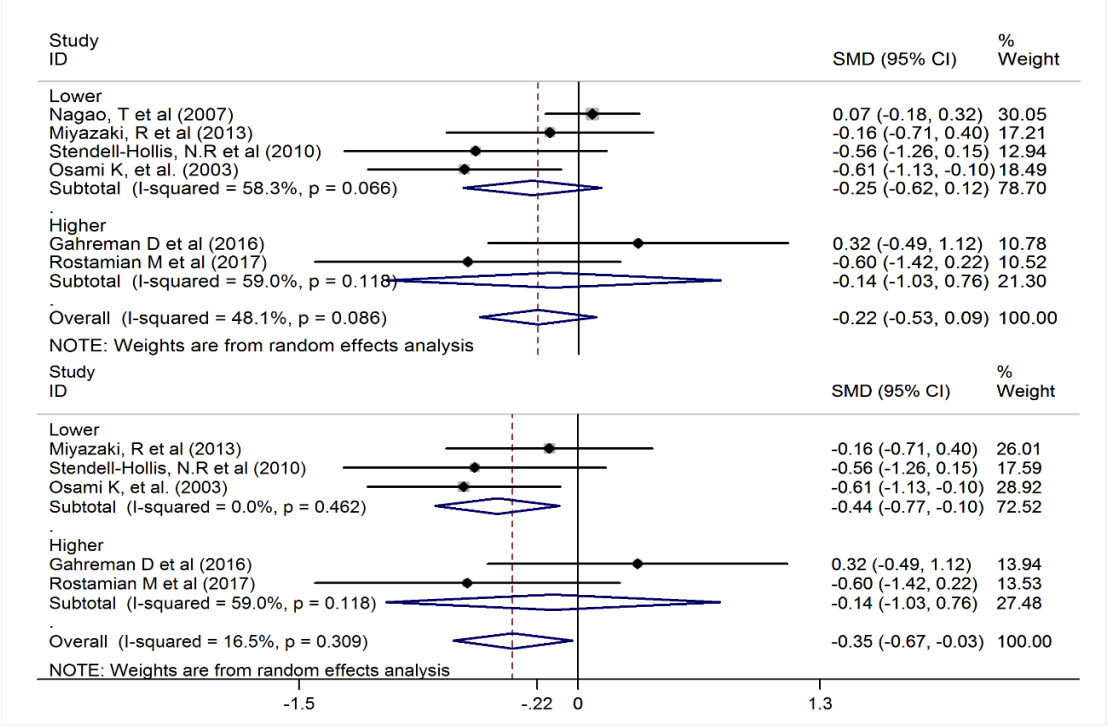



Figure 8 Results of subgroup and sensitivity analysis from difference dose EGCG evaluating the effect of GTE combined with exercise on TC (mmol/L). Sizes of data markers indicate the weight of each study in the analysis. (Lower subgroup = lower dose EGCG; Higher subgroup = higher dose EGCG)

**2.4 Discussion**

A total of seven RCTs were included in this meta-analysis, which found no significant differences in the serum LDL-C levels between the GTE combined with physical activity and placebo groups. However, subgroup and sensitivity analyses revealed that the TC level was significantly decreased in the lower-dose EGCG subgroup. The findings of the present meta-analysis contradict those of a previous meta-analysis, which revealed the beneficial effects of GTE on the lipid and lipoprotein profile (Zheng XX et al., 2011). In contrast to the previous review, our meta-analysis also assessed the effects of physical activity on the serum lipids. As the studies evaluated here were different from those evaluated in the previous review, there might have been discrepancies between these reviews regarding the findings concerning the beneficial effects of GTE on the lipid and lipoprotein profile (Onakpoya I et al., 2014). However, we did note some similarities in the lipid profiles of those of our review and the subjects of the previous meta-analysis.

Previous studies have shown that CVD is associated with oxidative stress induced lipid damage. Tea polyphenols reduce this damage and enhance the endogenous defense system (Gadkari PV et al., 2015). However, we found no significant decrease in the LDL-C or TC levels in our review. Although the previous meta-analysis found that GTE did indeed reduce these levels (Kim A et al., 2011). In comparison to the previous study, we considered physical activity as an important factor in our review. Increasing physical activity is effective for preventing CVD. However, our study, the combination of physical activity and GTE showed no significant effect. Of note, while we found no significant decrease in the LDL-C levels of the subjects in our meta-analysis, we did find a significant decrease in the TC levels in a sensitivity analysis.

While several meta-analyses have reported significant improvement in the lipid and lipoprotein content with physical activity, few studies have shown significant changes in the TC and LDL-C levels specifically (Kelley GA KK et al., 2006; Zhang B et al., 2013; Thompson PD et al., 2003). Furthermore, these beneficial effects were typically noted in studies including diet intervention or obese participants (Durstine JL GP et al., 2001). Studies have shown that many confounding factors can influence the effects of interventions targeting TC and LDL-C, including body characteristics, energy expenditure, food supplements, health status, and lifestyle. Consequently, the results obtained in our analysis might have been because the eligible studies all included population with differences in the health status, age, and degree of physical activity.

## 3. Study 3 The effects of combination of green tea extract and brisk walking on total cholesterol and body composition in overweight and obese men: A randomized control trial

### 3.1 Introduction

Over the last three to four decades, the proportion of obesity has increased dramatically worldwide. Excess weight is a well-recognized risk factor for several common chronic conditions, such as functional capacity, cardiovascular disease, type 2 diabetes, metabolic syndrome, cancer and other health problems (GBD 2015 Obesity Collaborators et al, 2017). Walking has been described as a near perfect ‘‘exercise’’ and has been recommended by health organizations worldwide (Morris J et al., 1997). Brisk walking as a simple, economic, and safe form of exercise is the most popular moderate-intensity aerobic physical activity for both men and women, especially for most middle-aged and/or overweight and obesity individuals. It is the most likely exercise or physical activity to be chosen to improve chronic diseases, and T2DM as well as to manage body weight (Lee IM et al., 2008). Natural herbal supplements, especially green tea and green tea extract, can help manage obesity and protect against chronic diseases (Wang S et al., 2014). The predominant constituents of green tea are polyphenols, and most of which are catechins. Epigallocatechin-3-gallate (EGCG) is the major component of tea catechins, and the most pharmacologically active. A previous study (Sae-tan S et al., 2011) on green tea and /or green tea extract showed that numerous potential benefits for managing obesity and improving TC and LDL-C levels. However, human studies do not strongly support these results and are still inconsistent, especially concerning the combination of green tea and exercise. The aim of this study was to investigate whether or not ingestion green tea extract (GTE) combined with brisk walking can positively influence the TC levels and body composition in overweight and obese men.

### 3.2 Methods

#### 3.2.1 Participants

Twenty-four overweight or obese, non-smoking, males (39.8±8.8 years old) volunteered for this study. None were regular consumers of green tea, and volunteers with known or suspected cardiovascular, diabetes, mental illness, liver, renal disease, and nerve disease were eliminated. Participants read and signed an informed consent form that explained the potential risks of this study. The study was approved by the Luohe Centre Hospital of Clinical Research Ethics Committee (No. 2018-03-015-E01).

#### 3.1.2 Intervention

24 participants were randomly divided into 2 groups: the GTE combined with brisk walking (GTE) group and placebo combined with brisk walking (placebo control) group. Participants were

assigned to either the control or GTE group through stratified randomization according to their body mass index (BMI). All of the participants were sedentary. Enrollment and assignment were carried out by the first author. There were no significant differences in the primary measured variable at baseline in any of the participants. All participants were asked to consume two GTE or placebo tablets daily: one tablet with breakfast and one with dinner. The first author or study assistant supervised the participants who consumed the GTE or placebo by telephone. The GTE tablet contained 150 mg of EGCG, and the placebo tablet contained neutral ingredients such as corn starch, and Isomaltitol. The GTE and placebo tablets were, identical in appearance, size and color.

The brisk walking intervention was a 12-week outdoor walking program. This walking program was performed under the supervision of the first author and a research assistant. The walking program involved 12 weeks of brisk walking at an intensity of 65%-80% of the maximum heart rate, which was supervised by heart rate belt. Brisk walking was performed 4 times a week, and each session lasted 60 minutes. The warm-up and cool down phases lasted 5 minutes. Due to all subjects being overweight or obese men with physical inactivity, for the first 3 weeks (initiation phase), we set the 50%- 65% of the maximum heart rate for all participants and then gradually increased the intensity.

*3.2.3 Statistical analyses*

All values are presented as means with their standard deviation. Data were analyzed using the Statistical Package for Social Science for Windows (SPSS 20). The intention-to-treat (ITT) efficacy analysis was used in this study. Pre- and post-intervention values were compared using a paired-sample *t*-test, and the analysis of covariance was used to compare the differences between the two groups. A value of $p < 0.05$ was considered to be statistically significant.

**3.3 Results**

3.3.1 General characteristics of the individuals

The demographic information of the subjects is shown in Table 1. The baseline TC level was 4.85±1.069 mmol/L for the GTE group and 4.78±1.105 mmol/L for the placebo control group. The baseline body weight was 83.0±9.37 kg for the GTE group and 82.3±8.46 kg for the placebo control group. There were no significant differences in the age, TC, body weight, WC, body fat, BMI, or systoblic or diastolic blood pressure between the two groups.

Table 1 Demographic data of participants

| Variable | GTE group (n=12) | Placebo control groups (n=12) | *P* |
|---|---|---|---|
| Age | 42.5±9.82 | 37.2±7.17 | 0.163 |
| TC (mmol/L) | 4.85±1.069 | 4.78±1.105 | 0.769 |
| Body weight (kg) | 83.0±9.37 | 82.3±8.46 | 0.536 |
| BMI | 28.4±2.24 | 27.7±2.26 | 0.918 |
| Body fat (%) | 28.04±2.826 | 27.68±3.017 | 0.948 |
| WC cm) | 99.4±6.18 | 98.9±5.77 | 0.948 |
| SBP (mmHg) | 115±10.8 | 116±9.0 | 0.223 |
| DBP (mmHg) | 75±13.3 | 78±10.5 | 0.264 |

BW: body weight; BMI: body mass index; WC: waist circumference; SBP: systolic blood pressure; DBP: diastolic blood pressure

3.3.2 TC and body composition

After 12 weeks (Figure 9), there were no significant differences in the TC levels compared with before intervention in the GTE group (pre: 4.85±1.069 mmol/L vs. post: 4.88±0.894 mmol/L; P = 0.892). However, the TC level had increased significantly in the control group (pre: 4.78±1.105 mmol/L vs. post: 5.53±1.235 mmol/L; P = 0.000). According to an analysis of covariance, there was a significant difference in TC level between the GTE group and control group (F= 10.337, *P*= 0.004).

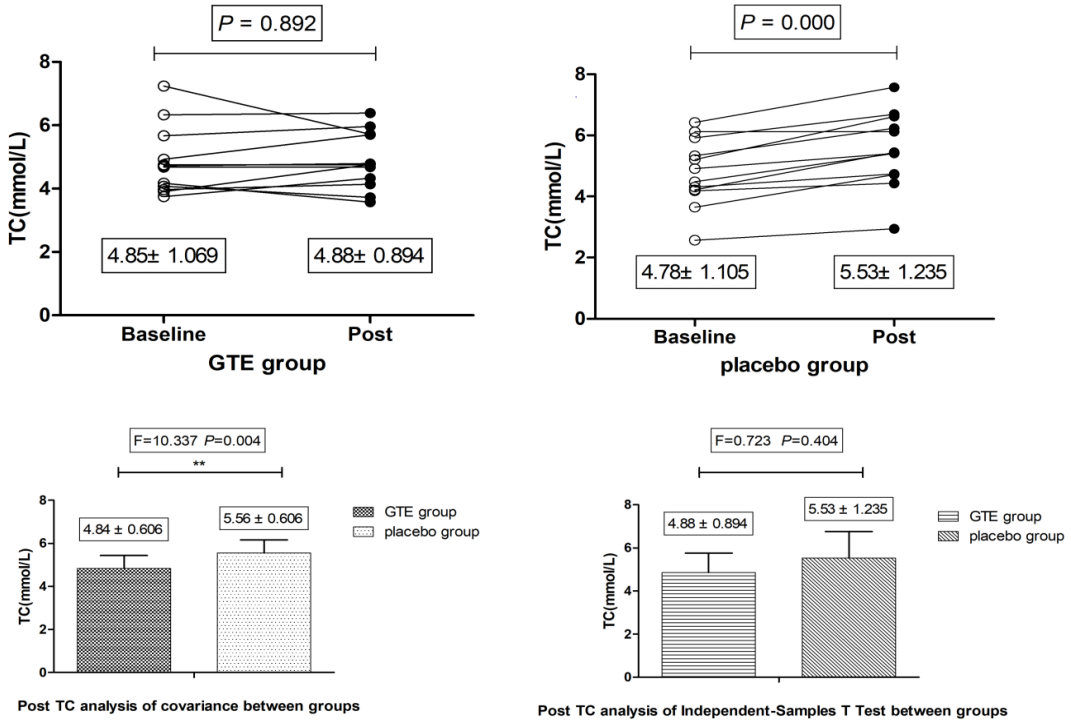



Figure 9 effect of GTE combined with brisk walking on TC

After treatment, the GTE group only showed a significant reduction in the WC, with no significant difference from the control group in the body weight, BMI, or SBP and DBP (table 2). The placebo control group showed no significant reduction in the WC, body weight, BMI, SBP and DBP. There was no significant difference in the WC, body weight, BMI, SBP and DBP between the GTE and placebo control group according to an analysis of covariance.

Table 2 Within-group body composition at baseline and after 12 weeks intervention

| | GTE group | | | Placebo group | | |
|---|---|---|---|---|---|---|
| | Pre | Post | P | Pre | Post | P |
| BW(kg) | 83.0±9.37 | 83.1±9.98 | 0.745 | 82.3±8.46 | 82.7±7.97 | 0.399 |
| WC(cm) | 99.4±6.18 | 98.2±5.74 | 0.047 | 98.9±5.77 | 98.0±6.47 | 0.138 |
| BMI | 28.4±2.24 | 28.5±2.48 | 0.232 | 27.7±2.26 | 28.0±2.17 | 0.124 |
| SBP(mmHg) | 115±10.8 | 116±9.33 | 0.733 | 116±9.0 | 118±9.4 | 0.545 |
| DBP(mmHg) | 75±13.3 | 79±10.93 | 0.173 | 78±10.5 | 81±11.4 | 0.112 |
| BF(%) | 28.04±2.826 | 28.00±2.850 | 0.880 | 27.68±3.017 | 27.16±2.70 | 0.320 |

BW: body weight; BMI: body mass index; WC: waist circumference; SBP: systolic blood pressure; DBP: diastolic blood pressure; BF: body fat.

### 3.4 Discussion

In the present study, we showed through our group comparison analyses that EGCG was able to control the TC level in overweight or obese men after 12 weeks' intervention. We also detected a significant reduction in the WC. However, we found no significant difference in the body weight, BMI, SBP and DBP between the GTE and placebo control groups after 12 weeks of intervention.

This study found no significant effect of GTE on weight reduction in overweight or obese men. The anti-obesity effect of green tea or GTE has been researched extensively over the past decade. The present study, contrary to a recent meta-analysis, showed that GTE has relatively little positive effect on body loss (Hursel R et al., 2009). However, these findings agree with those another meta-analysis that demonstrated that green tea or GTE has no statistically significant effect on weight loss (Baladia E et al., 2014). A randomized placebo-controlled study reported that daily EGCG (323 mg) had no significant effect on weight control (Kovacs E et al., 2004). Another RCT also showed that EGCG had no marked effect on body weight loss (Westerterp-Plantenga M et al., 2005). In contrast, an RCT (Brown AL et al., 2011) found that dose with GTE in overweight and obese men significantly reduced their body weight. Furthermore, another study (Rostamian M et al., 2017) showed that dose with GTE was indeed effective in helping to reduce the body weight. In addition, WC reductions in the GTE group were found following the moderate consumption of EGCG in a previous study (Hill AM et al., 2007). The effects of GTE on reducing the body weight and improving body composition have been attributed to EGCG in the gastrointestinal tract decreasing the digestion and absorption of macronutrients or altering the gut microbiota and inhibiting the intestinal absorption of cholesterol and dietary fat. In the present study, we noted no significant changes in the body composition except for the WC in the GTE group. The previous fingdings of beneficial effects on the body composition were obtained in studies performed during a diet control period or when receiving a high dose of GTE, whereas in the present study, we did not managed the diet of our subjects because the aim of this study was to estimate the effect of GTE combined with brisk walking on body composition in overweight and obese men. One important point was that all participants maintained their daily life, without making any changes.

Green tea and GTE have been shown to improve the serum levels of lipids in the majority of human and animal studies. However, the results in human studies have been heterogeneous. A previous meta-analysis showed that green tea intake results in significant reductions in TC levels, although the effect size on TC levels appear to be moderate. In our study, there was no marked change in the TC level in the GTE group after 12 weeks ´ intervention. However, taking 300 mg placebo per day for 12 weeks significantly increased the serum TC levels in the placebo control group. We found a significant difference in serum the TC levels between the two groups in an analysis of covariance. In contrast, however, Mielog-Ayuso et al. reported that GTE had no significant effect on TC levels in premenopausal obese women (Mielgo-Ayuso J et al., 2014). Furthermore, another study (Dostal AM et al., 2016) showed that long-term supplementation of GTE had no marked effect on the serum TC levels in overweight and obese postmenopausal women (Dostal AM et al., 2016). A recent study found similar result in overweight men (Gahreman D et al., 2016). However, a meta-analysis of 19 RCT trials revealed a significant reduction in TC levels (Onakpoya I et al., 2014). The discrepancy between the present and previous finding may be due to differences in intervention methods among studies. Of note, the

lifestyle (diet), dose of GTE, and characteristic of participants can strongly influence the results. Further studies on the effects of GTE combined with brisk walking on serum lipid profiles and body composition in overweight and obese men should be conducted.

**4 Conclusions**

In conclusion, the present review and study found that a brisk walking program might be able to improve the body weight, body fat, and WC. Furthermore, two factors were found to influence the effects of brisk walking on the body weight, body fat, WC and blood lipid values: (1) the amount and intensity of the brisk walking, and (2) the health status of the participants and their dietary habits. The present findings demonstrate limited evidence of a beneficial influence of GTE combined with brisk walking on serum TC levels. However, GTE combined with brisk walking did not markedly improve the body composition in overweight and obese men. These complex issues should be explored in more well-designed RCTs in the future.

**Reference:**

Malik VS, Willett WC, Hu FB. (2013). Global obesity: trends, risk factors and policy implications. *Nat Rev Endocrinol,* 9:13-27.

Morris J, Hardman A (1997). Walking to health. *Sports Med,* 23: 306–332.

Siegel PZ, Brackbill RM, Heath GW. (1995). The epidemiology of walking for exercise: implications for promoting activity among sedentary groups. *Am J Public Health,* 85:706–771.

Lee IM, Buchner DM. (2008). The importance of walking to public health. *Med Sci Sports Exerc,* 40:S512–S518.

Pillay JD, Kolbe-Alexander TL, Proper KI van Mechelen W, Lambert EV. (2014). Steps that count: physical activity recommendations, brisk walking, and steps per minute—how do they relate? *J Phys Act Health,* 11:502-508.

Pagels P, Raustorp A, Archer T, Lidman U, Alricsson M. (2012). Influence of moderate, daily physical activity on body composition and blood lipid profile in Swedish adults. *J Phys Act Health,* 9:867-874.

Murphy M, Nevill A, Neville C, Biddle S, Hardman A. (2002). Accumulating brisk walking for fitness, cardiovascular risk, and psychological health. *Med Sci Sports Exerc,* 34:1468-1474.

Braicu C, Ladomery MR, Chedea VS, Irimie A, Berindan-Neagoe I. (2013). The relationship between the structure and biological actions of green tea catechins. *Food Chem,* 141(3):3282-3289.

Namal Senanayake SPJ. (2013). Green tea extract: Chemistry, antioxidant properties and food applications – A review. *Journal of Functional Foods,* 5(4):1529-1541.

Sae-tan S, Grove KA, Lambert JD. (2011). Weight control and prevention of metabolic syndrome by green tea. *Pharmacol Res,* 64(2):146-54.

Warburton DE, Nicol CW, Bredin SS. (2006). Health benefits of physical activity: the evidence. *CMAJ,* 174: 801–809.

Sedentary Behaviour Research Network. (2012). Letter to the editor: standardized use of the terms ‘sedentary’ and ‘sedentary behaviours’. *Appl Physiol Nutr Metab,* 37: 540–542.

Thivel D, Tremblay A, Genin PM, Panahi S, Rivière D, Duclos M. (2018). Physical Activity, Inactivity, and Sedentary Behaviors: Definitions and Implications in Occupational Health. *Front Public Health,* 6:1-5.

Murtagh EM, Boreham CA, Nevill A, Hare LG, Murphy MH. (2005). The effects of 60 minutes of brisk walking per week, accumulated in two different patterns, on cardiovascular risk. *Prev Med*, 41:92-97.

Tully MA, Cupples ME, Chan WS, McGlade K, Young IS. (2005). Brisk walking, fitness, and cardiovascular risk: a randomized controlled trial in primary care. *Prev Med*, 41:622-628.

Hardman AE, Hudson A, Jones PR, Norgan NG. (1989). Brisk walking and plasma high density lipoprotein cholesterol concentration in previously sedentary women. *BMJ*, 299:1204-1205.

Cramer SR, Nieman DC, Lee JW. (1991). The effects of moderate exercise training on psychological well-being and mood state in women. *J Psychosom Res*, 35: 437-449.

John PF, Ken GG, Rebecca SR, Raynaud AS, Darnell L, Brown AH, Gotto AM. (1993). Response of free-living adults to behavioral treatment of obesity: attrition and compliance to exercise. *Behavior Therapy*, 24: 659-669.

Stensel DJ, Hardman AE, Brooke-Wavell K, Vallance D, Jones PR, Norgan NG, Winder AF. (1993). Brisk walking and serum lipoprotein variables in formerly sedentary men aged 42-59 years. *Clin Sci*, 85: 701-708.

Aldred HE, Hardman AE, Taylor S. (1995). Influence of 12 weeks of training by brisk walking on postprandial lipemia and insulinemia in sedentary middle-aged women. *Metabolism*, 44: 390-397.

Santiago MC, Leon AS, Serfass RC. (1995). Failure of 40 weeks of brisk walking to alter blood lipids in normolipemic women. *Can J Appl Physiol*, 20: 417-428.

Brooke-Wavell K, Jones PR, Hardman AE. (1997). Brisk walking reduces calcaneal bone loss in post-menopausal women. *Clin Sci*, 92: 75-780.

Coleman KJ, Raynor HR, Mueller DM, Cerny FJ, Dorn JM, Epstein LH. (1999). Providing sedentary adults with choices for meeting their walking goals. *Prev Med*, 28: 510-519.

Higashi Y, Sasaki S, Sasaki N, Nakagawa K, Ueda T, Yoshimizu A, Kurisu S, Matsuura H, Kajiyama G, Oshima T. (1999). Daily aerobic exercise improves reactive hyperemia in patients with essential hypertension. *Hypertension*, 33: 591-597.

Brooke-Wavell K, Jones PR, Hardman AE, Tsuritan, Yamada Y. (2001). Commencing, continuing and stopping brisk walking: effects on bone mineral density, quantitative ultrasound of bone and markers of bone metabolism in postmenopausal women. *Osteoporos Int*, 12: 581-587.

Murtagh EM, Boreham CA, Nevill A, Hare LG, Murphy MH. (2005). The effects of 60 minutes of brisk walking per week, accumulated in two different patterns, on cardiovascular risk. *Prev Med*, 41: 92-97.

Tully MA, Cupples ME, Chan WS, McGlade K, Young IS. (2005). Brisk walking, fitness, and cardiovascular risk: a randomized controlled trial in primary care. *Prev Med*, 41: 622-628.

Audette JF, Jin YS, Newcomer R, Stein L, Duncan G, Frontera WR. (2006). Tai Chi versus brisk walking in elderly women. *Age Ageing*, 35: 388-393.

Lee MR, Kim WS. (2006). The effects of brisk walking versus brisk walking plus diet on triglycerides and apolipoprotein B levels in middle-aged overweight/obese women with high triglyceride levels. *Taehan Kanho Hakhoe Chi*, 36: 1352-1358.

Kirkwood L, Aldujaili E, Drummond S. (2007). Effects of advice on dietary intake and/or physical activity on body composition, blood lipids and insulin resistance following a low-fat, sucrose-containing, high-carbohydrate, energy-restricted diet. *Int J Food Sci Nutr*, 58: 383-397.

Tully MA, Cupples ME, Hart ND, McEneny J, McGlade KJ, Chan WS, Young IS. (2007).

Randomised controlled trial of home-based walking programmes at and below current recommended levels of exercise in sedentary adults. *J Epidemiol Community Health,* 61: 778-783.
Coghill N, Cooper AR. (2008). The effect of a home-based walking program on risk factors for coronary heart disease in hypercholesterolaemic men, a randomized controlled trial. *Prev Med,* 46: 545-551.
Pierce GL, Eskurza I, Walker AE, Fay TN, Seals DR. (2011). Sex specific effects of habitual aerobic exercise on brachial artery flow-mediated dilation in middle-aged and older adults. *Clin Sci,* 120: 13-23.
Pagels P, Raustorp A, Archer T, Lidman U, Alricsson M. (2012). Influence of moderate, daily physical activity on body composition and blood lipid profile in Swedish adults. *J Phys Act Health,* 9: 867-874.
Foulds HJ, Bredin SS, Charlesworth SA, Ivey AC, Warburton DER. (2014). Exercise volume and intensity: a dose–response relationship with health benefit. *Eur J Appl Physiol,* 114: 1563-1571.
Kearney TM, Murphy MH, Davison GW, O'Kane MJ, Gallagher AM. (2014). Accumulated brisk walking reduces arterial stiffness in overweight adults: evidence from a randomized control trial. *J Am Soc Hypertens,* 8: 117-126.
Johnson ST, Mundt C, Qiu W, Soprovich A, Wozniak L, Plotnikoff RC, Johnson JA. (2015). Increase in daily steps after an exercise specialist led lifestyle intervention for adults with type 2 diabetes in primary care: a controlled implementation trial. *J Phys Act Health,* 12: 1492-1499.
Hui SS, Xie YJ, Woo J, Kwok TC. (2016). Practicing Tai Chi had lower energy metabolism than walking but similar health benefits in terms of aerobic fitness, resting energy expenditure, body composition and self-perceived physical health. Complement *Ther Med,* 27: 43-50.
Zhang HJ, He J, Pan LL, Ma ZM, Han CK, Chen CS, Chen Z, Han HW, Chen S, Sun Q, Zhang JF, Li ZB, Yang SY, Li XJ, Li XY. (2016). Effects of moderate and vigorous exercise on nonalcoholic fatty liver disease: a randomized clinical trial. *JAMA Intern Med,* 176: 1074-1082.
Blain H, Jaussent A, Picot MC, Maimoun L, Coste O, Masud T, Bousquet J, Bernard PL. (2017). Effect of a 6-month brisk walking program on walking endurance in sedentary and physically deconditioned women aged 60 or older: a randomized trial. *J Nutr Health Aging,* 21: 1183-1189.
Blain H, Jaussent A, Picot MC, Çetinkaya C, Şişman AR, Çimrin D, Doğru Y, Kaya D. (2017) The effect of 8-week different-intensity walking exercises on serum hepcidin, IL-6, and iron metabolism in pre-menopausal women. *Physiol Int,* 104: 52-63.
Herzig KH, Ahola R, Leppäluoto J, Jokelainen J, Jämsä T, Keinänen-Kiukaanniemi S. (2014). Light physical activity determined by a motion sensor decreases insulin resistance, improves lipid homeostasis and reduces visceral fat in high-risk subjects: PreDiabEx study RCT. *Int J Obes,* 38: 1089-1096.
Ho SS, Dhaliwal SS, Hills AP, Pal S. (2012). The effect of 12 weeks of aerobic, resistance or combination exercise training on cardiovascular risk factors in the overweight and obese in a randomized trial. *BMC Public Health,* 12: 1-10.
McNeilly AM, Davison GW, Murphy MH, Nadeem N, Trinick T, Duly E, Novials A, McEneny J. (2011). Effect of a-lipoic acid and exercise training on cardiovascular disease risk in obesity with impaired glucose tolerance. *Lipids in Health and Disease,* 10: 1-9.
Miyamoto T, Zhang X, Ueyama Y, Apisada K, Nakayama M, Suzuki Y, Ozawa T, Mitani A, Shigemune N, Shimatani K, Yui K, Honjoh KI. (2017) Development of novel monoclonal

antibodies directed against catechins for investigation of antibacterial mechanism of catechins. *J Microbiol Methods,* 137:6-13.
Chen XQ, Hu T, Han Y, Huang W, Yuan HB, Zhang YT, Du Y, Jiang YW. (2016). Preventive Effects of Catechins on Cardiovascular Disease. *Molecules,* 21(12).
Stangl V, Dreger H, Stangl K, Lorenz M. (2007). Molecular targets of tea polyphenols in the cardiovascular system. *Cardiovascular Research,* 73(2):348-358.
Pang J, Zhang Z, Zheng TZ, Bassig BA, Mao C, Liu X, Zhu Y, Shi K, Ge J, Yang YJ, Dejia-Huang, Bai M, Peng Y. (2016) Green tea consumption and risk of cardiovascular and ischemic related diseases: A meta-analysis. *Int J Cardiol,* 202:967-974.
Okwuosa IS, Lewsey SC, Adesiyun T, Blumenthal RS, Yancy CW. (2016). Worldwide disparities in cardiovascular disease: Challenges and solutions. *Int J Cardiol,* 202:433-440.
Laslett LJ, Alagona P, Jr., Clark BA, 3rd, Drozda JP, Jr., Saldivar F, Wilson SR, Poe C, Hart M. (2012). The worldwide environment of cardiovascular disease: prevalence, diagnosis, therapy, and policy issues: a report from the American College of Cardiology. *J Am Coll Cardiol,* 60(25 Suppl):S1-49.
Nascimento BR, Brant LC, Moraes DN, Ribeiro AL. (2014). Global health and cardiovascular disease. *Heart,* 100(22):1743-1749.
Tseng ML HC, Chen SC, Huang YC, Lai CH, Liaw YP. (2013). A simple method for increasing levels of high-density lipoprotein cholesterol a pilot study of combination aerobic- and resistance-exercise training. *Int J Sport Nutr Exerc Metab,* 23(3):271-281.
Marjan Rostamian NB. (2017). The Effect of short-term aerobic exercise and green tea consumption on MFO, Fatmax, body composition and lipid profile in sedentary postmenopausal women.International. *Journal of Applied Exercise Physiology,* 6(1):21-31.
Miyazaki R, Kotani K, Ayabe M, Tsuzaki K, Shimada J, Sakane N, Takase H, Ichikawa H, Yonei Y, Ishii K.(2013). Minor effects of green tea catechin supplementation on cardiovascular risk markers in active older people: a randomized controlled trial. *Geriatr Gerontol Int,* 13(3):622-629.
Osami Kajimoto YK, Mitsuharu Yabune, Ayumu Nozawa, Kozo Nagata, Takami Kakuda. (2003). Tea catechins reduce serum cholesterol levels in mild and borderline hypercholesterolemia patients. *J. Clin. Biochem. Nut.,* 33(3):101-111.
Stendell-Hollis NR, Thomson CA, Thompson PA, Bea JW, Cussler EC, Hakim IA. (2010). Green tea improves metabolic biomarkers, not weight or body composition: a pilot study in overweight breast cancer survivors. *J Hum Nutr Diet,* 23(6):590-600.
Gahreman D, Heydari M, Boutcher Y, Freund J, Boutcher S. (2016). The Effect of Green Tea Ingestion and Interval Sprinting Exercise on the Body Composition of Overweight Males: A Randomized Trial. *Nutrients,* 8(8).
Nagao T HT, Tokimitsu I. (2007). A green tea extract high in catechins reduces body fat and cardiovascular risks in humans. *Obesity (Silver Spring),* 15(6):1473-1483.
Belcaro G, Ledda A, Hu S, Cesarone MR, Feragalli B, Dugall M. (2013). Greenselect phytosome for borderline metabolic syndrome. *Evid Based Complement Alternat Med,* 2013:869061.
Zheng XX, Xu YL, Li SH, Liu XX, Hui R, Huang XH. (2011). Green tea intake lowers fasting serum total and LDL cholesterol in adults: a meta-analysis of 14 randomized controlled trials. *Am J Clin Nutr,* 94(2):601-610.
Onakpoya I, Spencer E, Heneghan C, Thompson M. (2014). The effect of green tea on blood

pressure and lipid profile: a systematic review and meta-analysis of randomized clinical trials. *Nutr Metab Cardiovasc Dis,* 24(8):823-836.

Gadkari PV, Balaraman M. (2015). Catechins: Sources, extraction and encapsulation: A review. *Food and Bioproducts Processing,* 93:122-138.

Kim A, Chiu A, Barone MK, Avino D, Wang F, Coleman CI, Phung OJ. (2011). Green tea catechins decrease total and low-density lipoprotein cholesterol: a systematic review and meta-analysis. *J Am Diet Assoc,* 111(11):1720-1729.

Kelley GA KK, Franklin B. (2006). Aerobic exercise and lipids and lipoproteins in patients with cardiovascular disease a meta-analysis of randomized controlled trials. *J Cardiopulm Rehabil,* 26(3).

Zhang B, Kawachi E, Miura S-i, Uehara Y, Matsunaga A, Kuroki M, Saku K. (2013). Therapeutic Approaches to the Regulation of Metabolism of High-Density Lipoprotein. *Circulation Journal,* 77(11):2651-2663.

Durstine JL GP, Davis PG, Ferguson MA, Alderson NL, DuBose KD. (2001). Blood lipid and lipoprotein adaptations to exercise a quantitative analysis. *Sports Med,* 31(15):1033-1062.

Thompson PD, Buchner D, Pina IL, Balady GJ, Williams MA, Marcus BH, Berra K, Blair SN, Costa F, Franklin B et al. (2003). Exercise and physical activity in the prevention and treatment of atherosclerotic cardiovascular disease: a statement from the Council on Clinical Cardiology (Subcommittee on Exercise, Rehabilitation, and Prevention) and the Council on Nutrition, Physical Activity, and Metabolism (Subcommittee on Physical Activity). *Circulation,* 107(24):3109-3116.

GBD 2015 Obesity Collaborators, Afshin A, Forouzanfar MH, Reitsma MB, Sur P, Estep K et al. (2017). Health Effects of Overweight and Obesity in 195 Countries over 25 Years. *N Engl J Med,* 377(1):13-27.

Lee IM, Buchner DM. (2008). The importance of walking to public health. *Med Sci Sports Exerc,* 40:S512–S518.

Wang S, Moustaid-Moussa N, Chen L, Mo H, Shastri A, Su R, Bapat P, Kwun I, Shen CL. (2014). Novel insights of dietary polyphenols and obesity. *J Nutr Biochem,* 25(1):1-18.

Hursel R, Viechtbauer W, Westerterp-Plantenga MS. (2009). The effects of green tea on weight loss and weight maintenance: a meta-analysis. *Int J Obes,* 33(9):956-61.

Baladia E, Basulto J, Manera M, Martínez R, Calbet D. (2014). Effect of green tea or green tea extract consumption on body weight and body composition; systematic review and meta-analysis. *Nutr Hosp,* 29(3):479-90.

Kovacs E, Lejeune M, Nijs I, Westerterp-Plantenga MS. (2004). Effects of green tea on weight maintenance after body-weight loss. *Br J Nutr* 91, 431–437.

Westerterp-Plantenga M, Lejeune M & Kovacs E. (2005). Body weight loss and weight maintenance in relation to habitual caffeine intake and green tea supplementation. *Obes Res.,* 13, 1195–1204.

Brown AL, Lane J, Holyoak C, Nicol B, Mayes AE, Dadd T. (2011). Health effects of green tea catechins in overweight and obese men: a randomised controlled cross-over trial. *Br J Nutr,* 106(12):1880-9.

Rostamian M, Bijeh N. (2017). Effect of short-term aerobic exercise and green tea consumption on MFO, Fat max , body composition and lipid profile in sedentary postmenopausal women.

*International Journal of Applied Exercise Physiology,* 1(6):2322-3537.
Hill AM, Coates AM, Buckley JD, Ross R, Thielecke F, Howe PR. (2007). Can EGCG Reduce Abdominal Fat in Obese Subjects. *J Am Coll Nutr,* 26(4):396S-402S.
Mielgo-Ayuso J, Barrenechea L, Alcorta P, et al. (2014). Effects of dietary supplementation with epigallocatechin-3-gallate on weight loss, energy homeostasis, cardiometabolic risk factors and liver function in obese women: randomised, double-blind, placebo-controlled clinical trial. *Br J Nutr,* 111(7):1263-71.
Dostal AM, Arikawa A, Espejo L, Kurzer MS. (2016). Long-Term Supplementation of Green Tea Extract Does Not Modify Adiposity or Bone Mineral Density in a Randomized Trial of Overweight and Obese Postmenopausal Women. *J Nutr,* 146(2):256-64.
Gahreman D, Heydari M, Boutcher Y, Freund J, Boutcher S. (2016). The Effect of Green Tea Ingestion and Interval Sprinting Exercise on the Body Composition of Overweight Males: A Randomized Trial. *Nutrients,* 8(8): 1-11.
Onakpoya I, Spencer E, Heneghan C, Thompson M. (2014). The effect of green tea on blood pressure and lipid profile: A systematic review and meta-analysis of randomized clinical trials. *Nutr Metab Cardiovasc Dis,* 24(8):823-36.
Kelley GA, Kelley KS, Franklin B. (2006). Aerobic exercise and lipids and lipoproteins in patients with cardiovascular disease: a meta-analysis of randomized controlled trials. *J Cardiopulm Rehabil,* 26:131-139.

# POSTER PRESENTATIONS

浅兰色纸 插页

# P1

# Research on physical improvements of the students in the health care classes with the underwater kinesitherapy

**Feng Linlin**

Tongji University, Shanghai

**Abstract**

**Background & Purpose**

For the people of different ages, some sports on land have been proved to bring various degrees of the athletic injuries, located at different parts of the human body, like the waist, the knee, the shoulder, the ankle and etc. Therefore, in order to reduce such injuries in the sports on land, the underwater kinesitherapy is proposed to be an innovative and effective exercise. This research is aimed at alleviating the pain and suffering of the students in the health care classes, like osteoarticular suffers and those with the obesity, with the help of the insensitive study on the underwater kinesitherapy. On the other hand, the effectiveness the physical state improvement of the health care students is simultaneously verified.

**Methods**

Firstly, through the literature, this study the theory of underwater kinesitherapy, and interviews more than ten experts and scholars of underwater kinesitherapy in Shanghai universities, grasps the basic situation of underwater kinesitherapy and the adaptability of health class students to it. According to the physical characteristics of students, the basic movements of underwater kinesitherapy are selected and designed. Secondly, professional swimmers are invited to demonstrate the action of underwater kinesitherapy, and the whole process of photography and photography. Finally, 82 health care students from Tongji University were selected as subjects for 14 weeks of underwater kinesitherapy intervention. We performed physical fitness tests on Weeks 1 and 14, respectively, and compared the test results.

**Results**

The results of the study showed that students who passed the 14-week teaching experiment health class students had significant effects on body weight, vital capacity, and sitting body flexion. Among them, the health index students' weight test results were 52.5±3.8，the vital capacity was 2691.4±275.5, and the sitting body flexion was 12.7±3.0. The impact on height, BMI, WHR and other indicators is not obvious.

**Conclusion**

Underwater kinesitherapy can effectively increase students' interest in participating in physical exercise. Health class students can effectively enhance their ventilator and cardiovascular functions through underwater kinesitherapy, and improve the flexibility. It has a significant impact on the optimization of body weight health indicators such as body weight, waist circumference, resting heart rate, lung capacity and sitting position flexion.

**Key Words**: Underwater kinesitherapy, University health class students, Physical test

# P2

# Construction Path for Training of Postgraduate in Physical Education Scheme Based on the Improvement of Comprehensive Practical Ability

**Qin Lili[1], He Yiwei[1]**

[1]Sports and Health Research Center, Department of Physical Education, Tongji University , Siping Road 1239, Shanghai 200092, P. R. China

**Abstract**

**Background & Purpose**

Against the background of educational reform, the postgraduate education also faced with the problem of insufficient comprehensive practical ability. In this study, we focus on constructing a Comprehensive Practice System with sports discipline characteristics. Through establishing the practice system of intra-school and extra-curricular interaction and integration promote the integration of practice platform into the graduate curriculum and graduate education links.

**Methods**

Exploring literature, interview and discussion will be used for searching theoretical basis and obtaining theoretical support. After sorting out the information obtained from the survey, a logical analysis will be made, combined with the current policies of Tongji University for postgraduate education.

**Results & Conclusions**

According to the results of the logical analysis both from literature and expert interviews, we suggest that comprehensive practice system should satisfy following conditions. Firstly, refine the graduate student training scheme should be refined and a dynamic adjustment mechanism of training programs should establish to meet social needs. In the training scheme, the quality standards and supervision system should be clear and definite. Secondly, it should strengthen the practical value of dissertation. There should be new ideas, new methods and new progress to solve the practical problems of sports science. Thirdly, the college should provide the increasing opportunities for international academic exchanges. At last, in the education teaching process, the practical activities should be enriched. Through strengthening the course setting of the practice program, the practical ability of the graduate students can be improved, and the first-hand information of the sports science can be understood.

**Key Words:** educational reform, Comprehensive Practical Ability, physical education, postgraduate education

# P3

# Research on the Influence of Multiple Physical Education Evaluation on Middle School Students' Sports Self-learning Ability

**Xia Jing**[1)] **HAN Junsheng** [1)]

Southeast University, China

**Abstract**

**Backgrounds & Purpose**

Nowadays, physical education evaluation becomes an important content of school physical education, the reform of multiple physical education evaluation has had a a strong impact on traditional physical education evaluation. With the increasing awareness of National Fitness, people have realized that the awareness of lifelong sports should be cultivated from an early age. The midddle school stage is an important stage for the comprehensive development of students' physical and mental health. The cognitive development of middle school students is gradually maturing and the individual consciousness is getting stronger and stronger. Therefore, it is particularly important to establish students' correct sports awareness in the middle school and to cultivate students' participation in sports. This paper studies the influence of multiple physical education evaluation on middle school students' self-learning ability of sports, in order to provide references for the reform of physical education evaluation in China.

**Methods**

This paper used the method of literature, expert consultation, experimental research and questionnaire. In this study, students from two classes in a middle school in Nanjing were selected as experimental subjects, which were divided into experimental group and control group, using multiple physical education evaluation method and traditional physical education evaluation menthod respectively. The questionnaire of middle school students' sports self-learning ability included four dimensions: learning strategies, learning motivation, self-management and learning environment.

**Results**

After 16 weeks of teaching experiments, comparing the results before and after the experiment, no significant differences regarding the sports self-learning ability of the control group were found before and after the experiment. However, the students' self-learning ability in the experimental group before and after the experiment had significant differences in all four dimensions, $P<0.01$. (2) Comparing the boys and girls in the control group, the learning motivation and self-management scores did not show significant differences before and after the experiment, but the learning strategies and learning environment scores had significant differences. Moreover, comparing the boys and girls in the experimental group, all the four dimensions of students' sports self-learning ability showed significant differences before and after the experiment, $p<0.01$.

**Conclusion**

Multiple physical education evaluation has a positive impact on middle school students' sports self-learning ability, while traditional physical education evaluation has no significant influence on it. Multiple physical education evaluation method is superior to traditional physical education evaluation method, and it should be applied to practical teaching as soon as possible. However, middle school boys and girls present different gender characteristics and differences. In general, boys' sports self-learning ability is superior to that of girls, and they are more motivated to participate in sports. In the process of teaching, individualized teaching is required for different gender characteristics.

**Key Words**: Multiple physical education evaluation, Middle school students, Sports self-learning ability

# P4

# Research on the Way of Cultivating Students' Sports Art Literacy in Colleges and Universities: Taking the Construction of Sports Dance Course as an Example

**Liu Jun** [1)] **Wang Xiao Ling** [2)]

[1)] Dalian University of Technology, China [2)] Dalian University of Technology, China

**Abstract**

**Backgrounds & Purpose**

In order to explore the cultivation methods of College Students' sports art literacy, realize the "five education" of morality, intelligence, sports and beauty, speed up the construction of first-class undergraduate education, and comprehensively improve the ability of talent cultivation. This paper clarifies the connotation of artistic literacy, analyses the current situation of aesthetic education in Colleges and universities, and puts forward the problems existing in traditional education. This paper introduces the important means of promoting aesthetic education - Sports dance, and introduces the origin and core value of sports dance. It is pointed out that attention should be paid to teaching methods, environmental facilities, teachers' level and teacher-student relationship in sports dance teaching. This paper puts forward some opinions on the construction of the talent training program for the all-round development of morality, intelligence, physical fitness, beauty and labor.

**Methods**

Case Analysis

**Results**

Art literacy should cover at least the following aspects:(1) Wide areas of knowledge (2) Excellent sports skills and artistic skills (3) Have a higher ideological realm

**Conclusion**

In the specific implementation process of sports dance teaching mode, there are the following points of attention:(1) Diversified teaching methods, constantly seeking innovative points(2) Improving the external environment and infrastructure (3) Improving the Teachers' Level

**Key Words**: Sports Dance; Sports Aesthetics; Artistic Accomplishment

# P5

# Research on sports injury and risk prevention and control of college students

**YAN Zhenlong[1)] HE Changke[1)] SU Yang[1)]**

1) Xi'an Jiaotong University，China

**Abstract**

**Backgrounds & Purpose**

As the objects and contents of physical education are constantly broadened, the types of sports injury accidents become more and more complex and difficult to deal with, this article through to the understanding of the relevant provisions, case study, questionnaire survey and interviews, analyzes the classification and causes of sports injury accidents of college students, On this basis, the measures and methods to prevent sports injury are put forward.

**Methods**

In this paper, students from 10 universities in 10 regions, including Beijing, Shanghai, Guangdong and Xi 'an, as well as experts and managers engaged in physical education, were selected as respondents to conduct a questionnaire survey. A total of 1000 questionnaires were sent out to students, 960 of which were collected, with an effective recovery rate of 93%. A total of 50 expert questionnaires were issued, 47 of which were valid, with a recovery rate of 94%. Face to face or telephone interview with experts on the problems related to risk prevention and control of college sports. SPSS 20 was used in this paper to conduct statistics, cross analysis and Pearson test on the collected data, and to analyze the test results.

**Results**

Nearly 40 percent of college students had sports injury accidents while in school. Boys are more likely than girls to have multiple sports injury accidents. There was significant difference between male and female students who suffered sports injury three times or more. The probability of sports injury accidents is the highest among students' extracurricular sports activities, and the degree of sports injury is different in different forms of sports activities. The main causes of students' injuries are lack of self-protection consciousness, insufficient preparation activities, irregular technical movements and reasonable normal collisions in fierce sports competition. Chinese universities can basically carry out sports risk prevention and control publicity and education work based on the actual situation of the school. Most school experts are in favor of setting up a sports risk insurance program in schools.

**Conclusions and Suggestions**

Conclusion: college students in China have a higher incidence of sports injury accidents. More male students have three or more sports injury accidents than female students. In different forms of sports, the probability of sports injury accidents is significantly different. College students have the highest probability of sports injury accidents in their extracurricular sports activities. Personal factors are the main causes of sports injury accidents, including not paying attention to the preparation activities in sports and inadequate preparation activities, not enough grasp of the self-protection methods of sports injury, etc. The establishment of risk prevention and control mechanism for college sports in China is not perfect, but the management of venues and equipment is standardized and the education of sports safety knowledge is carried out well. Most schools hold favorable opinions on the establishment of special insurance for school sports. 2. Suggestions: further improve the management of extracurricular sports activities in colleges and universities, and strengthen the supervision of students' extracurricular sports activities; The relevant schools shall improve the handling plan of sports injury accidents according to the actual situation of the school; The ministry of education should organizes expert group to inspect to relevant college; The pilot work of special sports injury insurance should be carried out in Beijing, Shanghai, Guangdong and other universities with better economic condition.

**Key Words:** college students, physical education, sports injuries, risk prevention and control, safety training

# P6

# Research on the current situation of sports injury accidents of female college students in private colleges in China

**GE Jinyan[1)] YAN Zhenlong[1)] WANG Yunbing[1)]**

1) Xi'an Jiaotong University，China

**Abstract**

**Backgrounds & Purpose**

This paper takes female college students in private colleges in ten provinces and cities (municipalities directly under the central government) as research objects, and tries to investigate and analyze the basic situation and causes of sports injuries of female college students in private colleges in China. To understand the current situation of female college students' sports injury accidents in private colleges in China, to analyze the causes of sports injury accidents, and to put forward preventive and management measures. It provides some theoretical basis for reducing the occurrence of sports injury accidents of female college students.

**Methods**

This paper takes the current situation of sports injury accidents of female college students in 10 private colleges and universities in 10 regions such as Beijing, Shanghai and guangdong as the research object. Literature, questionnaire survey, data statistics and other methods has been used. SPSS20 Chinese version and WPS form application software were used for data statistics. Frequency analysis in descriptive analysis was used for statistical processing of the collected data.

**Results**

1.The proportion of sports injury accidents of female college students in private colleges in China is 34.1%. 2. Sports activities organized by schools (sports meeting or sports competition) are the most important form of sports organization that leads to sports injury accidents of female college students in private colleges in China. The form of sports organization with the lowest incidence of sports injury accidents is physical education. 3. There are many reasons for female college students' sports injury accidents, but the main reasons are due to their poor awareness of self-protection and inadequate preparation activities in sports.

**Conclusions and Suggestions**

Conclusion: 1. The survey results of the current situation of sports injury accidents of female college students in private colleges in China show that 34.1% of female college students have sports injury accidents at school. 2. Sports competitions, exercises and games organized by schools have the highest probability of sports injury accidents. 3. The reasons for female college students' sports injury accidents in private colleges include school factors, teachers factors, students' own factors and venue and equipment factors, among which students' own factors are the main causes of female college students' sports injury accidents.

Suggestion:1. Strengthen the management of sports activities organized by the school, such as competition organization, referee training, site maintenance, etc. 2. Strengthen school sports safety publicity. Strengthen the frequency of safety publicity and education to improve the awareness of risk prevention and control of female college students. 3. Focus on female college students' physical structure and physiological characteristics, to strengthen the relevant aspects of physical education knowledge and methods.

**Key Words：** Private colleges, female college students, sports injury accidents

# P7

# Research on the current situation of physical exercise and sports injury accidents of female college students in Chinese “Double First-Class” Universities

**YAN Zhenlong[1)] HE Changke[1)] GE Jinyan[1)]**

1) Xi'an Jiaotong University，China

**Abstract**

**Backgrounds & Purpose**

Based on the investigation and study of female students' physical exercise and sports injury accidents in Chinese“ Double First-Class” universities, this paper probes into the problems of female students' physical education in Chinese “Double First-Class” universities, analyzes the causes of sports injury accidents, and provides some Suggestions for the physical education in Chinese colleges and universities.

**Methods**

This paper takes the current situation of female college students' physical exercise and sports injury accidents as the research object. A questionnaire survey was conducted among 500 female college students from 10 "double first-class universities" in Beijing, Shanghai, Guangdong, xi 'an and other 10 regions. 487 valid questionnaires were obtained, with an effective recovery rate of 97.4%. SPSS20 Chinese version and WPS form application software were used for data statistics. Frequency analysis in descriptive analysis was used for statistical processing of the collected data.

**Results**

Ninety percent of girls can participate in physical exercise more than once a week, but there is still a big gap between the national standard of exercising for one hour a day. Female college students had a high proportion of sports injuries, with 168 students having sports injury accidents at school, accounting for 34.5% of the respondents. 52.5% of female college students still participate in sports that they know are dangerous. Female college students are most likely to have sports injury accidents in the form of organization is personal sports activities; Lack of self-protection consciousness, fierce competition and reasonable collision in competition and inadequate preparation are the main causes of sports injuries. Nearly 96% of female college students agree or basically agree to set up special sports injury insurance or special fund.

**Conclusions and Suggestions**

1. Conclusion: female college students in Chinese top two universities are in good physical exercise condition, and sports injury accidents have a great impact on female college students' physical exercise. Female college students have strong adventure spirit and challenge when they participate in sports activities. Female college students are most likely to have sports injury accidents in the form of organization is personal sports activities; Chinese first-class college girls to buy personal accident injury insurance better. 2. Suggestions: strengthen the organization of female college students' physical exercise and improve their enthusiasm to participate in physical exercise; To strengthen the teaching of female college students' sports knowledge, rules and self-protection methods of sports injury; Special sports injury funds will be set up in the north, Shanghai and Guangzhou areas with better conditions.

**Key Words:** double first-class university, Female college students, Physical exercise, Sports injury accident

# P8

# Comparative Study on Sports Injury Accidents of Female College Students in Different Types of Universities in China

**WANG Yunbing[1]，YAN Zhenlong[1]，SU Yang[1]**

1) Xi'an Jiaotong University，China

**Abstract**

**Backgrounds & Purpose**

This paper attempts to compare the current situation of sports injury accidents between female college students in double first-class universities and ordinary universities, and to discuss the main causes and existing problems of sports injury between female college students in double first-class universities and ordinary universities, so as to provide some Suggestions for the physical education of female college students in China.

**Methods**

This paper takes the current situation of female college students' sports injury accidents as the research object. Female college students from top universities and colleges in 10 provinces including Beijing, Shanghai, Guangdong, Shaanxi, Henan, Hubei, Zhejiang, Xinjiang, Shandong and Sichuan were investigated by questionnaire. 1050 questionnaires were issued to students, and 1029 were recovered, with an effective recovery rate of 98.1%. Stata13 and WPS application software were used for data statistics, and statistical processing was carried out for the collected data results, z-test was carried out for the data results, and influencing factor were analyzed.

**Results**

Female college students have a higher participation rate in physical exercise, and the frequency of weekly physical exercise participation by female students in ordinary colleges and universities is higher than that in China's double first-class universities. There is no statistically significant difference between the two. The percentage of female college students who had sports injury accidents was 33.6% higher than 23.9% of female college students in normal colleges and universities ($P < 0.001$). The percentage of female college students who had three or more sports injury accidents was 6.1%, which was higher than that of female college students who had three or more sports injury accidents in ordinary colleges and universities ($P < 0.05$). ; In terms of fully mastering the methods of self-protection, the percentage of female college students in double first-class universities was 5.3%, which was lower than that of 11.1% in ordinary universities. There was a very significant difference between them ($P < 0.001$). The percentage of female college students in double first-class universities who master the emergency treatment method of sports injury is 61.0%, while that in ordinary universities is 65.0%, the difference between the two has statistical significance ($P < 0.05$).

**Conclusions and Suggestions**

1. Conclusion: female college students in China have a high participation rate in physical exercise; The rate of sports injury accidents of female college students in double first-class universities is higher than that of female college students in ordinary universities. Female college students are not serious enough in preparing for sports activities; Lack of self-protection consciousness becomes one of the important factors in sports injury accidents. More than one third of female college students did not master the emergency treatment of sports injuries, and nearly one third of female college students did not buy personal accident insurance. 2. Suggestions: organize students to carry out sports activities in and out of school according to local and school conditions, and cultivate female college students to participate in physical exercise every day; In physical education, teachers should strengthen the teaching of female college students' sports safety knowledge, such as sports rules, sports injury prevention and self-protection methods. We will improve and standardize the risk prevention mechanism of campus sports and encourage female college students to actively buy personal accident insurance.

**Key Words:** double-class colleges and universities, general colleges, female college students, sports injury accidents

P9

# Recognition of Amusement and Worries about Chinese Female University Students' Physical Activity

**Hejin WANG** (Shenyang Normal University, China)

**Sunhee KIM** (Mokpo University, Korea)

**Abstract**

**Purpose:** Recently, the scope of research on physical education in China has been gradually expanding and many research studies have started to come out. However, there are few research studies on the physical education of female students. The purpose of this study is to present basic data necessary for activating physical activity of female university students by analyzing the amusement and worries about Chinese athletes' physical activity. The research problems are set as follows. First, what is the amusement of Chinese female university students' physical activity? Second, what are the worries of Chinese female university students' physical activity? Third, what are the measures to activate Chinese female university students' physical activity? **Methods:** The research subjects has been sampled as a population of students from 62 universities in L province of China and 1,000 female students of 3 Universities(N,Y,E University) through convenience sampling method. The results obtained through the above procedure are as follows. **Conclusion:** First, there is a significant difference in amusement of physical activities depending on background variable of Chinese female university students. According to the grade, the students in the 4th grade and the 3rd grade had the highest fun and the students who liked the exercise showed the highest score. And then,Second grade showed the highest level of anxiety according to grade, and students who thought that exercise function was normal were high. Thirdly, it is necessary to grasp the factor that the female university students perceive as the amusement in the physical activity as a way to activate the physical activity of the Chinese female university students. Based on this, it is necessary to make the female student friendly class environment to actively participate in the physical activity. It should be done. Next, we need to develop and apply interesting and interesting teaching strategies for female university students. For this purpose, it is necessary to establish an appropriate sporting event for female university students, to create an atmosphere in which female students can participate actively in physical activities through small group activities and cooperative learning, and to keep the teaching materials and sports facilities in a pleasant state. Finally, it is necessary to make public relations activities and active efforts on the field to change perception of female university students. To this end, various efforts and training should be activated to change the perception of teachers and leaders. In the future, it will be possible to activate and improve the quality of physical education for the female students by deep understanding of the physical education , In addition, national and societal policy support for female students' athletic activities is needed and follow-up studies should be actively pursued.

**Key Words:** Female University Student, Amusement, Worries

# P10

# The structural relationships among coach trust, athlete satisfaction, knowledge sharing, and innovative behavior toward college student-athletes

**Jaehyun HA**

Keimyung University, Korea

**Abstract**

**Purpose:** The purpose of this study was to examine the structural relationships among coach trust, athlete satisfaction, knowledge sharing, and innovative behavior toward college student-athletes. **Methods:** In order to achieve the purpose, total 300 questionnaires were distributed to college student-athletes with use of a convenient sampling method. Among them, sixteen questionnaires were excluded because they were not applicable. There were 284 usable questionnaires. Data were analyzed with frequency analysis, correlation analysis, reliability analysis, confirmatory factor analysis, and structural equation modeling with use of SPSS Statistics 25.0 and AMOS 25.0. **Results:** The results of this study indicated that coach trust positively and significantly related to athlete satisfaction and knowledge sharing. However, coach trust didn't have an influence on innovative behavior toward college student-athletes. Athlete satisfaction had a positive and direct influence on innovative behavior toward college student-athletes. Knowledge sharing positively contributed to innovative behavior toward college student-athletes. **Conclusion:** The findings of the study provided the usable information and knowledge regarding coach trust's role in the college sports teams to effectively manage college student-athletes. In addition, the findings contributed to a provision of the practical application for the managers of college sports teams.

**Key Words:** Coach Trust, Athlete Satisfaction, Knowledge Sharing, Innovative Behavior

# P11

# Research on the Effect of Mixed Group Teaching Method on College Students' Basketball Skills

**CHEN Gang**

Shanghai Jiao Tong University

**Abstract**

**Background and Purpose**

Basketball is a favorite sport for teenagers. According to the survey, the vast majority of students say that basketball teaching is the main position for college students to master basketball skills. In this study, the mixed grouping teaching method is used to teach basketball courses for students.

**Methods**

With the group teaching method as the main body, combined with the stratified teaching method, the teaching objects are mixed and grouped according to physical quality and special ability, so that the students of each group member have three levels: high, middle and low. Through group practice, group counseling, mutual counseling and mutual promotion among the students in the group. After a semester of 8 weeks of teaching experiment, the physical quality and basketball skills of students were compared and analyzed.

**Results**

The Mastery of Basketball Skills of Grade One Students before and after the Experiment (Table 1)

| Test items | Experiment1 | | compare1 | |
|---|---|---|---|---|
| | Pre-experiment | After exp | Pre-experiment | After exp |
| Dribble（sec.） | 10.4（2.52） | 18.5（1.87） | 11（3.17） | 18.8（1.79） |
| close-in shot（Num.） | 9.6（1.56） | 19.5（0.87）# | 9.6（2.04） | 19.6（0.60）# |

The Mastery of Basketball Skills of Second Grade Students before and after the Experiment (Table 2)

| Test items | Experiment 2 | | compare 2 | |
|---|---|---|---|---|
| | Pre-experiment | After exp | Pre-experiment | After exp |
| lay up（Num.） | 13.1（3.73） | 18（2.92） | 13.2（2.74） | 17.9（3.10） |
| perimeter shot（Num.） | 8.8（4.81） | 17.3（2.86）# | 8.9（4.7） | 16.1（3.12）# |

Note: Data are expressed as mean (standard deviation). Before and after the experiment, * stands for $P < 0.05$, after the experiment, stands for $P < 0.01$.

**Conclusion**

1. Mixed grouping teaching method can effectively improve students' basketball skills.

2. Mixed grouping teaching method has obvious effect on basketball special skills which are difficult to master.

**Key Words**: College student, Mixed Group Teaching Method, Basketball Skills

# P12

# Dance education for children and adolescents: the organic combination of physical education and art education

**ZHANG Su**[1)]

[1)] Tongji University, China

**Abstract**

**Backgrounds & Purpose**

Recently, *the Suggestion of Profoundly Reforming the Educational System and Comprehensively Improving the Quality of Compulsory Education* is released by Chinese government and National Ministry of Education. The Suggestion advocates strengthening physical exercise by letting each student master one or two sports skills, and enhancing the level of art and aesthetical education by means of helping each student learn 1 or 2 artistic skills. It emphasizes the significance of physical education and art education in educational system reform, and has aroused widespread attention and discussion in society.

It has almost reached consensus that dance is an indispensable part of art education for children and adolescents. However, the physical-education attribute of dance have not been widely recognized. A large number of research findings of sports science have not been applied to dance training. Dance training sometimes ignores physiological regulation when pursuing aesthetics and performing effects, which are prone to body injuries. The idea of dualism between physical education and art education has always existed in public thinking. Those are still obstacles of the development of dance education for children and adolescents.

The purpose of this study is to confirm the physical-education attribute of dance, to suggest applying the research findings of sports science into dance training, and to relieve the idea of dualism between physical and art education in society, school teachers and parents' minds. The study also intends to introduce the idea that dance education for children and adolescents is an organic combination of physical and art education, which can help students improve their overall quality and promote comprehensive development efficiently.

**Methods**

The on-the-spot investigation method is used to observe the contents and characteristics of dance training course for children and adolescents; the questionnaire survey is used to investigate the parents' understanding of the dance education and the influence of dance education course on children and adolescents; the interview method is used to communicate with dancing experts and dance teachers to know the development situation of dance education presently in China; the experimental method is used to measure the physical activity intensity and effects of the dance course by measuring respiratory rate, heart rate and physical fitness test results of children before and after participating in the dance course (in progress) .

**Results**

The intensity of normal dance training reaches the standard of moderate-intensity physical activity, which really helps to improve children and adolescents' physical fitness. The contents of

the dance course can effectively improve the strength, speed, endurance, flexibility, balance, muscle control ability, etc. of the participants. Non-standard dance training cause body injuries, and the incidence rate is rather high. Dance will attract girls and their parents as an art education course mostly, while girls can get the confidence and interest in participating in other sports activities through dance training unexpectedly. It is admitted by parents and teachers that dance education contributes to children and adolescents' personality development and aesthetic cultivation.

**Conclusion**

Dance education for children and adolescents has the attribute of physical education; it is the organic combination of physical education and art education. It is imperative to apply the research findings of sports science and art education into dance education, so that to improve the professional level of instructors. The development of dance education can help to relieve and even eliminate the idea of dualism between physical and art education in public thinking, which can promote both of them coordinately and synergistically. Participating in dance education helps to eliminate some art-loving girls' resistance to sports, and thus contributes to achieve the goal of educational system reform in the end.

**Key Words**: Dance Education, Physical Education, Art Education, Educational system reform

# P13

# Application of long-term management mechanism of high-level sports teams in colleges and universities--Take Shanghai Jiao Tong University as an example

**Yun GAO**

Shanghai Jiao Tong University

**Abstract**

**Backgrounds & Purpose**

The State Education Commission issued a notice to recruit high-level athletes, and some institutions of higher learning began to recruit outstanding athletes on a pilot basis in April 1986; Since 1987, the number of colleges and universities that recruit elite athletes has grown from 51 to 275. The main purpose of building high-level sports teams in colleges and universities is to lead the development of after-school training and competition in school physical education, to train high-level sports talents for the country with all-round development, to complete the tasks of the World University Games and major international and domestic sports competitions, and to fully display the spiritual outlook of our college students. Colleges and universities have made some achievements in the training of competitive sports talents, which proves that it is feasible for colleges and universities to run high-level sports teams and train athletes. There are also a couple of problems:

(1) The source of students embarrassed, the lack of reserve talent

(2) The contradiction of academic training is becoming more and more intense

(3) Uneven distribution of events

(4) No professional supporting team to assist

This study focuses on problem research, compares the high-level sports team management and development system of two public universities in China and the United States (Shanghai Jiao Tong University and Arizona State University), further inquires about the root causes of many problems in the development of high-level sports teams in colleges and universities, and how to cultivate student athletes with high athletic ability by their own advantages. It is necessary to think about further deepening the reform of competitive sports to solve the contradiction between learning and training and promote the healthy and sustainable development of high-level sports teams in colleges and universities.

**Methods**

Documentation Act: The content of the subject research is collected and analyzed in advance. First of all, through the network to consult the domestic part of the more representative university's outstanding athletes class situation: mainly understand some of the institutions that set up high-level sports team teaching management, enrollment policy, training system, competition system, admission of special students cultural achievements and other relevant policies and

documents to collect.

Survey Analysis: The interview is divided into two parts, one part is faced with the relevant leadership, about the department of physical education and related schools and college teaching leadership, the other part is facing students; Comments and opinions on teaching management, training, etc.

Case Study: Take Shanghai Jiao Tong University and Arizona State University as examples to conduct case studies.

**Results**

The development of high-level sports team in our country's colleges and universities has entered a stage of bottleneck development, in order to make a breakthrough, enrollment channels, training methods, etc. need to be changed, the need for multi-modal, multi-channel selection, make full use of the "university primary and secondary schools" one-stop physical education combined route to retain excellent students, on the other hand, can also joint professional teams to train excellent students ;It is helpful to establish the status of student-athlete training in the strategy of sports power, and has a positive significance in exploring the training system of competitive sports talents and promoting the integration of teaching bodies.

The road of competitive sports in China's colleges and universities has just begun, and compared with the high-level sports teams in American colleges and universities, neither the NCAA's mature management system nor the personalized training program of colleges and universities is perfect enough.

While paying attention to competitive achievements, we attach importance to the quality and effect of teaching, according to the development of students, employment needs, the formulation of learning and training plans, tailor-made programs for further education and employment. Allow high-level athletes to benefit from professional career planning and management services in colleges and universities. To build high-level sports teams in colleges and universities well and build results, to train more excellent sports talents with higher cultural quality and sports level for our country, and to explore a new way for the all-round development of sports work in our country.

**Key Words:** long-term management mechanism, high-level sports teams in colleges and universities, Shanghai Jiao Tong University

# P14

# Discussion on the Current Situation of CUBA League under the Background of "Combination of Sports and Education"

**Chen zhefu[1], Yang ningning[1], Fan yu[2]**

1.Physical Education Department of Dalian University of Technology, Dalian 116024,Liaoning China

2. Dalian university of technology panjin campus school of humanities and law, Panjin 124200,Liaoning China

**Abstract:** The development of CUBA (Chinese College Basketball League) largely determines the development of college sports in China and the strength of Chinese basketball reserve force. By using the method of documentation and logical analysis, this paper defines the connotation of the combination of sports and education in China. It is concluded that CUBA has achieved remarkable results in recent years：Excellent results of league matches make universities well-known, competition reform promotes the promotion of campus basketball, and the positive interaction with CBA league matches under the background of the combination of sports and education. However, there are still some problems in the process of development, mainly as follows: Special enrollment of athletes may lead to unfair education, unbalanced development of League matches, and prominent contradictions between learning and training in athletes' training. This paper holds that we should gradually improve the system of enrollment, promote the diversion of talents by using policies, and vigorously solve the contradiction between learning and training. So as to promote the development of CUBA League and Chinese basketball reserve talents.

**Key Words:** combination of sports and education； CUBA； learning and training contradictions；Chinese basketball

# P15

# Implementation Approaches of Sports Promoting Urban Regeneration and Corresponding Influence Mechanism

**Tianfeng Lu [1)] Xiaoyu Zhang [1)]**

[1)] Department of Physical Education, Tongji University, Shanghai, 200092, P.R. China

**Abstract**

**Backgrounds & Purpose**

The General Plan for Shanghai (2017-2035) has identified a comprehensive objective of constructing a remarkable global city with worldwide influence. This strategic target has affected practical assumptions of various target modules. Shanghai has therefore gradually defined the goal of building a world famous sports city to promote its global competitiveness, which can also be regarded as a solution to achieving its regeneration in a sustainable way.

Based on literature materials and practical experience, this study is expected to conduct an overall review about four main implementation approaches of sports promoting urban regeneration and discuss their corresponding influence mechanism; so as to provide a solid theoretical basis to illustrate the comprehensive role of sports in urban regeneration.

**Methods**

Literature review method, including cases analysis, is the primary approach used in the accumulation of scholars' standpoints and background information. This article also used the mathematical and statistics method as an assistant tool..

**Results**

There are four principle implementation approaches of sports in the process of promoting urban regeneration, which all demonstrate sustainable features and are likely to generate profound influence.

Large sports buildings along with their facilities play a dominant part in urban regeneration. Scholars have come up with a theoretical structure to analyze outcomes and impacts associated with them.

Sports events and professional sports clubs are representatives of a city image, and they are both under the expectation to bring about huge amount of economic value and social benefits.

Sports social organizations (including community participation behaviors) provide a more diversified way to promote the cultivation of urban identity so as to build a more livable society..

**Conclusion**

While urban regeneration, which aims at realizing an overall renaissance in society, has developed into a multi-objective complex system; Sports, one of indications of urban soft power, should play a more significant role in the process of sustainable urban regeneration.

**Key Words**: sports; urban regeneration; sports city; influence mechanism

# P16

# Research on the Stratified Teaching of Football Course to Improve the Physical Fitness and Sports Skills of College Students

**Zhanwei [1], Jian-hua Wu [2],**

1.Tongji University, Shanghai, 200092, 2. Shihezi University, xinjiang, 832000

**Abstract**

Traditional college football teaching, after more than ten years of teaching practice, has not really improved the downward trend of College Students' physical fitness, football skills have not improved, which is the biggest heart disease of school physical education reform. Through the reform experiment of football course in International Football College of Tongji University and the teaching practice of two academic years and four semesters, this paper carries out data analysis to guide football teaching and improve college students' physical fitness and sports skills.

**Preface**

The same problem exists with the emphasis on football course in Tongji University. Firstly, the teaching syllabus of football course has been used for 20 years and has not changed greatly. Repetition of teaching content and mode has a certain gap with the healthy development, interest cultivation and lifelong physical education of college students in the new era. Secondly, the specific teaching method of football lesson still stays in the stage of teachers' teaching and students' learning. The interaction between teachers and students is not enough. The students' physical strength and physical fitness are not obviously improved. Thirdly, the level of football of students in football elective courses is uneven, which is not conducive to teaching practice. Students with good football skills can not get exercise and are not interested. Students with poor football skills do not actively participate in activities, polarization, seriously hampering the quality of College Public Physical Education teaching, students' interest, teachers' teaching and so on.

The purpose of this study is to reform the traditional football teaching. At the beginning of the course selection, students will arrange football classes, such as football basic classes, football improvement classes, football advanced classes. Students choose their own classes according to their actual situation. Second step, in the first teaching class, the teacher determines the actual level of students, through games, football technical assessment and observation and other means, the second stratification, football technical and tactical good students recommend high-level classes, poor technical and tactical students suggest that he go to football basic classes.

**Methods**

Through the reform experiment of football course in International Football College of Tongji University, the teaching practice of two academic years and four semesters was compared. Data analysis was carried out to guide football teaching and improve college students' physical fitness and sports skills.

**Results**

**1** The stratified teaching of college football course, which actively adjusts the distribution and state of students' class level, increases the selectivity of students' class, improves their initiative, physical resistance, physical quality and football skills, is conducive to the quality and effect of class.

**2** The stratified teaching of college football course, the active adjustment of students' class level distribution and state, the improvement of teachers' teaching according to their aptitude, the improvement of active service consciousness, the improvement of teaching methods and the increase of interaction with students are conducive to the improvement of College Students' physique and sports skills.

**Key Words:** College Football, Layered Teaching, College Students' Physical and Sports Skills

# P17

# A comparative study on life-style and health between Chinese and Japanese Students

**Yudai MIYAKE[1)] , Akira SUZUKI[1)] , Susumu TAKAHASHI[1)] , Satoshi HANEDA[1)], Haruka FUJISHIMA[2)],Tatsuya TAMURA[3)],Shiho HIRAKU[4)], Xiaojian YIN[5)]**

[1)] Daito Bunka University, [2)]Japan Institute of Sports Sciences,[3)] Aoyama Gakuin University, [4)]Tokyo Women's Christian University, [5)]Shanghai Institute of Technology

**Abstract**

**Background & Purpose**

The purpose of this study is to clarify the relationship between life habits and healthiness by comparing DIHAL2 (Diagnostic Inventory of Health and Life Habits) test results between Chinese and Japanese university students, and to obtain basic data for a healthier university life.

**Method**

This survey was conducted from June through July 2017 using DIHAL2 and obtained 300 respondents from university students in Shanghai and 176 from students in Tokyo and Saitama. DIHAL 2 stands for Diagnostic Inventory of Health and Life Habits and is composed of 4 scale based profiles and 12 factor based profiles. Each question is scored out of 5 points (irrelevant:1, mostly irrelevant:2, cannot say either:3, mostly relevant:4, very relevant:5) and the total score is used for evaluation. For the data analysis of the survey results, Chi-squared test and Student's T test, One-way analysis of variance and Tukey HSD were conducted using SPSS20.

**Results**

The average score for lifestyle habits among Shanghai students was higher than the average of Japanese students. Overall evaluation suggested that female freshmen scored low in "dietary balance", "regular meal schedule", "regular sleep schedule" and "quality of sleep" and implied that guidance is necessary in these areas. The average score for healthiness among Shanghai students was 42.82 (out of 60 points; 71.3% score ratio) and within Score 3 (39-44) which stands for. The average score for lifestyle habits was 125.79 (out of 175 points; 71.8% score ratio) and within Score 4 (125-142) which also lies within the score 4 range. The average score for healthiness among Japanese students was 43.94 (out of 60 points; 73.2% score ratio) and within Score 3 (39-44) which stands for usually. The average score for lifestyle habits was 113.70 (out of 175 points; 64.6% score ratio) and within Score 3 (108-124) which also lies within the Score 3 range.

**Conclusion**

This study identified the need for an education to re-acknowledge that ideal lifestyle habits such as exercising, eating nutritious meals and resting properly contributes to a healthier future. However, although health education has been conducted at school, the results show the score among Shanghai students was higher than Japanese students. We have to consider how to be more effective health education for Japanese students.

**Key Words:** Life-style, Chinese and Japanese students, DIHAL2

# P18

# Critical reflection on the training system of Chinese basketball student athletes

**Zhang, Zheng long* ·Kim, Sun hee**

Institute of Sports Industry of Mokpo National Univ.

**Abstract**

Improving the competitiveness of Chinese student basketball players is the key to the sustainable development of elite sports. Therefore, it is necessary to work out countermeasures that can transcend the limitations of the current cultivation system. **Purpose:** This paper analyzes the present situation and problems of the current Chinese basketball student athlete training system, and puts forward some Suggestions on the sustainable alternative basketball student athlete training system. **Methods:** Data were collected through literature research. Advanced retrieval was carried out through CNKI and wanfang databases to search the literature related to this study in detail. And carry on the topic classification and the content analysis to the data. **Conclusion:** First, the Chinese basketball student athlete training system is the standard form of talent training. It takes educational purpose as guidance and relies on educational content to realize educational method. Is the sum of physical and mental activities of the educated. Influenced by social history, cultural system, politics and economy. To educate people for the purpose, comprehensive life planning as the goal, better achieve social integration. Second, the problems existing in the current training system are that the overall quality of talent training is not high, the driving force for sustainable development is insufficient, the structure is fractured, the functional orientation is utilitarian, the goal concept is unclear, the system is closed and conservative, and the guarantee mechanism is insufficient. Overall present all levels of basketball reserve athletes insufficient. Third, the sustainable training system of alternative Chinese basketball student athletes is to redefine the training ideas and value orientation, change the training principles and methods, realize comprehensive development based on students, and realize the training mechanism based on learning, training, competition, transportation and evaluation integration. From the bottom up, form a pyramid structure from primary school to middle school to university. Expand the horizontal width of the system and increase the number of participants. Raise longitudinal height, make student level get rise in an all-round way. The realization system content is closely related but mutually independent. Realize the effective transfer of talents from primary school to middle school and then to university. Effective selection from university to primary school. First of all, primary school basketball players with excellent performance are selected to enter professional sports middle schools through cultural examination and professional basketball examination. Athletes with outstanding performance in vocational sports middle schools will be directly selected to the professional team, and other professional athletes and ordinary middle school athletes can only participate in college basketball examination after they have obtained grade certificates through provincial or above competitions. In addition to professional course scores, they also need to meet the test level required by cultural courses. Effectively ensure the quality of professional athletes and high level of delivery. Outstanding professional teams and college basketball players are sent directly to the national team for training. Finally, the efficient and sustainable development of student basketball players with Chinese characteristics training mechanism is realized.

**Key Words:** Student Basketball Player, Training System, Reflection

# P19

# The effects of force control training on finger force and enslaving in healthy elderly

**Yang Sun Park, Joong Woong Nam**

Korea National University of Transportation, Korea

**Abstract**

**Purpose:** The purpose of this study was to investigate the effects of this training program on MVF and enslaving in elderly.

**Methods:** All subjects randomly assigned to either training group or control group(12 training group: age: 73.9±5.5 yr, height: 152.1±4.6 cm, weight: 55.6±8.4 kg, 16 control group: age: 73.5±3.1 yr, height: 153.3±6.1 cm, weight: 58.6±8.0 kg). In order to measure the grasping forces of individual fingers, a customized device was developed with adjustable finger placements. Five force sensors (Loadcell: Futek LCM100, Data Acquisition(DAQ): National instrument USB-6003) were mounted to measure the forces produced by the thumb and four fingers. The force control training program provides game-based real-time visual feedback regarding total force subjects produce. Experiment protocol lasted 6weeks (pre and post tests, 3 days training per week during 5 weeks). The peak magnitude of the force produced by individual fingers (I, M, R, L and IMRL) was used as the MVF. Enslaving index and force deficit were calculated based on previous study(Kim et al., 2009). Statistical analysis was performed using SPSS statistics 21. Two-way repeated measures ANOVA was performed with a main effect of test (pre- and post-test) and group.

**Results:** The results of the 5-week training using the finger control device for the elderly are shown in <Figure1>.

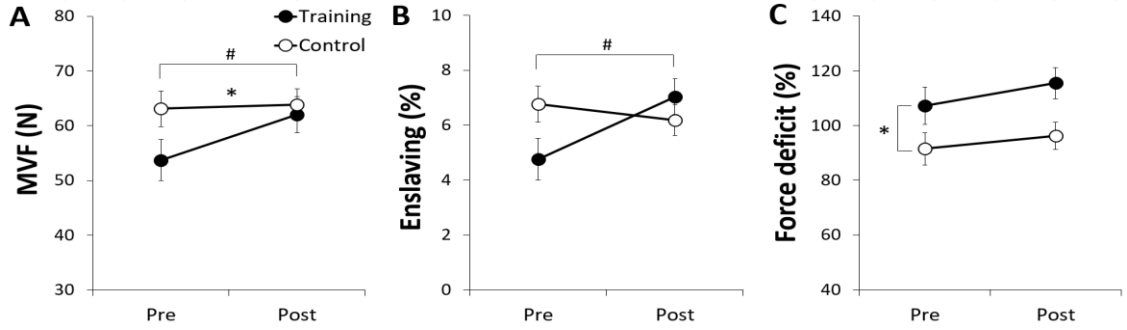



**Figure 1.** MVF (A), Enslaving (B) and Force deficit (C) are shown for each test (Pre-test: white and Post-test: black) between the two conditions (Pre: before training and Post: after 5 weeks-training). Mean of the participants' data are shown with standard error bars. Significant differences for test or group, *p<0.05; and interaction of group×test, #p<0.05.

**Conclusion:** We found that MVF and enslaving increased after the force control training of elderly. Hence we expect finger force control training through the game can help the elderly in daily life by improving enslaving indexes.

**Key Words**: Elderly, Force control training, Enslaving, MVF.

# P20

# Different mechanisms of exercise induced hypoxia and exogenous hypoxia intervention

**Qin YANG Qingguang LIU Jibing WANG Zhong ZHANG Wei ZHAN Cheng ZHANG Yinhao SHEN**

International College of Football Tongji University, China

**Abstract**

High-intensity training will cause hypoxia and lead to decreased exercise capacity, while training in hypoxia will improve exercise capacity evidently. These two phenomena have completely different physiological mechanisms. During high-intensity training, blood flow is faster than the minimum time required for the alveolar oxygen to diffuse into the blood, causing insufficient blood oxygenation and decreased oxygen saturation, which leads to tissue hypoxia and ultimately declining in athletic performance. For exogenous intermittent hypoxia, the concentration of oxygen in the mixed gas entering the lung decreases, followed by oxygen saturation decreases, and will reflexively cause the deeper breathing and vasodilation. Both exogenous and endogenous hypoxia can activate the expression of hypoxia-inducible factor alpha (HIF-1α), causing an increase in vascular endothelial growth factor (VEGF) production, which will promote angiogenesis. Simultaneously, exogenous hypoxia can stimulate secretion of erythropoietin (EPO) in the liver and kidney and enhance hemoglobin production. These changes together will promote the ability of the muscles to use oxygen and eventually improve exercise capacity.

By reducing exercise intensity and setting reasonable break intervals, the best results of high-intensity training can be achieved and hypoxia induced fatigue accumulation can be prevented. When the appropriate exogenous hypoxia is added, the dual stimulation of exercise and hypoxia will further enhance the oxygen uptake capacity and hypoxia tolerance of the muscle.

**Key Words**: Exogenous hypoxia, Endogenous hypoxia, Hypoxia training, Exercise capacity

# P21

# Preparation and Characterization of Cellulose aerogel - resveratrol Nanoparticles drug delivery for Sports Fatigue Nutrition Supplements

**Lili QIN[1)] Xinyu ZHAO[1)] Ai DU[2)]**

[1)]Department of Physical Education, Tongji University, [2)]School of Physical Science and Engineering, Tongji University，China

**Abstract**

**Backgrounds & Purpose**

With the popularization of sports for all, the number of people participating in sports is increasing, and the number of sports injuries is also increasing. How to prevent sports fatigue and reduce the damage of sports to the body becomes an important issue.

Exercise fatigue refers to the physiological process of the body cannot maintain its function at a certain level, cannot maintain the predetermined exercise intensity, produce reactive oxygen free radicals, manifested as sleepy fatigue, depression and anxiety, body aches, sleep disorders and other symptoms. Resveratrol is an antioxidant that protects against free radical-induced exercise fatigue. However, the use of resveratrol alone is poor in stability, short in vivo half-life, oral administration is easily hydrolyzed by proteases in the gastrointestinal tract, and bioavailability is low. The nanomaterials as a carrier can improve drug targeting and also provide sustained drug release.

**Methods**

The cellulose aerogel is prepared by micro-crystalline cellulose as a raw material through four steps of dissolution-aging-solvent displacement-supercritical drying.

**Results**

The drug-loaded aerogel is then obtained by impregnation and the maximum drug loading is obtained as much as possible by changing the ratio of matrix and drug. At present, the drug loading amount obtained by the experiment is 6%.

According to TGA:

1.25-70℃ The cellulose aerogel begins to lose a small amount of weight loss

2.200-230℃ Cellulose aerogels begin to decompose

**Conclusion**

In this study, Aerogel itself as a porous material, the drug loading is higher. So it needs to be further improved. In the future, we will focus on the cellulose aerogel-RES mechanism of anti-fatigue and improving exercise capacity. It is believed that the future can be applied to the recovery of sports fatigue.

**Key Words:** Sports fatigue，Cellulose aerogel，Resveratrol

# P22

# Efficacy of physical therapy yoga combined with specialized core strength training exercise for scoliosis in Tongji University students with adolescent idiopathic scoliosis: study protocol for a control variable trial

**Guoliang Zhou [1)] Jingmei DONG [1)]**

[1)] Department of Physical Education, Tongji University, Shanghai, 200092, P.R. China

**Abstract**

**Backgrounds & Purpose**

Adolescent idiopathic scoliosis (AIS) is one of the most prevalent spinal deformities that may progress sharply during growth. The aim of this study will be to evaluate the efficacy of physical therapy yoga combined with specialized core strength training exercise on the Cobb angle, angle of trunk rotation, sagittal index and quality of life in patients with AIS.

**Methods**

The study is designed as a control variable trial. Participants include 141 Tongji University students with AIS aged 18-21 years randomly divided into two groups. Participants in the control group attend normal campus physical class, while in an experimental group attend physical class which mainly use physical therapy yoga combined with specialized core strength training exercise. The whole trial lasts for 16 weeks. Blinded assessments at baseline and immediately after intervention will include the change of Cobb angle, angle of trunk rotation, sagittal index, and quality of life.

**Discussion**

If we find that the intervention of physical therapy yoga combined with specialized core strength training exercise is effective in improving Cobb angle, angle of trunk rotation, sagittal profile, and quality of life in young university students with AIS, this trial will have a positive impact and a guiding role in using physical exercise to ameliorate AIS.

**Key Words:** Adolescent idiopathic scoliosis, physical therapy yoga, specialized core strength training exercise, Cobb angle, ATR, Sagittal index, Quality of life

# P23

# Effect of laughter on middle aged and elderly people (1). Physiological effect.

**FUJITA Eri [1)] HIRAKU Shiho [2)] TANAKA Yukio [1)] YOKOZAWA Kikuko [2)]**

[1)] Tokyo University of Agriculture and Technology, [2)] Tokyo Woman's Christian University, Japan

**Abstract**

**Backgrounds & Purpose.**

Health of body and mind is important for everyone in order to realize an ageless society which everyone can act energetically regardless of age in the 100-year life. However mental patients are increasing year by year because of various stress relating to personal relations at work, family and school. Especially aged persons tend to be depressed due to physical performance decline, intelligent dysfunction, separation by death and loss of social role. Depression in old age has tendency to increase with aging of society. In modern Western medicine treatment, pharmacotherapy, psychotherapy and cognitive behavior therapy are prescribed, however the effect is restrictive. Without depending only on drugs or medical practitioners, it is assumed that Oriental medicine approach can develop vitality by facing one's body and mind. Actually, traditional Asian breathing has been reported to improve immune function and anti-stress effect. Although laughter is said to have relaxation effect, physiological effect by laughter remains unclear. To clear physiological effect of laughter and develop effective laughter method for health of middle aged and elderly people, this study investigated the physiological evaluation in various laughter methods.

**Methods**

Eleven healthy volunteers between the ages of 54 and 77 participated in this study. Approval for this study was obtained from the Ethics Committee of Tokyo University of Agriculture and Technology. Following two interventions were performed; (a) only action intervention (sitting, standing and walking without laughing and speaking), (b) laughter intervention (smile and roars of laughter in the sitting and standing position and during walking for 1 minute each). Stress test by salivary amylase activity and measurement of blood pressure, heart rate and vascular diameter were performed (1) before intervention, (2) after only action intervention and (3) after laughter intervention.

**Results**

The heart rate after laughter intervention tended to decrease compared with that before laughter and after only action intervention. The salivary amylase activity tended to decrease after laughter intervention compared with before intervention. The maximal blood pressure tended to increase after laughter intervention compared with after only action intervention.

**Conclusion**

This study revealed that this laughter methods released stress and tension and made body relaxed, because laughter tend to decrease heart rate and salivary amylase activity. Future studies are needed in order to develop more effective laughter methods and analyze laughter effect on human health from various aspects.

**Key Words**: Laughter, Physiological effect, Elderly people

# P24

# Effect of laughter on middle aged and elderly people (2). Psychological effect.

**HIRAKU Shiho [1)] FUJITA Eri [2)] TANAKA Yukio [2)] YOKOZAWA Kikuko [1)]**

[1)] Tokyo Woman's Christian University, Japan [2)]Tokyo University of Agriculture and Technology, Japan

**Abstract**

**Backgrounds & Purpose.**

In order to realize the aim of an "ageless society," a healthy body and mind is important for everyone. However, it has been observed that the elderly tend to be depressed due to decline in their physical performance, cognitive impairment, and the loss of social role. In modern Western medicine treatments, pharmacotherapy, psychotherapy, and cognitive behavior therapy are prescribed to deal with this; however, the effect is restrictive. It is assumed that Oriental medicine approach can help to develop vitality by working on the mind and body without depending on drugs or medical practitioners. Also, it has been reported that traditional Asian breathing techniques improve the immune function and are said to have an anti-stress effect. Although it is believed that laughter has a relaxing effect, the psychological effects remains unclear. To understand and clarify the psychological effects of laughter and develop an effective laughter technique for enhancing the health of middle aged and elderly people, this study investigates the psychological evaluation in various laughter methods.

**Methods**

Eleven healthy volunteers between the ages of 54 to 77 participated in this study. Approval to conduct the study was obtained from the Ethics Committee of Tokyo University of Agriculture and Technology. The following two interventions were performed; (a) sitting, standing, and walking without laughing and speaking, (b) smile and roars of laughter in the sitting and standing position and during walking for 1 minute each. Questionnaire about lifestyle, POMS2 (Profile of Mood States Second Edition-Adult Short), and Face scale were performed (1) before intervention, (2) after only action intervention, and (3) after laughter intervention.

**Results**

POMS2 revealed that Total Mood Disturbance (TMD) tends to be better and Vigor-Activity (VA) and Friendliness (F) are promoted after laughter intervention in comparison to the change seen after only action intervention. The Face scale also revealed that the mood tends to be better after laughter intervention as compared to after only action intervention. The Stress Check test revealed that stress levels also tend to be lower after laughter intervention than after only action intervention.

**Conclusion**

These results suggest that laughter improves the parasympathetic nervous system function. This study revealed that laughter methods released stress and tension and improved mood states. Future studies are required in order to develop more effective laughter methods and analyze the multi-directional effect of laughter on human health.

**Key Words**: Laughter, Psychological effect, POMS 2nd Edition-Adult Short, Elderly people

# P25

# Effect of laughter on middle aged and elderly people (3) Relation with the autonomic nervous system.

**TANAKA Yukio [1)], FUJITA Eri [1)], HIRAKU Shiho [2)] and YOKOZAWA Kikuko [2)]**

[1)]Tokyo University of Agriculture and Technology, [2)] Tokyo Woman's Christian University, Japan

**1.Purpose:**

It is important to maintain and improve the health of middle-aged and elderly people in the midst of a low birthrate and aging society. It has been observed that the elderly tend to be depressed due to decline in their physical performance, cognitive impairment, and the loss of social role. It is assumed that Oriental medicine approach can help to develop vitality by working on the mind and body without depending on drugs or medical practitioners. Also, it has been reported that traditional Asian breathing techniques improve the immune function and are said to have an anti-stress effect. Here we focus on human-specific laughs, and examine how laughing affects the mind and body of humans. Especially, this study focus on the relationship between laughter and the autonomic nervous system.

**2.Methods:**

1)The subjects: Eleven healthy volunteers between the ages of 54 and 77 participated in this study.

2) Two interventions were performed; (a) only action intervention (sitting, standing and walking without laughing and speaking), (b) laughter intervention (smile and roars of laughter in the sitting and standing position and during walking for 1 minute each).

3)The psychological measurements: Feeling (Face scale), POMS2, Questionnaire.

4)The physical measurements: Blood pressure, Salivary amylase activity, Hart rate, Autonomic nervous system activity (LF/HF)

**3.Results and discussion**

After laughter intervention, the heart rate tend to decrease compared with that before laughter. The vascular diameter and maximal blood pressure tend to increase after laughter. Feeling is better by face scale after laughter. These results suggest that laughter effects on autonomic nervous system and promotes harmony between sympathetic and parasympathetic functions. This study revealed that this laughter methods released stress and tension and relaxed body.

**Key Words**: Laughter, Physiological effect, Elderly people

# P26

# The Reversal Effect of Exercise-induced Microflora Diversity, Especially in Saccharibacteria, on Mice with DSS-induced Inflammatory Bowel Disease

**Shuangshuang HU [1)] Jingmei DONG [1)]**

[1)] Department of Physical Education, Tongji University, Shanghai, 200092, P.R. China

**Abstract**

**Backgrounds & Purpose**

The current treatments of inflammatory bowel disease (IBD) are not ideal and have potential side effects. In this study, we explored the reversal effect of exercise-induced microflora diversity on DSS-induced IBD mice.

**Methods**

Twenty SPF-grade male C57BL/6 mice(4-6 weeks old) were randomly divided into four groups. IBD mice models were induced by oral administration of 5% DSS in the drinking water for one week. The direct effects of exercise on the gut microbiome of IBD mice were investigated by using 6-week moderate treadmill exercise models. Disease activity index, histologic damage score, host immunity and the gut microbial communities were measured.

**Results**

H&E staining showed that DSS administration distorted glandular formation and led to the recruitment of inflammatory cells into the submucosal layer. However, exercise restored the tight junction of epithelial cells, reduced the disease activity score and also decreased histologic damage score. In DSS-induced IBD mice, serum TNF-α was negative related with Bacteroidetes phylum($r=-0.933, P=0.021<0.05$) and Saccharibacteria phylum ($r=-0.885, P=0.046<0.05$). Serum IL-1β in IBD mice was positive related with Erysipelotrichaceae phylum($r=0.939, P=0.018<0.05$). After six-week exercise intervention, IBD mice serum IL-1β($P<0.001$),IL-10($P=0.006<0.01$)and IL-18($P=0.020<0.05$) were significantly reduced. And exercise significantly reduced the intestinal Proteobacteria phylum ($P=0.012<0.05$) and increased Saccharibacteria ($P=0.002<0.01$) phylum. The intestinal flora abundance of IBD mice was increased by exercise.

**Conclusion**

Our current research, for the first time, demonstrates the reversal effect of exercise-induced microflora diversity on DSS-induced IBD mice. Therefore, exercise may be an alternative to medicine as a new treatment for IBD.

**Key Words**: Inflammatory bowel disease, Exercise, gut microbiome

# P27

# Comparison of Dry Needling versus Wet Needling in Treatment of Patients with Myofascial Low Back Pain

**Qingguang LIU [1], Jibing WANG [1], Qin YANG [1], Qiangmin HUANG [2]**

[1] Tongji University, [2] Shanghai University of Sport, China

**Background:** The objective of this study was to assess which it is more effective in relieving pain after two weeks of dry needling and wet needling.

**Materials and Methods**: Recruit 36 patients with low back pain according to the inclusion and exclusion criteria from the Shanghai Sport Injury Orthopaedics Hospital of Shanghai University of Sport and Pain Department of Shanghai Hudong Hospital. All participants participated in the trial to demonstrate the purpose, protocol, and procedures of the trial. Informed consent forms were signed. Participants were randomly divided into three groups: Myofascial trigger points (MTrPs) control group (C), MTrPs dry needling group (DN) and, MTrPs wet needling group (WN). The treatment were two times a week. Before treatment, during treatment, after 2 weeks of treatment, and 3 months after the end of treatment, Electromyogram (EMG) and Visual Analogue Scale (VAS) were analyzed.

**Results**: WN group can rapidly reduce the self-generating activity of the EMG and pain through drugs (sterilized water for injection and 2% lidocaine were mixed in a ratio of 1:1) during needling, but with high pain level within the following two days. DN group effectively reduced EMG and pain ($p<0.01$), but with high pain levels during needling. DN and WN groups reduced EMG and VAS after two weeks of treatment and 3 months of follow-up. The VAS and EMG of the WN group were significantly lower than the DN group after 3 months of follow-up.

**Conclusion**: DN resulted in significant improvement of low back pain, specifically in the short and medium term. However, WN was more effective than DN in the medium and long term.

**Key Words**: Myofascial trigger point, spontaneous electrical activity, needling

# P28

# Executive Function Performance and Cortical Activation When Cycling at an Active Workstation in Young Adults

**Tao Huang[1], Qian Gu[1], Zhangyan Deng[2], Kun Wang[1]**

1. Department of Physical Education, Shanghai Jiao Tong University, Shanghai, China

2. Graduate school of Education, Shanghai Jiao Tong University, Shanghai, China

Email：taohuang@sjtu.edu.cn

**Objective**: Previous studies suggested that exercise on an active workstation while working may be a promising intervention strategy for reducing sedentary time at workplace. The influence of using active workstation on cognitive function are not well studied and the existing studies yielded mixed findings. The purpose of the study was to examine the effects of self-paced cycling on an active workstation on executive function and prefrontal cortex activation among young adults.

**Methods:** In a cross-over study design, 35 young adults (mean age = 21.4 ± 2.6 years, 45.7% females) were randomly assigned to the following two task conditions separated by 48 hours: performing cognitive tests while sitting (SIT) and performing cognitive tests while cycling on an active workstation (ACTIVE). Executive function was assessed by a task-switching paradigm and Stroop Color and Word Test (SCWT) programed using E-Prime 2 professional (Psychology Software Tools, Inc., Sharpsburg, PA, USA), respectively. Stroop effects, global switch costs, and local switch costs were derived and used as the behavioral outcomes of the two tasks. Prefrontal activation was monitored using a 38-channel fNIRS system (NIRx Medical Technologies LLC, USA).

**Results:** The behavioral results showed that there were no significant differences on Stroop effects (112.61±136.66 vs. 136.57±122.24, P=0.19) between SIT and ACTIVE conditions. The global switch costs (463.19 ± 35.47 vs. 452.77 ± 28.65, p = 0.73) and local switch costs (-6.14 ± 29.88 vs. 9.97 ± 26.77, P = 0.70) also did not differ. For the fNIRS results, compared with SIT, the oxy-Hb in response to Stroop interference in Channel 5, 10 and 12 was decreased during the ACTIVE condition (Ch5:0.40 ± 1.25 vs. -0.21 ± 0.88, Ch10: 0.41 ± 0.88 vs. -0.05 ± 0.72, Ch12: 0.31 ± 0.77 vs. -0.11 ± 0.58, all P<0.05). The three channel was located at frontopolar area and left-dorsolateral prefrontal cortex (left-DLPFC). The oxy-Hb in all channels related to task-switching was not different between the conditions (P>0.05).

**Conclusion:** The results suggests that the behavioral performances on Stroop task and task-switching were not influenced by cycling on an active workstation; however, the cognitive resources for performing executive function may be reduced.

**Key Words:** Executive function; Physical activity; Active workstation; fNIRS

# P29

# Utility of EMG indices in evaluating rectus femoris muscle fatigue induced by intermittent sprinting during Cycling

**Wang Lejun[1],Shao Qineng[1],Ma Guoqiang[2],Gong Mingxin[1],Niu Wenxin[3],Qiu Jun[2]**

1.Sport and Health Research Center, Physical Education Department, Tongji University, Shanghai 200092；2. Physical Education and Sports Science institute of Shanghai, Shanghai 200030, China；3.Tongji University school of medicine, Shanghai 200092

**Abstract**

**Objective**

The aim of this study was to examine utility of EMG indices in evaluating rectus femoris muscle fatigue induced by intermittent sprinting during cycling by Grey Association Analysis.

**Methods**

Taking 10 track cyclists as the study object, five stages of 6 seconds sprint cycling exercise were carried out, with 24 seconds recovery time for every two sprint cycling exercise stages. Output power and pedal frequency and the surface electromyography (sEMG) of the right rectus femoris muscle was recorded. RMS、MF、MPF、MDF、MNF、C(n)、FD and SE were calculated.

**Results**

The output power and pedal frequency show a monotonous decreasing trend. MF、MPF、MDF、MNF、C（n）and SE also show a decreasing trend ($P<0.05$). Through grey correlation analysis, SE has the highest correlation with output power and pedal frequency, while FD has the lowest correlation.

**Conclusions**

SE has the most consistent trend with the output power and pedal frequency in the EMG evaluation effect of cycling sprint interval training induced rectus femoris fatigue based on grey correlation degree, and is a better index in EMG evaluation.

**Key Words：** sEMG; cycling exercise; sprint interval training; exercise-induced muscle fatigue

# P30

# Effect of 12-week Aerobic Exercise on the Working Memory of Obese University Students

**Zhai Yifei[1]，Li Huarui[1]**

[1]Research Institute of Sports Science ,Nanjing University, 210046

**Abstract**

**Objective:** This research aims to analyze how 12-week aerobic exercise of moderate intensity would influence the working memory of obese university students, and how it would reduce their BMI (Body Mass Index) and improve their physical health.

**Methods**: 80 volunteers whose BMI were above 28 were randomly divided into two groups: the obesity control group (OC, n=40) and the obesity exercise group (OE, n=40). All the subjects had completed body composition test and recognition memory task before the formal experiment. OC group also took the body composition test and recognition memory task after every 4-week exercise done by the OE group. The aerobic exercise intervention last for 12 weeks, three times a week, 50 minutes each time, and the exercise intensity should be 55%-69% of the maximal heart rate. The body composition test is to measure the weight, BMI and body fate rate of the subjects; the recognition memory task is to record the accuracy and response time when the subjects perform the task.

**Results:** (1) Before the formal experiment, there was no significant difference in BMI, accuracy and response time of recognition memory task between OC group and OE group. (2) Compared with those of OC group, the subjects of OE group had their weight decreased ($P<0.01$), their BMI decreased ($P<0.05$), and the accuracy of recognition memory task increased ($P<0.05$) as the exercise period extended.

**Conclusion:** (1) There is a negative correlation between BMI and working memory related to recognition. (2) The 12-week aerobic exercise can improve the obese university students' working memory. Also, though the OE group had their BMI steadily decreased as the exercise period extended, their accuracy of recognition memory task only changed a little. Therefore, how exercise decreases BMI and then improves the obese individual's working memory still needs to be discussed in the future.

**Key Words：** Aerobic Exercise; Working Memory; Obese University Students

# P31

# Mediating effect of self-efficacy on relationship between college student's physical health belief and exercise intention

**Hao SHEN, Yumeng SUN, Tianfeng LU**

Tongji University, China

**Abstract**

**Backgrounds & Purpose**

It is known that the exercise intention is affected by interactions between a number of factors. Previous studies have shown the self-efficacy played an important role in the belief-intention-habit chain (e.g., Hamilton et al ., 2017; et al., Olander 2014; Koring et al., 2012). Some studies find self-efficacy was a mediator between physical health belief and exercise intention. (e.g., Ma et al., 2013; Xie et al., 2012), however, what kind of mediator is not clearly indicated. The purpose of our study was to explore the specific mediation effect of self-efficacy on the relationship between physical health belief and exercise intention, in order to provide references for the promotion of physical health of undergraduate.

**Methods**

The 962 participants (male=568; female=394) from 5 general colleges in Shanghai filled out the physical health belief scale, exercise intention scale and general information. Physical health belief scale consists of 5 dimensions: perceived benefits (7 items), attention to physical health result (4 items), perceived susceptibility (4 items), perceived severity (5 items) and self-efficacy (4 items)， Exercise Intention scale consists of 8 items. On a 5-point scale, the responses ranged from 1 (strongly disagree) to 5 (strongly agree). The data were analyzed using the SPSS 23 to address descriptive statistics, and Pearson correlation was used for all study variables. Amos 22 was used to address structural equation modeling. Confirmatory factor analysis was used to judge the quality of measurement. We performed 2000 times bootstrap distribution to test mediation effect of each model.

**Results**

The score of exercise intention (2.85 ± 0.90, 2.52 ± 0.85), perceived benefits (3.79 ± 0.73, 3.66 ± 0.77), attention to physical health result (3.40 ± 0.84, 3.18 ± 0.83), perceived susceptibility (3.46 ± 0.84, 3.25 ± 0.85), perceived severity (3.24 ± 0.86, 3.10 ± 0.87), self-efficacy (3.01 ± 0.85, 2.84 ± 0.85), female group was significantly lower than man group ($p < 0.05$). All variables significantly and positively correlated with one another ($r = 0.329 - 0.632$, $p < 0.01$). Self-efficacy partially mediated the association of perceived benefits and exercise intention, the mediating effect were 81.7%. Self-efficacy played a complete mediator role on the relationship between attention to physical health result, perceived susceptibility and exercise intention. Self-efficacy played a suppression mediating role in the relationship between perceived severity and exercise intention.

**Conclusion**

This study showed self-efficacy was a different mediator on the relationship between perceived benefits, attention to physical health result, perceived susceptibility, perceived severity and exercise intention, which suggest self-efficacy has a strong relationship in belief-intention chain. Therefore, increasing self-efficacy is an effective mechanism for increasing exercise intention and physical activity of undergraduates.

**Key Words**: Key words: physical health belief; exercise intention; self-efficacy; structural equation modeling; mediator

# P32

# The Relationship among the Participation Motivation, Satisfaction and Continuous Participation of College Student Volunteers for Sports Events

**Jangkuk BAEK, Kanghoon SEOK**

Korea National University of Transportation, Korea

**Abstract**

**Purpose:** The purpose of this research is to sublimate the social perception of volunteer work in positive ways and spread volunteer culture among college students by identifying the relationship among the participation motivation, satisfaction, and intention of continuous participation of college student volunteers for sports events.

**Methods:** For this research, college student volunteers who participated in marathon evens held in Korea in 2018 were selected as the population, and sampling was conducted using a convenience sampling method. Among the, 320 college student volunteers who participated in 2018 Seoul Race, 2018 Gyeongju International Marathon, and 2018 Gongju Baekje Marathon were chosen for sampling, and the researcher distributed question surveys with 3 research assistants who had been trained in advance, and the survey sheets were collected back based on the self-administration method. Out of the returned sheets, the survey results from a total of 315(98.4%), except for 5 who answered poorly or missed out some questions, were used as effective samples. As for the data processing, SPSS WIN 21.0 program was used to carry out frequency analysis, exploratory factor analysis, reliability analysis, and simple and multiple regression analyses.

**Conclusion:** The results of these analyses are as follows: First, the participation motivation of the college student volunteers for sports events showed positive effect on satisfaction. Second, the participation motivation of the college student volunteers for sports events had positive effect on their intention of continuous participation. Third, satisfaction of the college student volunteers for sports events showed positive effect on their intention of continuous participation.

**Key Words:** Participation Motivation, Satisfaction, Continuous Participation, College Student Volunteers, Sports Events

# P33

# Research on the characteristics of the continuation of the history of Chinese martial arts thought

**Yang Yulong**[1)] **Liu Liqing**[2)]

Department of Physical Education, Dalian University of Technology, China

**Abstract**

**Backgrounds & Purpose**

As a cultural ideological form with Chinese characteristics, the history of Chinese martial arts thoughts is still in a state where there are very few related academic works and papers. How to clarify the connotation and extension of Chinese martial arts thoughts, and identify the continuation and characteristics of Chinese martial arts is the key issue in this field. The purpose of the research is to solve the long-standing lack of understanding of the history of Chinese martial arts and to establish a discourse system of martial arts history with Chinese characteristics.

**Methods**

Through the literature and data method, we extensively collect information on the history of Chinese history, the history of thought, and the history of martial arts. With the guidance of dialectical materialism as a guide, we constructive research on the origin and development of Chinese martial arts, and use the systematic research method to logically summarize and analyze the basic construction and characteristics of the continuation of intellectual Chinese martial arts.

**Results**

1. The rudiment of the history of Chinese martial arts is gradually formed by comprehensive activities such as witchcraft, war, and a life practice. In ancient times, people first gave the actual symbolic meaning to the action of martial arts in war and formed the logical thinking consciousness of space, time, knowledge and belief. In this historical process, martial arts has produced a great pragmatic effect on people's spiritual and material worlds.

2. The connotation of Chinese martial arts is formed by the traditional Confucianism, Buddhism, and Taoism. With the gradual prosperity of ancient Chinese ideology and civilization, the ideology of martial arts fighting and brutal plundering has gradually developed into "harmony and rites." "The idea of thinking." The traditional Chinese thinking in the fields of education, culture, military, and art constitutes its ideological extension.

3. The development of Chinese martial arts thoughts exhibits biological “genetic” characteristics. First, it has the vitality to accurately replicate the ideological connotation, and heritable changes occur under special circumstances. The second is the potential to store a large amount of traditional ideology and culture.

**Conclusion**

1. The development of Chinese martial arts thoughts has been continuously updated with the improvement of material civilization and spiritual civilization.

2. Chinese martial arts thoughts are produced, developed and prospered in the context of a multi-ethnic, multi-cultural integration. They are rich in cultivating ideas and educating people.

**Key Words**: Chinese martial arts thoughts; gene; continuation; characteristics

# P34

# Research on the Inheritance Carrier of Sports Culture

**HAN Junsheng**

Southeast University, China

**Abstract**

**Backgrounds & Purpose**

In the process of continuous, healthy and balanced development of sports, the inheritance and development of sports culture is particularly important. The inheritance of sports culture depends on the material, system and spiritual culture of sports, while different nationalities and regions have their own different forms of expression and rich in different connotations due to the historical development of sports culture. This study starts with sports culture, through the understanding and expansion of sports culture inheritance carrier, focusing on the main forms of expression of sports culture inheritance carrier, in order to provide theoretical reference for the inheritance and protection of sports culture in our country.

**Methods**

Through consulting, collecting and sorting out relevant monographs, papers and newspapers and periodicals, the method of literature and materials understands the present situation and trends of research in this field at home and abroad, and determines the research ideas of the subject. The expert consultation method visited more than 10 domestic experts and scholars, and combined with letters to consult and consult, absorb the essence of the experts' ideas, obtain creative ideas, broaden the perspective of this study, and lay an important ideological foundation for this study.

**Results**

The inheritance of traditional sports activities of ethnic minorities mainly depends on the inheritance from generation to generation, once the inheritance activities have been stopped, it means extinction. The way of inheritance is usually in the form of language education, personal teaching, that is, words and deeds, so that these skills, skills and skills are handed down from their ancestors to the next generation, so that the preservation and continuation of intangible cultural heritage is possible.

Due to the historical development of different nationalities and regions, the carriers of sports culture inheritance have their own different forms of expression and rich in different connotations. The inheritance of sports culture can be manifested by the holding of sports events, the achievement of sports achievements, the development of sports economy, the reform of physical education, the national traditional sports and so on. Different nationalities adopt different forms of cultural inheritance according to their own tradition and the characteristics of sports culture.

**Conclusion**

Word of mouth is the main way of inheriting traditional sports culture in our country, and modern media, such as film, television, VCD,DVD, recording, tape, network and so on, play a more and more important role in the inheritance of sports culture, and gradually become the main way of communication accepted by the people.

**Key Words**: Sports Culture; Inheritance Carrier; Development

*This work was supported by “the Fundamental Research Funds for the Central Universities”.

# P35

# Research on the Index System of College Students' Physical Literacy in Shanghai----Based on the Analysis of Structural Equation Model

**Hongyan Yu [1)] Gang Chen[1)] Kun Zhao [1)] Maomao Zhang[2)] Tansiqi Xin [1)]**

[1)] Shanghai Jiao Tong University, [2)] China Mining University(Xuzhou)

**Abstract**

**Backgrounds & Purpose**

The Canadian Assessment of Physical Literacy (CAPL) is a widely used assessment tool in the world. Due to differences in culture and physical education, people have different understandings of physicals literacy, which leads to different evaluating methods of physicals literacy. The evaluation index system of college students' physicals literacy in China is still in the research.

**Methods**

Based on the theoretical construction process of the index system and the investigation of physicals literacy literature, the index system of College Students' physical literacy is constructed from three parts: cognition and attitude, knowledge and skills. Based on the survey data of college students' physical literacy in universities in Shanghai, this paper evaluates the index system based on structural equation model(SEM).

**Results**

The half-fold reliability of 400 questionnaires was 0.844. The Cronbach's alpha of the three factors was greater than 0.7. The three factors KMO> 0.80, the total KMO was 0.924, the Bartlett's approximate chi-square was 3338.926, and the degree of freedom was 136. The significant probability of chi-square of ball test is 0.000, which indicates it is suitable for factor analysis. Rotate by variance maximization and select factors with eigenvalues greater than 1, we find that the 22 items converge to 3 exploratory factors. The load of each factor is greater than 0.6, and the cumulative contribution rate is 61.008%.

Maximum Likelihood is used to estimate the parameters of structural equation model, and MI and C.R. are modified. The standardized regression coefficients of the three first-order factors are 0.69-0.84, and the non-standard estimates of the models are significant at the level of 0.001. The Second order model fitting parameters are: $\chi^2$ = 171.846, df = 60, $\chi^2$ /df = 2.864, RMSEA is 0.068, CFI is 0.939, TLI is 0.954, RMR is 0.048, GFI is 0.939, AGFI is 0.907. The weight of the index is determined by using the standard factor load (correlation coefficient) in the SEM.

**Conclusion**

There are 3 first-level indicators in the index system of College Students' physicals literacy, namely, cognitive attitude (28.8%), knowledge (32.1%) and skills (39.1%). The number of secondary indicators corresponding to them is 4, 4 and 5, respectively.

**Key Words**: Physical Literacy Index System, Exploratory Factor Analysis; Confirmatory Factor Analysis

This paper is supported by: National Social Science Foundation of China (NSSFC).No.18BTY082

# P36

# The effects of 12-week competitive Wushu intervention on cognitive processing speed of college students

**ZHANG Wenjing JI Jingjing**

Southeast University, China

**Abstract**

**Backgrounds & Purpose**

Processing speed is not only an indicator of how fast an individual performs various cognitive operations, but also an important indicator of mental ability. The perceptual speed tested in this paper reflects an individual's ability to make simple perceptual judgments on and other quick responses to stimuli. It is the most common method to measure the processing speed indicator. As an important cognitive function, the processing speed is related to age and gradually degrades in old age. In the early stage of life, it can be changed by practice. When faced with different stimuli, individual processing speed feedback will also be different. Taking competitive Wushu as the intervention exercise, this paper explores the effects of 12-week competitive Wushu on College Students' processing speed.

**Methods**

After consent and screening, 48 subjects were randomly assigned to the competitive Wushu group and the control group. The competitive Wushu group was f by professional Wushu teachers to practice movements of sticks, knives, swords and so on. Those teachers were responsible for leading their practice and checking their attendance. The control group was also led by traditional Chinese sports major teachers, but carried out stretching exercises. For both groups, classes met four times a week for no less than an hour over the 12-week period. The Trail Making Test, Digit Symbol Substitution Test and Letter cancellation Test were used to perform tests before and after the experiment. By repeated measurement variance analysis, the main or interactive effects of group * time * condition on response time and accuracy were analyzed.

**Results**

The competitive Wushu group responded faster than the control group in the B conditions and A-B conditions in the Trail Making Test. In the Digit Symbol Substitution Test, the competitive Wushu group completed more during the specified time; the post-test scores of the two groups were better than the baseline scores. In the Letter Cancellation Test, the competitive Wushu group has a higher level of response time and accuracy.

**Conclusion**

After 12 weeks of competitive Wushu training, the cognitive processing speed of the competitive Wushu group was significantly higher than that of the control group. This potential mechanism needs further investigation, which will require more experiments to determine the relationship between competitive Wushu and processing speed or other aspects of cognition. With the involvement of fMRI, EEG and other technologies, the research on the effects of exercise on improving cognition in the aging process will be further deepened.

**Key Words**: Processing speed, Wushu, University students

# P37

# A Study on the Countermeasures of Students Physical Health Management in Traditional Chinese Medicine Colleges and Universities

**Zhikun Wu，Dongying Wang**

Shanghai University of Traditional Chinese Medicine，Shanghai

**Abstract**

**Backgrounds & Purpose**

A strong youth makes a strong nation . Furthermore, the overall health condition of university students in a country is directly related to the future of its motherland. However, in recent years the university student population's physical health condition is becoming worrying. As the guardian of human health, medical students should pay more attention to their own health. Thus the physical health management of students directly benefits the healthy growth of students. The purpose of the present study was to highlight how Chinese medicine colleges and universities make use of their own advantages to establish a student physical health management system with Chinese medicine characteristics and give full play to the role of physical education in college education.

**Methods**

By referring to various literary sources, this paper studies the management of college students' physical health in China from three angles: the current situation of college students 'physical health, the status of college students' physical health management and the restriction of students' physical health development.

**Conclusion**

Formulating and perfecting theory as the foundation, promoting the establishment of feedback mechanism as the key, constructing a TCM sports culture atmosphere as the characteristic, all these aspects thereby in order to promote the improvement of the physical health of students.

**Key Words:** TCM colleges and universities; Students' physique; Health management

# P38

# A study of the correlation between college students′ lifestyle and their physical health

**Yangcai XU， Huaping XU， Hui QIU**

P. E. Dept. of Shanghai University of TCM, Shanghai 201203, China

**Abstract**

**Objective**

To observe the relationship between the lifestyle and physical health of college students, in order to provide evidence for promoting healthy lifestyle and improving their physical health level.

**Methods**

180 students of grade 2013 from Shanghai University of TCM were selected by stratified sampling to investigate their physical health and lifestyle in the 2015-2016 academic year, and the correlation was analyzed.

**Results**

36 students were overweight and obese, accounted for 20%. The average scores of male and female students about middle-distance running was at the pass level. There was no statistically significant difference in the total score of male and female students′ life style ($P > 0.05$). The score of male students exercise behavior was significantly higher than female ($P < 0.01$), while the score of female interpersonal support behavior was significantly higher than the male ($P < 0.01$). Physical exercise behavior of College students was positively correlated with height, weight, vital capacity, and standing long jump ($P < 0.01$);the total lifestyle score was positively correlated with body weight and BMI ($P < 0.05$).

**Conclusion**

The average physical health of college students is at the pass level. The healthy lifestyle of college students has an effect on their physical health level, and the exercise behavior has a great influence on their physical health level. It is suggested that community, family and school should interact together to create a harmonious environment for college students to form a healthy lifestyle.

**Key Words：** Lifestyle; Physical health; College students

# P39

# Association between pulse pressure and BMI in the Chinese faculty

**Junjie Wang, Yi Hu, Jian Xu, Linlin Yan**

Department of Physical Education, Dalian University of Technology, Dalian, China

**Abstract**

**Backgrounds & Purpose**

Pulse pressure (PP), which is the difference between the systolic and diastolic blood pressures, is linked to cardiovascular and cerebrovascular morbidity and mortality. But the relationship between PP and body mass index (BMI) were debated. This study aims to describe the association between BMI and PP among the sedentary Chinese adult faculty.

**Methods**

Analyses are based on pooled cross-sectional data from 512 faculty (male: 219; female: 293; mean age: 42.54 ± 9.27) at a university in northeast China for the years 2017-2019. BMI was calculated using WS-H200 ultrasonic instrument (Woshen, Shanghai), and PP was assessed with VaSera-1500A cardio-ankle vascular index instrument (Fukuda, Tokyo). The normality of data distributions was tested using the Kolmogorov–Smirnov test, and the correlations between BMI and PP were assessed using Pearson's correlation analyses. All statistical analyses were calculated with PASW statistics ver. 24.0 software (SPSS, Chicago, IL), and P-values < 0.05 were considered significant.

**Results**

The value of BMI and PP was 23.84±3.35 kg/m$^2$ (male: 25.42±3.19 kg/m$^2$; female: 22.67±2.97 kg/m$^2$) and 45.70±7.96 mmHg (male: 48.56±8.12 mmHg; female: 43.56±7.15 mmHg), respectively. Using partial correlation analysis with sex and age as control variable, the result revealed statistical significant positive correlation (P-value=0.001) and low degree of association (r=0.160) between PP and BMI.

**Conclusion**

BMI, as the traditional tool for assessing malnutrition and obesity, has predictive value to PP.

**Key Words**: PP, BMI, Chinese faculty, association

* This work was supported in part by grants from the Humanities and Social Sciences Project of Ministry of China (NO. 19YJC890044), and Teaching Reform Project of Dalian University of Technology (NO. YB2019078)

# P40

# Results about Comparative analysis of school sports work of new college student in Jiangsu province some universities between 2017-2018

**ZHI YongHong** [1)] **JIANG Yan** [2)]

[1)] Southeast University, [2)] Nanjing University

**Abstract**

**Backgrounds & Purpose**

The physical health of students in colleges and universities continues to decline. In this paper, the new college student school sports work situation questionnaire, through the literature material law, questionnaire survey, mathematical statistics and logic analysis and other research methods, to the physical education, physical education teaching and extracurricular physical exercise conditions, parents concerned about the child physical exercise situation and situation of homework, nutrition and sleep, leisure, decompression and self-rated health, school of transportation and so on has carried on the related research.

**Methods**

Through the literature material law, questionnaire survey, mathematical statistics and logic analysis and other research methods, to the physical education, physical education teaching and extracurricular physical exercise conditions, parents concerned about the child physical exercise situation and situation of homework, nutrition and sleep, leisure, decompression and self-rated health, school of transportation and so on has carried on the related research.

**Conclusion**

1. The establishment of physical education class in grade three is not optimistic, showing a downward trend.

2. There is a serious shortage of extracurricular exercise time for students, and the exercise of strength, speed and endurance events is seriously lacking. The awareness of "national standards for students' physical fitness" has been improved

3.More and more parents have realized the importance of physical exercise in the growth of their children, but family attention is not enough.

4.The increase of study burden is one of the indispensable reasons for the decline of students' physical health. According to the survey, the amount of time spent on homework on weekends and working days increased significantly compared with 2017, and students' learning burden increased significantly.

5. The number of students who do not eat breakfast and drink milk every day shows a subordinate trend. In 2018, the study pressure of senior students increased compared with that of 2017, and they did not get enough sleep.

6. Students' evaluation of their health status shows a downward trend. The ways of students' leisure and stress reduction have been increased and changed.

7 the way students travel to school has changed. The proportion of students who go to school on foot, by private car or by bicycle has increased, and the proportion of students who go to school by other people's bicycles and other means of transportation has decreased especially.

**Key Words**: New college student; School sports; The questionnaire survey

# P41

# Research on the Prescription of Physical Fitness for the Elderly with Different Health Characteristics—Take Jiangsu as an example

**Liang Peigen**

Nanjing Vocational College of Information Technology

**Abstract**

**Backgrounds & Purpose**

This paper is one of the research results of the provincial social science subject "Research on the effect of physical exercise on promoting healthy aging". The object of study is the effectiveness of physical exercise for the elderly in Jiangsu Province to promote the healthy aging of individuals. This paper intends to investigate and test the current situation of physical exercise and healthy aging of the elderly aged over 60 in cities and townships of Jiangsu Province.

**Methods**

Firstly, this paper expounds the demand of the elderly's serious "health" situation for the effectiveness of physical exercise in Jiangsu. The main contents include: (1) predicting the trend of the change of the structure of the elderly population in China and Jiangsu Province in the future; (2) discussing the necessity of maintaining the healthy level of the elderly people's daily life under the current social security system and pension mode; (3) discussing the reform from the two aspects of the cost of medical care and the stable operation of the medical security system. The urgency of improving the health level of the elderly; (4) Discussing the importance of physical exercise to keep the health of the elderly in the relative lack of countermeasures for aging from the aspects of the current living situation of urban and rural areas, social service system and urban and rural construction.

Secondly, this paper summarizes the current situation, characteristics and influencing factors of physical exercise behavior of different types of elderly (gender, age, urban and rural) in Jiangsu Province, and the current situation, characteristics and influencing factors of individual healthy aging of different types of elderly (gender, age, urban and rural, etc.) in Jiangsu Province.

Thirdly, 1 summarizes the interaction between physical exercise behavior of the elderly and the aging effect of individual health. According to the survey data of physical exercise behavior and healthy aging of the elderly, it is concluded that: (1) different physical exercise behavior has different effects on healthy aging; (2) different levels of healthy aging have different effects on physical exercise behavior; and (3) there is an interactive relationship between physical exercise behavior and healthy aging effect. 2. Effective strategies of physical exercise for the elderly to promote the healthy aging of individuals. (1) To reveal the effective model of physical exercise for the elderly by studying the influence of different physical exercise behaviors on healthy aging; and (2) To put forward how to prevent and avoid the health risks of physical exercise for the elderly.

**Results**

Finally, according to the above theoretical elaboration, investigation and research, put forward the prescription of physical fitness for the elderly with different health characteristics in our province.

**Key Words**: Aged, Health characteristics, Physical Fitness, exercise prescription

# P42

# Correlation between Physical Fitness and Fundamental Movement Skill of Children aged 3 to 8 years old

**Xu Jian** [1)] **Wan Tingting** [1)]

[1)] Dalian University of Technology

**Abstract**

**Backgrounds & Purpose**

A large number of scholars at home and abroad agree that the early 3-8 years of childhood is a crucial period for cultivating children's motor skills. The level of development of children's motor skills during this period will have an important impact on children throughout their lives. This article will compare and analyze children's physical quality and basic motor skills. The former is a result evaluation, that is, quantitative evaluation, the latter is a process evaluation, that is, qualitative evaluation, the relationship between the two evaluation systems is discussed and relevant hypotheses are proposed: The test results of the system have significant correlation, and further demonstrate the international substitutability of the current basic motor skills test for children. If the test results of the two evaluation systems are not significantly correlated, they will be further analyzed in a test project. A certain age group has a large difference, and then analyze the reasons for these differences.

**Methods**

In this paper, 115 children aged 3-8 years were tested for physical fitness and basic motor skills. SPSS data analysis software was used to analyze the test results through correlation analysis and logic analysis.

**Results**

Through the analysis of the correlation between physical fitness and basic motor skills of children of different ages, we can see that the physical fitness of children aged 3 years is related to the standard of body displacement ability, and is related to sportsmen; the physical quality and objects of children aged 4 years old. The control ability standard is relevant; it is related to the sportsman; when the child is 5 years old, the correlation between physical fitness and basic motor skills is significantly reduced. The physical fitness and basic motor skills of 6 years old, 7 years old and 8 years old are not. Correlation,

**Conclusion**

There is no correlation between the results-oriented physical fitness test and the test-oriented basic motor skills test. The child's physical fitness development level cannot be completely used to measure the development level of children's basic motor skills, Children's flexibility, speed quality and core strength are not important factors affecting children's basic motor skills. As children age, the level of basic motor skills shows a downward trend. This shows that the development of children's basic motor skills has not reached the level of the corresponding age. With the increase of age, the basic motor skills advantage gradually disappears, which is not conducive to the long-term development of children's physical health.

**Key Words**: Children, Physical Fitness, Fundamental Movement Skill, TGMD-2

# P43

# Strategies for Institutionalization of New Marine Tourism and Leisure City Development Project

**Jongback KIM** (Dong-Eui University, Korea)

**Kanghoon SEOK (**Korea National University of Transportation, Korea)

**Abstract**

**Background:** It is absolutely necessary to develop marine tourism and leisure cities in Korea which is surrounded by seas on three sides. Due to the rapid changes in the social, economic and policy environment, the original functions of marine tourism and leisure city development project are weakening. In addition to the existing tourism and leisure city development project, it is time also for the marine tourism and leisure city development project to introduce institutionalization of new promotion and new policies. It is necessary to induce people's interest in the marine tourism and leisure city development by region, and to put interest of local governments and constant national interest in the development.

**Purpose:** The purpose of this study is to analyze the present status of marine tourism and leisure city development projects, to reflect them in policies and systems, and to present basic data for new marine tourism and leisure city development projects that are appropriate to local characteristics and circumstances.

**Methods:** As a method of this study, review of existing researches, search for related materials and interview with field experts will be employed. In order to minimize errors that may occur in the course of study and to enhance the research professionalism, opinions of related experts will be presented through qualitative analysis.

**Conclusion:** The conclusions obtained through the above approach is as follows.

1. It is possible to establish a role model for a new tourism and leisure city by creating a marine tourism and leisure city development project.

2. The establishment of a Korean style marine tourism and leisure city will help to find a new direction for marine tourism and to build and institutionalize marine leisure policies in our daily lives.

3. It is possible to develop an international marine tourism and leisure city by building a marine tourism and leisure city satisfying local characteristics.

**Key Words:** Marine Tourism, Leisure City, Development Project, Institutionalization

# P44

# Plan for Development of Sports Tourism in North Korea

**Joongwoong NAM**

Korea National University of Transportation, Korea

**Abstract**

**Background:** The Korean peninsula, the last divided nation on the planet, has been in a state of miserable armistice for 70 years. But now it is changing gradually. The whole world is trying to change North Korea in various ways such as the inter-Korean summit and the North Korea-USA summit. North Korea, which has had the last card of nuclear weapon, is also rapidly changing to solve its economic problems. The Korean peninsula is now on its way to an era of peace. Sports and tourism are the areas of greatest interest in these situations. We cannot help but think about how to utilize the blessed resources of North Korea's tourism in preparation for the era of peace. In addition, it is time to think about how to utilize various sports events together with the tourism resources.

**Purpose:** The purpose of this study is to investigate data on tourist attractions in North Korea and to present basic data to develop a sport tourism by combining the tourism and sports of North Korea.

**Contents & Methods:** The contents of this study are to investigate the current tourism resources of North Korea, to analyze the sports to be combined with the resources, and to establish the strategy and basic data for development of the sports tourism in North Korea. As a method of this study, search for websites and materials related to North Korea and interview with experts on North Korea will be employed. In order to minimize errors that may occur in the course of study and to enhance the research professionalism, opinions of related experts will be presented through qualitative analysis.

**Conclusion:** The conclusions obtained through the above approach is as follows.

1. In order to prepare for the era of peace, basic data to combine North Korean attractions and sports can be identified.

2. Various types of tourism programs can be organized.

3. It will help North Korea attract tourists through the development of programs that combine North Korean attractions and sports.

**Key Words:** Sports Tourism, North Korea, Plans for Development

# P45

# Strategies for International Promotion of Regional Sport Events

**Kanghoon SEOK**

(Korea National University of Transportation, Korea)

**Abstract**

**Background:** Now, the world has been transformed into a completely different world from the past, in which local governments compete with the world upon the great waves called info. revolution, globalization and localization. Each local government is racing hard the competition to develop and create events, local festivals, local events and sports events based on various cultures and traditions, uniquely highlighting the local culture, and to contribute to the development of local community and the vitalization of its economy. To this end, local governments are making lots of efforts to attract not only international sporting events but also domestic ones.

**Purpose:** The purpose of this study is to establish various public relations strategies to promote different local sports events in the international markets as well as domestic ones.

**Contents & Methods:** The contents of this study are to analyze the current approaches for promotion of various sports events in each region, and to present new promotion strategies after problem analysis. As a method of this study, review of existing researches, search for related materials and interview with field experts will be employed. In order to minimize errors that may occur in the course of study and to enhance the research professionalism, opinions of related experts will be presented through qualitative analysis.

**Conclusion:** The conclusions obtained through the above approach is as follows.

1. It is possible to improve the regional reputation for the sports event by presenting various promotional strategies for the sports event held in the region.

2. We should come up with solutions to the problems arising from insufficient promotions and establish effective public relations strategies employing various tools such as Internet and SNS.

3. Through the various promotion strategies, we can have an opportunity to not only increase the number of tourists in the region but also promote the region internationally.

**Key Words:** Strategy, International Promotion, Regional Sport Events

# P46

# Attitude toward Physical Education Class and Judo Instruction of Holland Judo Enthusiasts

**Susumu TAKAHASHI** (Daito Bunka University), **Akira SUZUKI** (Daito Bunka University)**,**
**Masahiko KIMURA** (Yokohama National University)**,**
**Seiki NOSE** (Saitama Gakuen University)
**Hiroyuki TANAKA** (All Japan Judo Federation)**, Yuta TAKIZAWA** (Daito Bunka University)
**Toshihiro TAKEZAWA** (Juntendo University)**, Yukitomo YOGI** (Kagoshima University)
**Kota SAMEJIMA** (Senior High School at Otsuka, University of Tsukuba)
**Motonobu ISOMURA** (Tokyo Metropolitan Hachioji Takuma High School)
**Kenji TAKAHASHI** (Nerima Ward Nukui Junior High School)

**Abstract**

## Purpose

The purpose of this study was to obtain meaningful discernments toward “Enjoyable Judo instruction” and “Safety Judo Instruction” which have been regarded as important in Judo Instruction in Japan. To research them, we focused on the attitude toward Judo instruction in Holland.

**Methods**

Subjects of the survey are 52 peoples (36 men and 16 females) who belong to the following three groups in Holland. The survey period is September 2018.

1. CIOS students (NOVA University, CIOS Harlem students)
2. Members of “The Judo Colleagues”
3. Lovers in the "Kata" of “Judo club Oyama”

The investigation was conducted by questionnaire. The obtained data was analyzed by factor analysis and so on.

**Results and Conclusion**

1) It was suggested that Dutch Judo enthusiasts evaluated Judo instruction as highly benefit. Particularly, Male Judo enthusiasts acknowledged that Judo instruction had a positive impact on other sports.

2) It was recognized that Dutch Judo enthusiasts had favorable feelings for both Judo classes and Judo instruction.

3) It was cleared that Judo classes evaluated higher assessments than Physical education classes.

4) It was assumed that the atmosphere of good Judo instruction brought up their senses of competence among Judo enthusiasts in Holland.

5) It was recognized that the favorable attitude by Judo among Dutch Judo enthusiasts, there is no denying that Japanese Judo teacher must learn from Judo teaching methods in Holland.

**Key Words:** Dutch Judo enthusiasts, attitude, factor analysis

# P47

# Exploration on Professional Quality of Instructors of Chinese Dance Sports Club

**ZiHao LEE · Sunhee KIM**

Mokpo University, Korea

**Abstract**

**Purpose:** Leadership literacy is an increasingly concerned relationship in today's educational circles. In the process of developing education level, leadership is the core of specific education for important practitioners and managers. With the rapid development of dance sport, at the center of public concern, the development of Chinese dance sport is mostly based on club education. The success or failure of club education in the future will affect the basic quality of the leadership team. Therefore, the purpose of this study is to explore the professional quality and accomplishment of leaders of dance sports clubs. **Methods:** First, what is the content of professional accomplishment of sports dance instructors. Secondly, what professional qualities should dance sports leaders possess? Thirdly, what are the efforts to develop the professional qualities of dance sports leaders? Set to Therefore, the research method of this paper is to collect documents, questionnaires, expert interviews and so on with 130 leaders registered by China Dance Sports Association, and collect data through content analysis and analysis.

**Conclusion:** Through this process, the results are as follows. Firstly, teachers' professional qualities are the comprehensive qualities gradually formed by teachers' professional concepts, codes of conduct and moral qualities in the process of educational activities. The author of this paper is a dance sports magazine. The professional accomplishment of dancing sports leaders is a person who is engaged in dancing sports education. Based on physiological and psychological conditions, they show professional ideas, morals, professional knowledge and all-round knowledge in the process of education and labor. The summation of civilized abilities is the comprehensive qualities that he shows and plays in his educational career. Secondly, according to the survey records, the professional qualities of dance sports leaders should include at least three aspects: professional knowledge, professional ability and professional spirit. Thirdly, through questionnaires, the factors affecting the career achievement growth of dance leaders are analyzed from both internal and external aspects. China's dance sports development time is relatively short, but many dance sports instructors have the professional ability to provide certain reference for the development of dance sports .

**Key Words:** Dance Sports

# P48

# Research on the Ideology Construction of Chinese Sports Culture in the New Era

**Cai Qing**

Marxism College, Hunan University, Changsha 410012

**Research purposes:**

In the current era, the status and role of culture in the development of human society is more remarkable. With the deepening of economic globalization, culture has undergone increasingly frequent exchanges. The sports culture close to the people's lives, as the forefront of the current socialist trend of thought, deep changes have also taken place as the world's cultural landscape has changed. As the soul of culture, ideology determines the direction and development path of culture. To build a strong socialist sports country, we must build a socialist sports culture ideology with strong cohesiveness and leading power. Starting from the development strategy of China's cultural power, we should build a good Chinese sports spirit, Chinese sports value, and Chinese sports power to provide spiritual guidance to the people. Provide theoretical support for sports culture and provide sports programs for the construction of China's foreign discourse system. It is more strategic for the improvement of college students' physical fitness and motor skills.

**Research method:**

Research methods include: literature methods, expert interviews, survey methods and statistical methods.

1. Qualitative and quantitative research. Theoretical and policy research focuses on qualitative analysis combining philosophy, culture, history, ethnology, and communication, and incorporates ideas such as sociology and organization. Practice research widely uses survey method and interview method to analyze the influencing factors of sports culture ideology in China, and to construct the ideology of sports culture in China in the new era.

2. System analysis and structural analysis combined. From the overall grasp, and under the guidance of the overall thinking, we focus on comprehensive and multi-level research on relevant factors.

3. Combination of micro analysis and macro analysis. Through comparative analysis, we grasp the commonality and characteristics of the construction of sports culture ideology in China and abroad, and supplemented with micro-analysis to realize the research on the ideology construction of Chinese sports culture in the new era.

**Research result:**

General Secretary Xi Jinping pointed out in his speech many times that the world today is facing a major change in the past 100 years. China is increasingly approaching the center of the world stage in the process of changing the world structure. Socialism with Chinese characteristics has entered a new era, and its theory and practice have provided the world with new directions, new programs, and new choices. In this process, socialist ideology is also facing the challenge of multiculturalism and values. At the same time, as a sports activity close to the people's life, its

cultural ideology is also experiencing the impact and erosion of foreign values. The study believes that the construction of socialist sports culture ideology with Chinese characteristics in the new era should be based on the global perspective, starting from the reality of China, taking the Chinese national sports culture as the root, transforming thinking, and innovating the ideas of the construction of sports culture ideology in China. Starting from meeting the needs of the people's growing and better life, we will continue to improve the level of sports culture and life, let the people get physical and mental development in sports, strengthen the confidence of the Chinese national sports culture, and enhance the attraction and influence of the socialist sports culture ideology with Chinese characteristics, communication, cohesiveness, and appeal, build a sports culture ideology system that conforms to the development trend and laws of contemporary world culture and can adapt to the practice of socialism with Chinese characteristics.

**Analysis conclusion:**

1. Establishing the ideology of sports culture in China in the new era, strengthening the armed forces of theory, and promoting the socialist sports culture concept with Chinese characteristics in the new era is deeply rooted in the hearts of the people, especially for the physique and skills enhancement of college students;

2. Deepen the theoretical study of the core of the Chinese national sports culture, build a team of high-quality sports culture ideology workers, and continuously promote the theoretical innovation of sports culture ideology, which falls on university physical education teachers;

3. Adhere to the correct direction of public opinion, attach great importance to the cultivation and popularization of the traditional Chinese sports culture, and teach in the university physical education class;

4. Actively cultivate and practice the core values of socialism and attach importance to its penetration in the dissemination of sports culture;

5. Strengthen the construction of Internet content and create a cyberspace that strengthens the confidence of Chinese sports culture.

# P49

# The Effect of Participation Motivation of Virtual Reality Physical Education Class on Satisfaction and Exercise Adherence

**Kang-Bon, Goo • Hwa-Ryong, Kim**

Korea National Univ. of Transportation

**Abstract**

**Purpose:** In the era of the 4th industrial revolution, virtual reality physical education classes are increasing recently. In addition to current sports education, virtual reality classes are being introduced into all of the education by merging with IT technology.

This is contributing to the development of sports industry as well as educational change.

In this study, it is thought that the era of the fourth industrial revolution and the era of fusion will lead the change of physical education class. The limitation of physical activity due to lack of space and fine dusts that became a problem of physical education class can be activated by the demonstration project in 2017 and the virtual reality sports classroom in elementary school in earnest in 2018.

Therefore, the purpose of this study is to investigate the effect of participation motive of virtual reality physical education class on satisfaction of class and exercise adherence.

**Methods:** By using purposive sampling method, from March 5th to June 10, 2019, a total of 300 questionnaires were distributed and 284 questionnaires (94.7%) from the participants excluding unreliable questionnaires with omissions were chosen to be valid sample. Several statistical analyses including a descriptive analysis, an exploratory and Pearson's correlation analysis, an internal consistency test, and a structural equation SEM analysis were conducted by using IBM SPSS WIN Ver. 21.0 and IBM AMOS 21.0.

**Conclusion:** The followings are the results of the current study.

First, The motivation for participating in virtual reality physical education class influenced class satisfaction.

Second. The motivation for participating in the virtual reality physical education class influenced the adherence of the exercise.

Third. The satisfaction of class in virtual reality physical education class affected the adherence of exercise.

**Key Words**: Participation Motivation, Virtual Reality, Physical Education, Class Satisfaction, Exercise Adherence

# P50

# An investigation on the development and validation of selection attribute scale toward children sports center

Gyeong-Yeol, PARK, Jaehyun HA (Keimyung University, Korea)

NamGyu Kim, JaeHyung LEE[1] (Korea Maritime and Ocean University, Korea)

**Abstract**

**Purpose:** The purpose of this study was to develop and validate selection attribute scale toward children sports center.

**Methods:** In order to accomplish this study, total 460 questionnaires were distributed to parents of children sports center's members at two children sports centers located in D city in South Korea using a convenient sampling method. Among them, 423 questionnaires were collected. Fifty-nine questionnaires were excluded because they were not reliable and completed. There were 364 usable questionnaires. Using SPSS Statistics 25.0 and AMOS 25.0, data were analyzed with frequency analysis, descriptive statistics analysis, correlation analysis, exploratory factor analysis, reliability analysis, and confirmatory factor analysis.

**Conclusion:** The results of this study indicated that selection attribute scale consisted in eight factors (safety and cleanliness, instructor qualification, class quality, related talk, accessibility, size of center and interior, parking lot, promotion) based on the results of descriptive statistics analysis, exploratory factor analysis, and reliability analysis. The results of confirmatory factor analysis revealed that eight factor measurement model satisfied overall model fit of selection attribute scale and construct validity. Practical implications of the findings and directions for future study were discussed.

**Key Words:** Selection Attribute, Children Sports Center, Scale Development and Validation

# P51

# The structural relationship among organizational justice, knowledge sharing, innovation resistance, innovative behavior, and intention to dropout of athlete

**Jaehyun HA**

Keimyung University, Korea

**Abstract**

**Purpose:** The purpose of this study was to identify the relationship among organizational justice (distributive, procedural, and interactional justice), knowledge sharing, innovation resistance, innovative behavior, and intention to dropout of athlete. **Methods:** In order to accomplish this study, total 300 questionnaires were distributed to college student-athletes using a convenient sampling method. Among them, sixteen questionnaires were excluded due to inappropriate response. There were 284 usable questionnaires. Data were analyzed with frequency analysis, correlation analysis, reliability analysis, confirmatory factor analysis, and structural equation modeling using SPSS Statistics 25.0 and AMOS 25.0. **Conclusion:** First, the results of this study indicated that all three dimensions of organizational justice positively and significantly related to knowledge sharing. Second, procedural and interactional justice had a negative and direct influence on innovation resistance. However, distributive justice didn't have an influence on innovation resistance. Third, distributive and interactional justice had a positive and direct influence on innovative behavior. However, procedural justice didn't contribute to innovative behavior. Fourth, interactional justice negatively contributed to athlete dropout intention. However, distributive and procedural justice didn't have an influence on athlete dropout intention. Fifth, knowledge sharing contributed to innovative behavior and intention to dropout of athlete. Sixth, innovation resistance positively contributed to innovative behavior. However, there was no relationship between innovation resistance and intention to dropout of athlete. Last, innovative behavior negatively contributed to intention to dropout of athlete. The finding was to provide valuable information on the management of college sports teams. Furthermore, the findings contributed to a provision of the practical application for the coaches of college sports teams.

**Key Words:** Organizational Justice, Knowledge Sharing, Innovation Resistance, Innovative Behavior

# P52

# The influence of organizational justice of caddie to golf course on job stress, job satisfaction, organizational commitment, organizational citizenship behavior, and turnover intention

**Jaehyun HA**

Keimyung University, Korea

**Abstract**

**Purpose:** The purpose of this study was to examine the influence of organizational justice on job stress, job satisfaction, organizational commitment, organizational citizenship behavior, and turnover intention. More specifically, this study attempted to (1) examine whether organizational justice influences job stress of golf course caddies, (2) examine whether organizational justice influences job satisfaction of golf course caddies, (3) examine whether organizational justice influences organizational commitment of golf course caddies, (4) examine whether organizational justice influences organizational citizenship behavior of golf course caddies, and (5) examine whether organizational justice influences turnover intention of golf course caddies. In addition, organizational justice consisted in distributive, procedural, and interactional justice. **Methods:** In order to accomplish this study, total 300 questionnaires were distributed to golf course caddies with use of a convenient sampling method. Among them, nine questionnaires were excluded because they were not fully completed. There were 291usable questionnaires. Using SPSS Statistics 25, data were analyzed with descriptive statistics, correlation analysis, exploratory factor analysis, reliability analysis, and multiple regression analysis. **Conclusion:** First, distributive and interactional justice had a negatively impact on job stress. However, there was no relationship between procedural justice and job stress. Second, distributive justice had a significant influence on job satisfaction. However, procedural and interactional justice didn't contribute to job satisfaction. Third, procedural justice positively contributed to organizational commitment. However, distributive and interactional justice didn't have an influence on organizational commitment. Fourth, all three dimensions of organizational justice positively contributed to organizational citizenship behavior. Last, interactional justice negatively contributed to turnover intention. However, distributive and interactional justice didn't have an influence on turnover intention. The findings of this study will contribute not only to a provision of the valuable information and an extension of basic knowledge base regarding the management of golf courses, but also practical applications to effectively manage golf courses.

**Key Words:** Organizational Justice, Job Stress, Job Satisfaction, Organizational Commitment, Organizational Citizenship Behavior, Turnover Intention

# P53

# The analysis of the application of induction teaching method in juvenile martial arts teaching in the background of new era.

**Ji Jingjing**

Southeast University

**Abstract**

The induction is through some method initiation induction object on own initiative according to the induction intention pondered, goes to one psychological regulation method, which the cognition expresses, moves. The induction teaching method is guides the student through the induction method to explore, to find the problem on own initiative, the driving research, solves the problem, grasps the rule, the principle on own initiative, on own initiative learns one kind of teaching process which studies independently. This article utilized the literature material law, the questionnaire survey procedure, the visit survey procedure has conducted certain degree research to the martial arts teaching using the induction method, thought the martial arts had the content to be many, the movement technology was relatively complex, had the high request characteristic to practitioner's will quality, in the teaching suits uses the induction the teaching method; In the martial arts teaching, the induction method to transfers the student to study the interest, to help the student to form the movement concept, the elimination movement study fear, supervises the student positively enterprising, setting up competition consciousness to have the positive role; Technical demonstration, demonstration and explanation union, slow imitation, interdependence uses which according to the movement characteristic, hand in hand and so on form movement induction methods, can play the vital role in the martial arts movement technology teaching.

**Key Words:** Martial arts teaching, Induction, Teaching method