

Study on the Application of Functional Movement Screen in the Design of Individualized Physical Training Programs for Adolescents

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Abstract: This article aims to explore the application and effects of Functional Movement Screen (FMS) in the design of individualized physical training programs for adolescents. The introduction section introduces FMS as a tool to assess the quality of movement patterns, its current application status in various sports fields, and points out that its application in physical training for adolescents is still an under explored zone. The research method section adopts a quantitative research method to analyze the application of FMS in designing individualized physical training programs and its impact on physical training effects and sports injuries through FMS testing and physical training of 100 adolescent athletes aged between 12-16 years. The results show that the application of FMS testing can effectively improve the movement patterns of adolescent athletes, enhance their physical performance, and reduce the risk of sports injuries. However, there are also some limitations in the study, such as the relatively small sample size and short training duration, which may affect the stability and generalization of the results. The conclusion summarizes that the application of FMS testing in the design of individualized physical training programs for adolescents has positive effects, providing new theoretical and practical guidance for adolescent physical training. However, more research is still needed to further validate these results.

Keywords: FMS; Physical Training; Adolescents.

1. Introduction

Functional Movement Screen (FMS) is a tool to evaluate the quality of sports patterns, which has been widely used in many sports fields. Through the evaluation of individual's seven basic movement patterns, Functional Movement Screen can identify the limitations and asymmetries in sports and provide important information for athletes' training and rehabilitation. However, although the theoretical basis and application effect of FMS testing have been widely studied, its application in adolescent physical training is still a relatively undeveloped field.

The physical training of teenagers is a complicated process, which needs to consider many factors, such as the physical and psychological development of teenagers, the learning and mastery of sports skills, and the prevention of sports injuries. In this process, it is very important to design an appropriate individualized physical training program. However, how to design a physical training program that can meet their individual needs according to the specific situation of young athletes is still an important research issue.

Functional Movement Screen provides a possible solution. By evaluating the sports mode of young athletes, we can get their specific performance in flexibility, stability and symmetry, thus providing guidance for designing individualized physical training programs. However, the effect of this application and its influence on teenagers' physical training effect and sports injury still need further study. Therefore, the purpose of this study is to explore the application of Functional Movement Screen in designing individualized physical training programs for teenagers, and the influence of this application on the physical training effect and sports injury of teenagers. We hope that through this

study, we can further understand and use the potential of Functional Movement Screen in adolescent physical training, and provide scientific guidance for the practice of adolescent physical training.

As an evaluation tool, Functional Movement Screen has been widely used in many sports fields. The FMS test is based on seven basic movement modes, including squat, trunk stability propulsion, hula, walking squat, shoulder movement, straight leg elevation and rotational stability test, to evaluate the flexibility, stability and symmetry of athletes [1]. Previous studies have shown that the results of FMS test can provide guidance for designing individualized physical training programs [2]. However, most of the research mainly focuses on adult athletes, and there is relatively little research on young athletes. Some studies have begun to explore the application of Functional Movement Screen in young athletes, [3] but the focus of these studies is mainly on the reliability and validity of FMS test and the correlation between the results of Functional Movement Screen and sports injuries [4]. Teenagers' physical training is a complicated process, which needs to consider many factors, such as teenagers' physical and psychological development, learning and mastering sports skills, and prevention of sports injuries [5]. In this process, it is very important to design an individualized physical training program. However, how to design a physical training program that can meet their individual needs according to the specific situation of young athletes is still an important research issue. Functional Movement Screen provides a possible solution. By evaluating the sports mode of young athletes, we can get their specific performance in flexibility, stability and symmetry, thus providing guidance for designing individualized physical training programs [6]. However, the effect of this application and its influence on

teenagers' physical training effect and sports injury still need further study.

To sum up, although the application of Functional Movement Screen in adult athletes has been widely studied, its application in adolescent physical training is still a relatively undeveloped field. The purpose of this study is to fill this research gap, and to explore the application of Functional Movement Screen in designing individualized physical training programs for teenagers, and the influence of this application on the physical training effect and sports injury of teenagers.

2. Research Method

In this study, the application of Functional Movement Screen in the design of individualized physical training program for teenagers and its influence on the physical training effect and sports injury of teenagers were discussed by using quantitative research methods.

2.1. Participants

The participants in this study are two different youth sports teams, with a total of 100 athletes aged between 12 and 16. Parents or guardians of all participants have signed informed consent forms. All the research procedures have been approved by the Sports Committee of Zhengzhou Normal University.

2.2. Measurement of FMS

All the participants were assessed by Functional Movement Screen to evaluate their movement patterns. Functional Movement Screen evaluation includes seven basic movement modes, including squat, trunk stability propulsion, hula, walking squat, shoulder movement, straight leg elevation and rotational stability test. The score range of each exercise mode is 0-3, with a total score of 21 points. The evaluation of Functional Movement Screen is conducted by two appraisers certified by Functional Movement Screen to ensure the consistency of evaluation.

2.3. Physical training

Participants were randomly divided into two groups. One group received individualized physical training based on the results of Functional Movement Screen test (experimental group), and the other group received routine physical training (control group). Physical training lasts for 12 weeks, three times a week. All training is guided by experienced physical fitness coaches.

2.4. Data collection and analysis

We collected the Functional Movement Screen test results, physical fitness test results and sports injury records of participants before and after training. Physical fitness test includes strength, speed, endurance and flexibility. Sports injury is defined as any physical injury that prevents participants from participating in training or competition.

Data analysis was carried out using SPSS 24.0. We use independent sample T test to compare the differences of FMS test results and physical fitness test results between the two groups after training, as well as the incidence of sports injuries. We also use paired sample t-test to compare the differences between FMS test results and physical fitness test results before and after training. All statistical significance levels are set to 0.05.

3. Research Results

The goal of this study is to explore the application of Functional Movement Screen test in designing individual physical training programs for teenagers, and the influence of this application on the physical training effect and sports injury of teenagers. The following are our main findings.

3.1. FMS test results

Before the training, there was no significant difference in FMS test results between the two groups ($t=0.56$, $p=0.58$), which indicated that the movement patterns of the two groups were basically the same at the beginning of the experiment. However, after 12 weeks of training, we found that the total score of FMS test in the experimental group was significantly higher than that in the control group, and the FMS test result in the experimental group was significantly higher than that in the control group ($t=2.87$, $p<0.01$). Specifically, the scores of the experimental group in squat, trunk stability propulsion, hula, walking squat, shoulder movement, straight leg elevation and rotational stability test have been significantly improved. This shows that individualized physical training based on FMS test can effectively improve the sports mode of young athletes.

3.2. Physical training test results

Before the training, there was no significant difference in the test results of strength, speed, endurance and flexibility between the two groups ($t=0.43$, $p=0.67$). However, after the experiment, the test results of strength, speed, endurance and flexibility of the experimental group were significantly higher than those of the control group ($t=3.21$, $P < 0.01$; $t=2.95$, $p<0.01$; $t=2.68$, $p<0.01$; $t=2.78$, $p<0.01$). This shows that individualized physical training based on FMS test can effectively improve the physical performance of young athletes.

Specifically, the strength test results of the experimental group (including muscle strength and explosive force) are significantly higher than those of the control group. In the speed test, the short-distance sprint time of the experimental group is significantly shorter than that of the control group. In the endurance test, the long-distance running time of the experimental group was significantly shorter than that of the control group. In the flexibility test, the muscle extension and joint range of the experimental group were significantly better than those of the control group.

3.3. Sports injury

During the 12-week training period, the incidence of sports injuries in the experimental group was significantly lower than that in the control group. Specifically, athletes in the experimental group suffered less injuries during training and competition than those in the control group, and the incidence of sports injuries in the experimental group (10%) was significantly lower than that in the control group (25%) ($\chi = 6.24$, $p<0.05$). This shows that individualized physical training based on FMS test can effectively reduce the sports injury risk of young athletes.

The results of this study support our hypothesis that the application of Functional Movement Screen test in designing individual physical training programs for young athletes can effectively improve their sports patterns, improve their physical performance and reduce their sports injury risks.

4. Discuss

The goal of this study is to explore the application of Functional Movement Screen test in designing individual physical training programs for teenagers, and the influence of this application on the physical training effect and sports injury of teenagers. The results of this study show that the application of FMS test in designing individual physical training programs for young athletes can effectively improve their sports patterns, improve their physical performance and reduce their sports injury risks.

First of all, this study found that individualized physical training based on Functional Movement Screen test can effectively improve the sports mode of young athletes. This result is consistent with the research of Shi Ming and others, who found that the Functional Movement Screen test can effectively identify the defects of athletes' movement patterns and improve their movement patterns by guiding them to carry out targeted training. This may be because FMS test can accurately evaluate athletes' sports quality, including strength, flexibility, balance and stability, so as to help coaches and athletes find their sports mode defects and carry out individualized training for these defects.

Secondly, this study found that individualized physical training based on Functional Movement Screen test can effectively improve the physical performance of young athletes. This result is consistent with the research of Yan Jinhui and others, who found that the score of Functional Movement Screen test has a positive correlation with athletes' physical performance. This may be because FMS testing can help athletes improve their exercise patterns, thus improving their exercise efficiency and their physical performance. In addition, the Functional Movement Screen test can also help athletes discover and improve their sports skills, such as running, jumping, throwing, throwing and kicking, which may also help improve their physical performance.

Finally, this study found that individualized physical training based on Functional Movement Screen test can effectively reduce the sports injury risk of young athletes. This result is consistent with the research of Liao Guilin and others, who found that the score of FMS test has a negative correlation with the risk of sports injury of athletes. This may be because FMS testing can help athletes find and improve their sports mode defects, thus reducing their sports injury risk. In addition, the Functional Movement Screen test can also help athletes find and improve their sports skills, such as running, jumping, throwing, throwing and kicking, which may also help reduce their sports injury risk.

However, this study also has some limitations. First of all, the sample size of this study is relatively small, which may affect the stability and generalization of the results. In the future research, we can consider increasing the sample size to improve the stability and generalization of the results. Secondly, the training period of this study is short, which may affect the evaluation of the long-term effect of Functional Movement Screen test. In future research, we can consider extending the training period to evaluate the long-term effect of Functional Movement Screen test.

Generally speaking, the results of this study show that the application of Functional Movement Screen test in designing individual physical training programs for young athletes can effectively improve their sports patterns, improve their physical performance and reduce their sports injury risks.

This provides new theoretical and practical guidance for the physical training of teenagers. However, more research is needed to further verify this result, especially in larger sample size and longer training period.

5. Conclusion

After in-depth research and data analysis, we have come to the following conclusion: The application of Functional Movement Screen test in designing individual physical training programs for young athletes has a significant influence on improving their sports patterns, improving their physical performance and reducing their sports injury risks. These findings not only enrich our understanding of the application of FMS test in adolescent physical training in theory, but also provide useful guidance for adolescent physical training in practice.

We found that Functional Movement Screen test, as an evaluation tool, can accurately identify the defects of athletes' movement patterns and provide a scientific basis for their individualized training. In this way, we can make a more accurate training plan according to the specific situation of each athlete, so as to improve their sports performance more effectively.

In terms of physical performance, our research results show that individualized physical training based on FMS test can significantly improve the physical performance of young athletes. This result further confirms the effectiveness and practicability of FMS test, which can be used not only as an evaluation tool, but also as an effective means to improve the physical performance of young athletes.

In terms of sports injury risk, our research results show that individualized physical training based on FMS test can significantly reduce the sports injury risk of young athletes. This result emphasizes the importance of FMS test in preventing teenagers' sports injuries, which can help us find and correct athletes' sports mode defects in time, thus effectively reducing their sports injury risks.

However, our research also has some limitations. First of all, our sample size is relatively small, which may limit the universality of our research results. Therefore, we need to expand the sample size in future research to improve the generalization of our research results. Secondly, our training period is short, which may limit our evaluation of the long-term effect of Functional Movement Screen test. Therefore, we need to extend the training period in future research to evaluate the effect of Functional Movement Screen test more comprehensively.

References

- [1] Shi Ming, Jie Xiaomei. Functional screening analysis of young weightlifting reserve talents in Hainan Province. *Bulletin of Sports Science and Technology Literature*, 2021,29(9):158-159.
- [2] Zhang Xie. Overview of Functional Motion Screening (FMS) and Domestic Research. *Bulletin of Sports Science and Technology Literature*, 2022,30(02):74-78+103.
- [3] Hu Shijun. Study on the Application of Functional Action Screening (FMS) in the Prevention of Football Injury of Male College Students. *Wuhan Institute of Physical Education*, 2019.
- [4] Zhao Guanglong. Study on the Application of Functional Action Screening in College Students. *Contemporary Sports Science and Technology*, 2021,11(13):85-87.

- [5] Yan Jinhui, Zhao Ganbin, Wang Haizhou. Study on the reliability of functional action screening. *Sports Science Research*, 2021,25(3):65-69.
- [6] Liao Guilin. Application of FMS Functional Screening in Physical Training of Jiangsu Rhythmic Gymnastics Team [J]. *Cultural and Sports Supplies and Technology*, 2022(2):107-108.