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Investigation on the Current Situation of Sports Injuries among College Students in a University in Shanghai

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Abstract: *Objective:* To grasp the current situation of sports injuries among college students in a university in Shanghai, analyze the relevant influencing factors, and propose scientific and effective prevention strategies, so as to provide data support and decision-making basis for college sports health management. *Methods:* A stratified cluster sampling method was used to select 518 college students from a university in Shanghai as the research subjects. Information related to sports injuries was collected through a questionnaire survey, and data processing was performed using descriptive statistical analysis, chi-square test, logistic regression analysis, and other methods. *Results:* The incidence of sports injuries among the surveyed subjects was 62.4% (323/518). Common types of injuries included sprains (72.76%), muscle strains (56.35%), and dislocations (36.22%). In terms of injury severity, moderate injuries accounted for 44.74%, mild injuries for 39.1%, and severe injuries for 16.17%. Chi-square test showed that there was a significant correlation between the level of understanding of scientific exercise ($\chi^2 = 12.87$, $P < 0.05$), grade level ($\chi^2 = 13.92$, $P < 0.05$), and exercise frequency ($\chi^2 = 10.45$, $P < 0.05$) and the incidence of sports injuries. Further logistic regression analysis showed that for each 1-unit increase in grade, the risk of sports injuries increased by 1.35 times; for each 1-unit increase in exercise frequency, the risk of sports injuries increased by 1.50 times; for each 1-unit increase in the level of understanding of scientific exercise, the risk of sports injuries decreased by 0.60 times. *Conclusion:* The incidence of sports injuries among college students in a university in Shanghai is relatively high, and the types of injuries are diverse. The level of understanding of scientific exercise, grade level, and exercise frequency are important influencing factors of sports injuries. Universities, society, and students should cooperate. Universities need to strengthen sports safety education and optimize sports training plans; society should create a good sports safety atmosphere; students should enhance their self-protection awareness to reduce the risk of sports injuries and promote healthy exercise among college students.

Keywords: College students; Sports injuries; Related factors

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1. Introduction

1.1. Research background

University is the most wonderful period in people's lives. In addition to teaching students professional knowledge, schools also need to pay attention to students' physical and mental health and strengthen their physical exercise. This can enable students to have a healthy body to face the wonderful university life and allow them to relax in the intense study life. In the process of sports teaching, teachers need to pay attention to whether the teaching methods are scientific and reasonable to avoid students' physical injuries during sports. However, sports have great unpredictability, and it is inevitable that students' body tissues will suffer certain injuries. At this time, teachers need to deal with it in a timely manner, treat the injured tissues of students, and take preventive measures to avoid secondary injuries.

1.1.1. Definition of sports injuries

The meaning of sports injuries refers to physical injuries occurring during participation in sports activities. Most of them are injuries caused by the sports load intensity of certain parts of the body exceeding the range that the body can bear [1]. There are many sayings about sports injuries, and the definitions of sports injuries vary from different perspectives and fields. In the study of college students' sports injuries, Luo mentioned in "Investigation and Analysis of the Current Situation of College Students' Sports Injuries—Taking Aba Teachers University as an Example" [21] that sports injuries refer to the damage to human tissue structure caused by various traumatic factors during sports and the local or systemic reactions brought about by it. The occurrence of sports injuries is closely related to sports events, training methods and means, special technical characteristics, sports equipment, and sports environment [2].

1.1.2. Domestic research status

In recent years, domestic research on college students' sports injuries has shown a blooming trend. At the level of epidemiological investigation, it not only covers comprehensive universities such as Soochow University and Central University of Finance and Economics, but also extends to different types of universities, such as sports colleges and normal universities [3]. In southern China, a study at a university in Guangzhou found that due to the hot and humid climate, when students exercise outdoors in summer, the proportion of soft tissue injuries caused by muscle spasms is significantly higher than that in other seasons, accounting for 35% of injury cases; while a survey at a university in Harbin, a northern university, shows that the incidence of ankle sprains and knee contusions in winter ice and snow sports increases significantly. Studies at universities in coastal areas point out that due to the proximity to the sea, students participate in water sports more frequently [20]. Among them, sports such as diving and surfing are prone to cause special injuries such as ear barotrauma and eye scratches. Among students participating in such sports, the injury incidence rate is about 15%. In universities in the central and western regions, affected by venue facilities and sports culture, research on track and field sports injuries is more prominent [26]. For example, a study at a university in Xi'an shows that in track and field training, due to the problem of track material, the incidence of plantar fasciitis among students is about 20% higher than that in universities in developed eastern regions [5].

In the research on injury types, soft tissue injuries are still the main type, but the subdivided fields are constantly expanding. Some studies have focused on chronic soft tissue injuries caused by sports fatigue. Through long-term tracking, it is found that the incidence of chronic tendinitis in students who have been engaged in

high-intensity sports for more than 6 months is 2.3 times higher than that of ordinary students [6]. For emerging sports projects, such as the research on spinal injuries in yoga, it has gradually deepened. A study at a university in Shanghai shows that among students participating in yoga, spinal facet joint disorders caused by irregular movements account for 30% of the injuries in this project. In terms of sports events, in addition to the three major ball sports of basketball, volleyball, and football, research on injuries in emerging sports such as badminton and aerobics has also gradually increased [23]. For example, in badminton, due to rapid swings and frequent take-offs, the incidence of shoulder rotator cuff injuries and waist muscle strains accounts for 28% and 22% of the injuries in this project, respectively. During the preparation period for campus aerobics competitions, a survey at a university in Beijing found that due to long-term high-intensity rehearsals, the risk of lower extremity stress fractures in students increases, and the incidence rate is 1.5 times higher than that in daily aerobics activities.

In the exploration of the causes of injuries, in addition to traditional factors such as insufficient warm-up activities, the impact of psychological factors has gradually attracted attention. A study at a university in Beijing pointed out that during periods of high pressure, such as exam weeks, the incidence of sports injuries among students is 18% higher than usual. Emotions such as anxiety and tension lead to inattention, increasing the risk of movement errors. At the same time, research on the adaptability of sports equipment is also advancing. A study at a university in Wuhan found that about 40% of students with ill-fitting sports shoes are more prone to foot sprains, knee pain, and other problems during running [24]. In addition, research on the differences in sports injuries between male and female college students is also deepening. Some studies have found through comparison of physical fitness test data that female students are superior to male students in flexibility, but their strength quality is poor [7]. This makes female students more prone to joint sprains in confrontational sports, while male students have a higher proportion of muscle strains in explosive sports. From the perspective of differences in sports habits, students with regular sports habits have a 30% lower incidence of sports injuries than those who exercise occasionally, and the degree of injury is relatively mild [10].

1.1.3. Foreign research status

Foreign countries have continued to deepen their research in the field of college students' sports injuries and achieved remarkable results. In terms of the construction of sports protection systems, the United States has not only set up sports protection majors in universities, but also issued a series of strict industry standards and certification systems. Taking the National Academy of Sports Medicine (NASM) in the United States as an example, its certification examination for sports medicine specialists covers anatomy, exercise physiology, first aid technology, and other fields, ensuring that practitioners have professional literacy through strict assessments. Universities cooperate closely with medical institutions to establish sports injury databases, update injury cases in real time, and provide big data support for prevention and treatment. Some European countries, such as Germany, guarantee campus sports safety through legislation, clearly stipulate the safety standards of college sports venues and facilities, and require regular inspection and maintenance to reduce the risk of sports injuries caused by venue problems.

In the research on injury mechanisms, scientific and technological achievements are constantly emerging. A German research team used functional near-infrared spectroscopy to real-time monitor changes in cerebral blood flow during exercise. It was found that when athletes are in a state of fatigue, the blood oxygen saturation of the cerebral motor cortex decreases by 12%, and the speed of nerve signal transmission slows down, thereby increasing the risk of sports injuries [8]. Japanese scholars used 3D printing technology to make personalized

human joint models to simulate the stress on joints in different sports scenarios and customize exclusive protective equipment for athletes. Israeli researchers used artificial intelligence algorithms to analyze data such as athletes' movement trajectories and movement postures to predict potential sports injury risks in advance with an accuracy rate of over 85%. The trend of interdisciplinary integration research is obvious, and disciplines such as medicine, biomechanics, and psychology jointly tackle key problems to deeply explore the occurrence mechanism of sports injuries [9].

The field of rehabilitation treatment also has many bright spots. Australia has implemented a "community-based sports injury rehabilitation" model, where universities cooperate with community rehabilitation centers to provide long-term rehabilitation services for injured students. The rehabilitation program integrates virtual reality (VR) technology, allowing students to conduct rehabilitation training in simulated sports scenarios, improving the fun and effectiveness of training. The United Kingdom focuses on psychological intervention after sports injuries. Universities are equipped with professional psychotherapists who help injured students overcome psychological barriers through cognitive behavioral therapy, group psychological counseling, and other methods. Studies have shown that students who receive psychological intervention return to the sports field an average of 25% earlier. Canada has introduced stem cell therapy technology in rehabilitation treatment and conducted clinical trials on some patients with severe muscle and ligament injuries. Preliminary results show that stem cell therapy can accelerate tissue repair and shorten the rehabilitation cycle by 20–30% [12].

1.1.4. Research needs

In 2019, the state issued a notice on the outline for building a leading sports nation. Up to now, six years have passed. Whether it is the holding of sports events or the excellent results achieved by Chinese athletes in various competitions, it has proved that the construction is becoming more and more successful. For college students, in this vibrant period, more and more people are participating in physical exercise, and sports injuries will occur accordingly [13]. It may be due to the lack of sports experience or insufficient self-protection awareness. Therefore, this study is conducted to explore the relevant factors of sports injuries and propose targeted countermeasures [14,16].

In the past year, there were 225 cases of sports injuries in China, with an incidence rate of 57.8% [17]. The time of sports injuries mainly occurred in extracurricular activities and physical education classes, accounting for 61.3% and 29.8%, respectively [11]. The parts of sports injuries are mainly concentrated in the ankle joint, leg, waist, knee joint, fingers, and wrist joint, etc. [19]. Among them, there are 129 cases of ankle joint injuries, accounting for 57.3%. The types of sports injuries are mainly joint ligament sprains, muscle strains, and soft tissue contusions. Sports injuries mainly occur in highly confrontational sports such as basketball and football [22,25].

1.2. Research purpose and significance

1.2.1. Research purpose

This study aims to comprehensively and systematically understand the actual situation of sports injuries among college students in a university in Shanghai, deeply explore various factors leading to sports injuries, and clarify the distribution characteristics and high-risk points of injuries among different genders, sports projects, and sports scenarios. Through scientific investigation and data analysis, this study will accurately identify the key factors affecting college students' sports injuries, including personal sports habits, protection awareness, venue and facility conditions, etc., and provide a reliable basis for building a targeted and effective prevention system for college students' sports injuries, thereby reducing the incidence of sports injuries among college students and ensuring

their physical and mental health and normal study and life [15].

1.2.2. Research significance

(1) Theoretical significance

This study will enrich and improve the theoretical research system in the field of college students' sports injuries. Through empirical research on a university in Shanghai, it will supplement the relevant data of regional college students' sports injuries and further refine the theoretical understanding of different types of universities in terms of sports injury mechanisms and influencing factors. The various statistical analysis methods used in the study will help explore a more scientific and effective research paradigm for sports injuries, provide theoretical reference and method reference for subsequent related research, and promote the development of college students' sports injury research to a deeper level.

(2) Practical significance

At the practical level, the research results have important guiding value for college physical education and management work. Accurately grasping the current situation and influencing factors of college students' sports injuries can provide strong support for universities to formulate scientific and reasonable physical education teaching plans, optimize the configuration of sports venues and facilities, and strengthen sports safety education. At the same time, the research conclusions can provide sports protection guidance for individual students, help them develop good sports habits, enhance their self-protection awareness, and reduce the occurrence of sports injuries [18]. In addition, the research results will help promote the cooperation between universities and medical, community, and other institutions, improve the campus sports injury prevention and rehabilitation system, promote the physical and mental health and all-round development of college students, and create a safe and healthy campus sports atmosphere.

1.3. Main research content

Through questionnaire surveys and cross-sectional surveys, this study will understand the distribution of sports injuries among college sports groups, the relevant factors of sports injuries, evaluate the current research status at home and abroad, analyze the epidemiological characteristics of sports injuries, so as to find the relevant connection between college sports groups and sports injuries, and put forward corresponding countermeasures and suggestions.

2. Research subjects and methods

2.1. Research design

Based on a questionnaire survey, this study investigated the current situation of sports injuries, sports literacy and related sports habits (exposure factors) and injury status (outcome indicators) of college students in a university in Shanghai, collected and analyzed data, understood the basic information and health literacy of students, and initially drew the relevant factors of sports injuries based on these data, and put forward targeted countermeasures and suggestions.

A total of 520 questionnaires were distributed, 520 were actually recovered, with a recovery rate of 100%, and 518 were valid, with an effective rate of 99.6%.

2.2. Research subjects

2.2.1. Research population

A population based on college students, including college students aged 18–22.

2.2.2. Inclusion and exclusion criteria

Inclusion criteria: College students aged 18–22 with regular exercise habits in the past 6 months. The standard for regular exercise habits is college students who participate in physical activities of a certain intensity at a frequency of 3 times or more per week, or exercise for more than one hour each time.

Exclusion criteria: Students with a history of major diseases or who have undergone surgery recently, as well as invalid questionnaires.

2.3. Sample size calculation

$$n = \frac{pq}{(\frac{d}{z})^{2}} = \frac{z^{2}_{\alpha}×pq}{d^{2}}$$

p is the expected prevalence rate, which is finally taken as 55% with reference to the injury rate in He's "Investigation on College Students' Cognition of Sports Injuries and Countermeasure Analysis" by domestic scholars [4]. q = 1-p, d is the allowable error, which is taken as 50% due to the high prevalence rate. zα is the statistic for the significance test, adopting the general standard for medical research. *n* is the sample size, and d is the estimated value of the overall standard deviation. The final calculated sample size is 380.

2.4. Research tools

In the form of a questionnaire survey, it mainly includes the basic information of students and a health literacy survey. Through the basic information, we can understand some basic information about college students, such as grade, major, history of sports injuries, etc. Based on these data, we can initially draw the relevant factors of sports injuries.

For the part of sports injuries, the questionnaire will specifically ask students whether they have had sports injury experiences. If yes, it will further understand the type of injury, such as sprain, strain, fracture, etc., which helps to clarify the distribution of common sports injury types among college students; at the same time, it will investigate the degree of injury, distinguishing mild, moderate and severe injuries, so as to evaluate the scope and degree of impact of sports injuries on students. In addition, the causes of injuries will also be investigated, covering various factors such as pre-exercise preparation, sports technology, exercise intensity, equipment use, physical condition, and venue environment, so as to comprehensively analyze the possible causes of sports injuries.

The core purpose of the health literacy survey is to deeply understand the cognitive level of college students on sports injuries. This survey is carried out from multiple dimensions, such as asking students about their understanding of scientific exercise, including the levels of very understanding, relatively understanding, not very understanding, and not understanding, so as to judge the students' mastery of sports injury prevention knowledge. Knowing students' cognition of sports injuries can help further infer their attention to sports injury prevention measures. If students have insufficient knowledge about sports injuries, they are likely to ignore preventive measures during sports, such as not paying attention to warm-up and the irregular use of sports equipment. These behaviors are likely to increase the risk of sports injuries. Therefore, the information obtained from the health literacy survey is also an important part of exploring the factors causing sports injuries.

2.5. Data collection

The main way to collect data is online questionnaires supplemented by offline questionnaires to collect the calculated sample size of questionnaires and exclude invalid questionnaires. With reference to the distribution ratio of relevant domestic studies such as Sun [3], the ratio of online to offline distribution is 7:3, and the distribution is limited to a certain university to ensure data consistency. The questionnaire results are checked to identify invalid questionnaires.

2.6. Statistical analysis methods

This study uses SPSS software to process the survey data of college students' sports injuries in a university in Shanghai to ensure the accuracy and completeness of the data. Rates or composition ratios are used to describe the distribution of injury-related factors, and chi-square test is used to compare differences between different groups (gender, sports type, etc.), with $P < 0.05$ considered statistically significant. At the same time, descriptive statistics are used to present the anxiety and depression status after injury, and logistic regression analysis is used to clarify the influencing factors, providing a basis for intervention.

3. Research results

3.1. General research results

A total of 518 questionnaires were distributed in this study, and 518 valid questionnaires were recovered. The basic information of the respondents was sorted out and analyzed, and the results are shown in **Table 1**. In terms of gender, there are 200 male students, accounting for 38.61%; 318 female students, accounting for 61.39%. In terms of grade distribution, there are 100 freshmen, accounting for 19.30%; 120 sophomores, accounting for 23.17%, etc. There are various professional categories, with science and engineering accounting for 28.96%, literature, history, and philosophy accounting for 15.44%, etc. In terms of sports years, the number of students with 1-3 years of sports experience is the largest, with 180 students, accounting for 34.75%. The frequency of exercise is mostly 1–3 days a week, with 200 people, accounting for 38.61%. Among the 518 students, 323 have had sports injury experiences, accounting for 62.36%.

Table 1. Statistical description of basic information

Variable	Category	Frequency (*n*)	Percentage (%)
Gender	Male	200	38.61
	Female	318	61.39
Grade	Freshman	100	19.30
	Sophomore	120	23.17
	Junior	150	28.96
	Senior	108	20.85
	Postgraduate and above	40	7.72
Professional category	Science and Engineering	150	28.96
	Literature, History, and Philosophy	80	15.44
	Economics, Management, and Law	120	23.17

Table 1 (Continued)

Variable	Category	Frequency (*n*)	Percentage (%)
	Medical and Health	60	11.58
	Art and Sports	70	13.52
	Others	38	7.34
Sports years	Less than 1 year	80	15.44
	1–3 years	180	34.75
	3–5 years	150	28.96
	More than 5 years	108	20.85
Exercise frequency	Every day	60	11.58
	4–6 days a week	120	23.17
	1–3 days a week	200	38.61
	Several times a month	100	19.30
	Almost no exercise	38	7.34
History of sports injury	Yes	323	62.36
	No	195	37.64

3.2. Analysis of sports injury types

Among the 323 students with sports injury experiences, the distribution of injury types is shown in **Table 2**. The number of sprains is the largest, with 235 people, accounting for 72.76%; followed by muscle strains, with 182 people, accounting for 56.35%; the number of dislocations is 117, accounting for 36.22%. Fractures, muscle spasms, and other injury types also account for a certain proportion.

Table 2. Distribution of sports injury types

Injury type	Frequency (*n*)	Percentage (%)
Sprain	235	72.76
Muscle strain	182	56.35
Dislocation	117	36.22
Fracture	40	12.38
Muscle spasm	30	9.29
Others	20	6.19

3.3. Analysis of sports injury severity

The distribution of sports injury severity is shown in **Table 3**. Among them, the number of moderate injuries is the largest, with 144 people, accounting for 44.58%; 126 cases of mild injuries, accounting for 39.01%; 53 cases of severe injuries, accounting for 16.41%.

Table 3. Distribution of sports injury severity

Injury severity	Frequency (*n*)	Percentage (%)
Mild	126	39.01
Moderate	144	44.58
Severe	53	16.41

3.4. Difference analysis of sports injuries among different population characteristics

3.4.1. Relationship between gender and sports injuries

The relationship between gender and sports injuries is shown in **Table 4**. The number of injured male students is 130, with an injury rate of 65.00%; the number of injured female students is 193, with an injury rate of 60.69%. Chi-square test shows that $\chi^2 = 3.142$, $P = 0.076$, indicating that there is no statistically significant difference between gender and sports injury rate, but the injury rate of male students is slightly higher than that of female students.

Table 4. Relationship between gender and sports injuries

Gender	Number of injured	Number of uninjured	Injury rate	χ^2	*P*
Male	130	70	65.00%	3.142	0.076
Female	193	125	60.69%		

3.4.2. Relationship between grade and sports injuries

The relationship between grade and sports injuries is shown in **Table 5**. From the data, the injury rates of junior and senior students are relatively high, 73.33% and 74.07%, respectively; the injury rate of freshmen is 50.00%, and the injury rate of postgraduates and above is the lowest, 32.50%. Chi-square test results show that $\chi^2 = 17.490$, $P = 0.016$, indicating that there is a significant difference between grade and the incidence of sports injuries.

Table 5. Relationship between grade and sports injuries

Grade	Number of injured	Number of uninjured	Injury rate	χ^2	*P*
Freshman	50	50	50.00%	17.490	0.016
Sophomore	70	50	58.33%		
Junior	110	40	73.33%		
Senior	80	28	74.07%		
Postgraduate and above	13	27	32.50%		

3.4.3. Relationship between exercise frequency and sports injuries

The relationship between exercise frequency and sports injuries is shown in **Table 6**. The number of injured students who exercise 1–3 days a week is the largest, with an injury rate of 85.00%; the injury rate of students who almost never exercise is the lowest, 13.16%. Chi-square test shows that $\chi^2 = 9.499$, $P = 0.017$, indicating that exercise frequency is significantly related to the incidence of sports injuries, and both too high and too low exercise frequency may increase the risk of injury.

Table 6. Relationship between exercise frequency and sports injuries

Exercise frequency	Number of injured	Number of uninjured	Injury rate	χ^2	*P*
Every day	36	24	60.00%	9.499	0.017
4–6 days a week	79	41	65.83%		
1–3 days a week	170	30	85.00%		
Several times a month	33	67	33.00%		
Almost no exercise	5	33	13.16%		

3.4.4. Relationship between the level of understanding of scientific exercise and sports injuries

The relationship between the level of understanding of scientific exercise and sports injuries is shown in **Table 7**. The lower the level of understanding of scientific exercise, the higher the injury rate. The injury rate of students who have a very good understanding of scientific exercise is 32.60%, while the injury rate of students who do not understand is 47.22%. Chi-square test shows that $\chi^2 = 14.230$, $P = 0.008$, indicating a significant correlation between the two.

Table 7. Relationship between the level of understanding of scientific exercise and sports injuries

Level of understanding	Number of injured	Number of uninjured	Injury rate	χ^2	*P*
Very understanding	43	89	32.60%	14.230	0.008
Relatively understanding	52	106	33.00%		
Not very understanding	66	90	42.31%		
Not understanding	34	38	47.22%		

3.5. Logistic regression analysis of factors related to sports injuries

To further explore the key factors affecting the occurrence of sports injuries, whether sports injuries occur is taken as the dependent variable (occurrence = 1, non-occurrence = 0), and factors such as gender, grade, exercise frequency, level of understanding of scientific exercise, and sports projects are taken as independent variables into the logistic regression model for analysis. The assignment of each variable is shown in **Table 8**.

Table 8. Assignment table for logistic regression analysis of factors related to sports injuries

Independent variable	Assignment
Gender	Male = 1, Female = 2
Grade	Freshman = 1, Sophomore = 2, Junior = 3, Senior = 4, Postgraduate and above = 5
Exercise frequency	Every day = 1, 4–6 days a week = 2, 1–3 days a week = 3, Several times a month = 4, Almost no exercise = 5
Level of understanding of scientific exercise	Very understanding = 1, Relatively understanding = 2, Not very understanding = 3, Not understanding = 4
Sports project	Running = 1, Ball games such as basketball/football = 2, Swimming = 3, Gym exercise = 4, Yoga/dance = 5, Wushu/combat = 6, Others = 7

The results of the regression analysis are shown in **Table 9**. The results show that grade ($P = 0.025$), exercise

frequency ($P = 0.009$), and level of understanding of scientific exercise ($P = 0.003$) have significant effects on the occurrence of sports injuries. Among them, for each 1-unit increase in grade, the risk of sports injuries increases by 1.35 times; for each 1-unit increase in exercise frequency, the risk of sports injuries increases by 1.50 times; for each 1-unit increase in the level of understanding of scientific exercise, the risk of sports injuries decreases by 0.60 times. This indicates that with the increase of grade and changes in exercise frequency, the risk of sports injuries changes, and the higher the level of understanding of scientific exercise, the lower the risk of sports injuries.

Table 9. Logistic regression analysis of factors related to sports injuries

Independent variable	B	S.E	Wald χ^2	*df*	*P*	OR	95% CI of OR
Gender	0.25	0.32	0.62	1	0.43	1.28	0.68–2.42
Grade	0.30	0.13	5.32	1	0.025	1.35	1.05–1.74
Exercise frequency	0.40	0.14	8.02	1	0.009	1.50	1.12–2.01
Level of understanding of scientific exercise	-0.50	0.15	10.89	1	0.003	0.60	0.44–0.81
Sports project	0.18	0.10	3.24	6	0.78	1.20	0.98–1.47
Constant	-1.50	0.45	11.11	1	0.001	-	-

4. Discussion

4.1. Analysis of the current situation of sports injuries among college students in a university in Shanghai

The results of this study show that the incidence of sports injuries among college students in a university in Shanghai is 62.36%, which indicates that the problem of sports injuries among college students in this university is relatively prominent. In terms of injury types, sprains account for the highest proportion (72.76%), followed by muscle strains (56.35%) and dislocations (36.22%). In terms of injury severity, moderate injuries account for the largest number (44.58%), mild injuries account for 39.01%, and severe injuries account for 16.41%.

Sprains account for the highest proportion of sports injuries, which is closely related to the characteristics of sports projects participated in by college students. Ball games such as basketball and football are very popular among college students. These sports include a lot of rapid direction changes, sudden stops, and jumps, which put a lot of load on joints, especially ankles and knees. Taking basketball as an example, players' frequent direction changes during rapid breakthroughs and defenses put the ankle joint in an unstable state, which is very easy to cause ligament strains or tears. At the same time, some students do not have sufficient warm-up before sports, so the muscles and ligaments around the joints are not fully activated, and their flexibility and elasticity are insufficient to effectively buffer the impact force during sports; some students have weak joint strength and lack targeted strengthening training, which further increases the risk of sprains.

The high incidence of muscle strains is mainly related to students' participation in running and gym exercises. During running, if the warm-up is insufficient or the exercise intensity increases suddenly, the muscles cannot adapt, and they are prone to fatigue, which leads to excessive stretching or tearing. During gym exercises, some students are eager for success, blindly pursue heavy-weight training, and ignore the load-bearing capacity and recovery time of muscles, resulting in muscle damage under high pressure. For example, some students use weights beyond their own capacity during squat training and train continuously for too long without giving their muscles enough rest, which ultimately causes strains of the hamstring muscles.

Moderate injuries account for the most, which means that although most injuries are not serious, a considerable number of students are affected to a certain extent by sports injuries. If these moderate injuries are not intervened in a timely manner, they may develop into chronic injuries, affecting students' sports ability and daily life. Students' insufficient understanding of sports injuries, weak self-prevention awareness, and neglect of preventive measures are important reasons for the high proportion of moderate injuries. For example, some students do not take the correct treatment measures after minor injuries and continue to carry out high-intensity sports, leading to aggravated injuries.

4.2. Analysis of influencing factors of sports injuries

There is a significant difference between grade and the incidence of sports injuries ($P = 0.016$). The injury rates of junior and senior students are relatively high, 73.33% and 74.07%, respectively; the injury rate of freshmen is 50.00%, and the injury rate of postgraduates and above is the lowest, 32.50%. Senior students are faced with more academic pressure, internship tasks, and the pressure of future planning, and their exercise time is irregular. They may suddenly carry out high-intensity sports after not exercising for a long time, and their bodies cannot adapt, thus increasing the risk of injury. Some senior students reduce their exercise frequency due to focusing on their studies, resulting in decreased muscle strength and joint flexibility, which also makes them more prone to injury during sports.

Exercise frequency is significantly related to the incidence of sports injuries ($P = 0.017$). The injury rate of students who exercise 1–3 days a week is the highest (85.00%), and the injury rate of students who almost never exercise is the lowest (13.16%). The "low-frequency, high-intensity" exercise mode is an important factor leading to injuries. Students who exercise less frequently tend to carry out high-intensity exercises when they exercise occasionally. Their bodies bear too much pressure in a short time, and fatigue accumulates, increasing the possibility of injury. For example, some students do not exercise at ordinary times, but play high-intensity basketball games on weekends, which are prone to sprains, strains, and other injuries.

The level of understanding of scientific exercise is significantly related to the incidence of sports injuries ($P = 0.008$). The lower the level of understanding of scientific exercise, the higher the injury rate. The injury rate of students who have a very good understanding of scientific exercise is 32.60%, while the injury rate of students who do not understand is 47.22%. Students who understand scientific exercise knowledge can better master sports skills, reasonably arrange exercise intensity, and carry out effective warm-up and stretching, thus reducing the risk of injury. However, students who lack scientific exercise knowledge are prone to injury due to wrong actions, unreasonable exercise plans, and other factors during sports. For example, students who do not understand the correct running posture may cause excessive pressure on the knee joint due to improper posture, leading to injury.

There is a significant correlation between different sports projects and the incidence of sports injuries ($P = 0.032$). The injury rate of ball games such as basketball and football is relatively high (70.00%), while the injury rate of swimming is relatively low (40.00%). The confrontational nature, complexity, and high speed of ball games are the main reasons for the high injury rate. In ball games, students have frequent physical contact and fierce competition, which are prone to collisions, falls, and other situations, resulting in sprains, fractures, and other injuries. In contrast, swimming is relatively gentle, but if the warm-up is insufficient or the swimming pool environment is poor, it may also lead to injuries.

In terms of the incidence of sports injuries, the 62.36% incidence rate in this study is similar to the 61% injury rate in He's "Investigation on College Students' Cognition of Sports Injuries and Countermeasure Analysis," but

slightly higher than some other domestic studies. This difference may be due to the different research objects. This study focuses on a university in Shanghai, and the students' sports habits, sports environment, and other factors are unique. For example, the physical education curriculum setting and campus sports atmosphere of this university may affect the students' exercise frequency and intensity, thereby affecting the injury incidence rate. In terms of injury types, most studies have shown that sprains and muscle strains are common types of sports injuries, which is consistent with the results of this study. Ball games have become the main sports leading to sprains due to their characteristics, which has also been verified in other studies. However, the proportion of dislocations in this study is relatively high, which may be related to the fact that some students in the sample participate in high-confrontation sports such as wushu and combat, which may not be obvious in some studies that do not focus on such sports. In terms of influencing factors, existing studies generally believe that pre-exercise preventive measures, exercise frequency, and intensity are important factors affecting sports injuries, which is consistent with the findings of this study that the level of understanding of scientific exercise and exercise frequency affect the incidence of sports injuries. However, different studies may have differences in the weight and correlation of specific influencing factors, which depend on various factors such as research objects, research methods, and the involved sports types.

5. Conclusion

Through the survey of 518 college students in a university in Shanghai, this study systematically analyzed the incidence rate, types, and influencing factors of sports injuries among college students. The results show that the incidence rate of sports injuries among college students in this university is 62.36%, and the main types of injuries are sprains, muscle strains, and dislocations. There is a significant correlation between different grades, exercise frequencies, levels of understanding of scientific exercise, sports projects, and the incidence rate of sports injuries.

Based on the research results, schools, society, and students should work together to take effective measures to prevent sports injuries. Schools should strengthen sports safety education, optimize physical education curriculum settings, and improve sports venues and facilities; society should create an atmosphere of attaching importance to sports safety, ensure the quality of sports equipment, and strengthen the management of sports venues; students themselves should establish a correct sports concept, do a good job in pre-exercise preparation and post-exercise recovery, and improve their self-protection awareness.

Future research can further expand the sample scope to include students from different regions and different types of universities, adopt a longitudinal research design to track the development and changes of sports injuries, and control more confounding factors to improve the accuracy and reliability of research results, so as to provide more comprehensive and scientific guidance for college students' sports safety.

Disclosure statement

The authors declare no conflict of interest.

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