

Prevention and Control Measures of the Adolescent Constitution Deterioration from the Perspective of Health Management

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Keywords: Adolescent, Constitution, Health Management, Cause, Prevention and Control Measures

Abstract: In view of this situation that the reasons for the continuous physical deterioration of Chinese adolescents, the key measures as well as the effective ways of prevention and control have not been fully revealed in China, this study is dedicated to reveal the reasons why adolescent constitution continuously deteriorates, and why relevant policies and regulations have not been well implemented, then to put forward corresponding measures, through a questionnaire survey and an empirical study from the perspectives of lifestyle, learning methods and Internet addiction. The results showed that root causes for the deterioration were weak self-awareness of health management of adolescents, resulting in the formation of unhealthy lifestyle, learning style and online behavior, and the policies issued by governments and schools were inadequate in terms of scientificity and operability. Key measures were to improve adolescents' health crisis consciousness, to develop good lifestyle, learning style and online behavior. Consequently, Integrated Intervention Model of Solution-Focused Health Management with Study Method Change and IAD Prevention and Treatment should be a mainstream method of physical constitution health intervention in the future.

1. Introduction

The continuous deterioration of adolescent constitution has been noticed by the whole society. Since the central government document No. 7 issued in 2007, governments at all levels have launched more than 70 programs to enhance adolescent constitutional health, such as the "sunshine sports movement", "big class break sports activity". However, the continuous deterioration of adolescent constitution has not been fundamentally addressed (Lei Zhang, 2013). The overall level of adolescent constitution in China is still unnerving, specifically regarding vital capacity, obesity, myopia rate, speed, endurance, blood pressure regulating function (Xiaoling Feng, 2012).

On the one hand, government departments at all levels have been highly concerned with adolescents' health. On the other hand, students' constitution has deteriorated for 30 years. This situation shows that the existing theories and practices focusing on reversing the deterioration of adolescent constitution still have shortcomings. For example, the main reasons for the deterioration, the key measures as well as the effective ways of prevention and control have not been fully revealed. Various corresponding policies have not been implemented effectively or the practicality of these policies is not very strong. Therefore, exploring the root cause of this problem and generating corresponding solutions have emerged as the priority of this field.

This study is dedicated to reveal the reasons why adolescent constitution continuously deteriorates, and why relevant policies and regulations have not been well implemented through questionnaire survey combined with evidence-based analysis. And an empirical study regarding how to solve this problem from the perspectives of lifestyle, learning method and Internet addiction (IAD) will be launched according to health management concept.

2. Method

2.1 Testees

104 freshmen were selected from two classes of senior grade one in a middle school of Guangzhou, and were randomly divided into test group and control group, with 52 students each group (male 30, female 22). They were 16-17 years old. In addition, 104 parents of the student testees and 20 teachers were selected as questionnaire subjects.

2.2 Research Tool

2.2.1 Questionnaire on the Causes and Prevention and Control Measures of Adolescent Physical Decline

The questionnaire consists of 3 versions: student questionnaire, parent questionnaire and teacher questionnaire, including 4 dimensions: causes of physical decline, factors affecting physical decline, scientificity and operability of policy, measures of prevention and control.

2.2.2 Middle School Students' Internet Addiction Questionnaire

The main body of the questionnaire is *Chinese Internet Addiction Scale* (CIAS) (Shuhui Chen, Lizhen Weng, Yiren Su, et al., 2003). CIAS is composed of 26 questions, contains 5 factors: tolerance, withdrawal reaction, obsessive-compulsive symptoms, time management and healthy interpersonal relationship problems. CIAS is marked according to Richter 4 point score, the total score of which represents degree of personal IAD, the higher the score is, the higher IAD tendency is. Standards: 42 points below as general web surfers, 42-59 points as mild addicts, 59 points above as severe addicts. In this questionnaire, 5 items related to sports interest were added to CIAS to form the "sports interest factor". In this study, Cronbach α of whole questionnaire was 0.84, Cronbach α of 6 factors was between 0.69 and 0.77.

2.2.3 MMHI-60

Mental Health Inventory of Middle-School Students (MMHI-60) (Jisheng Wang, 1997) is composed of 60 questions, including 10 subscales: obsessive compulsive disorder, paranoid, hostility, interpersonal sensitivity, depression, anxiety, learning stress, maladaptation, emotional imbalance and mental imbalance. Each subscale is made up of 6 items. Full scale reflects individual overall mental health status. The higher the scores in full scale and subscales are, the greater the psychological problems are. In this study, Cronbach α of full scale was 0.65, Cronbach α of 10 subscales was between 0.61 and 0.86.

2.3 Questionnaire Method

Before the test, 104 testees, 104 parents and 20 teachers were tested respectively in the student, parent and teacher versions of *Questionnaire on the Causes and Prevention and Control Measures of Adolescent Physical Decline*. The numbers of collected valid questionnaires were 104 for students, 98 for parents and 20 for teachers.

2.4 Experimental Comparison Method

According to the results of the questionnaire, the concept and methods of health management were used to conduct integrated physical health intervention for 3 months in the test group (but the control group was not treated). The intervention content included lifestyle intervention, learning intervention and IAD prevention and treatment.

2.4.1 Lifestyle Intervention

This type of intervention included nutrition, exercise, cognitive behavior, time management and other intervention elements. Testees were required to actively practice a healthy lifestyle, namely moderate exercise, reasonable diet, no smoking and drinking, clear cognition and no staying up late. Testees walked 3 to 5 km per day, did aerobic exercise 3 to 5 times per week, did strength and

flexibility exercises 2 to 3 times per week, and maintained the same sitting posture for no more than 1 hour each time. Testees and their parents were also asked to attend a lecture on health education once a week. Finally, the effect of lifestyle intervention was evaluated by using the physical test results of two groups before and after the test, combined with the results of learning intervention and intervention of IAD prevention and treatment.

Boys' physical test indicators included height, weight, BMI, vital capacity and body mass exponent, grip strength values of body mass index, sit and reach, standing long jump, pull-up, 50m race and 1000m race. In addition to pull-up and 1000m race being replaced with sit-up and 800m race respectively, other physical test indicators for girls were the same as the boys.

2.4.2 Learning Method Intervention

This intervention adopted constructivism learning theory (George W. C., Michelle C., 2008) or Intervention of Emergent Learning Theory of Putting Exercise Blending into Learning (ELTPEBL) (Gengdan Hu, 2015). Constructivist learning theory is suitable for students who are sedentary and less active due to poor learning autonomy, lack of concentration, and easy to be interfered by the Internet, TV and mobile phone. ELTPEBL is suitable for students who are sedentary and inactive due to hard work in learning. For those who adopted constructivism learning theory were a group of 2 to 3 testees, 5 times a week, 1 to 2 hours every time. For the participants who adopted ELTPEBL, they conducted the learning intervention alone, 5 times a week, 45~60min each time.

2.4.3 IAD Prevention and Treatment

This intervention was aimed at IAD students in the test group, and adopted Biological-Psychological-Social Multidisciplinary Integrated IAD Prevention and Treatment Mode Based on "Addiction Displacement" (Gengdan Hu, Jun Zhang, 2016). Students with IAD were required to choose different training courses according to their own interests. And the intervention was at weekend, 3 times a week, 1.5 hours every time. Then, MMHI-60 was used to evaluate the mental health of two groups before and after the test.

2.4.4 Condition Control of Exercise Intervention

All the testees participated in normal school physical activities during the test. The above three methods of intervention all contain exercise intervention, that is to say, the content of exercise intervention in these three methods of intervention can be used with each other, and the total exercise intervention load should be no more than 2 hours per day.

2.5 Statistical Approach

The following data were analyzed by descriptive statistics analysis and Pearson correlation analysis with SPSS20.0.

3. Results

3.1 Questionnaire Results

Chief reasons of the deterioration: (1) Most of the students and their parents who were responsible for the decline of physical fitness had little awareness of the health crisis and did not realize the role of health management on the current and future health of students, and were in the "ignorance" and "unprepared" state in their own health and its management. Most students had no exercise habits and interests, were chronically in a state of passive exercise. (2) Existing physical fitness studies generally attributed the adolescent constitutional deterioration mainly to lack of physical exercise, ignorance of the impact of nutrition, work and rest, IAD, learning methods, psychological pressure and so on, thus resulting in the various policies issued by the government and schools to be inadequate in scientificity and operability.

The underlying reason for poor implementation of the policies was the lack of effectiveness of the operation and management mechanism. As a result, it was unable to ensure their effective operation and implementation, so that the concerted efforts of government, school, society and

family always became nobody's business.

3.2 Physical Fitness Test Results

Before the test, the scores of physical fitness test had no significant difference between the two groups (Table 1 and Table2). But after 3 month intervention, grip strength values of body mass index, pull-up and 1000m race scores of boys in the test group were significantly better than the control group's, $P<0.05$; Grip strength values of body mass index and sit-up scores of girls were significantly higher than the control group's, $P<0.05$, and 800m race scores of girls had a very significant difference between the test group and the control group, $P<0.01$. Vital capacity and body mass exponent of both boys and girls had a very significant difference between the two groups, $P<0.01$. Height, weight, BMI, sit and reach, standing long jump and 50m races cores of both boys and girls in the test group were all better than the control group's, but had no significant difference.

Table 1: The comparison of boys' physical fitness test results of two groups before and after the test (X \pm SD)

Test indexes	Before		After	
	Test (30)	Control (30)	Test (30)	Control (30)
Height (cm)	170.21 \pm 5.43	170.48 \pm 5.03	171.59 \pm 4.88	171.5 \pm 5.12
Weight (kg)	59.88 \pm 8.85	59.45 \pm 8.72	59.43 \pm 8.37	61.72 \pm 7.94
BMI (kg/m ²)	20.73 \pm 2.89	20.52 \pm 2.93	20.05 \pm 2.78	20.62 \pm 2.84
Vital capacity and body mass exponent (ml/kg)	63.19 \pm 11.54	63.7 \pm 10.83	72.26 \pm 10.94**	64.45 \pm 11.06
Grip strength values of body mass index	66.82 \pm 11.24	65.97 \pm 11.62	73.56 \pm 9.86*	68.20 \pm 10.51
Sit and reach (cm)	10.82 \pm 8.05	10.53 \pm 7.95	12.58 \pm 7.40	11.70 \pm 7.86
Standing long jump (cm)	232.52 \pm 21.08	229.18 \pm 20.98	239.62 \pm 19.87	230.97 \pm 20.02
Pull-up	4.97 \pm 2.94	5.21 \pm 3.87	7.75 \pm 3.54*	5.96 \pm 3.05
50m race (s)	7.95 \pm 0.53	7.90 \pm 0.61	7.69 \pm 0.58	7.87 \pm 0.63
1000m race (s)	259.4 \pm 14.6	261.3 \pm 15.8	250.3 \pm 15.1*	258.3 \pm 15.6

Note: * $P<0.05$, ** $P<0.01$. The same below.

Table 2: The comparison of girls' physical fitness test results of two groups before and after the test (X \pm SD)

Test indexes	Before		After	
	Test (22)	Control (22)	Test (22)	Control (22)
Height (cm)	158.62 \pm 5.15	158.06 \pm 5.36	160.23 \pm 5.20	159.86 \pm 5.64
Weight (kg)	50.38 \pm 7.33	50.82 \pm 7.50	50.41 \pm 6.86	52.28 \pm 7.13
BMI (kg/m ²)	20.17 \pm 2.75	20.78 \pm 2.68	19.81 \pm 2.67	21.20 \pm 2.83
Vital capacity and body mass exponent (ml/kg)	56.91 \pm 10.32	57.22 \pm 10.74	66.83 \pm 10.22**	57.89 \pm 10.36
Grip strength values of body mass index	49.42 \pm 8.57	49.96 \pm 8.15	56.15 \pm 8.33*	50.22 \pm 8.86
Sit and reach (cm)	12.84 \pm 6.15	12.12 \pm 6.62	14.15 \pm 5.93	12.76 \pm 6.07
Standing long jump (cm)	175.2 \pm 17.10	176.1 \pm 17.54	180.1 \pm 16.85	178.4 \pm 17.02
Sit-up	36.79 \pm 6.94	36.3 \pm 7.06	41.82 \pm 7.12*	36.53 \pm 7.30
50m race (s)	9.35 \pm 0.60	9.32 \pm 0.58	9.02 \pm 0.53	9.24 \pm 0.60
800m race (s)	258.2 \pm 19.2	257.9 \pm 18.7	240.5 \pm 17.9**	256.8 \pm 18.3

3.3 Academic Performances

Table 3 showed that Chinese, There was no significant difference between the two groups regarding Chinese, Maths and English achievements in senior high school entrance exams. After the test, There was a very significant difference between two groups in Maths performance between the

two groups, $P<0.01$; Performances of Chinese and English in the test group were respectively better than the control group's, $P<0.05$.

Table 3: The comparison of academic performances of two groups before and after the test ($X\pm SD$)

Courses	Before		After	
	Test (52)	Control (52)	Test (52)	Control (52)
Maths	90.28 \pm 22.30	91.02 \pm 24.23	102.56 \pm 19.41**	90.34 \pm 22.95
Chinese	94.36 \pm 19.83	93.95 \pm 19.20	101.74 \pm 17.94*	93.46 \pm 18.98
English	95.56 \pm 21.37	94.89 \pm 19.77	103.73 \pm 18.45*	95.22 \pm 19.23

3.4 IAD and Mental Conditions

Before the test, there was no significant difference between the two groups regarding score of IAD and online time per week; Compared with the control group, score of IAD and online time per week in the test group decreased significantly after the intervention, $P<0.01$ (table 4).

Except the score of paranoid, the total score of mental health and factor scores of obsessive compulsive disorder, hostility, interpersonal sensitivity, depression, anxiety, learning stress, maladaptation, emotional imbalance, mental imbalance in the test group were all significantly less than the ones of the control group after the intervention, $P<0.05$ or $P<0.01$ (Table 5).

Table 4: The comparison of IAD conditions of two groups before and after the test ($X\pm SD$)

Test indexes	Before		After	
	Test (52)	Control (52)	Test (52)	Control (52)
Scores of IAD	58.79 \pm 10.83	57.44 \pm 8.33	42.4 \pm 8.85**	55.3 \pm 11.31
Hours of online time/week	10.6 \pm 3.2	10.1 \pm 3.8	6.4 \pm 1.8**	10.4 \pm 2.6

Table 5: The change and comparison of mental conditions of two groups before and after the test ($X\pm SD$)

Psychological index	Before		After	
	Test (52)	Control(52)	Test (52)	Control(52)
Total score of mental health	109.72 \pm 28.86	109.23 \pm 29.11	95.93 \pm 26.94**	111.88 \pm 27.12
Obsessive compulsive disorder	1.92 \pm 0.60	1.88 \pm 0.63	1.65 \pm 0.61*	1.94 \pm 0.65
Paranoid	1.80 \pm 0.71	1.83 \pm 0.65	1.60 \pm 0.68	1.82 \pm 0.63
Hostility	1.72 \pm 0.68	1.74 \pm 0.73	1.38 \pm 0.70**	1.76 \pm 0.72
Interpersonal sensitivity	1.91 \pm 0.68	1.89 \pm 0.71	1.57 \pm 0.69**	1.93 \pm 0.70
Depression	1.74 \pm 0.67	1.78 \pm 0.63	1.41 \pm 0.68**	1.82 \pm 0.74
Anxiety	1.75 \pm 0.68	1.78 \pm 0.65	1.43 \pm 0.66**	1.80 \pm 0.71
Learning stress	1.88 \pm 0.85	1.91 \pm 0.89	1.49 \pm 0.89**	1.95 \pm 0.92
Maladaptation	1.91 \pm 0.62	1.82 \pm 0.64	1.61 \pm 0.63*	1.89 \pm 0.62
Emotional imbalance	1.80 \pm 0.67	1.84 \pm 0.65	1.52 \pm 0.64**	1.87 \pm 0.68
Mental imbalance	1.90 \pm 0.66	1.94 \pm 0.63	1.62 \pm 0.67*	1.92 \pm 0.64

4. Discussion

4.1 Changing Study Method is an Effective Way to Prevent and Control the Physical Deterioration of Adolescents

According to the mainstream view of academic circles, the reasons for physical deterioration of Chinese adolescents are the exam-oriented education system and the college entrance examination system (Chao-an Zhang, 2014). For example, a survey by the China youth daily's social research center on "who is the main responsibility for the continuous decline of teenager physical fitness?" showed that the preferred reason for 67.9% of the respondents was "the examination-oriented

education system". Therefore, in the past ten years or so, many people with insight have consistently put forward suggestions about reducing the burden on primary and secondary school students, reforming and even abolishing the college entrance examination system, and fully implementing the conversion from the exam-oriented education model to the quality education model and so on.

The functional departments of governments at all levels have paid high attention to this issue, have taken on active actions and launched a series of measures, such as reducing burden, adding sports examination into senior high school entrance examination and college entrance exam, reforming course content, etc. However, the severe fact that the continuous deteriorative situation of adolescent constitution hasn't been improved fundamentally for 30 years shows that the above measures have had little effect. Because students tend to spend the time released through reducing schoolwork burden for self-pressurized learning or for things like watching TV and surfing the Internet, rather than for physical exercise and sleep. A number of surveys show that only a few Chinese teenagers exercise for 1h every day, and playing online games and surfing the Internet occupy the exercise time of most students (Ran Tao, Banghe Li, 2005; Dongping Li, Xian Li, Yanhui Wang, et al., 2013).

Multiple surveys show that the physical condition of Chinese teenagers was obviously inferior to that of Japan and South Korea (Kaichun Lei, Xiong Yang, 2011). Although Japan also implements the examination-oriented education system, the students' physical fitness rises rather than falls. The reasons are that Japanese students and their parents must attend a health lecture in the community once a month, the concept of physical exercise and healthy lifestyle has been deeply rooted in the hearts of Japanese students, and the students prefer to do exercise at weekend and 40% of them take exercise 2-3 hours a day (Guangzhi Ma, 2010).

In conclusion, it can be considered that although the exam-oriented education is one of the factors influencing the physical deterioration of adolescents, there is no causal relationship between the examination-oriented education system and the deterioration. That is to say, the root cause of the deterioration is not the examination-oriented education system, but the subject's consciousness of health crisis.

Learning is an important factor affecting physical decline. Students with physical decline caused by inappropriate learning styles can be divided into two kinds. The first kind is diligent students, who spend all their free time studying for their future and had no time to participate in physical exercise to lead to sitting for too long and not moving. They think they will reap from what they have done, but the actual effect is often a physical and mental fatigue, a physical deterioration, and even a decline of learning efficiency and performance, because it is not a sustainable, scientific approach to learning that goes against the brain's cognitive principles (Scudder M. R., Federmeier K. D., Raine L. B., et al., 2014).

The second kind is students those with weak self-control and scattered attention. They lack time management and goal management ability and are easily disturbed by the outside world such as the Internet and TV. As a result, they are sedentary and less active, have low physical and mental health, and have low learning efficiency. Therefore, under the condition that the college entrance examination system remains unchanged, the only way to solve this problem is to change students' learning methods and provide corresponding learning theories for different kinds of students, to help students master learning methods that can not only improve learning efficiency and performance, but also maintain and improve physical and mental health.

For the second kind of students, constructivism learning theory can be adopted to intervene, while for the first kind of students, a new learning theory blending in sports should be adopted. This study adopted ELTPBEL and attempted to conduct experimental intervention study for 3 months based on the change of learning methods. The results showed that compared with the control group, the students' scores in Maths, Chinese and English in the test group all had very significant or significant increase after the test (Table 3). Moreover, all the physical indicators in the test group were improved to different degrees (Table 1 and Table 2). This showed that there was a significant predictable correlation between ELTPBEL and the academic performance and physique of testees.

The connotations and steps of ELTPEBL are as follows. Firstly, quickly review the knowledge acquired during the class and browse study materials and exercises. Secondly, walk alone to think and enlighten, repeating all these things to analyze, deduce, induce and summarize. Thirdly, comb and concentrate knowledge points, key points and difficult points, transition points. Then, find and solve problems. Later, consolidate knowledge and emerge new knowledge structures. Finally, achieve a learning goal of promoting academic performance and innovation ability.

The mechanism of ELTPEBL to improve academic performance and physical fitness may be that self-retelling and independent thinking during walking play a unique role in developing students' innovation ability (e.g. memory, imagination, insight, and attention) and logical thinking ability. In addition, walking as an active rest, it is beneficial to relieve brain fatigue, release the pressure of body and mind and also enhance cardiopulmonary function. When the cardiopulmonary system works more powerfully, the brain behaves in best condition that improves innovative thinking ability. Therefore, walking and thinking promote each other and complement each other to eventually create a positive feedback loop.

4.2 Preventing and Treating IAD is Indispensable to the Prevent and Control of Adolescent Constitutional Deterioration

It is worth pondering that, with the rapid pace of network popularization, on the one hand, the physical fitness of Chinese teenagers has been declining for 30 years in a row, on the other hand, the number of adolescent netizens and Internet addicts are increasing yearly. Up to the January 2016, Chinese adolescent netizens under the age of 25 have reached 226 million, accounting for 63.5 % of the total youth population, and adolescents with IAD about account for 13.72% in total number of adolescent netizens. This suggests that there may be a negative correlation between the decline of physical fitness and the increase of IAD population, which is also proved by some related studies (Xiaoling Feng, 2012). This study also showed that all the physical indicators in the test group improved to different degrees after the test (Table 1 and Table 2), which corresponded to different degrees of improvement in IAD score and mental health status (Table 4 and Table 5), namely, IAD was negatively correlated with physical and mental health. At present, the Internet has been recognized as having a significant negative impact on human health, especially on the health of adolescents. For example, it results in long time sitting, severe decline in vision, depression and anxiety and human communication obstacle (Deryakulu D., Ursavaş F., 2014). According to the previous studies, the percentage of teenagers with the physical decline due to too long time on the Internet or IAD is increasing yearly in China. A joint survey on physical health of Sino-Japanese teenagers showed that the surfing online or watching TV time of Chinese students was over 1.5 hours a day more than that of Japanese students (Dijun Sheng, 2014). Therefore, the effective prevention and treatment of IAD has become an indispensable part to prevent and control the physical deterioration of teenagers, and to maintain their physical and mental health.

In recent 10 years, scholars have done a lot of research on the formation, mechanism and correction of IAD. The intervention methods mainly include psychological treatment, health education, government intervention, medical treatment and physical exercise. A consensus has been reached on a combination of approaches to intervene in IAD (Aneta M. P., Agata B., Barbara M., et al., 2014; Tam P., Walter G., 2013). However, the fact that the proportion of Chinese adolescent Internet addicts increases yearly and the relapsing rate of IAD holds at a high level shows that more research effort on the cause and mechanism of IAD are direly needed, and the existing intervention methods have poor long-term efficacy, calling for new intervention concepts and methods. Therefore, it is an important task to carry out multi-perspective, multi-disciplinary and in-depth research on the cause and mechanism of IAD, and explore the intervention approaches with long-term mechanism.

In recent years, academia has begun to analyze the causes of IAD from the perspective of psychological instinct, providing a stronger theoretical basis for the prevention and treatment of addiction. However, this research is still in the stage of theoretical exploration (Zhe Zhu, Songli Mei, 2010; Gengdan Hu, Mingqiang Xiang, 2011). At the same time, sports as a means of

correcting IAD has also been widely recognized. However, the research on the mechanism of such intervention only stays at the psychological level of exercise, and regards sports as an auxiliary means to intervene in IAD (Yinghai Liu, Yujin Dan, Lianyong Su, 2010; Lanjun Zhang, 2009). It does not involve the discussion of deep internal mechanism and core elements of sports intervention to correct IAD.

In view of the research situation, Gendan Hu, et al. (2016) investigated the internal correlation between sports and network behavior from the perspective of instinct theory, and made in-depth research on the effect and deep mechanism of sports intervention to correct IAD. The findings were as follows. (1) The intrinsic mechanism for the formation of IAD is that the Internet behavior activates the instinct, and only other behaviors that can activate the instinct can replace IAD. (2) Sport has the same instinct activation effect as the network behavior, so IAD can be replaced by sport "addiction". (3) The reason for the poor long-term efficacy of the existing integrated treatment paradigm of IAD is that the formation mechanism and intervention approaches of IAD have not been explored deeply from the perspective of instinct. (4) The core idea of preventing and treating IAD is to replace the addiction with "addiction". That is to say to replace IAD with healthy "addiction". (5) The difference between the method of sport intervention based on instinct activation and other methods of IAD intervention is that it is to channel, transfer and replace the instinct energy, rather than to suppress it. (6) Psychotherapy is an essential factor for the prevention and treatment of IAD, and sport is an effective way to achieve the curative effect of this factor and an indispensable part in the integrated prevention and treatment of IAD. According to above results, they put forward Biological-Psychological-Social Multidisciplinary Integrated IAD Prevention and Treatment Mode Based on "Addiction Displacement", which takes "addiction replacement" as the subject, and is a comprehensive IAD prevention and treatment model that integrates sport, psychology, management, education, sociology, law and other means. In addition, they used this model to interpose 49 middle school students with IAD for 1 year, and found that the model had good long-term curative effect.

In this study, 52 middle school students in the test group were treated with this model (Table 4 and Table 5). The results showed that the mean score of IAD, the total score of mental health and the scores of multiple psychological factors in the test group were significantly better than those in the control group after the intervention, which not only provided strong evidence for the reliability and feasibility of this model, but also proved that the IAD prevention and treatment was a key link in the prevention and control of adolescent physical decline.

4.3 Integrated Intervention Characterized by Health Management is an Essential Way to Prevent and Control the Adolescent Physical Deterioration

The foothold of most policies issued to prevent and control the adolescent physical deterioration in China was physical exercise, and people tried to improve their health by strengthening physical exercise. However, the fact that the continuous deterioration trend of adolescent physique has not been overcome effectively shows that the reasons for the deterioration are diverse, and it is difficult to achieve the expected goals just relying on exercise intervention. Other factors, such as nutrition, work and rest, tobacco and alcohol, and psychological stress, should be taken into account in the research on preventing and controlling the deterioration.

Some scholars also began to explore the problem of adolescent physical health from the perspective of lifestyle in recent years. Studies showed that many factors of affecting health included genetic factors, lifestyle, mental factor, environmental factor and so on, but lifestyle accounted for up to 60% (Xianli Zhao, Zhijun Li, Zhikun Wu, 2011). For example, there was a significant correlation between the lifestyle of middle school students and physical health, the students with bad lifestyle had poor physique test scores, while the students with good comprehensive evaluation had few bad lifestyles. Unreasonable routine and diet will reduce the health level of students. Watching TV and surfing the Internet for too long is the main cause of affecting sleep, which is also one of the causes to increase the detection rate of obesity (Fan Ding, 2009). A continuing education program in USA led to a 37% drop in the number of junior middle

school students smoking, and a 50% drop in the obesity rate among girls in the school-based education program. Many studies have shown that good school education and family supervision can effectively reduce the spread of unhealthy behaviour among students and help them develop good lifestyle, thus improving their health (Jianfang Jin, 2007; Gengdan Hu, Dan Wang, 2015). It can be seen that the cultivation of healthy lifestyle, such as nutrition, sleep and exercise, is an effective way to guarantee the health of adolescents. This means integrated interfering adolescent constitution with measures of nutrition, sleep, exercise, etc. will be the mainstream ideas and methods for health intervention in the future.

Although people in China have realized the important role of diet and sleep on the health of adolescents, there are only a few empirical studies on the intervention of physical health with these elements, and the reason may be related to the difficulty in the control of experimental conditions. Problems like how much influence of reasonable diet and sleep on teenagers' physique, how to implement teenagers' diet and sleep intervention, are still being explored. In contrast, Japan is far ahead of China in research and practice of this respect. For example, in terms of nutrition, Japanese schools uniformly implement the diet plan formulated by Japanese Ministry of Education, and make personalized meal matching for teenagers according to age, gender, weight and other indicators. The nutrients and calories consumed in each meal have been digitized to ensure reasonable meals. In terms of sport, a good coordination mechanism and guarantee mechanism of operation have been formed among schools, parents and various societies to ensure that every student exercises for 2 to 3 hours every day, and each student has mastered more than 2 sports skills. All of these provide scientific basis for the phenomenon that the constitution of Japanese teenagers does not decline but rises instead, and also provide reference for China on how to carry out the adolescent physical health intervention in the future.

This study carries out co-ordinated intervention and comparative research on the physical health of adolescents from various aspects such as lifestyle change, learning style change and Internet habit change, and initially forms Integrated Intervention Model of Solution-Focused Health Management with Study Method Change and IAD Prevention and Treatment.

This model is characterized not only by physical exercise to maintain and improve physical health, but also by multidisciplinary and multi-dimensional joint intervention. The intervention concept focuses on strengthening the healthy subject consciousness of students and their parents, strengthening time management and goal management, and adopting a variety of means such as nutrition, rest and exercise to conduct integrated intervention on the physical health of adolescents, while the premise of realizing this concept is to establish and improve the cooperative mechanism among society, school, family and students, and to carry out effective health management for the lifestyle, learning style and online habit of students.

From table 1 to table 5, it can be seen that this model can not only effectively improve the physical fitness of adolescents, but also improve their mental health and academic performance. Therefore, the integrated intervention with health management as the main body may be the fundamental way to prevent and control the decline of adolescent physical fitness.

5. Conclusions

(1) There are two root reasons for the continuous decline of physical fitness in adolescents. Firstly, adolescents and their parents' self-awareness of health management are weak, resulting in the formation of sedentary, over-nutrition, irregular lifestyles. Secondly, the policies that have been issued are inadequate in terms of scientificity and operability, e.g. the joint intervention on adolescent physical health from the perspectives of nutrition, work and rest, IAD, learning methods, etc. has not been effectively carried out, and the guarantee mechanism of operation of the policies has not yet been well established.

(2) Key measures are as follows: Changing the subjects' concept to improve their health crisis consciousness; Establishing an integrated prevention and control mode that combines lifestyle, learning style, cognitive behavior, target management, time management and other means altogether.

(3) The fundamental way to prevent and control physical deterioration is to adopt the concept and method of integrated intervention which takes health management as the main body, including cultivating students' interest in sports, changing passive exercise to active exercise, developing good lifestyle, learning style and online behavior, and practicing sports in both their study time and spare time.

(4) Integrated Intervention Model of Solution-Focused Health Management with Study Method Change and IAD Prevention and Treatment can not only effectively improve adolescent physical health, but also obviously enhance their mental health and academic performances, and consequently should be a mainstream method of physical constitution intervention in the future.

(5) Students who are physically inactive because of IAD should be mainly interposed by Biological-Psychological-Social Multidisciplinary Integrated IAD Prevention and Treatment Mode Based on "Addiction Displacement". Students who sit and study for a long time should be mainly interposed by ELTPEBL. Students with poor concentration should be mainly interposed by constructivism learning theory.

Acknowledgements

This work was supported by Key Project of School Sports Scientific Research in Shanghai (HJTY-2016-C02); Social Sciences Interdisciplinary Project of Tongji University (1430219042) and The Humanities and Social Sciences Planning Fund Project of Ministry of Education in China (09YJAZH018).

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