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FULL TIME

The Impact of Income Level and Social Activities on Sports Participation: An Empirical Study
Based on CGSS 2021 Data

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Budapest, 2025

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Abstract

With the improvement of people's living standards and the upgrading of consumption structures, participation in sports activities has gradually become a focal point of public attention as an important lifestyle choice. General Secretary Xi Jinping has emphasized that "the ultimate goal of promoting high-quality development is to ensure people's happiness and well-being." Against this backdrop, the widespread engagement in sports activities not only reflects the quality of life of residents but also signifies a shift in societal and cultural demands. However, empirical research on sports participation and its potential influencing factors remains limited in China, lacking systematic theoretical and practical analysis.

This study, based on data from the Chinese General Social Survey (CGSS) in 2021, explores key factors influencing participation in sports activities by integrating Maslow's hierarchy of needs theory and social capital theory. Using regression analysis on data related to sports participation, this study examines the impact of income level and social activities on sports engagement. Additionally, it analyzes the differences in sports participation among heterogeneous groups categorized by age and education level.

The empirical results indicate that income level, social activities, educational attainment, and subjective social class all have a significant positive effect on sports participation. Specifically, individuals with higher incomes and more frequent social interactions are more likely to engage in sports activities. This trend is particularly pronounced among middle-aged and elderly individuals as well as those in the middle-income group.

Based on the empirical findings, this study proposes policy recommendations to promote sports participation. First, the construction of public sports facilities should be accelerated to enhance accessibility and diversify sports programs. On the demand side, efforts should be made to strengthen the promotion of sports culture, raise public awareness of sports participation, and improve the overall exercise environment. Creating a social atmosphere that encourages active participation in sports will help attract more people to engage in physical activities and enhance their overall well-being.

CHAPTER 1: INTRODUCTION

1.1 Background to the Study

General Secretary Xi Jinping has emphasized that "the ultimate goal of promoting high-quality development is to ensure people's happiness and well-being." In the new stage of development, the demand of the Chinese people for a better life is no longer limited to material aspects but is increasingly shifting toward cultural, spiritual, and health-related needs. With the continuous development of China's socio-economic landscape, people's demand for a healthy lifestyle has been growing^[1]. As an essential part of daily life, sports activities have gradually gained prominence as a key component of well-being^[2]. According to projections, by 2035, the sports industry is expected to account for approximately 4% of GDP, making it a pillar industry of China's national economy^[3].

As urban and rural income levels continue to rise, the participation in sports activities has also been increasing annually, becoming one of the most significant lifestyle choices after daily consumption^[4]. While people continue to enjoy improved material living conditions, they are placing greater emphasis on sports activities to enhance physical and mental well-being, providing a vast market for the sports industry. However, despite the great potential of the sports consumption, systematic research on sports participation and its relationship with industrial development remains insufficient in China, lacking in-depth analysis.

The outbreak of COVID-19 and its control measures have significantly altered people's lifestyles, causing a severe negative impact on sports activities and consumption patterns^[5]. However, as the pandemic gradually subsides, the public's awareness of healthy living has further deepened, and sports participation rates have steadily increased, becoming a key driver of the sports industry's recovery and growth. With the relaxation of pandemic control policies, the demand for sports activities has surged, further accelerating the development of the sports industry^[6].

Currently, research on sports participation in China primarily focuses on consumer behavior and market trends. However, how to effectively enhance participation rates to promote the sports industry's development and how different demographic groups (such as age and education levels) differ in their sports participation remain underexplored. Therefore, this study aims to investigate the key factors influencing sports participation, analyze its impact, and examine how variations in participation across different demographic groups shape the overall growth and optimization of the industry.

1.2 Research Significance

1.2.1 Theoretical Significance

This study aims to fill the research gap in academia regarding the mechanisms of influence between sports participation and the development of the sports industry. By constructing a theoretical model and combining it with empirical analysis, this research seeks to further improve and deepen the understanding of the interactive mechanism between sports participation and the sports industry, particularly from the demand-side perspective. By analyzing sports participation from an individual's perspective, this study expands the research scope of sports economics. Starting from the demand for sports participation among residents, this research examines the influencing factors and their role in driving the development of the sports industry. These insights help people to know the motivations behind individuals' decisions in engaging sports activities and provide a theoretical foundation for predicting changes in the sports market and optimizing public sports policies.

By integrating social capital theory and Maslow's hierarchy of needs theory, this study explores how multiple levels and dimensions influence sports participation and examines its role in developing the sports industry. This research not only focuses on the growth of the sports industry but also incorporates perspectives from socioeconomics and residents' quality of life, offering recommendations on how enhancing sports participation rates can contribute to develop the sports industry. Ultimately, this study contributes to establishing a theoretical framework that connects sports participation, the sports industry, and socioeconomic development, enhancing the understanding of the role of sports activities in health promotion, social capital accumulation, and sports economic growth.

1.2.2 Practical Significance

This study, through an empirical analysis of the factors influencing participation in sports activities, can provide data support and theoretical basis for the government in formulating policies related to the development of the sports industry and the promotion of national fitness. Especially in improving the participation rate in sports activities, optimizing the allocation of public sports resources, the suggestions proposed in this study will help guide policy implementation more accurately, enhance the accessibility and participation of sports activities for all citizens, and further promote the sports industry's development.

By deeply analyzing the determinants of participation in sports activities, this study can offer more precise market positioning and sports demand analysis for enterprises related to the sports industry. It can help companies make more scientific decisions in areas such as sports

facility construction, fitness service provision, event operation, and product innovation. By increasing the participation level of different groups, it will not only promote the sports industry's development but also popularize sports culture and enhance the overall sports atmosphere in society.

In addition, the results of this study help raise public awareness of the importance of sports activities, encourage a more active and healthy lifestyle, and provide practical guidance for various sectors of society. Through the understanding and analysis of residents' sports participation behavior, this study can assist governments, enterprises, and social organizations in formulating more targeted incentive measures to promote wider participation in sports activities, thus improving the overall health level of residents and enhancing national happiness and quality of life.

Considering the ongoing social changes and the evolving lifestyles of residents, this study further explores the innovation space and development potential of sports participation. It also proposes new opportunities for the sports industry in emerging health demands, smart fitness, and online sports services. This provides innovative ideas for companies to develop new sports products and optimize sports service models, thus promoting the sports industry to develop in a more diversified, personalized, and market-oriented direction.

1.3 Research Methods

1.3.1 Literature Analysis Method

This study first employs the literature analysis method to review and summarize existing research on sports participation and related behaviors both domestically and internationally. By analyzing previous studies, this research aims to understand the theoretical framework of sports participation, influencing factors, and its relationship with the development of the sports industry, providing theoretical support and research direction for subsequent empirical analysis. The literature analysis method not only helps identify the gaps and shortcomings in current academic research but also provides necessary references for constructing the theoretical model. In particular, it aids in extracting valuable theories and methodologies from existing studies when exploring sports participation behavior, individual decision-making motivations, and the impact of social activities on sports participation.

Additionally, by summarizing and comparing relevant literature, this study identifies the multidimensional factors influencing sports participation and examines how these factors affect the development of the sports industry through individual sports participation behaviors. The literature analysis method provides the theoretical foundation and hypothesis construction for

this study and serves as a crucial step in understanding the relationship between sports industry development and sports participation.

1.3.2 Econometric and Statistical Analysis Method

This study employs the generalized ordered logit regression model to analyze the factors influencing sports participation. Additionally, mediation effect analysis is used to explore how specific variables affect individuals' sports participation frequency, thereby influencing sports-related behaviors. Through empirical analysis, this study examines how these variables independently and collectively impact the level of sports participation and further investigates how social activities function as a mediating variable in shaping decisions related to the sports industry.

In this study, the generalized ordered logit regression model is applied to handle ordinal categorical dependent variables, such as the frequency of participating in physical exercise and the frequency of attending live sports events. The use of this model allows for a precise assessment of how various influencing factors impact sports participation levels. Furthermore, mediation effect analysis is conducted to reveal the way through which different factors influence people's sports participation. Specifically, this approach helps identify how certain variables shape individual sports behavior patterns by affecting their participation frequency. This analysis will enhance the understanding of the direct effects of independent variables on sports participation as well as clarifying how they indirectly influence individual engagement in sports through different pathways.

The combined use of the generalized ordered logit regression model and mediation effect analysis deepens the understanding of the multi-level impact mechanisms of sports and leisure consumption behaviors. It also provides empirical evidence and strategic recommendations for promoting the sports industry's development. By applying these econometric and statistical methods, this study ensures the accuracy and reliability of its conclusions while offering a scientific foundation for promoting sports participation and formulating relevant policies in the sports industry.

CHAPTER 2: CONCEPT DEFINITION AND LITERATURE REVIEW

2.1 Concept Definition

2.1.1 Participation in Sports Activities

Participation in sports activities refers to the process in which individuals or groups, driven by multiple needs, engage in various sports behaviors (such as physical exercise, sports training, and watching sports events) to enhance physical health, psychological well-being, and social interaction^[7] (Zhang Fenglin, 2024). This concept not only includes direct participation in physical exercise but also indirect forms of engagement, such as watching sports events and participating in sports-related social activities^[8] (Xia Qifei, 2023). With social development, the forms of participation in sports activities have become increasingly diverse, and the motivations for participation have become more complex, involving multi-layered needs such as health, social interaction, and self-fulfillment^[9] (Li Zhuojia et al., 2024).

Participation in sports activities can be categorized into two forms. The first one is the direct participation, and the second one is the indirect participation. Direct participation refers to individuals engaging in exercise and sports competitions to directly improve their physical fitness and athletic ability, such as fitness training, running, and ball games^[10] (Yang Rongrong, 2019). The second type is indirect participation, which includes watching sports events, following sports news, and participating in sports-related social activities to fulfill personal needs related to sports^[11] (Wang Jianqing, 2021). These forms not only meet physiological needs but also provide emotional satisfaction and opportunities for social interaction^[12] (Zhang Dong, 2022).

The motivation for participation in sports activities is a key factor influencing the frequency, type, and depth of participation^[13] (Li Yan, 2020). Based on different motivations, participation in sports activities can be categorized into intrinsic motivation-driven and extrinsic motivation-driven. Intrinsic motivation refers to individuals engaging in sports voluntarily for health, enjoyment, or self-improvement, such as exercising to enhance physical fitness or improve skills^[14] (Sun Xiaoqiang, 2006). Extrinsic motivation is driven by some other external factors, such as social needs, peer pressure, or cultural influences^[15] (Huang Qian, 2024).

Moreover, the external environment also plays a crucial role in influencing participation in sports activities. For example, the “30-Minute Sports Life Circle” initiative has significantly increased residents' participation rates by developing more sports facilities and providing more accessible public sports services in urban communities^[16] (Li Xiaotian, 2024). This policy-driven support and community engagement have not only expanded opportunities for participation in sports activities but also enhanced residents' sports awareness and social

interactions. The accessibility of community sports facilities and the optimization of the sports environment have significantly improved the frequency and quality of physical activity among residents^[7] (Bao Lixia, 2015).

Overall, participation in sports activities is not only a reflection of physical health but is also closely related to individuals' social needs, cultural identity, and self-fulfillment. With changes in social structures, participation in sports activities has evolved from merely fulfilling physiological needs to encompassing more diverse social and cultural demands, showing a trend of diversification and personalization. It has become a crucial force in promoting national fitness and social harmony.

2.1.2 Development of the Sports Industry

The core of the sports industry lies in meeting the diverse demands of society for sports entertainment, health management, and cultural identity through the production and sale of sports activities, events, and products^[18], thereby driving the growth and maturity of the relevant market^[19]. As people's living standards improve and health awareness increases, the sports industry has evolved from traditional manual labor and competitive sports services into a complex industry encompassing multiple sectors and possessing a sophisticated structure^[20].

Sports industry's development is not only a result of economic growth but also a reflection of social and cultural progress and changes in consumption patterns^[21]. In many countries, government policies and investments in the sports industry have facilitated the construction of sports facilities, the organization of sporting events, and the popularization of sports culture^[22].

Technological advancement is another key factor driving the sports industry's development. With the widespread use of the internet and mobile devices, the sports industry has achieved deep integration between online and offline platforms. Internet advertising plays a guiding role in the sports industry's development^[23]. Big data has changed people's habits and perceptions of sports participation, making access to sports-related information more convenient and diversified, thereby effectively promoting innovation and upgrading within the sports industry^[24]. Through smart fitness equipment, virtual sports events, and online fitness platforms, the forms of the sports industry have been greatly enriched, making it an essential driver of digital sports development and the cultivation of new sports-related productivity^[25].

Furthermore, with globalization and the rise of multinational sports brands, the sports industry's development has increasingly exhibited an international trend. The organization of international sports events, the promotion of global sports brands, and the integration of the

global sports market have all contributed to making the sports industry a significant component of the global economy^[26].

2.2 Literature Review

2.2.1 Sports Consumption and Participation in Sports Activities

Existing research primarily explores related behaviors from the perspective of sports consumption, while studies that specifically examine sports participation from an economic perspective remain relatively scarce. Therefore, this study will build upon research related to sports consumption, drawing on valuable theoretical and empirical analytical methods to investigate the economic factors influencing sports participation.

Sports consumption behavior refers to the actions through which consumers invest money, time, effort, and emotions to participate in sports activities or purchase related products to fulfill their needs^[27] (Zheng Liankai, 2024). This behavior not only reflects consumers' material demands but also highlights their aspirations for a healthy lifestyle, enriched spiritual experiences, and social integration^[28] (Li Zhenpeng et al., 2024). Tian Hong (2014) pointed out that sports consumption behavior is typically categorized into physical consumption and service-based consumption^[29]. Service-based sports consumption mainly includes participation in sports exercises, payment of fitness membership fees, and attending sports events^[30] (Yang Yang, 2014). In the current social context, sports participants are increasingly focusing on experience and interaction, making service-based sports consumption a dominant trend^[31] (Zhao Qiang et al., 2014).

Moreover, technological advancements have continuously driven innovations in sports consumption formats, with digital sports consumption models becoming increasingly popular^[32]. The diversification of sports participation has gradually blurred the traditional boundaries between spectator-based and participatory sports consumption, further enriching the ways in which individuals engage with sports activities and their related demands^[33] (Wu Zhangzhong & Zhong Yaping, 2022).

Therefore, the widespread participation in sports activities not only drives the growth of service-based sports consumption but also promotes the diversification and personalization of sports consumption behavior, ultimately enhancing the quality of life for individuals. This trend provides a broader perspective for studying the motivations and effects of sports participation and offers important insights into the study of sports consumption behavior.

2.2.2 Research on Factors Influencing Participation in Sports Activities

The diversity and complexity of sports participation are influenced by some factors, mainly at the individual, social, and economic levels. At the individual level, income level is widely recognized as a key factor affecting participation in sports activities. Studies indicate that high-income groups have greater access to sports participation and are more likely to participate in regular physical exercise, such as joining gyms, hiring personal trainers, or attending professional sports training. They also tend to have a wider range of sports options, including social-oriented activities like joining sports clubs, participating in long-distance races, or marathons^[34] (Zheng Liankai & Zheng Junwei, 2024). In contrast, low-income groups, due to financial constraints, are more likely to engage in low-cost or free public fitness activities, such as exercising in community parks or using public sports facilities, rather than opting for paid gym memberships or professional training. Research suggests that income level not only affects the frequency of sports participation but also determines the type of sports individuals choose^[35] (Ye Xin & Chen Shaojun, 2024). Additionally, differences in age and gender also influence participation. Younger individuals prefer interactive and emerging sports, such as virtual sports events and online fitness programs, while older individuals favor low-intensity, socially engaging activities like square dancing and Tai Chi. Gender differences are also evident, with men being more inclined toward competitive and physically demanding sports, whereas women tend to prefer activities focused on health management and relaxation, such as yoga and Pilates^[36] (Huang Ying & Sun Shuhui, 2024).

At the social level, social capital and social networks play a crucial role in sports participation. A well-developed social network can encourage individuals to engage more actively in sports, as many sports activities involve group participation and social interactions. Studies have shown that individuals with higher social capital, such as those who frequently engage in social activities or have strong community connections, are more likely to participate in sports, including community fitness programs, team sports, and group yoga classes^[37] (Zhang Qianqian & Tong Yingjuan, 2024). These social interactions not only enhance the appeal of sports but also increase the frequency and consistency of participation. Social networks provide greater access to sports resources, and sports activities themselves serve as important social settings. Marital status and family structure also influence sports participation behavior, as married individuals are more inclined toward family-friendly activities such as parent-child sports, while single individuals may prefer independent fitness activities that offer greater flexibility^[38] (Zhang Wei et al., 2022).

At the economic level, regional economic development and the availability of public sports facilities significantly affect participation in sports activities^[39] (Yu Lei et al., 2019). Research indicates that residents in economically developed areas generally have higher participation rates, not only because of their higher income levels but also due to better-developed sports infrastructure and a greater variety of fitness resources. The accessibility of public sports facilities directly influences residents' exercise habits and participation frequency, as areas with well-established parks, jogging trails, and public sports venues make it easier for residents to maintain regular exercise habits. In contrast, regions with inadequate sports facilities may see lower participation rates due to the limited availability of venues and resources^[40] (Li Hai et al., 2024).

2.3 Literature Evaluation

Through a review of existing research on sports participation, the following key points can be summarized: First, the influencing factors of sports participation exhibit multi-layered and multidimensional characteristics, encompassing economic, individual, and social aspects. Existing studies generally suggest that income level and health status play a significant role in promoting sports participation. High-income groups, due to their stronger financial capacity, more tend to engage in regular physical exercise and afford a wider range of sports choices, while individuals with good health conditions tend to participate in high-intensity or frequent sports activities. Moreover, individual factors such as gender, age, and cultural background have gradually gained research attention. However, further exploration is needed on the impact of specific individual behavioral characteristics (such as sports preferences and fitness habits) on participation patterns.

Second, with the advancement of socioeconomic development and technological progress, sports participation is increasingly shifting towards digitalization and virtualization. The rise of online fitness courses and virtual sports events, particularly among younger demographics, has emerged as a new mode of engagement. This format not only breaks the traditional time and space constraints of sports activities but also broadens the reach of participants, injecting new vitality into sports promotion. Studies have shown that the widespread adoption of online sports activities following the COVID-19 pandemic has speeded up the digital transformation of the sports industry while presenting new challenges for researchers, such as how to adapt to and meet these emerging demands to further promote the sustainable development of sports participation.

Third, although existing studies have conducted in-depth analyses of the multi-tiered structure of the sports industry, policy support, and technological innovation, the increasing diversification and personalization of sports participation demands call for an expansion of research scope. Specifically, in areas such as urban-rural disparities and differences in participation across age groups, researchers need to examine the dynamic changes in sports participation behavior and propose targeted strategies to promote broader engagement and increase participation levels. Additionally, while existing studies have largely focused on the influence of sports participation on industry development, they have overlooked the reverse effect, such as how improvements in the quality of sports industry services can in turn motivate individuals to participate in sports activities. This aspect warrants further exploration to achieve a more comprehensive understanding of the bidirectional relationship between sports participation and sports industry development.

Overall, the existing literature has laid a solid foundation for research on sports participation. However, with rapid changes in the socioeconomic environment and technological advancements, future research should further focus on the trends of personalized and digitalized sports participation, as well as key issues such as urban-rural disparities. By deepening the exploration of the underlying influencing factors and mechanisms of sports participation, and expanding the interaction between sports participation, socioeconomic development, and technological progress, this field can advance in both theoretical and practical dimensions, providing stronger academic support for increasing public participation in sports and optimizing the development path of the sports industry.

CHAPTER 3: THEORETICAL FRAMEWORK AND RESEARCH DESIGN

3.1 Theoretical foundation

3.1.1 Hierarchy of needs theory

The hierarchy of needs theory was founded by Abraham Maslow (Maslow, 1943). As a motivational theory, it classifies human needs into five levels, arranged from lower to higher^[41]. According to Maslow's theory, physiological needs encompass the fundamental material conditions necessary for human survival, such as food, air, water, and shelter. Safety needs follow, referring to an individual's need for a stable living environment, job security, and physical health. The next level, love and belonging needs, involves an individual's emotional and social relationships, including family bonds, friendships, and romantic relationships. Esteem needs include both self-respect and the respect of others, relating to self-worth, a sense of achievement, and social status. Finally, self-actualization needs represent the pursuit of maximizing personal potential, including creativity, self-improvement, and the desire for self-transcendence.

Maslow's hierarchy of needs theory is based on several key points: (1) Needs are hierarchical, but this hierarchy is not rigid, as external factors and individual differences can influence changes in need levels. (2) Unfulfilled needs drive individual behavior—once lower-level needs are met, individuals naturally strive toward higher-level needs. (3) When multiple needs coexist, the most urgent need takes priority—once it is satisfied, other needs then become sources of behavioral motivation. (4) The level of a need determines its motivational priority—once a lower-level need is fulfilled, its influence on behavior gradually weakens.

From the perspective of the hierarchy of needs theory, leisure sports refer to various forms of physical activities and sports participation undertaken in leisure time to satisfy higher-level needs such as physical and mental well-being, social interaction, and self-actualization. Leisure sports not only contribute to improving an individual's health status but also enhance social interaction and personal growth, making them an essential part of the higher-level needs in human value systems^[42] (Xie Yuhang, 2008).

In the field of sports participation, the hierarchy of needs theory effectively explains individuals' motivations for engaging in sports at different stages of development. Currently, most individuals have already satisfied their physiological and safety needs and are gradually moving toward the self-actualization stage. At this stage, sports activities serve not only as a means to fulfill health and recreational needs but also as an important avenue for personal growth and socialization. Regular exercise, participation in sports training, and engagement in sports competitions enable individuals to improve their quality of life and health, expand their

social circles, and enhance their psychological well-being, ultimately fostering comprehensive physical and mental development^[43] (Xin Changcheng, 2013).

Thus, sports participation has become a significant means for individuals to pursue self-actualization and enhance their quality of life. With China's economic development and rising living standards, an increasing number of individuals are striving to meet higher-level needs such as physical and mental health, social interaction, and spiritual growth. Sports participation has gradually emerged as a crucial means of fulfilling these needs. It not only involves physical exercise but also plays a role in health management, social networking, and psychological fulfillment, helping individuals progress toward higher-level needs such as self-actualization and personal development^[44] (Zhu Yang, 2012).

3.1.2 Social capital theory

Social capital theory provides important theoretical support for understanding the relationship between sports participation and social interactions. First proposed by American sociologist L.J. Hanifan (Hanifan, 1916), social capital theory emphasizes the resources and benefits individuals and groups obtain through the establishment and maintenance of social networks^[45]. In the 1980s, French sociologist Pierre Bourdieu (Bourdieu, 1986) further expanded the concept of social capital, arguing that it consists of the actual or potential resources acquired by individuals or groups through social relationships and networks^[46].

Later, James Coleman (Coleman, 1988) and Robert Putnam (Putnam, 1995) deepened the theoretical framework of social capital. Coleman thought the social capital as a social structural resource that facilitates individual actions, suggesting that individuals accumulate social capital by participating in collective activities, establishing social networks^[47]. Putnam emphasized the role of social capital in political participation, arguing that it enhances community cooperation, strengthens social trust, and promotes the management of public affairs^[48] (Putnam, 1995).

Social capital theory offers a crucial perspective on sports participation and the development of the sports industry. Interactions among friends help strengthen engagement and persistence in sports activities. Through regular exercise, joining sports communities, or participating in sports events, individuals can deepen their social connections, facilitate the formation of social networks, and increase their enthusiasm for sports participation.

Support and interaction within social networks serve as key motivators for individuals to participate in sports more frequently. For example, engaging in team sports activities not only promotes physical health but also enhances social interactions and the expansion of social networks, thereby increasing an individual's social capital^[49] (Yuan Qing, 2024). The

accumulation of social capital further contributes to the sports industry's development, particularly in the promotion of community sports activities and public sports services, playing a significant role in their expansion (Coleman, 1988).

3.1.3 Rational choice theory

Rational choice theory originates from the fields of economics and sociology and serves as a theoretical model for studying how individuals make behavioral choices based on rational analysis and decision-making. The core idea of this theory is that when faced with multiple options, individuals evaluate the costs and benefits of each choice to make decisions that maximize their utility. Initially proposed by economist Becker (Becker, 1976) to explain individual decision-making in different contexts, rational choice theory emphasizes rationality and goal-oriented behavior^[50]. Within the framework of rational choice, individuals typically calculate the maximum potential benefits of each option based on their goals, preferences, and available resources, ultimately selecting the most beneficial course of action.

In the field of sports participation, rational choice theory is widely used to analyze how individuals allocate their limited time, money, and energy, especially when deciding whether to engage in a particular sports activity. For example, when individuals consider whether to exercise or participate in a sports event, they weigh multiple factors such as health benefits, entertainment value, social opportunities, and the economic and time costs involved. According to rational choice theory, individuals make optimal decisions by balancing the benefits and costs of sports participation based on their preferences and resource constraints. Consequently, individuals with different income levels, occupational pressures, and lifestyles may exhibit different decision-making patterns in sports participation. If the perceived benefits of engaging in a sports activity—such as improved health, social interactions, or relaxation—outweigh its costs (such as financial, time, and energy investments), individuals are more likely to choose participation. Becker (1976) pointed out that decision-making behavior is not only based on an immediate assessment of gains but is also closely linked to long-term benefits, personal preferences, and social environment factors^[51] (Zheng Guohua, 2006). Given the constraints of time and financial resources, individuals weigh various external factors, such as their economic situation, health needs, and societal expectations, before making decisions that best serve their interests. For instance, consumers may opt for fitness activities with high social and entertainment value, whereas those with limited financial means may choose low-cost or free public sports services, such as sports programs offered at public sports facilities. Furthermore, rational choice theory explains why high-income groups tend to invest more in fitness and

health management services, while low-income groups are more likely to engage in low-cost or free sports activities.

Rational choice theory also helps analyze how individuals make sports participation decisions under the influence of market dynamics and social culture. With increasing health awareness, many people now view sports participation as a key component of enhancing personal health and quality of life, while the sports industry continues to innovate products and services based on public demand. For example, fitness training, health management services, and sports event participation have gradually become integral to individuals' rational decision-making. Particularly with the rise of digitalization and online fitness trends, rational choice theory provides strong support for explaining how individuals adopt new technologies and modern forms of sports participation.

3.2 Data source and variable selection

3.2.1 Data source

The data used in this study is sourced from the 2021 CGSS database. This database employs a stratified multi-stage sampling technique to systematically collect data at different levels, ensuring national representativeness while maintaining comprehensiveness and temporal continuity. Due to its objectivity and authority, CGSS is widely recognized in the field of social science research.

CGSS 2021 covers 29 provinces, municipalities, and autonomous regions across China. During the data-cleaning process, this study excluded samples where respondents' answers were recorded as "missing," "unable to answer," or "do not know" to eliminate abnormal values from the dataset.

3.2.2 Variable selection and description

The definitions of the variables used in this study and a partial descriptive analysis of the sample are presented in Table 3-1, where:

(1) Dependent variables: In this study, the dependent variables include the frequency of sports exercise participation (A30.9) and the frequency of attending live sports events (A30.10). The definition of A30.9 is derived from the survey question that asks residents about the frequency of their sports exercise participation over the past year. The response options range from "never" to "daily", with values recoded on a scale from 1 to 5, where a higher value indicates a higher frequency of sports exercise participation, reflecting residents' level of engagement in sports activities. A30.10 measures the frequency of attending live sports events, based on the survey responses ranging from "never" to "daily", which are also recoded on a 1

to 5 scale. This variable represents residents' involvement in sports entertainment activities. These two dependent variables capture the behavioral differences between participation in sports activities and spectating live sports events.

(2) Key independent variable: The key independent variable in this study is income level, which is measured by personal income (A8a). This variable reflects residents' economic status and their financial capability to engage in sports activities.

(3) Mediating variable: Based on the literature review, "social activities" is considered a potential mediating variable in this study. A higher frequency of social interactions often indicates stronger social ties, which, to some extent, enhance individuals' willingness and motivation to participate in sports activities. This mediating variable provides an explanatory pathway for how income level influences sports participation.

(4) Control variables: This study incorporates factors related to individual, family, and socioeconomic characteristics as control variables. These variables are included in the regression analysis to reduce omitted variable bias and improve the reliability of the model results.

At the individual level, age (Age) and highest education level (Edu) are included to control for individual characteristics affecting sports participation.

At the family level, parental education level (Parent_Edu) is introduced to reflect the potential impact of family socioeconomic background on individual sports participation.

At the social level, subjective social class (Social_Layer) and perceived social fairness (Fairness) are included to measure individuals' perception of their social status and further examine how social structural factors influence sports participation.

Table 3-1 Variable description and descriptive statistics

Variable category	Variable name	Definition	Descriptive statistics				
			Obs	Mean	Max	Min	Std. dev.
Dependent variables	Frequency of sports exercise (Sports_Exercise)	1 = Never, 2 = A few times a year or less, 3 = A few times a month, 4 = A few times a week, 5 = Daily	8134	1.83	5	1	1.61
	Frequency of attending live sports events (Sports_Watch)	1 = Never, 2 = A few times a year or less, 3 = A few times a month, 4 = A few times a week, 5 = Daily	8113	1.29	5	1	0.68
Key independent variable	Personal income (Personal_Income)	1 = Personal income less than	8148	2.72	4	1	1.16

			2000, 2 = Personal income between 2000 and 19999, 3 = Personal income between 20000 and 49999, 4 = Personal income of 50000 and above					
Mediating variable		Social activity (Social_Activity)	Average frequency of social and recreational activities with friends: 7 = Almost every day, 6 = 1-2 times per week, 5 = A few times a month, 4 = About once a month, 3 = A few times a year, 1 = Once a year or less	8107	3.78	7	1	1.97
Control variables	Individual level	Age (Age)	CGSS survey year minus the respondent's birth year	8148	51.64	99	18	17.57
		Highest education level (Edu)	0 = No formal education, private school, or literacy classes; 1 = Primary school; 2 = Junior high school; 3 = Vocational high school; 4 = General high school; 5 = Technical school; 6 = Adult higher education (associate degree); 7 = Regular higher education (associate degree); 8 = Adult higher education (bachelor's degree); 9 = Regular higher education (bachelor's degree); 10 = Postgraduate and above; 13 = Other	8127	2.315	13	1	3.31

	Family level	Parental education level (Parent_Edu)	The same as Highest education level (Edu).The final parental education score is the sum of both parents' scores.	7225	1.693	20	0	1.263
	Social level	Subjective social class (Social_Layer)	Measured on a scale of 1 to 10, where 1 represents the lowest social class and 10 represents the highest social class	7881	0.590	10	1	1.372
		Perceived social fairness (Fairness)	1 = Completely unfair, 2 = Relatively unfair, 3 = Neither fair nor unfair, 4 = Relatively fair, 5 = Completely fair	8090	3.45	5	1	0.97

3.3 Status of sports participation

3.3.1 Participation in sports exercise

This database Data from the China General Social Survey in 2021 indicates that the average frequency of residents' participation in sports exercise is 1.83, which is close to the category of "a few times a year or less". Most residents fall within the range of "never" to "a few times a year or less" in terms of exercise frequency. Similarly, the average frequency of attending live sports events is 1.29, which is close to "never", with most residents selecting "never" as their response. Overall, the participation frequency of both sports exercise and attending live sports events among Chinese residents remains relatively low.

This study categorizes the full sample based on urban-rural classification, regional distribution, age groups, and income levels to further explore the differences in sports exercise frequency and live sports event attendance among different demographic groups.

According to Table 3-2, there is a significant difference ($p < 0.01$) in sports exercise frequency between urban and rural residents in 2021. Urban residents generally exhibit higher sports participation frequencies, with a noticeably greater proportion engaging in weekly or daily exercise compared to rural residents. This disparity can be attributed to better living conditions and access to resources in urban areas, including more comprehensive public sports facilities and a greater variety of sports activity options. In contrast, rural residents face limited

access to sports facilities and fewer available resources, leading to lower participation frequencies.

Over the years, disparities between urban and rural areas in terms of economic conditions, education, and public health services have directly influenced residents' lifestyles and sports participation habits. Therefore, improving sports infrastructure in rural areas and expanding the availability of sports activities would help enhance rural residents' participation in sports and reduce the urban-rural gap in exercise frequency.

Table 3-2 Differences in sports exercise frequency between urban and rural residents in 2021

	Urban		Rural	
Sports exercise frequency	Freq.	Percent	Freq.	Percent
Never	1463	0.27	1379	0.51
A few times a year or less	632	0.12	294	0.11
A few times a month	823	0.15	255	0.09
A few times a week	1008	0.19	288	0.11
Daily	1478	0.27	514	0.19
Total	5404	1	2730	1
Mean value	2.07513		1.364103	
T-test (t-value)	19.1076***			

Note:(1) Data analysis is based on the CGSS 2021 database. (2) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

(3) The same applies to the following tables.

According to Table 3-3, there are significant differences in sports exercise frequency among residents in the eastern, central, and western regions of China in 2021. Residents in the eastern region tend to engage in sports exercise more frequently, with a higher proportion participating daily or several times per week, whereas residents in the western region show relatively lower participation rates. The ANOVA test results indicate that the differences in sports exercise frequency across the eastern, central, and western regions are statistically significant ($p < 0.01$). This disparity is closely related to regional economic development levels, public infrastructure, and sports facility availability. The economic advantages, infrastructure development, and public service quality in the eastern region provide better living conditions and greater opportunities for sports participation, whereas the relatively lagging development in the central and western regions may contribute to lower participation frequencies.

Existing research has pointed out that economic development and improvements in public services can promote higher participation in sports activities. For the central and western

regions, enhancing infrastructure development, increasing investment in sports venues and facilities, and expanding the coverage of public services would help increase residents' engagement in sports activities, thereby improving overall health levels and quality of life.

Table 3-3 Differences in sports exercise frequency among eastern, central, and western regions in 2021

Sports exercise frequency	Eastern		Central		Western	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Never	899	0.28	1,094	0.40	939	0.43
A few times a year or less	381	0.12	276	0.10	269	0.12
A few times a month	460	0.14	360	0.13	258	0.12
A few times a week	557	0.17	449	0.17	299	0.14
Daily	951	0.29	632	0.23	409	0.19
Total	3248	1	2,721	1	2,165	1
Mean value	3.086207		2.790151		2.520092	
ANOVA test (F-value)			82.63***			

Note:(1) Data analysis is based on the CGSS 2021 database. (2) *** p<0.01, ** p<0.05, * p<0.1.

(3) The same applies to the following tables.

This study groups respondents using the quintile method based on income levels, ranking individuals from highest to lowest income. The top 20% income group is classified as the high-income group, while the bottom 20% is categorized as the low-income group, with the remaining respondents classified as the middle-income group^[52].

According to Table 3-4, there are significant differences in sports participation frequency among low-income, middle-income, and high-income groups. Specifically, low-income individuals have significantly lower participation rates than middle- and high-income groups, with a higher proportion falling into the "never" and "a few times a year or less" categories. Middle-income individuals are primarily concentrated in the "a few times a week" and "a few times a month" categories, while high-income individuals show a higher proportion of participation ranging from "a few times a month" to "daily".

Table 3-4 Differences in sports exercise frequency among low-, middle-, and high-income groups in 2021

Sports exercise frequency	Low-income group		Middle-income group		High-income group	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Never	826	0.46	1637	0.35	379	0.24
A few times a year or less	155	0.09	554	0.12	217	0.14
A few times a month	193	0.11	570	0.12	315	0.20

A few times a week	252	0.14	710	0.15	334	0.21
Daily	387	0.21	1251	0.26	354	0.22
Total	1813	1	4722	1	1599	1
Mean value	2.569222		2.762382		3.087743	
ANOVA test (F-value)			64.45***			

This study classifies individuals into different age groups: young group, middle-aged group, and elderly group. Young people (under 30 years old) are generally more energetic and more likely to take part in various social and sports activities, leading to a higher participation frequency. In contrast, the middle-aged group (30 to 60 years old) tends to participate in sports less frequently due to increased family responsibilities and work pressures. Although elderly individuals (over 60 years old) may experience a decline in physical strength, growing health awareness and changing lifestyles encourage some seniors to maintain a certain level of physical activity, though overall participation remains relatively low.

Research indicates that differences in sports participation across age groups reflect changes in life stages, physical conditions, and social roles, which further influence the frequency of sports engagement.

Table 3-5 Differences in sports exercise frequency among different age groups in 2021

	Young group		Middle-aged group		Elderly group	
Sports exercise frequency	Freq.	Percent	Freq.	Percent	Freq.	Percent
Never	10	0.05	735	0.23	2097	0.45
A few times a year or less	17	0.09	523	0.16	386	0.08
A few times a month	46	0.24	701	0.22	331	0.07
A few times a week	71	0.37	730	0.23	495	0.11
Daily	46	0.24	550	0.17	1396	0.30
Total	190	1	3239	1	4705	1
Mean value	1.099404		1.40422		1.305	
ANOVA test (F-value)			44.22***			

3.3.2 Participation in sports exercise

According to Table 3-6, there are significant differences in the frequency of watching live sports events between urban and rural residents in China in 2021. Urban residents demonstrate higher participation rates in attending sports events, with 77% reporting "never" attending, while approximately 16% watch once a year or less. However, the proportion of those who watch monthly or weekly is relatively low, with only 0.02% attending weekly. In contrast, 85%

of rural residents never watch sports events, and only 0.10% watch once a year or less, indicating a substantially lower level of participation in sports events compared to urban residents. The ANOVA test results confirm that the difference in attendance frequency between urban and rural residents is statistically significant ($p < 0.01$).

This disparity is closely related to differences in infrastructure, education, and income levels between urban and rural areas. Over the years, public cultural services in rural areas have lagged behind, with limited investment in cultural infrastructure such as libraries and cultural activity centers, restricting rural residents' access to cultural and sports activities. Furthermore, as urbanization progresses, many young individuals migrate from rural areas to cities, leaving behind an aging population with generally lower education levels. This demographic shift has further limited rural residents' participation in cultural and sports activities.

To narrow the urban-rural gap, efforts should focus on enhancing opportunities for sports event organization and participation in rural areas, improving cultural infrastructure, and expanding sports education and community-based sports programs tailored to rural populations. Strengthening sports culture initiatives in rural areas will help increase engagement and enthusiasm for sports participation among rural residents.

Table 3-6 Differences in live sports event attendance frequency between urban and rural residents in 2021

	Urban		Rural	
Sports exercise frequency	Freq.	Percent	Freq.	Percent
Never	4179	0.77	2312	0.85
A few times a year or less	872	0.16	276	0.10
A few times a month	191	0.04	76	0.03
A few times a week	101	0.02	38	0.01
Daily	50	0.01	18	0.01
Total	5393	1	2720	1
Mean value	.0814482		.0564338	
ANOVA test (F-value)	6.1802***			

According to Table 3-7, there are significant differences in the frequency of watching sports events among residents in different regions of China in 2021. Residents in the eastern region have a significantly higher frequency of sports event attendance compared to those in the central and western regions. The data shows that 81% of residents in the eastern region "never" watch sports events, while 0.14% watch once a month, and the proportions of those who watch weekly or daily are even lower, at 0.01% and 0.01%, respectively. In comparison,

the proportions of residents who "never" watch sports events in the central and western regions are 82% and 76%, respectively. While the western region has a slightly lower proportion of residents who "never" watch sports events, the overall differences in sports event attendance frequency among the three regions remain significant.

The ANOVA test results indicate that the differences in sports event attendance frequency among the eastern, central, and western regions are statistically significant ($p < 0.01$). This disparity reflects regional differences in economic development, cultural infrastructure, and cultural consumption capacity. The eastern region, with its more developed economy and well-established cultural and sports infrastructure, has higher demand and participation rates in sports and cultural consumption. In contrast, the central and western regions, particularly the western region, face economic underdevelopment and lagging cultural and sports infrastructure, leading to fewer opportunities and lower participation rates in sports activities.

To address this issue, the government can increase investment in public cultural and sports infrastructure in the central and western regions, promoting a more balanced development of cultural and sports activities across regions. This would help enhance sports participation and overall cultural engagement among residents in the central and western regions, gradually reducing regional disparities in sports and cultural consumption.

Table 3-7 Differences in live sports event attendance frequency among eastern, central, and western regions in 2021

Sports exercise frequency	Eastern		Central		Western	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Never	2622	0.81	2,219	0.82	1,650	0.76
A few times a year or less	453	0.14	353	0.13	342	0.16
A few times a month	85	0.03	19	0.01	103	0.05
A few times a week	47	0.01	48	0.02	44	0.02
Daily	33	0.01	16	0.01	19	0.01
Total	3240	1	2715	1	2158	1
Mean value	1.276543		1.264825		1.350324	
ANOVA test (F-value)	10.65***					

Table 3-8 presents the sports event attendance frequency among different income groups in 2021. The data indicates that there are significant differences in the average frequency of watching sports events across income groups. Specifically, the high-income group has a

significantly higher frequency of sports event attendance compared to the low-income group, which has the lowest participation rate.

Existing research suggests that income level directly influences the likelihood and frequency of participation in sports activities. Individuals with better economic conditions tend to have more leisure time and financial resources to engage in sports-related activities. After fulfilling basic living needs, their remaining resources and time are more likely to be allocated to high-value sports entertainment consumption.

Furthermore, from the perspective of social and cultural capital, the high-income group benefits from an accumulation of social resources and cultural capital, making it easier for them to participate in sports events and related entertainment activities. This, in turn, further enhances their overall level of sports participation.

reducing regional disparities in sports and cultural consumption.

Table 3-8 Differences in sports event attendance frequency among low-, middle-, and high-income groups in 2021

	Low-income group		Middle-income group		High-income group	
Sports exercise frequency	Freq.	Percent	Freq.	Percent	Freq.	Percent
Never	1552	0.86	3852	0.82	1117	0.70
A few times a year or less	192	0.11	606	0.13	350	0.22
A few times a month	49	0.03	135	0.03	83	0.05
A few times a week	28	0.02	79	0.02	32	0.02
Daily	18	0.01	34	0.01	16	0.01
Total	1809	1	4706	1	1598	1
Mean value	1.246545		1.244898		1.375299	
ANOVA test (F-value)			33.37***			

Table 3-9 presents the sports event attendance frequency across different age groups in 2021. The data indicates that there are significant differences in the average frequency of watching sports events among different age groups. As age increases, the frequency of sports event attendance gradually decreases. The young group has a significantly higher frequency of watching sports events compared to the middle-aged and elderly groups.

Young individuals typically have higher education levels and stronger cultural participation awareness, allowing them to access sports event information more easily through various channels. In contrast, the middle-aged and elderly groups have lower participation rates, which may be influenced by time constraints, health conditions, and other factors.

Additionally, elderly individuals face challenges related to the "digital divide" in the information age. Many sports events are broadcast through online platforms and digital media, which may pose barriers to their participation, further contributing to their lower frequency of sports event viewing.

Table 3-9 Differences in sports event attendance frequency among different age groups in 2021

	Young group		Middle-aged group		Elderly group	
Frequency of Watching Sports Events	Freq.	Percent	Freq.	Percent	Freq.	Percent
Never	94	0.49	2309	0.71	4088	0.87
A few times a year or less	59	0.31	674	0.21	415	0.09
A few times a month	21	0.11	160	0.05	86	0.02
A few times a week	14	0.07	70	0.02	55	0.01
Daily	2	0.01	18	0.01	48	0.01
Total	190	1	3231	1	4692	1
Mean Value	1.794737		1.394924		1.201194	
ANOVA test (F-value)	131.08***					

3.4 Model establishment

3.4.1 Ordered logistic regression model

When the dependent variable belongs to an ordered categorical type, commonly used analytical methods include the ordered Logit model and the ordered Probit model. These models are based on a key assumption: the intervals between different categories are considered equal, meaning the differences between categories remain consistent. However, in practical research, this assumption does not always hold true. Therefore, a parallel lines assumption test is necessary to evaluate the model's applicability to the data and ensure its validity. If the data violates this assumption, a more flexible model, such as the generalized ordered Logit model, may be considered for analysis.

When conducting ordered logistic regression analysis, a standard ordered Logit model is first established. The core of this model is to define a continuous latent variable Y_i^* , which serves as the underlying driving force behind the observed ordered categories Y_i . Specifically, the latent variable Y_i is assumed to be linearly dependent on a combination of independent variables

X , expressed as $Y_i^* = x\beta + e$, where β represents the coefficient vector, and e is the error term. Based on the value of the latent variable Y_i^* , the category of the observed variable Y_i can be determined. By modeling the relationship between these latent variables and independent variables, we can estimate regression coefficients, which help us understand how different independent variables influence the probability distribution of the dependent variable.

$$Y_i = \begin{cases} 1, & Y_i^* \leq C_1 \\ 2, & C_1 < Y_i^* \leq C_2 \\ \dots \dots \\ j-1, & C_{j-2} < Y_i^* \leq C_{j-1} \\ j, & Y_i^* > C_{j-1} \end{cases} \quad (1)$$

Where $C_1 < C_2 < \dots < C_{j-1}$ represents a series of threshold values for the unobserved latent variable Y_i^* . In this study, Y_i represents the frequency of residents' participation in sports activities (such as the frequency of engaging in sports exercise or watching sports events), x is the set of independent variables that influence sports participation behavior, and β is the set of parameters to be estimated.

Under the assumption that the residual term e follows a standard logistic distribution, we can derive the distribution of Y_i given the explanatory variables x and further calculate the corresponding probabilities:

$$P(Y = 1|x) = P(Y_i^* \leq C_1|x) = F(C_1 - x\beta) \quad (2)$$

$$P(Y = 2|x) = P(C_1 \leq Y_i^* \leq C_2) = F(C_2 - x\beta) - F(C_1 - x\beta) \quad (3)$$

.....

$$P(C_{j-2} \leq Y_i^* \leq C_{j-1}) = F(C_{j-1} - x\beta) - F(C_{j-2} - x\beta) = P(Y = j-1|x) \quad (4)$$

$$P(Y = j|x) = 1 - P(Y^* \leq C_j|x) = 1 - F(C_j - x\beta) \quad (5)$$

From this, we can derive:

$$P(Y_i > i) = F(C_i - x\beta) = \frac{e^{C_i - x\beta}}{1 + e^{C_i - x\beta}}, i = 1, 2, \dots, j-1 \quad (6)$$

This study conducted a parallel lines assumption test based on the established model, and the results indicate that the p-values are all less than 0.01 (see Table 3-10). The test results suggest that the ordered logistic regression model does not satisfy the proportional odds assumption. Therefore, to ensure the model's applicability and the accuracy of the results, this study further employs the generalized ordered logistic regression model for empirical analysis.

Table 3-10 Parallel lines assumption test

	Chi2	df	P>Chi2
Wolfe Gould	142.8	12	0.000
Brant	122.2	12	0.000
score	126.4	12	0.000
likelihood ratio	116.6	12	0.000
Wald	124.8	12	0.000

3.4.2 Generalized Ordered Logistic Regression Model

The generalized ordered logistic regression model relaxes the proportional odds assumption of the ordered logistic regression model, allowing the coefficients of independent variables to vary across different categories. This adjustment enhances the model's adaptability and flexibility in fitting the data. Unlike the standard ordered logistic regression model, which assumes that the effects of independent variables remain constant across different outcome categories, the model allows the marginal effects to differ when moving from one category to another. This means that the influence of independent variables can vary across different ordered categories.

The specific form of the model is expressed as follows:

$$P(Y_i > j) = g(X\beta_j) = \frac{e^{\alpha_j + X_j\beta_j}}{1 + e^{\alpha_j + X_j\beta_j}}, j = 1, 2, \dots, N - 1 \quad (7)$$

where N represents the number of categories of the ordered dependent variable, β_j is the set of coefficients corresponding to the independent variables when the ordered dependent variable takes category j , and β_j can vary as the level of Y changes.

When the dependent variable Y takes different values, its probability can be expressed as:

$$P(Y_i = 1) = 1 - g(X_i\beta_1) \quad (8)$$

$$P(Y_i = 2) = g(X_i\beta_2) - g(X_i\beta_1) \quad (9)$$

.....

$$P(Y_i = N) = g(X_i\beta_{N-1}) \quad (10)$$

When the parameter β remains constant across all categories of the ordered dependent variable Y , the above equation simplifies to the standard ordered logistic regression model, if the proportional odds assumption holds across all categories.

To further enhance model accuracy, we can introduce the partial proportional odds model. This model improves upon the generalized ordered logistic regression model by allowing for more flexible handling of constraints on different independent variables. Therefore, when some independent variables fail to meet the proportional odds assumption, the partial proportional odds model becomes a more appropriate choice ^[53-54].

3.4.1 Mediation Effect Model

When the independent variable X influences the dependent variable Y through its effect on the mediating variable M , M is considered a mediating variable. According to Wen Zhonglin and Ye Baojuan (2014), who introduced the mediation effect model and its testing methods, when all variables are continuous and standardized (i.e., the regression equations do not include an intercept term), a simple mediation effect model can be described using the following regression equations, which illustrate the relationships between the independent variable, dependent variable, and mediating variable^[55]:

$$Y = cX + \varepsilon_1 \quad (11)$$

$$M = aX + \varepsilon_2 \quad (12)$$

$$y = c'X + bM + \varepsilon_3 \quad (13)$$

Here, c represents the total effect, meaning the direct impact of X on Y without considering the mediating variable. a denotes the effect of X on the mediating variable M , reflecting the indirect pathway through which X influences Y . b represents the effect of M on Y while controlling for X , illustrating the role of M in the causal chain. c' refers to the direct effect of X on Y after controlling for the effect of M , indicating whether the influence of X on Y can be explained by M .

The terms ε_1 、 ε_2 、 ε_3 are residual errors, assumed to be independent and normally distributed. The coefficient product ab represents the mediating effect (or indirect effect) of X on Y . The mediating effect ab , the total effect c , and the direct effect c' satisfy the following relationship^[56]:

$$c = c' + ab \quad (14)$$

There are various methods for testing mediation effects, including the stepwise causal approach, product-of-coefficients approach, and Bootstrap method^[57]. Each method has its own strengths in error control and statistical power, making the applicability of any single method relatively limited. When conducting mediation effect tests, it is essential to select the most appropriate method based on the specific research context^[58].

This study follows the mediation effect testing procedure proposed by Wen Zhonglin and Ye Baojuan (2014), which demonstrates high reliability in controlling Type I and Type II errors, while maintaining strong statistical power. This approach provides a robust methodological foundation for testing mediation effects^[59].

In this study, based on the literature review and theoretical foundation discussed earlier, we construct a specific mediation effect model, as represented by the regression equations (15)–(17):

$$Sports_Exercise_i/Sports_Watch_i = C + \alpha Pi_i + \beta_1 Control_i + \mu_1 \quad (15)$$

$$Mediator_i = C + \beta Pi_i + \mu_2 \quad (16)$$

$$Sports_Exercise_i/Sport_Watch_i = C + \alpha' Pi_i + \delta Mediator_i + \beta_2 Control_i + \mu_3 \quad (17)$$

Here, $Sports_{Watch_i}/Sports_{Exercise_i}$ represents the individual-level frequency of watching sports events and participating in sports exercise, Pi_i denotes personal income, and $Mediator_i$ represents the mediating variable (social activities). C is the constant term, and $Control_i$ includes various multi-level factors influencing sports event attendance and sports exercise participation.

CHAPTER 4: EMPIRICAL ANALYSIS

4.1 Baseline Regression Results

4.1.1 Multicollinearity Test

Before constructing the regression model, it is necessary to test whether there is multicollinearity among the independent variables.

Typically, the Variance Inflation Factor (VIF) is used to assess multicollinearity between variables, helping to evaluate the stability and reliability of the model. The tolerance level, which is the reciprocal of VIF, indicates the degree of correlation between a variable and other independent variable. A low tolerance value (close to 0) suggests a strong multicollinearity issue.

In general, when $VIF \leq 10$, the multicollinearity problem is mild or negligible. However, when $VIF > 10$, it indicates strong multicollinearity among variables, which requires further treatment. A higher VIF value implies more severe multicollinearity, potentially affecting the stability of the regression model and the reliability of the estimation results.

In this study, the VIF values for all variables in the model do not exceed 2, which is far below the threshold of 10, and all tolerance values are well above 0.1. This indicates that the linear relationship among these variables is weak, and there is no significant multicollinearity issue in the model.

Table 4-1 Multicollinearity Test for Independent Variables

Variable	VIF	1/VIF
Personal_Income	1.33	0.7545
Parent_Edu	1.74	0.5755
Age	1.67	0.5994
Social_Layer	1.08	0.9255
Social_Activity	1.12	0.8921
Fairness	1.04	0.9575
Education	1.47	0.6824

4.1.2 Generalized Ordered Logit Regression Results

In STATA 17.0, the `gologit2` command with the `autofit` option can automatically identify which independent variables satisfy the parallel lines assumption and construct a partially constrained proportional odds model accordingly. This estimation approach classifies variables based on whether their influence significantly changes with variations in the latent variable threshold.

In this model, for independent variables whose parameter estimates remain stable as the latent variable threshold changes, a constrained estimation approach is applied. This means these variables satisfy the parallel lines assumption, and their coefficients remain constant across different categories. In contrast, for independent variables whose parameter estimates significantly change as the latent variable threshold varies, an unconstrained estimation approach is used. This relaxes the parallel lines assumption, allowing coefficients to vary across different categories. This method ensures a balance between model flexibility and interpretability, allowing the model to accurately capture relationships between variables while avoiding bias caused by unnecessary constraints.

According to the analysis results in Table 4-2, this study compares the generalized ordered Logit model and the ordered Logit model to investigate factors influencing the frequency of sports exercise participation. The comparison shows that the generalized ordered Logit model provides a better fit than the traditional ordered Logit model. In terms of Pseudo R^2 and the Likelihood Ratio Chi-square statistic (LR χ^2), the values for the generalized ordered Logit model are significantly higher than those for the ordered Logit model. This suggests that the generalized ordered Logit model better captures the impact of independent variables on the dependent variable and offers a higher goodness-of-fit, providing more accurate analytical results. Therefore, this study selects the generalized ordered Logit model as the primary analytical model to ensure the reliability and interpretability of the results.

Further analysis indicates that stepwise inclusion of control variables significantly improves the explanatory power of the model. As individual-level control variables such as age and highest education level are introduced (Model 2), followed by family-level variables (Model 3), the model's explanatory power is notably enhanced. Although the coefficients related to sports exercise frequency undergo some adjustments with these additions, they remain statistically significant at the 1% level, indicating that these factors significantly increase residents' participation in sports activities.

Model 4 further incorporates socioeconomic-level control variables, performing a comprehensive regression analysis with all variables. After controlling for these broad factors, the results of the generalized ordered Logit model indicate that the coefficient for sports exercise frequency remains significant, confirming that higher personal income significantly increases the frequency of participation in sports exercise.

Table 4-2 Baseline Regression Results of Sports Exercise Frequency: Comparison Between Generalized Ordered Logit and Ordered Logit Models

Variables	Gologit	Ologit
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		β_1	β_2	β_3	β_4	β
Model 1	Pi	0.911*** (14.76)	0.594*** (10.21)	0.367*** (6.26)	0.324*** (3.22)	0.566*** (10.80)
	Constant	-0.590*** (-11.95)	-0.793*** (-16.01)	-0.970*** (-19.05)	-1.370*** (-23.91)	
	Observations			8093		8093
	LR chi2			878.78		451.84
	Pseudo R^2			0.0357		0.0184
	Pi	0.282*** (4.34)	0.143** (2.32)	0.140** (2.27)	0.077 (1.12)	0.273*** (4.97)
	Individual-level control variables			Yes		Yes
Model 2	Constant	-0.721*** (-5.85)	-1.461** (-12.35)	-2.334*** (-19.34)	-3.359*** (-24.52)	
	Observations			8072		8072
	LR chi2			2181.79		814.53
	Pseudo R^2			0.0888		0.0332
	Pi	0.251*** (3.54)	0.120* (1.81)	0.125* (1.90)	0.099 (1.34)	0.274*** (4.69)
Model 3	Individual-level control variables			Yes		Yes
	Family-level control variables			Yes		Yes
	Constant	-0.969*** (-7.02)	-1.738 (-13.20)	-2.531*** (-18.94)	-3.409*** (-22.53)	
	Observations			7159		7159
	LR chi2			2032.57		759.67
	Pseudo R^2			0.0928		0.0347
	Pi	0.191*** (2.60)	0.061 (0.89)	0.070 (1.03)	0.081 (1.06)	0.227*** (3.80)
Model 4	Individual-level control variables			Yes		Yes

Family-level control variables		Yes	Yes
Socioeconomic-level control variables		Yes	Yes
Constant	-1.275*** (-8.15)	-1.968*** (-13.27)	-2.783*** (-18.60)
Observations		6928	6928
LR chi2		2003.00	769.01
Pseudo R ²		0.0942	0.0361

According to the analysis results in Table 4-3, this study employs both the generalized ordered Logit model and the ordered Logit model to examine the factors influencing the frequency of sports event attendance.

Through the analysis of ordered Logit and generalized ordered Logit models, we explore the impact of personal income, along with individual-level and socioeconomic-level control variables, on the frequency of watching sports events. The results indicate that personal income has a significant positive effect on sports event attendance frequency, with its coefficient gradually adjusting from 0.710 in Model 1 to 0.676 in Model 5, all of which remain statistically significant at the 1% level.

As individual-level control variables such as age and education level, family-level factors such as parental education level, and socioeconomic-level factors such as social stratification perception are introduced, these variables also exhibit a significant positive effect on the frequency of watching sports events. Specifically, in Model 5, the coefficient for individual-level control variables is 0.292, while the coefficient for socioeconomic-level control variables is 0.227, both showing a strong positive association.

The model's goodness-of-fit and statistical significance improve progressively as more control variables are introduced, with the Pseudo R² value increasing from 0.0324 to 0.0709 and the LR chi² value rising from 385.462 to 796.173. These findings suggest that the generalized ordered Logit model provides a more precise analysis when multiple control variables are considered.

These results highlight that personal economic status and socioeconomic background are key factors influencing sports event attendance frequency. This has direct implications for sports market strategies and the promotion of sports activities, emphasizing the importance of

incorporating both individual and socioeconomic factors when formulating policies and marketing strategies for sports events.

Table 4-3 Baseline Regression Results of Sports Event Attendance Frequency: Comparison Between Generalized Ordered Logit and Ordered Logit Models

	Variable	Gologit				Ologit
		β_1	β_2	β_3	β_4	β
Model 1	Pi	0.710*** (9.33)	0.322*** (2.67)	0.128 (0.72)	0.032 (0.10)	0.676*** (8.94)
	Constant	-2.509*** (-33.94)	-3.768*** (-27.89)	-4.222*** (-23.57)	-4.970*** (-18.91)	
	Observations		8073			8073
	LR chi2		385.46			354.95
	Pseudo R^2		0.0352			0.0324
	Pi	0.298*** (3.74)	0.118 (0.94)	-0.091 (-0.50)	-0.491 (-1.52)	0.292*** (3.72)
	Individual-level control variables		Yes			Yes
Model 2	Constant	-1.697*** (-11.39)	-2.921*** (-11.80)	-4.201*** (-11.61)	-6.687*** (-10.75)	
	Observations		8052			8052
	LR chi2		839.31			722.71
	Pseudo R^2		0.0768			0.0661
	Pi	0.343*** (4.06)	0.058 (0.44)	-0.229 (-1.18)	-0.643* (-1.68)	0.324*** (3.89)
	Individual-level control variables		Yes			Yes
Model 3	Family-level control variables		Yes			Yes
	Constant	-1.888*** (-11.48)	-2.836*** (-10.52)	-3.667*** (-8.99)	-7.180*** (-9.00)	
	Observations		7140			7140
	LR chi2		808.72			673.84
	Pseudo R^2		0.0825			0.0687

	Pi	0.305*** (3.55)	0.043 (0.32)	-0.188 (-0.94)	-0.332 (-0.80)	0.227*** (3.80)
	Individual-level control variables		Yes			Yes
	Family-level control variables		Yes			Yes
Model 4	Socioeconomic- level control variables		Yes			Yes
	Constant	-2.050*** (-12.03)	-2.962*** (-10.47)	-3.768*** (-8.63)	-7.254*** (-8.49)	
	Observations		6948			6948
	LR chi2		796.17			678.43
	Pseudo R^2		0.0833			0.0709

4.2 Endogeneity Treatment

In empirical research within economics and social sciences, endogeneity is a common challenge. In this study, endogeneity arises primarily from the potential bidirectional causality between income level and residents' sports exercise behavior or the influence of omitted variables (e.g., health status, family background). Failing to address these endogeneity issues may lead to biased estimation results, preventing reliable causal inferences. Therefore, this study employs the instrumental variable (IV) approach to mitigate endogeneity concerns.

This research investigates the impact of income level on residents' sports exercise behavior, if a bidirectional causal relationship may exist. That is, higher income levels may provide more time and resources for sports activities, while participation in sports activities may improve health conditions, potentially leading to higher income levels.

Additionally, income level may be correlated with unobserved variables (such as health status and social support), which may also influence sports exercise behavior. If these confounding factors are not controlled, they may introduce endogeneity, leading to biased regression results. Therefore, this study applies the instrumental variable (IV) approach to address endogeneity, reducing bias in causal inference and ensuring more reliable results.

To resolve the endogeneity of income level, this study selects the number of family-owned properties (A12b) from the CGSS2021 survey as an instrumental variable. In sociological and economic theoretical frameworks, property ownership is often considered a proxy for household wealth, particularly in China, where housing assets are strongly linked to economic

status and social standing^[60]. There is typically a strong correlation between property ownership and income level, as housing assets serve as a key indicator of family wealth and income^[61].

The number of properties satisfies the two fundamental requirements of an instrumental variable: relevance condition and exclusion restriction. The relevance condition states that the number of properties must be strongly correlated with income level. In most cases, families with more property holdings tend to have higher income levels, aligning with existing literature. The exclusion restriction requires that the number of properties should not directly influence sports exercise behavior. While household wealth may indirectly support sports participation (e.g., providing financial resources for sports activities), its effect on sports behavior is only mediated through income level, thus satisfying the exclusion restriction.

This study applies the Two-Stage Least Squares (2SLS) method to address endogeneity. In the first stage, we use family property ownership to predict income level. In the second stage, the predicted income level is used to explain sports exercise behavior. This method effectively eliminates bias caused by endogeneity, ensuring more reliable causal inferences. The regression results indicate that after addressing endogeneity, the positive impact of income level on sports exercise behavior remains significant and more stable.

Table 4-4 Regression Analysis Results of Property Ownership on Personal Income and Sports Event Attendance

	(1)	(2)
	m1	m2
VARIABLES	personal_income	sports_watch
number of properties	0.040*** (3.012)	
social_activity	0.074*** (4.615)	0.018 (0.932)
age	-0.002*** (-5.033)	0.001 (1.300)
education	0.482*** (20.383)	-0.183* (-1.655)
health	0.145*** (7.201)	-0.065* (-1.839)
children_normalized	-0.202 (-1.644)	0.219** (2.296)

parent_education_normalized	0.076*	-0.008
	(1.906)	(-0.244)
social_layer_normalized	0.156***	-0.039
	(6.280)	(-1.000)
personal_income		0.490**
		(2.200)
Constant	0.329***	-0.166*
	(9.502)	(-1.943)
Observations	4,292	4,292
R-squared	0.241	

Table 4-5 Regression Analysis Results of Property Ownership on Personal Income and Sports Exercise Frequency

	(1)	(2)
	m1	m2
VARIABLES	personal_income	sports_exercise
number of properties	-0.000*	
	(-1.835)	
social_activity	0.073***	0.091
	(4.536)	(1.162)
age	-0.002***	0.005***
	(-5.038)	(2.620)
education	0.489***	-0.148
	(20.744)	(-0.299)
health	0.144***	-0.029
	(7.135)	(-0.193)
children_normalized	-0.207*	0.205
	(-1.688)	(0.735)
parent_education_normalized	0.080**	0.103
	(1.998)	(1.031)
social_layer_normalized	0.156***	-0.007

	(6.294)	(-0.046)
personal_income		0.983
		(0.972)
Constant	0.373***	-0.425
	(11.786)	(-1.130)
Observations	4,323	4,317
R-squared	0.240	-0.440

By using the instrumental variable (IV) method, this study effectively addresses the endogeneity issue associated with income level. Our regression analysis confirms that income level has a significant positive impact on residents' sports exercise behavior, and this conclusion is robustly validated across different models and instrumental variables. Compared to traditional regression methods, the instrumental variable approach provides more accurate causal inference, offering more reliable evidence for understanding the relationship between income level and sports exercise behavior.

4.3 Mediation Effect Analysis

In sociological theory, social capital is regarded as the resources individuals acquire through social networks and interactions, which provide support and opportunities that influence their behaviors and decision-making^[62]. Social activities, as an essential component of social capital, can shape individuals' health behaviors and social participation, including engagement in sports activities^[63]. Social interactions not only provide emotional support but also deliver health-related information and motivation, helping individuals overcome barriers to sports participation^[64]. For instance, social interactions and group behavior encourage individuals to engage in sports activities, particularly among lower-income individuals, where support from friends and family plays a crucial role^[65].

Participants in sports activities tend to exhibit higher levels of social trust and social support, which, in turn, further enhances the frequency and quality of their sports engagement^[66]. Social activities also provide opportunities, facilities, and guidance for physical exercise, especially in community-based sports and mass fitness activities^[67]. Therefore, social activities and social capital play a critical role in sports participation.

This study applies stepwise regression and product-of-coefficients methods to examine whether social activities mediate the relationship between personal income and sports participation. To verify the mediation role of social activities, the following steps are performed:

First, we examine whether personal income significantly influences social activities. Second, we test whether personal income significantly affects sports exercise. Lastly, we analyze whether both personal income and social activities simultaneously influence sports exercise, and whether the effect of personal income weakens when social activities are included. If all conditions hold, it can be confirmed that social activities mediate the effect of personal income on sports exercise participation.

According to the Table 4-5 analysis, this study explores the mediation effect of social activities between personal income and sports exercise participation. In Model 1, the regression results indicate that the frequency of social activities significantly influences the relationship between personal income and sports participation. Specifically, the regression coefficient of social activities is 0.045, and it is statistically significant at the 1% level, suggesting that social activity frequency positively contributes to the increase in sports participation frequency. In Model 2, personal income also exhibits a significant effect on sports participation, with a regression coefficient of 0.058 ($p < 0.01$), further confirming that income level enhances engagement in sports activities. Model 3 demonstrates that social activities serve as a mediator between income and sports exercise participation, where the regression coefficient of social activities is 0.036 and remains statistically significant, indicating that social activities play an important mediating role in the impact of personal income on sports participation.

Analysis of ACME (Average Causal Mediation Effect) shows that the mediation effect of social activities is 0.058, with a confidence interval of [0.045, 0.072], confirming that social activities play a significant role in bridging the relationship between income and sports participation. The proportion of ACME to total effect is 20.58%, meaning that approximately 20.6% of the total effect is mediated through social activities. The proportion of direct effect (ACME0) is 79.42%, indicating that the direct effect of personal income on sports exercise remains dominant.

In conclusion, the findings suggest that the impact of personal income on sports participation is not only direct but also significantly mediated by social activities. Social activities serve as an essential bridge between income and sports exercise, providing a new perspective for future research on the relationship between income level and sports engagement.

Table 4-6 Mediation Effect Analysis of Sports Exercise Participation

Variable	Sports_exercise (Model 1)	Social_Activity (Model 2)	Sports_Exercise (Model 3)
Pi	0.045*** (0.012)	0.058*** (0.010)	0.036*** (0.012)
Social_Activity			0.162*** (0.014)

Control Variables	yes	yes	yes
N	6928	6928	6928
Adj R^2	0.0939	0.1043	0.1091
F	120.61	135.48	122.14
Sobel Z			0.009*** (0.001)
Mediation Effect Ratio			20.581%

According to the results shown in Table 4-6, this study examines the mediating effect of social activities on the relationship between personal sports event viewing frequency and sports exercise frequency. In Model 1, the regression results indicate that social activities significantly influence the relationship between sports event viewing frequency and sports exercise. Specifically, the regression coefficient for social activities is 0.009 ($p < 0.05$), showing a positive effect of increased social activity frequency on sports event viewing frequency. In Model 2, the regression coefficient for social activities is 0.058, and it is significant at the 1% level, indicating that social activities play a significant mediating role between sports viewing frequency and sports exercise frequency. Model 3 further emphasizes this, with a regression coefficient for social activities of 0.006, also statistically significant ($p < 0.01$), reinforcing that social activities mediate the relationship between sports viewing and sports exercise.

Through Sobel test, the mediation effect analysis of the model shows that the mediating effect coefficient for social activities is 0.003. This indicates that social activities significantly mediate the relationship between sports viewing frequency and sports exercise frequency, specifically, social activities indirectly influence sports exercise frequency by affecting sports viewing frequency. The total mediation effect proportion is 31.873%, meaning that approximately 31.9% of the total effect is mediated through social activities, while the remaining 68.127% reflects the direct effect of sports viewing on sports exercise.

In conclusion, the outcome of this study suggest that social activities not only mediate the relationship between sports viewing frequency and sports exercise frequency, but they also help strengthen the positive link between the two. This finding provides a new perspective for further research on how social behaviors can influence individual health behaviors through sports activities.

Table 4-7 Mediation Effect Analysis of Sports Event Viewing

Variable	Sports_Watch (Model 1)	Social_Activity (Model 2)	Sports_Watch (Model 3)
Pi	0.009* (0.005)	0.058*** (0.010)	0.006*** (0.005)
Social_Activity			0.053*** (0.006)
Control Variables	yes	yes	yes

N	6911	6911	6911
Adj R^2	0.0510	0.1050	0.0597
F	62.86	136.18	63.66
Sobel Z			0.003*** (0.0006)
Mediation Effect Ratio			31.873%

4.4 Heterogeneity Analysis

Based on the full sample, this study uses generalized ordered logit regression and an analysis of the influencing mechanisms to not only verify that personal income significantly affects the participation of residents in different age groups in sports exercise and sports event viewing but also reveals that the impact of education level on this effect exhibits significant heterogeneity. However, considering the complexity of China's population structure and the imbalance in regional development, the effect of personal income on sports activity participation may vary across different age groups and education levels. Therefore, this study further conducts subsample analysis to explore how personal income affects residents' participation in sports exercise and sports event viewing behavior in different demographic and educational backgrounds, as well as the heterogeneity of this impact.

4.4.1 The Impact of Personal Income on Sports Participation Across Different Age Groups

As shown in Table 4-7 and Table 4-8, the impact of personal income on sports exercise participation and sports event viewing among different age groups is statistically significant. Specifically, for the youth group, the coefficient for personal income is 0.580, indicating that an increase in income significantly raises the frequency of sports exercise participation among young people. However, for the middle-aged and elderly groups, while the positive impact of income on sports participation remains, with coefficients of 0.157 and 0.593 respectively, both significant at the 1% level, the magnitude of the impact is different compared to the youth group. This suggests that the influence of personal income on the frequency of sports exercise varies across different age groups.

Regarding the impact of personal income on sports exercise participation across different age groups, the results show that the regression coefficients for the middle-aged and elderly groups are 0.429 and 0.525, respectively, meaning that an increase in income significantly increases the frequency of sports exercise participation in these age groups. In contrast, the impact of income on sports participation in the youth group is smaller, with the coefficient decreasing from 0.023 to -0.102, which is statistically insignificant, indicating that other factors may have a stronger influence on sports participation behavior in the youth group.

Overall, these results emphasize the key role of personal income in promoting sports participation across different age groups, demonstrating how economic conditions can drive public health and an active lifestyle by increasing both sports exercise and viewing frequency, particularly for the elderly and youth. This provides strong evidence for further exploration of economic incentives in national fitness policies.

Table 4-8 The Impact of Personal Income on Sports Exercise Participation Across Different Age Groups

Age Group	Variable	β_1	β_2	β_3	β_4
Youth Group	Pi	0.580**	0.023	-0.123	-0.102
		(2.25)	(0.12)	(-0.73)	(-0.48)
	Controls	Yes	Yes	Yes	Yes
	Observations		1,019		
	Pseudo R^2		0.0826		
Middle-aged Group	Pi	0.157	0.081	0.069	-0.003
		(1.45)	(0.79)	(0.66)	(-0.03)
	Controls	Yes	Yes	Yes	Yes
	Observations		3,584		
	Pseudo R^2		0.0804		
Older Group	Pi	0.593***	0.429***	0.496***	0.525***
		(4.53)	(3.27)	(3.70)	(3.62)
	Controls	Yes	Yes	Yes	Yes
	Observations		2,325		
	Pseudo R^2		0.0561		

Table 4-8 shows the generalized ordered logit regression analysis results of the impact of personal income on sports event viewing across different age groups. In the youth group, although the initial coefficient for personal income is 0.203, indicating a slight positive relationship, it is statistically insignificant and fluctuates in subsequent models, eventually rising to 0.227 in the fourth model, though still not significant. For the middle-aged group, the positive impact of personal income on sports event viewing is significant in all models, with the initial coefficient at 0.552, which slightly decreases to 0.092 after fluctuations in later models, indicating that an increase in income significantly boosts the frequency of sports event viewing among middle-aged individuals. The data for the elderly group also shows a similar positive impact, with an initial coefficient of 0.602, which decreases to 0.083 after adjustments in subsequent models.

These results reveal significant heterogeneity in the impact of personal income on sports event viewing frequency across different age groups. The influence is most significant in the middle-aged group, while the impact on the youth and elderly groups, though present, is relatively weaker, possibly due to interference from other factors such as lifestyle and time availability. This analysis helps deepen the understanding of how economic conditions affect quality of life through recreational activities and provides a basis for designing targeted sports participation promotion policies.

Table 4-9 The Impact of Personal Income on Sports Event Viewing Across Different Age Groups

Age Group	Variable	β_1	β_2	β_3	β_4
Youth Group	Pi	0.203	-0.052	-0.322	0.227
		(1.22)	(-0.22)	(-0.85)	(0.20)
	Controls	Yes	Yes	Yes	Yes
	Observations		1,016		
	Pseudo R^2		0.0680		
Middle-aged Group	Pi	0.552***	0.503**	0.762*	0.092
		(4.09)	(2.20)	(1.91)	(0.13)
	Controls	Yes	Yes	Yes	Yes
	Observations		3,575		
	Pseudo R^2		0.0804		
Older Group	Pi	0.602***	0.751**	0.722	0.083
		(2.81)	(2.15)	(1.46)	(0.11)
	Controls	Yes	Yes	Yes	Yes
	Observations		2,320		
	Pseudo R^2		0.0486		

4.4.2 The Impact of Personal Income on Sports Participation Across Different Education Level

According to the Table 4-9, the impact of personal income on sports exercise participation varies significantly across different education levels. For the medium education group, the coefficient for income is 0.364, showing that an increase in income significantly promotes the chance of residents in this group participating in sports exercise. Based on the current situation, the medium education group may be more focused on improving health and quality of life, and they possess a certain level of economic foundation, allowing them to invest extra income in fitness activities or related equipment. Therefore, the impact on sports participation is more significant.

In contrast, for the high education group, the income coefficient is smaller and not significant, with a negative relationship (e.g., $\beta_2 = -0.263$, $\beta_3 = -0.420$, both significant at the 1% level). This may be related to the lifestyle and time allocation of the high education group. Due to typically higher work pressure and time constraints, individuals in this group may prioritize time for career development and other activities over sports exercise. Additionally, high income does not significantly increase the willingness of high-education individuals to engage in physical exercise, possibly because of the availability of substitutes for exercise (such as other health management methods).

For the low education group, the income coefficient is 0.180, but it does not reach the significance level. This could be due to the higher economic pressure faced by the low education group, with income increases mainly being used to meet basic living needs, which has a limited impact on promoting sports participation. It may also be due to the lower focus on health and limited access to relevant resources, which affects their motivation to participate in physical exercise.

In summary, the regression results suggest that the medium education group is more likely to increase sports participation through income growth, while the high education and low education groups are less influenced by income, and in the case of the high education group, the effect may even be negative. This suggests that policymakers should consider the different needs of each education group when promoting sports participation. Specifically, for the high education group, more flexible time support and high-quality sports resources may be needed, while for the low education group, greater economic incentives and health education guidance are required.

Table 4-10 The Impact of Personal Income on Sports Exercise Participation Across Different Education Levels

Education Group	Variable	β_1	β_2	β_3	β_4
Low Education Group	Pi	0.180	0.083	0.123	0.122
		(1.40)	(0.63)	(0.87)	(0.75)
	Controls	Yes	Yes	Yes	Yes
	Observations		2,075		
	Pseudo R^2		0.0382		
Middle Education Group	Pi	0.364***	0.196*	0.118	0.059
		(3.38)	(1.92)	(1.16)	(0.52)
	Controls	Yes	Yes	Yes	Yes

Observations		2,956			
Pseudo R^2		0.0524			
High Education Group	Pi	0.046	-0.263**	-0.420***	-0.396***
		(0.30)	(-2.10)	(-3.80)	(-3.10)
	Controls	Yes	Yes	Yes	Yes
	Observations	2,732			
	Pseudo R^2	0.0742			

Based on the regression results shown in Table 4-10, the analysis examines the impact of personal income on sports event viewing across different education levels. The results reveal significant heterogeneity in the effect of income on sports event viewing behavior among different educational groups.

For the low education group, the income coefficient is 0.913, showing that an increase in income significantly raises the probability of this group watching sports events. This may be due to the greater sensitivity of the low education group to the entertainment demand for sports events, and they may be more likely to spend additional income on leisure activities. Furthermore, the coefficient for β_2 is 1.239, also significant at the 1% level, further emphasizing the strong effect of income increase on their participation in sports-related activities, such as event viewing.

For the medium education group, the income coefficient is 0.125, but it is not significant, indicating that the impact of income on sports event viewing is weaker in this group. This may be because the medium education group already has a relatively higher income, and their demand for participation in sports events is more limited by time and other lifestyle choices, rather than simply by increased income.

For the high education group, the income coefficient is 0.100, which also does not reach showing that an increase in income may negatively affect the probability of high-education individuals viewing sports events. This may be because the high education group faces greater work pressure and has less disposable time, and any additional income is more likely to be allocated to higher-level consumption rather than leisure activities like watching sports events.

In conclusion, the regression results show that the low education group is the most responsive to income increases in terms of sports event viewing behavior, while the responses of the medium education and high education groups are weaker or even negative. Policy recommendations may include providing more high-quality, low-cost sports event resources for the low education group to further stimulate their participation, while for the high education

group, time-friendly event arrangements and higher-tier event experiences could attract their involvement.

Table 4-11 The Impact of Personal Income on Sports Event Viewing Across Different Education Levels

Education Group	Variable	β_1	β_2	β_3	β_4
Low Education Group	Pi	0.913***	1.239***	0.801	0.322
		(4.23)	(3.40)	(1.16)	(0.26)
	Controls	Yes	Yes	Yes	Yes
	Observations		2,073		
	Pseudo R^2		0.0683		
Middle Education Group	Pi	0.125***	-0.058	-0.071	-2.019**
		(0.95)	(-0.28)	(-0.23)	(-2.31)
	Controls	Yes	Yes	Yes	Yes
	Observations		2,945		
	Pseudo R^2		0.0419		
High Education Group	Pi	0.100	-0.223	-0.606**	-0.555
		(0.84)	(-1.22)	(-2.03)	(-0.86)
	Controls	Yes	Yes	Yes	Yes
	Observations		2,725		
	Pseudo R^2		0.0572		

CHAPTER 5: CONCLUSION AND DISCUSSION

5.1 Conclusion

Based on the Hierarchy of Needs Theory and Social Capital Theory, and using data from the 2021 China General Social Survey (CGSS), we construct an empirical model of the "Impact of Income Level and Social Activities on Sports Participation." The study employs methods such as generalized ordered logit regression and mediation effect analysis to explore the heterogeneity of sports activity participation and sports event viewing across different groups. The main conclusions of this study are as follows:

First, income level plays a big role on sports participation. Overall, higher-income groups are more likely to increase their frequency of sports participation. In contrast, low-income groups have relatively lower participation rates, indicating that economic ability remains one of the key factors influencing sports participation.

Second, social activities play a mediating role between income level and sports participation. Higher-income individuals tend to have broader social networks, and the frequency of social activities further promotes sports participation. Social interactions not only provide more sports information and participation opportunities but also, to some extent, enhance individuals' motivation and sustainability in exercise.

Third, the demographic characteristics of sports participants and regional differences are significant. In terms of age, the middle-aged group has the highest sports participation rate, while the youth group is more active in sports event viewing. Higher-income groups not only participate more in sports exercise but also show a stronger willingness to watch sports events. Additionally, residents in the eastern regions have significantly higher participation rates than those in central and western regions, indicating that external environmental factors such as economic development level and the availability of public sports facilities play a key role in sports participation.

Based on these findings, the study proposes targeted policy recommendations: increase the supply of public sports facilities to lower the barriers to participation, thereby enhancing sports participation levels among low-income and low-education groups. Additionally, policy design should focus on regional differences and promote the development of the sports industry in central and western regions through resource allocation, further narrowing the gap in sports participation levels between regions.

5.2 Policy Implications

This study explores the impact of sports participation behavior on the development of the sports industry and analyzes various factors influencing sports participation behavior. The results reveal that individuals with higher income levels and frequent social activities are more likely to engage in more sports activities, thereby driving the sports industry's development. To further help the sports industry's development, the following recommendations are made:

5.2.1 Enhancing the Economic Accessibility of Sports Participation

(1) Narrowing the Income Gap and Lowering Barriers to Participation

Income level is a key factor affecting sports participation behavior. High-income groups are particularly active in sports participation, while low-income group is another story. Therefore, the government needs to adopt a series of policy measures to narrow the income gap and enhance the ability of low-income groups to participate in sports. For example, increasing social welfare, providing sports activity vouchers, or offering targeted subsidies can help reduce the economic barriers to sports participation for low-income groups. Additionally, it is recommended to establish a national public sports activity fund to subsidize low-income individuals' participation in sports activities and help them access more sports facilities and services.

In practice, policies promoting free or low-cost sports activities can be implemented at the grassroots community level, supported by additional financial subsidies from local governments. For instance, community gyms, public sports fields, and other infrastructure should gradually become free or low-cost to use. This not only directly promotes sports participation among low-income groups but also encourages the general public's participation in sports, further improving societal health levels.

(2) Promoting a Multi-Level Sports Participation Model

Sports participation is developing in a multi-level, diversified manner, with significant differences in participation needs across different income groups. High-income groups tend to engage in high-end, customized sports activities, such as personal trainers, one-on-one fitness sessions, and exclusive sports programs. Middle-income groups are more focused on cost-effectiveness and a variety of sports options, while low-income groups have a greater demand for public, affordable sports activities. Therefore, the government should collaborate with businesses and social organizations to promote a multi-level sports participation model based on the needs of different demographic groups.

Specifically, customized sports activities can be promoted among high-income groups, such as offering premium membership clubs or organizing tailored sports experience events to enhance the market value of sports participation. Meanwhile, for middle and low-income groups, affordable sports programs, such as basic fitness courses and community sports events, should be introduced to expand participation coverage. This approach not only meets the participation needs of different income groups but also optimizes the promotion and development of sports activities.

5.2.2 Enhancing the Role of Education in Promoting Sports Participation

(1) Strengthening Physical Education in Schools

Education level is one of the key factors influencing sports participation. The popularity and quality of physical education in schools directly determine the awareness and interest of the youth in sports activities, which in turn influences their future participation habits. The government should further deepen the reform of physical education, making sports courses an integral part of basic education, and establishing clear goals and evaluation mechanisms. For example, the number of physical education classes can be increased, and the scientific and fun aspects of teaching should be improved, encouraging students to actively engage in various sports. Additionally, promoting school sports events, inter-school competitions, and other activities can help create a positive sports culture, stimulating students' interest and enthusiasm for sports.

Moreover, schools can collaborate with community sports organizations to offer more diverse sports opportunities to students. For example, extracurricular sports training and sports summer camps during holidays can help students experience a variety of sports activities. This not only improves their physical fitness but also fosters a positive attitude towards sports participation.

(2) Promoting National Fitness Education and Public Awareness

The impact of education is not limited to the school level; on a societal level, education and public awareness are also essential to improving public engagement in sports. The government should use a combination of traditional media and social media to raise awareness about the importance of physical exercise. For example, public service advertisements, fitness challenges, or setting up "Healthy Living Months" can be used to increase the public's focus on physical exercise.

Additionally, sports education activities targeting different groups can be carried out at the community level. For example, providing health lectures and exercise guidance courses for the

elderly, promoting sports programs suitable for them; offering stress management and fitness courses for working groups to improve their health; and organizing parent-child sports courses for families to enhance interaction and cohesion among family members. Through multi-level sports education, the participation in sports activities can be further expanded, increasing public enthusiasm for sports participation.

(3) Integrating Sports with Cultural Education

The integration of sports and cultural education is an important method to enhance the attractiveness of sports participation. For example, traditional culture can be combined with sports events, such as hosting local cultural festivals like folk sports events during the Spring Festival or dragon boat races during the Dragon Boat Festival. These events not only stimulate residents' interest in sports participation but also strengthen cultural identity, which can further encourage broader participation in sports. Through such activities, residents not only enjoy the fun of physical exercise but also immerse themselves in a rich cultural atmosphere, thus enhancing their motivation to participate.

Moreover, by cleverly incorporating cultural elements, the attractiveness and entertainment of sports events can be enhanced. For instance, integrating traditional performances or concerts into large sports events can offer a more enriching cultural experience for the audience, attracting more people to participate. This combination of culture and sports can provide a unique viewing experience for spectators, especially for those who are not very interested in sports activities themselves, thus increasing overall sports participation.

5.3 Outlook and Limitations

The data used in this study is cross-sectional, which limits the in-depth understanding of the mechanisms through which personal income influences sports participation, particularly the inability to capture the impact of time changes on individual sports participation levels. If panel data were available, it would allow for a more comprehensive exploration of the long-term effects of income changes on sports exercise and sports event viewing behaviors across different age groups, while also analyzing the dynamic effects of cultural and economic background changes on sports participation. Furthermore, as China's economy and society develop, the types and ways of participating in sports are diversifying and becoming more specialized, with significant differences in sports participation preferences between urban and rural areas, regions, and different groups. This study, due to data availability constraints, did not further segment sports activities and explore the impact of participation in different types of sports on the subjective experiences of different age groups. Therefore, future research

should further explore the impact of different types of sports activities on the experiences of different groups, to develop more precise sports promotion policies and enhance residents' enthusiasm and satisfaction with sports participation. With these improvements, future research will be able to more accurately capture the effects of economic and social factors on sports participation, providing empirical evidence for policymakers to promote public health and improve quality of life.

CHAPTER 6: REFERENCES

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