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Research on the Impact of Physical Exercise on the Subjective Well-being of Chinese Residents

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Abstract. Against the backdrop of the "Healthy China" strategy, enhancing residents' well-being has become one of the core objectives of public policy. Drawing on the latest data from the 2023 China General Social Survey (CGSS2023), this paper employs a logit regression model to examine in depth the impact of residents' physical activity participation on subjective well-being and the significance of this relationship. The study found that, after controlling for sociodemographic variables such as gender, age, educational attainment, economic status, and political affiliation, physical exercise has a significant positive predictive effect on residents' well-being. Empirical results show that residents who actively engage in physical exercise are 1.564 times more likely to feel happy than those who do not exercise; when residents who were previously inactive become active participants, their absolute probability of experiencing a sense of fulfillment increases by 7.9%. This conclusion indicates that physical exercise is not only a means of improving physical fitness but also a vital resource for enhancing individual psychological resilience, alleviating social stress, and strengthening a sense of fulfillment in life. The study recommends that future public service systems should shift from a focus on mere "facility coverage" to "health ecosystem management." By lowering participation barriers and enriching social sports activities, the "dividends of exercise" can be transformed into a sense of well-being that benefits the entire population, thereby providing micro-psychological support for building a "Happy China."

Keywords: National Fitness, Subjective Well-being, Quality of Life, Sense of Accomplishment, Public Sports Services

1. Introduction

The rapid improvement of material living standards has not led to a synchronous growth in people's spiritual life. On the contrary, under the fast-paced lifestyle and the increasing dual pressure of work and life, anxiety, loneliness, and sub-health have become invisible barriers affecting the well-being of Chinese residents. In this context, physical exercise is no longer just a personal leisure and entertainment activity; it also has the social function of improving people's quality of life and fostering a harmonious social mentality. Since the release of the Healthy China 2030 Plan Outline in 2016, national fitness has been officially designated as a national strategy. This strategic structural transformation represents a major shift in the country's positioning of sports, from a narrative

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centered on competitive medals to one focused on public health and people's well-being. Government initiatives such as building 15-minute fitness circles and promoting inclusive public sports services aim to lower the threshold for residents to participate in sports activities and enhance individual sense of achievement in daily life at the micro level.

From a social psychology perspective, physical exercise improves people's well-being through multiple channels. The physiological regulatory effects induced by exercise (dopamine release) can immediately improve negative emotions, while participating in sports activities can rebuild social capital. Group sports activities in urban communities (running clubs, flag football) act as a "social glue", which reduces the loneliness caused by the atomization of contemporary society by strengthening interpersonal communication and neighborhood trust, thereby shaping long-term subjective well-being.

However, existing academic discussions mostly focus on the macroeconomic benefits of sports activities [1] or pure physiological mechanisms [2], and few studies use the latest micro data to quantitatively verify the extent to which people's sports participation behavior is transformed into psychological well-being dividends under large-scale national strategic intervention. After several years of the implementation of the Healthy China initiative, does the effect of physical exercise on improving well-being vary among different social groups? Can such intangible health resources become an effective way to improve national well-being in modern society [3]? This paper studies the sub-questions from the following three aspects: First, conduct an empirical test at the correlation level, that is, does the frequency of Chinese residents' physical exercise have a significant positive impact on subjective well-being? After controlling for traditional material variables such as economic income and educational attainment, does sports participation still have independent and robust explanatory power? Second, conduct a mediating mechanism analysis to explore the internal reasons why physical exercise improves well-being, that is, whether the positive emotions generated after exercise-induced physiological reactions are caused by exercise itself, or whether exercise enhances social interaction and builds social capital, thereby alleviating individual anxiety and social alienation. Third, from the perspective of policy evaluation, how to more effectively transform the supply of public sports services into tangible well-being for residents, resolve social contradictions through non-material means, and improve the public's sense of life achievement?

Therefore, this paper uses the latest CGSS2023 data to empirically analyze the impact path of residents' sports participation behavior on subjective well-being. This paper mainly discovers the internal mechanism of "exercise promoting happiness" behind the national fitness strategy through rigorous quantitative analysis, and provides a scientific decision-making basis for optimizing public service supply and building a "happy China". Theoretically, this paper attempts to challenge the view that "material resources solely determine well-being", uses quantitative methods to prove the contribution of sports participation to subjective well-being, and provides the latest empirical support for sociological and psychological theories on the impact of non-material resources on life satisfaction.

In terms of practical significance, this paper uses the latest CGSS2023 data to evaluate the social welfare effect of the "Healthy China" initiative, and provides scientific support for the government to evaluate the cost-effectiveness of public sports investment. Empirical results show that physical exercise is closely linked to the achievements of "Healthy China" construction, indicating that high-quality sports services are a psychological safety valve for the public [4]. It also reminds policymakers that future public sports services should target high-stress groups or groups with obvious loneliness, create an inclusive health ecosystem, which can not only improve the physical fitness of the people, but also strengthen social cohesion through the social attributes of sports

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activities, thereby achieving the dual improvement of the public's overall psychological well-being and life satisfaction at a lower cost.

2. Literature review

Academia has reached a consensus on the relationship between physical exercise and subjective well-being, that is, participating in sports activities is an important driving force for improving the well-being of the general public. A large number of empirical studies based on large-scale national surveys such as the CGSS show that compared with people who do not participate in physical exercise, those who regularly participate in physical exercise report much higher levels of life satisfaction and positive emotions [5]. The positive effect is not only the improvement of physical function, but also the enhancement of emotional regulation and psychological resilience.

From a psychological mechanism perspective, physical exercise is a positive psychological reinforcement method. It can significantly improve an individual's level of hope and psychological resilience, enabling people to have higher psychological energy when bearing life pressure [6]. The self-challenge and sense of achievement obtained in exercise will promote people to form a positive self-image, and use self-improvement to alleviate negative anxiety, thereby achieving the joint improvement of physical and mental health [7].

In the social dimension, physical exercise is a powerful "social glue". Participating in group or social sports activities can significantly improve the quality of peer relationships and increase the frequency of interpersonal communication, thereby enabling individuals to form supportive social capital in an atomized society [8]. Trust and a sense of belonging formed based on sports ties are the main sources of individual subjective well-being [9]. There is an obvious chain coupling relationship among physical exercise, health status, and well-being. Physical exercise is the foundation of a healthy lifestyle, and ultimately achieves a positive evaluation of quality of life through the mediating variable of improving physical health. Therefore, existing studies have proven that sports can promote well-being. In summary, existing research has thoroughly demonstrated the empowering role of sports in well-being [10]. However, with the continuous advancement of the "Healthy China" initiative, it is still of great academic significance to use the latest data such as CGSS2023 to test whether the well-being dividend is sustainable and differentiated in a complex social environment. At present, there are still gradient differences in regional coverage and financial investment in China's public sports services, and the governance logic needs to shift from "quantity first" to "quality improvement and efficiency enhancement".

Therefore, this paper uses the CGSS2023 dataset to establish a binary logistic regression model to explore the impact and magnitude of physical exercise participation behavior on individual subjective well-being (sense of achievement). This paper mainly uses micro data to test how physical exercise, as "health capital", is effectively transformed into psychological well-being, and attempts to establish a robust link between individual daily exercise behavior and sense of life achievement. It not only provides empirical support for the social benefits of the "Healthy China" initiative, but also provides a micro psychological basis for the precise supply of public sports services and the improvement of the overall national well-being.

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3. Theoretical framework and research hypotheses

3.1. Theoretical foundation

This paper takes the "Social Capital Theory" as the core theoretical framework. Social capital refers to a resource embedded in social networks, and the benefits obtained by individuals through social interaction, trust, and reciprocal norms are called social capital [11]. In modern atomized society, physical exercise is not only a personal physiological activity but also a form of social participation. According to Robert Putnam, collective or social sports participation can form "bridging" and "bonding" social capital, thereby strengthening neighborhood trust and interpersonal communication. With the effectiveness of "social glue", sports activities reshape individuals' social support networks, better alleviate the pressure and loneliness caused by social transformation, and provide continuous psychological empowerment and subjective well-being for residents at the non-material level [12].

3.2. Research hypotheses

The impact of physical exercise on residents' subjective well-being is not a linear effect of a single path, but the result of the joint action of physiological function, psychological capital, and social capital. From the perspective of health capital, continuous participation in physical exercise can improve physiological function, thereby enhancing individuals' evaluation of their own health and providing a good physiological basis for well-being. From a psychological perspective, physical exercise is regarded as a positive psychological empowerment method, which regulates emotions by stimulating physiological responses such as dopamine secretion, significantly improving residents' "level of hope" and self-efficacy, and enabling residents to have stronger psychological resilience when facing life pressure, thereby achieving the continuous growth of subjective well-being [13].

In addition, from a sociological perspective, sports activities themselves have strong social attributes. Peer interaction and community connection can generate "bridging social capital", thereby effectively reducing the loneliness of individuals in modern atomized society. Interpersonal trust and a sense of belonging formed with sports as the bond are social resources that generate individual well-being. Based on the above theoretical logic, this paper proposes the following main research hypothesis: after controlling for demographic variables, economic status, political affiliation and other variables, the more times residents participate in physical exercise, the stronger their subjective well-being.

4. Models and data

4.1. Data sources and processing

The micro data used in this paper is from the 2023 Chinese General Social Survey (CGSS). The CGSS is the first national, comprehensive, and longitudinal academic survey project organized by the China Survey and Data Center of Renmin University of China. Adopting scientific sampling methods, the dataset covers all provinces, autonomous regions, and municipalities directly under the Central Government in mainland China, and its authority and representativeness are widely recognized in the social science community.

The 2023 CGSS data is closely integrated with social hot issues such as "Healthy China" and "governance satisfaction", and has detailed measurement indicators. The data cleaning process is as

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follows: first, filter according to the completeness of the core explanatory variable (physical exercise participation) and the explained variable (life satisfaction), and then exclude missing values (i.e., "don't know", "not applicable" or refusal to answer) in important demographic variables such as educational attainment, income, and political affiliation. After logical testing and screening, the final effective sample size for the regression model is 11,201. This ten-thousand-level sample size ensures the robustness of statistical inference and lays a solid foundation for in-depth exploration of the health governance logic in China's complex social context.

4.2. Variable definitions

To ensure the reproducibility of this study, this paper explains the sources and coding processes of each core variable. Subjective Well-being (SWB) is the main proxy variable reflecting residents' satisfaction with national governance performance and evaluation of quality of life. This study uses question A36 "Overall, do you think your life is happy?" to measure individuals' life happiness. The original questionnaire uses a scale from 1 (very unhappy) to 5 (very happy). In accordance with standard practices in social psychology, this variable is recoded into a binary variable happybinary: residents who choose "very happy" or "relatively happy" are assigned a value of 1, representing high life satisfaction; residents who choose "very unhappy", "relatively unhappy" or "average" are assigned a value of 0, as the control group.

The core explanatory variable measures the frequency of residents' participation in national fitness activities, corresponding to question A3009 in the questionnaire "In the past year, in your spare time, do you often participate in physical exercise?". The original response options are "every day", "several times a week", "several times a month", "several times a year" and "never". To establish an indicator of "self-discipline intensity" under the framework of biopolitics, this variable is recoded into a binary variable sportactive: people with an exercise frequency of "several times a month or more" are defined as "active participants" and assigned a value of 1; people with an exercise frequency of "several times a year or less" or who never participate are defined as "non-active participants" and assigned a value of 0.

Regarding control variables, to control for the impact of other factors on the sense of life achievement, 5 control variables are introduced. Gender (male), a dummy variable with 1 for male and 0 for female, is used to explore gender differences in health achievement. Second is age (age), calculated by subtracting the birth year from 2023. Since the relationship between age and life satisfaction is generally U-shaped or linear, it is included in the model as a continuous variable. Educational attainment (edu) uses the original 14-level educational attainment coding to reflect the fundamental impact of human capital on the sense of life achievement. Political affiliation (isparty), a dummy variable with 1 for members of the Communist Party of China and 0 for non-members, is used to examine the differences in perception of governance effectiveness among different political identities. Finally, economic status (logincome), that is, the logarithm of personal annual income. Since the original income data has an obvious long-tail distribution, taking the logarithm can effectively eliminate heteroscedasticity and make the model coefficients better reflect the relationship between elasticities.

4.3. Model configuration

Since the explained variable happybinary is a binary categorical variable, the linear probability model (LPM) established by traditional Ordinary Least Squares (OLS) will produce predicted probabilities outside the [0,1] range and cannot satisfy the residual normality assumption. Therefore,

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this study mainly uses a logistic regression model with Maximum Likelihood Estimation (MLE). The core logic of this model is to use the logistic cumulative distribution function to predict the probability of an individual "having a sense of life achievement" given a set of explanatory variables. The model formula is:

$$\left(\text{logit}\left(\text{SW}\right) = \ln\left(\frac{\text{SW}}{1-\text{SW}}\right) = \beta_0 + \beta_1 \text{sport}_\text{active} + \beta_2 \text{male} + \beta_3 \text{age} + \beta_4 \text{edu} + \beta_5 \text{is}_\text{party} + \beta_6 \text{log}_\text{income} + \epsilon\right)\right) \tag{1}$$

Here, P represents the probability that the dependent variable takes the value 1, and β_1 is the regression coefficient for the core independent variable, sports participation. To enhance the robustness of the findings, subsequent analyses will present OLS estimates alongside the results, and will calculate the odds ratio and marginal effects of the Logit model to precisely deconstruct the extent to which physical exercise contributes to a sense of fulfillment from various perspectives.

5. Results of the empirical analysis

This chapter conducts a rigorous empirical test on the core hypothesis of "how physical exercise is transformed into a sense of life achievement and well-being" from four aspects: descriptive statistics, model comparative analysis, odds ratio interpretation, and marginal effect calculation.

5.1. Descriptive statistics of variables

Table 1 presents the basic information of 11,202 valid samples. Based on the explained variable happybinary, the mean value of Chinese residents' sense of life achievement (subjective well-being) is 0.760, indicating that approximately 76% of residents have a positive evaluation of their lives. The mean value of the core explanatory variable physical exercise participation (sportactive) is 0.312, indicating that although "national fitness" has been elevated to a national strategy, only about 30% of residents have developed the habit of regular exercise (several times a month or more). This shows that sports, as a kind of "health capital", still has great growth potential for improving the overall well-being of residents.

Table 1. Statistical characteristics of variables included in the model

Variable	Obs	Mean	Std. Dev.	Min	Max
happybinary	11201	0.760	0.427	0	1
Variable	Obs	Mean	Std. Dev.	Min	Max
sportactive	11201	0.312	0.463	0	1
male	11201	0.548	0.498	0	1
age	11201	46.700	15.820	18	95
edu	11201	6.990	3.850	1	14
isparty	11201	0.733	0.443	0	1
logincome	11201	9.120	2.150	0	16

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5.2. Regression to the mean

To test whether the impact of physical exercise on the sense of life achievement is robust, Table 2 presents the results obtained using Ordinary Least Squares (OLS) and binary logistic regression models.

Table 2. Comparative regression results

Variables	OLS(happybinary)	Logit(happybinary)
sportactive	0.075***(0.009)	0.447***(0.052)
male	-0.061***(0.009)	-0.358***(0.052)
age	0.002***(0.000)	0.012***(0.002)
edu	0.015***(0.002)	0.087***(0.011)
isparty	-0.085***(0.010)	-0.498***(0.058)
logincome	0.002***(0.000)	0.011***(0.003)
Constant term	0.523***(0.021)	-1.245***(0.123)
N	11201	11201
R^2/PseudoR^2	0.042	0.038

The results show that after controlling for variables such as gender, age, educational attainment, political affiliation, and income, physical exercise (sportactive) is significantly positively correlated at the 1% level in both models ($P<0.01$). In the OLS model, the coefficient is 0.075; in the logistic regression model, the coefficient is 0.447. This indicates that regardless of which statistical method is used, the effect of physical exercise on improving the sense of life achievement is solid.

This shows that physical exercise is an intangible resource, which is not only conducive to improving people's physical fitness but also can serve as a high-quality leisure activity to alleviate the psychological pressure brought about by the social transformation period. When residents "get moving" using public resources such as parks, green spaces, and fitness trails, the positive physical benefits are transformed into psychological well-being.

5.3. Explanation of odds ratios

Since the regression coefficients in the Logit model do not have an intuitive linear interpretation, Table 3 presents the odds ratios (ORs) for each explanatory variable.

Table 3. Odds ratios for each explanatory variable

Variables	ORs	z-score
sportactive	1.564***	8.59
male	0.700***	-6.88
age	1.012***	5.76
edu	1.091***	7.92
isparty	0.608***	-8.21
logincome	1.011***	3.64
Constant term	0.287***	-10.08

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The results in Table 3 show that the Odds Ratio (OR) of physical exercise (sportactive) is 1.564. That is, under the same other conditions, residents who regularly participate in physical exercise are 1.564 times more likely to report a sense of life achievement than those who do not participate in physical exercise. Therefore, it can be concluded that "health capital" plays an important role in improving personal well-being.

Under the condition of diminishing marginal utility of traditional material resource allocation, the dual physical and psychological benefits obtained through physical exercise have become a cost-effective means to improve public well-being — it can not only reduce individuals' health risks but also bring considerable "emotional dividends" to the public psychologically.

5.4. Diminishing returns analysis

To further quantify the actual impact of policy interventions, Table 4 presents the average marginal effects

Table 4. Average marginal returns

Variables	Diminishing returns	z-score	P>|z|
sportactive	0.079***	8.57	0.000
male	-0.063***	-6.86	0.000
age	0.002***	5.75	0.000
edu	0.015***	7.90	0.000
isparty	-0.087***	-8.19	0.000
logincome	0.002***	3.63	0.000

It can be seen from the data that the marginal utility of physical exercise is 0.079. The academic interpretation is: when people who originally did not participate in physical exercise are incorporated into the national fitness system and become active exercisers, the absolute probability of their well-being (sense of life achievement) increases by 7.9%. For each unit increase in the logarithm of personal annual income, the sense of life achievement increases by 0.2%. The comparative results clearly show that in contemporary China, improving residents' micro well-being through the precise supply of public sports services brings a much greater increase in sense of achievement than simple income growth [14].

5.5. An in-depth discussion of control variables

The social and political dynamics exhibited by other variables in the regression model are also very complex.

In terms of gender and age, it is found that males (male) report lower levels of achievement than females (female), which may be due to the greater pressure and stronger risk perception borne by males during the social transformation period; age is positively correlated with achievement, and the elderly are more likely to have a stable sense of satisfaction, which also indirectly reflects the effectiveness of China's social security system construction in responding to population aging.

Educational level (edu) and income (log_income) both have an impact on the sense of life achievement, which is also consistent with the view of resource empowerment theory, that is, people with more socioeconomic resources are less likely to be overwhelmed by risks in life.

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The special performance of political affiliation is explained by the regression analysis results. The statistical results show that the regression coefficient of party membership (is_party) is negative and significant (marginal effect is -0.087). This seems counterintuitive, but it can be explained from the logic of public governance: party members bear much greater public responsibilities than ordinary people, have much higher psychological expectations, and face greater work pressure (especially at the front line of grassroots governance). This results in "responsibility spillover", making them more strict in evaluating their own subjective well-being.

Therefore, the empirical results strongly support the research hypothesis of this paper. The national fitness strategy not only advocates a healthy lifestyle to improve the physical fitness of the people, but also enhances personal well-being and hope, thereby transforming public sports services into tangible "happiness dividends". This path of "promoting happiness through sports" not only proves the unique value of sports as an intangible capital in improving quality of life, but also becomes the micro psychological foundation for building a "happy China" and realizing the all-round development of people.

6. Conclusions and policy implications

6.1. Research conclusions

This paper uses the large-scale national dataset of the 2023 Chinese General Social Survey (CGSS) to test the impact of physical exercise on the subjective well-being of Chinese people. After controlling for socioeconomic variables, physical exercise has a significant and stable positive impact on well-being. Residents who actively participate in physical exercise are 1.564 times more likely to be happy than those who do not regularly participate, with a net increase of 7.9% in the probability of well-being. It follows that sports participation is a "health dividend" for improving national well-being. Sports activities can not only improve individuals' physical health, but also enhance people's level of hope and rebuild social resources, providing long-term support for residents' well-being at the micro psychological level.

6.2. Policy implications

Based on the above empirical results, to further play the role of sports in improving people's well-being, this paper puts forward the following three policy recommendations.

First, create an inclusive fitness environment and reduce the threshold for accessing well-being benefits. According to descriptive statistics, nearly 70% of people have not developed the habit of regular exercise. The government should continuously strengthen the construction of "15-minute fitness circles", pay special attention to the exercise needs of "marginal groups" such as low-income and low-educated groups, create a convenient, open and inclusive fitness environment, ensure that residents with various resource conditions can fairly enjoy the benefits brought by sports, and turn sports into inclusive public welfare.

Second, shift from the supply of facilities and equipment to the cultivation of community ecology and strengthen social cohesion. A large part of the well-being brought by sports comes from its social attributes. Public sports services should not only stay in facility construction, but should encourage the organization of more "interesting" and "social" mass sports activities. Hold community sports meetings, running clubs, fencing competitions and other activities, build sports into a bond for neighborhood interaction, and rely on the social capital generated by sports to

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enhance residents' sense of belonging and social trust, thereby improving the happiness index of the entire community.

Third, launch physical and mental intervention programs for "high-stress groups". Empirical studies show that males and frontline workers (party members) have relatively low levels of well-being, which is caused by the accumulation of social responsibility and psychological pressure of special groups during the transformation period. Relevant departments should take targeted intervention measures, promote activities such as hiking and ball games that can both reduce stress and socialize for young and middle-aged people and frontline workers, and take physical exercise as a flexible way of psychological decompression. Adopt a physical and mental collaborative intervention method, use the physical pleasure brought by exercise to alleviate job burnout, and turn sports into a psychological pressure relief valve against the high-pressure lifestyle.

6.3. Limitations and future directions

Although this paper uses the latest data to prove the positive impact of sports activities on well-being, there are still some shortcomings. Although cross-sectional data can establish correlations, it is difficult to rule out the potential endogeneity problem that "people with higher levels of well-being are more likely to participate in physical exercise". Future research can use instrumental variable methods or longitudinal data to study the realization process of the "health dividend".

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