

The Impact of Cultural Values on Sporting Excellence: A Study of Nations Worldwide

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Abstract

This article examines the impact of Hofstede's cultural indicators on national performance in elite sports, using a sample of 112 countries from all continents with valid data. The methodology includes cross-sectional OLS regressions with White's correction for heteroscedasticity and hierarchical clustering through Ward linkage. The study controls for GDP per capita and income inequality (GINI index), finding that only GDP per capita is statistically significant. Key cultural indicators that significantly influence sports performance include Individualism, Motivation towards Achievement and Success, and Long Term Orientation. The hierarchical clustering analysis identifies four behavioral patterns of countries based on sports performance, economic development, and relevant cultural indicators. These findings suggest that while economic factors play an important role, cultural dimensions also significantly shape a nation's success in international sports. The article contributes to the understanding of how cultural values influence sports outcomes, providing insights that can inform policies and strategies to enhance national sports performance. This research highlights the importance of considering both economic and cultural factors when analyzing the determinants of sports success across different nations. This study is important because it shows how cultural values, alongside economic factors, significantly impact national sports performance, providing valuable insights for improving sports policies and strategies.

Keywords: Sports Performance, Financing Of Sports, National Cultural Values, Hierarchical Clustering.

Introduction

Understanding how nations perform in international sports competitions is important because it reflects their athletic capabilities and global influence. This knowledge is not just about celebrating success; it helps countries critically assess their sports programs, pinpoint weaknesses, and allocate resources more effectively. By examining both economic factors, such as national funding, and cultural influences, we gain a deeper understanding of what drives sports performance. Cultural aspects like individualism, motivation for achievement, and long-term planning can profoundly shape how athletes train, compete, and ultimately succeed.

Recognizing these cultural impacts allows countries to design sports programs that align more closely with their societal values, leading to better athlete development and higher chances of success on the global stage. This study is particularly relevant in the fields of business and social sciences, as it merges economic analysis with cultural sociology and performance metrics. In business, insights from this research can guide sponsorship decisions, marketing strategies, and the commercial dynamics of sports, ensuring that investments are targeted and effective. In social sciences, understanding the interplay between culture and sports performance enhances our knowledge of how societal values influence individual and collective achievements.

By integrating economic and cultural perspectives, this research not only contributes to the development of successful sports policies but also fosters national pride and international recognition. The findings can help craft strategies that promote athletic excellence while staying true to cultural identity, ensuring that sports development is both strategic and meaningful. This comprehensive approach ensures that nations can build sports programs that are not only competitive but also resonate with their unique cultural and economic contexts.

Literature Review and Hypotheses

Academic literature has explored various topics related to national sports performance. Research on elite sport systems and policies examines how different countries develop and implement strategies to enhance athletic excellence. Studies on sport funding and finance analyze the allocation of resources and their impact on performance, while investigations into socio-economic, political, and cultural factors highlight how these elements influence the success of athletes on a national level.

Elite Sport Systems and Policies

Elite sport systems and policies are critical frameworks that determine the competitive success of nations in international sports. These systems include government policies, funding mechanisms, athlete development programs, and organizational structures that support elite athletes. According to De Bosscher et al (2009), financial investment is a fundamental component of these systems, influencing a nation's competitive position. Stewart (2017) emphasizes the significance of robust financial arrangements to sustain elite sports funding, noting that countries with strong economic policies often excel in international competitions. Similarly, Houlihan and Green (2007), discuss the necessity of institutional support and its impact on elite sport development.

Government policies play an important role in shaping elite sports systems. As noted by Seguí-Urbaneja et al (2022), and Milon (2014), the economic and social policies of a country can significantly influence the performance of sports federations. Additionally, Litvishko et al (2019), highlight the need for efficient financing mechanisms to support professional sports, which is essential for maintaining competitive standards. The cultural attitudes towards sports also contribute to the success of elite athletes, as Zozulya and Kuz'micheva (2015), discuss the importance of a strong sports culture in highly developed countries. Škorić and Obadić (2022) provide insights into how state funding is linked to international sporting success, using Croatia as a case study. They argue that cultural, political, and socio-economic factors influence the allocation of sports funding. Green and Oakley (2001), further explore the interplay between cultural and financial catalysts in developing elite sports systems, highlighting that these factors vary across countries. Madella et al (2005), compare the organizational performance of national swimming federations in Mediterranean countries, illustrating how financial resources are managed to achieve competitive results. Tóth and Mátrai (2023), discuss the public finance aspects of Hungarian sport financing, emphasizing the role of government participation in competitive sports funding. Additionally, Acquah-Sam (2021) explores the challenges of sports development in developing countries, focusing on the lack of financial capital and social barriers.

The effectiveness of elite sports systems can be attributed to the coordination between various stakeholders, including government bodies, sports organizations, and the private sector. Dimitropoulos et al. (2018) analyze the financial performance of municipal sports organizations, suggesting that efficient management of resources is crucial for success. Ennis and Ennis (2020) argue that providing adequate funding for sports is essential for societal and economic development, which in turn supports elite athletes. The comparison of elite sport systems across different countries reveals diverse approaches and outcomes. According to Bosscher et al. (2009), understanding these systems' structures and funding mechanisms is essential for improving international sporting success. Overall, the causal relationships within elite sport systems revolve around financial investment, institutional support, and cultural attitudes towards sports, making these factors indispensable for achieving competitive success on the global stage.

Sport Funding and Finance

Sport funding and finance are essential components in developing and maintaining competitive sports programs. Effective allocation of resources can significantly influence a country's performance in international competitions. De Bosscher et al (2009), emphasize that comparing financial strategies across nations reveals critical insights into successful sport management practices. Stewart (2017), highlights that robust financial frameworks are necessary to sustain high levels of competitive sports. Similarly, Houlihan and Green (2007) note that consistent funding is vital for the development of elite athletes and the maintenance of sports facilities.

The sources of funding for sports programs are diverse, including government allocations, private sponsorships, and public donations. Siebold and Klingmuller (2004) discuss how public and private investments play crucial roles in financing sports facilities, which can host both sports and cultural events. Seguí-Urbaneja et al (2022), illustrate that economic policies

directly impact the financial performance of sports federations, thereby affecting overall sports success. Efficient resource allocation is another critical aspect of sports finance. Litvishko et al. (2019) suggest that professional sports clubs need to adopt more efficient financial mechanisms to enhance their competitiveness. Zozulya and Kuz'micheva (2015), highlight the importance of strategic financial planning in the sports sector, particularly in countries with a strong sports culture. Škorić and Obadić (2022), provide a case study on Croatia, demonstrating how state funding is linked to international sporting success.

The financial sustainability of sports organizations is often challenged by economic fluctuations and changing priorities. Green and Oakley (2001), emphasize the need for financial stability to develop a sustainable elite sports system. Ennis and Ennis (2020), argue that sustained financial support is crucial for both societal benefits and economic development through sports. According to Puț (2023), public funding remains a significant contributor to sports activities in many European countries, although it is influenced by cultural and economic contexts. Madella et al. (2005), compare the financial performance of national swimming federations in Mediterranean countries, highlighting the importance of financial management in achieving competitive success. Tóth and Mátrai (2023), discuss the role of public finance in Hungarian sports, stressing the necessity of governmental support in youth and competitive sports. Acquah-Sam (2021), examines the financial challenges faced by developing countries in sports development, pointing out the lack of financial capital and social barriers as significant obstacles. The interrelationship between funding and performance is evident across different sports systems. As Dimitropoulos et al. (2018) indicate, effective financial management can enhance the performance of municipal sports organizations. Barker-Ruchti et al (2018), provide a comparative analysis of athlete development governance, underscoring the impact of financial and institutional support on sports performance. Lastly, Wicker et al. (2012) highlight that hosting major sports events can drive financial investments and boost a country's sporting success.

Cultural Factors

Cultural factors significantly shape the development and performance of sports within a country, influencing how sports are perceived, funded, and managed. According to De Bosscher et al. (2009), cultural differences impact the competitive position of nations in elite sports. Societal values play a crucial role in how sports are integrated into daily life and national identity, which can be seen in countries like Japan, where sports are deeply embedded in culture (Stewart, 2017, Milon & Milon, 2019). Historical traditions also contribute to the sporting success of nations. For instance, Green and Oakley (2001) argue that the historical commitment to sports in a country influences its development strategies and policies. In many European countries, the tradition of public investment in sports facilities has created a strong foundation for sports development (Siebold & Klingmuller, 2004). National identity is another cultural factor that drives sports performance. Seguí-Urbaneja et al. (2022) note that sports can foster national pride and unity, which in turn boosts the performance of athletes representing their country. The societal importance placed on sports in nations like Spain and Croatia underscores the link between cultural values and sporting success (Škorić & Obadić, 2022).

The influence of culture on sports can also be observed in the funding mechanisms and organizational structures of sports federations. Litvishko et al. (2019) highlight that countries with a strong sports culture are more likely to develop efficient financing mechanisms for professional sports. Similarly, Zozulya and Kuz'micheva (2015) emphasize that the cultural emphasis on physical activity drives resource allocation towards sports. Cultural attitudes towards competition and excellence further impact sports development. Green and Oakley (2001) suggest that nations with a culture of competitiveness and high performance are more likely to succeed in international sports. The cultural support for sports excellence in Australia, for example, has contributed to its success in various sports disciplines (Sotiriadou et al., 2014). Cultural factors also influence the types of sports that are popular and well-supported within a country. In some nations, traditional sports receive more attention and funding, shaping the overall sports culture and performance (Ennis & Ennis, 2020). This can be seen in the way cricket is supported in countries like India and Australia, where it is a significant part of national identity (Bourg & Gouguet, 2010). The role of culture in sports is also evident in the management and governance of sports organizations. According to Winand et al. (2014) and Milon & Şlicaru (2017), cultural differences influence the governance structures and strategic priorities of sports organizations, impacting their performance. In countries with a strong sports culture, governance models tend to be more robust and supportive of sports development. Cultural factors also affect the public perception of sports and athletes. The societal value placed on sports can enhance the public support for sports programs and athletes, leading to better performance outcomes (Cetin & Tribou, 2017). This cultural support is crucial for the sustainability and success of sports programs, as seen in the examples of various successful sports nations. In summary, cultural factors such as societal values, historical traditions, and national identity play a significant role in shaping the development and performance of sports within a country. These factors influence how sports are perceived, funded, and managed, ultimately affecting the success of sports programs and athletes.

Socio-Economic and Political Factors

Socio-economic and political factors significantly influence the development and success of sports systems, encompassing aspects such as economic stability, political commitment, and social policies. According to De Bosscher et al. (2009), a nation's economic and political environment profoundly impacts its elite sports systems. Economic stability ensures consistent funding and resources for sports development, as Stewart (2017) notes that financial arrangements are crucial for sustaining competitive sports programs. Political commitment to sports can drive significant advancements in sports infrastructure and athlete support systems. Green and Oakley (2001) highlight that countries with strong political backing often develop robust elite sports programs. The investment in sports facilities, such as those detailed by Siebold and Klingmuller (2004), reflects the political will to support sports, which can attract major sporting events and improve national sports performance. Social policies that prioritize sports can lead to broader societal benefits and enhanced sports performance. Seguí-Urbaneja et al. (2022) emphasize that economic and social policies directly affect the financial performance of sports federations. Litvishko et al. (2019) argue that efficient financial mechanisms in professional sports are vital for maintaining competitiveness, particularly in countries with strong socio-economic support for sports. In Croatia, as Škorić and Obadić (2022) discuss, state funding is directly linked to international

sporting success, demonstrating the importance of governmental financial support. Similarly, Zozulya and Kuz'micheva (2015) highlight that well-developed socio-economic structures in highly developed sport cultures enhance the overall sports ecosystem.

Public funding and societal support play essential roles in fostering sports development. Puț (2023) points out that public funding is essential for sports activities across Europe, reflecting a socio-economic commitment to sports. This is echoed by Madella et al. (2005), who show that financial management in sports organizations leads to better performance outcomes. The relationship between socio-economic stability and political factors can be seen in countries with high sports performance levels. Tóth and Mátrai (2023) explain that public finance aspects are critical in supporting youth and competitive sports, which are often prioritized in socio-politically stable nations. Acquah-Sam (2021) illustrates that developing countries face challenges such as inadequate financial capital and social barriers, which hinder sports development.

The role of social policies in sports can also be observed in the management and governance of sports organizations. Winand et al. (2014) discuss how cultural and political contexts shape the governance structures and strategic priorities of sports organizations. This underscores the need for a supportive socio-economic and political environment to achieve high sports performance. Overall, socio-economic and political factors are integral to the success of sports systems. These factors ensure stable funding, political backing, and supportive social policies, which together create a conducive environment for sports development and international success.

Research Hypothesis

Academic literature is quite abundant in explaining the sports performance of nations. Since the role of economic development and sports funding is well-documented, we will not prioritize this aspect. However, there is a lack of empirical studies clearly demonstrating which of Hofstede's cultural indicators significantly affect sports performance, in the presence of control variables. The research hypothesis of our study focuses on this gap. We aim to explore the impact of cultural factors on national sports performance. This approach seeks to provide new insights into the cultural dimensions influencing athletic success.

H1: Hofstede's six cultural indicators influence national sports performance. Power Distance might influence sports performance by determining the level of centralized authority and decision-making in sports organizations, potentially affecting coaching styles and athlete development. Individualism versus Collectivism could impact team dynamics and cooperation, with collectivist cultures fostering stronger teamwork and support among athletes. A nation's Motivation towards Achievement and Success can drive the resources and emphasis placed on sports, leading to higher investment in training and facilities. Uncertainty Avoidance may affect how athletes and teams handle pressure and adapt to changing conditions during competitions, with high uncertainty avoidance possibly resulting in more cautious and prepared approaches. Long Term Orientation might influence the focus on sustained development and future success, leading to more strategic planning and investment in youth programs. Indulgence versus Restraint could impact the balance between

training, leisure, and overall athlete well-being, with more indulgent cultures potentially promoting a healthier, more sustainable approach to sports.

Data and Methodology

The data used in this study are public and provided by international organizations, World Bank (2024), Hofstede Institute (2024) and WRCEC (2024). The World Ranking of Countries in Elite Sport (WRCEC) is an annual, research-based ranking that accurately measures the performance of countries with National Olympic Committees. It evaluates international results across all sports recognized by the Global Association of International Sports Federations (GAISF) and includes other highly popular and universal sports not yet part of GAISF. This comprehensive ranking provides a detailed assessment of national athletic performance on a global scale. Our sample contains 112 countries from all continents for which available data was found for all indicators.

The variables used in our research are presented in Table 1, along with some descriptive statistics. For the relevance of statistical results, some variables have undergone transformations. SPORT_ABS is not very relevant in our study because it is affected by the size effect. Generally, countries with larger populations have a much higher chance of ranking at the top of sports competitions. Therefore, we used a relative measure of this indicator, SPORT_REL, which takes the country's population into account. However, we did not simply divide SPORT_ABS by the population; instead, we divided it by the natural logarithm of the population (expressed in thousands of inhabitants). International sports performance of a nation is not proportional to its population but rather to the natural logarithm of the population because countries can only enter a limited number of athletes or teams in competitions, regardless of their population size. Additionally, factors such as the quality of training facilities, investment in sports development, and cultural emphasis on athletic achievement play important roles. Larger populations might offer a broader talent pool, but the efficiency and effectiveness of identifying and nurturing talent are more significant determinants of success.

Table 1

The variables used in the empirical study

<i>Code</i>	<i>Description</i>	<i>min</i>	<i>max</i>	<i>mean</i>	<i>st.dev.</i>
SPORT_ABS	Absolute Sports Performance Index. The national score in the World Ranking of Countries in Elite Sport, the average of the period 2018-2023.	28485	2126286	298080	284959
SPORT_REL	Relative Sports Performance Index. The variable is calculated as a ratio between the Absolute Sports Performance Index and the natural logarithm of the respective country's population, the average of the period 2018-2023.	4094	167288	29937	23845
GDP_CAP	Gross Domestic Product per inhabitant, average of the period 2018-2023 (2015 constant USD).	560	107414	18245	21688
GINI_INDEX	The Gini index measures the income inequality of the population, high values indicating income polarization.	24.1	63	36.15	7.75

POPULATION	The population of the respective country, in millions of inhabitants, the average of the period 2018-2023.	0.128	1409	62.46	19.02
POWER_DIST	Power Distance measures the extent to which less powerful members of a society accept and expect power inequalities within institutions and organizations.	11	100	66.0	20.7
INDIVIDUALISM	This dimension measures a society's interdependence, with Individualist societies focusing on "I" and self-reliance, while Collectivist societies emphasize "We" and group loyalty.	0	100	40.6	23.1
MOTIVATION	Motivation towards achievement and success. A high score on this dimension (Decisive) indicates a society driven by competition, achievement, and success, while a low score (Consensus-oriented) emphasizes caring for others and quality of life.	5	100	46.5	17.4
UNCERT_AVOID	Uncertainty Avoidance reflects how a society handles the unpredictability of the future, managing anxiety through established beliefs and institutions.	8	100	67.3	21.4
LONG_ORIENT	Long Term Orientation reflects how societies balance tradition with modernity, valuing either time-honored norms or pragmatic future-oriented approaches.	1	100	40.6	19.1
INDULGENCE	Indulgence reflects the extent to which societies exercise weak (Indulgence) or strong (Restraint) control over desires and impulses.	0	97	44.4	19.6

Our methodology employs cross-sectional OLS regressions with White correction for heteroscedasticity and hierarchical clustering (Ward linkage) to group countries based on sports performance, economic development, and cultural characteristics. This approach allows us to analyze the relationships and patterns across different nations, providing a comprehensive understanding of the factors influencing international sports success. An OLS regression model with White's robust correction for heteroscedasticity is ideal for explaining the effects of cultural factors on national sports performance because it corrects for heteroscedasticity in cross-sectional data. The model is specified as:

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 GDP_i + \beta_3 GINI_i + \epsilon_i$$

where Y_i represents the sports performance indicator, X_i is a vector of Hofstede's cultural factors, and GDP_i and $GINI_i$. GDP is used in the regression in relative (per capita) and logarithmic form. Heteroscedasticity occurs when the variance of ϵ_i is not constant across observations, which can bias standard errors and hypothesis tests. White's robust correction adjusts the variance-covariance matrix of the estimators to account for this issue:

$$\hat{V}(\beta) = (X'X)^{-1} \left(\sum_{i=1}^n \hat{\epsilon}_i^2 X_i X_i' \right) (X'X)^{-1}$$

This adjustment ensures more accurate and reliable inference about the impact of cultural factors on sports performance, while controlling for GDP per capita and the GINI coefficient. It is particularly suitable given that Hofstede's cultural indicators are available only as cross-

sectional data, not time series. Hierarchical clustering with Ward linkage is ideal for grouping countries based on international sports performance, economic development, and Hofstede's cultural indicators because it minimizes the variance within clusters. The method uses the following formula to update the distance between clusters:

$$d_{(A \cup B), C} = \sqrt{\frac{|C|+|A|}{T} d_{AC}^2 + \frac{|C|+|B|}{T} d_{BC}^2 - \frac{|C|}{T} d_{AB}^2}$$

$$T = |A| + |B| + |C|$$

d represents the Euclidean distance between clusters. This approach ensures that clusters are as homogenous as possible by joining clusters that result in the smallest increase in within-cluster variance. It is particularly suitable for our analysis because it effectively captures the complex relationships between sports performance, economic factors, and cultural indicators. In our study, the most appropriate method for determining the number of groups after hierarchical clustering is the "elbow method." This method involves plotting the explained variance against the number of clusters and identifying the point where the rate of variance reduction sharply decreases, indicating the optimal number of clusters. All data processing is performed in STATA 18, and the figures are drawn in Tableau.

Results and Discussion

It is interesting to first look at the geographical distribution of absolute sports performance (Figure 1). In the top quartile, we see countries with large or very large populations and strong economic development capable of supporting performance: USA, United Kingdom, France, Japan, Spain, China, and Germany. On the opposite end, with poor performance, we find: Bangladesh, Tanzania, Mozambique, Burkina Faso, Malawi, Suriname, Ethiopia, Sierra Leone, Bhutan. These countries vary greatly in national population size but share a common factor: low economic development. In Figure 1, the countries are grouped into quartiles, with light blue indicating better sports performance and dark blue the lowest performance. Light grey denotes a lack of data for those countries.

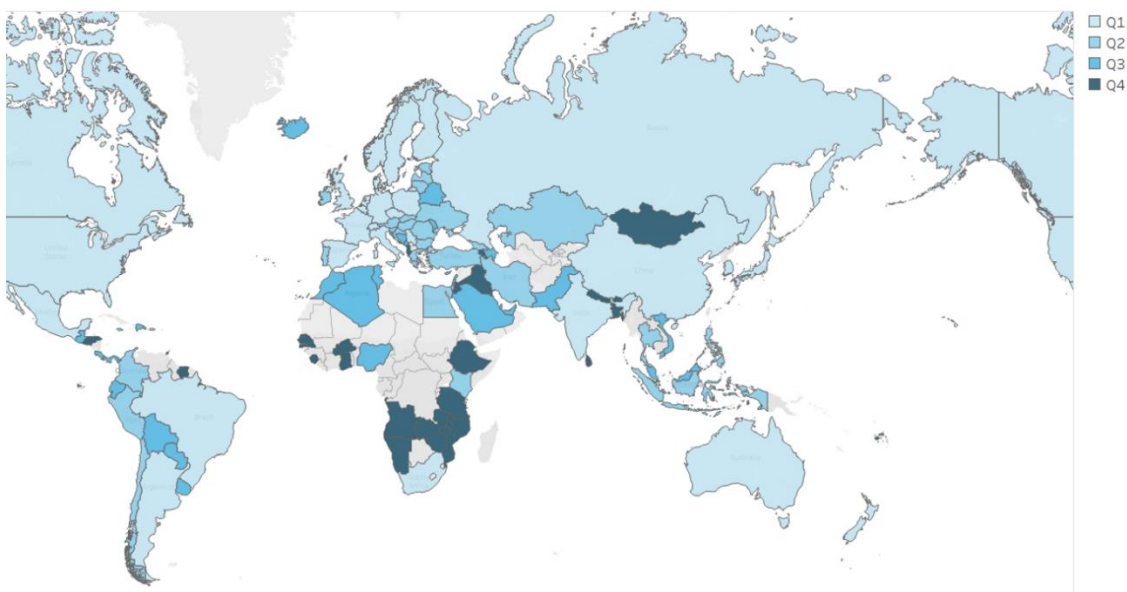


Figure 1. Geographical distribution of absolute sports performance (SPORT_ABS)

Similarly, but in green, we distinguish relative sports performance (Figure 2, variable SPORT_REL), which accounts for national population size. From this perspective, we observe countries with smaller populations, like Belgium, New Zealand, and Australia, reaching the top of the rankings. At the bottom, we find both populous countries like Ethiopia and Bangladesh and smaller ones like Bhutan, all sharing a very low GDP per capita. Both figures also show a geographical grouping of countries, largely overlapping with economic development, with poorer sports performance in Africa and parts of Southeast Asia. However, these maps are merely descriptive tools and cannot prove or validate any hypotheses.

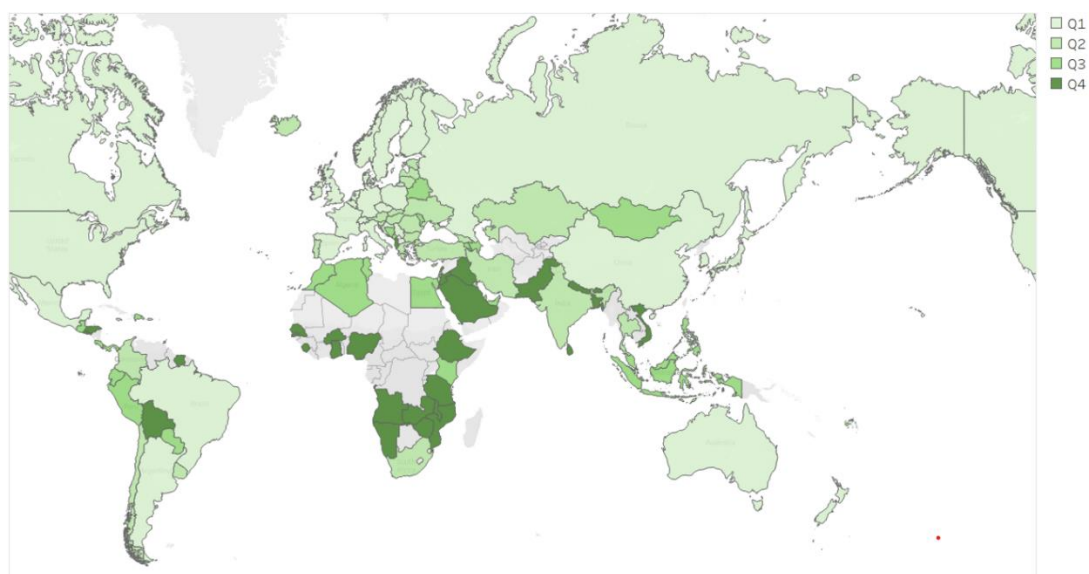


Figure 2. Geographical distribution of relative sports performance (SPORT_REL)

The regression analysis (Table 2) primarily shows results consistent with intuition and previous empirical studies. Economic development (variable $\ln\text{GDP_CAP}$) is highly statistically significant because higher GDP per capita enables greater investment in sports infrastructure, training, and facilities, which are crucial for nurturing athletic talent and enhancing performance. Additionally, economically developed countries can allocate more resources to health, nutrition, and education, further supporting the overall development of elite athletes. Income inequality is not statistically significant in our study because the distribution of wealth within a country may not directly impact the availability of resources and opportunities for elite athletes, which are often provided by specialized programs and institutions. Additionally, even in countries with high income inequality, talented individuals may still receive support and sponsorship necessary for success in international sports. There is a clear distinction between statistically significant Hofstede cultural indicators (Individualism, Motivation, Long Term Orientation) and those that are not significant (Power Distance, Uncertainty Avoidance, Indulgence) because traits like individualism, motivation, and long-term orientation directly foster personal ambition, goal-setting, and sustained effort—all critical for achieving high sports performance. Individualism encourages self-reliance and personal achievement, while motivation drives athletes to strive for excellence. Long-term orientation supports consistent investment in training and development. Conversely, traits like power distance, uncertainty avoidance, and indulgence may not directly influence sports performance because they primarily affect social hierarchy, risk tolerance, and gratification, which do not have a direct bearing on athletic training and competition. High power distance might limit equal access to

opportunities, but elite sports programs often operate independently of general societal structures. Uncertainty avoidance and indulgence pertain more to societal comfort with risk and pleasure-seeking behaviors, which do not necessarily impact the rigorous discipline and support systems critical for nurturing elite athletes. These results partially validate the research hypothesis because they show that certain cultural indicators, such as individualism and long-term orientation, directly foster the qualities and institutional support necessary for elite sports performance. However, not all cultural indicators impact these areas, indicating that only specific cultural traits are relevant to achieving high levels of athletic success.

Table 2

OLS (robust White correction) regression results on international sports performance

	<i>Coef.</i>	<i>St. Err.</i>	<i>t-stat</i>	<i>p-value</i>
(ln)GDP_CAP	4902.0	2232.0	2.20	**0.030
GINI_INDEX	270.72	266.47	1.02	0.320
POWER_DIST	-50.911	126.91	-0.45	0.652
INDIVIDUALISM	260.76	126.91	2.05	**0.042
MOTIVATION	288.42	100.21	2.88	***0.005
UNCERT_AVOID	20.938	86.721	0.24	0.810
LONG_ORIENT	321.52	121.76	2.64	***0.010
INDULGENCE	138.78	108.90	1.27	0.205
Constant	-65695	23670	-2.78	0.007

$N = 112$; $R^2 = 0.485$; $R^2_{adj} = 0.485$

***, **, * statistically significant at 1%, 5% and 10%

To better understand the mechanisms behind the national development of sports performance, we used hierarchical clustering, as detailed in the methodology. The variables included in defining the clusters are those significant in the regression analysis (SPORT_REL, GDP_CAP, INDIVIDUALISM, MOTIVATION, and LONG_ORIENT). The cultural variables are initially defined on a scale from 0 to 100. To equally contribute to the clustering process, the other variables were standardized through normalization (centering and scaling) and then applied to a standard normal distribution. However, comments on the mean values in the sample are based on the original variables, which have intuitive units of measurement. The mean values in the clusters are also commented on for variables not involved in defining the groups (e.g., POPULATION).

Table 3

Average values of some variables in the groups resulting from the hierarchical clustering

	Group 1	Group 2	Group 3	Group 4
SPORT per POPULATION	19222	9475	35373	54999
GDP_CAP	7822	1766	27669	40385
INDIVIDUALISM	27.6	16.4	56.2	67.4
MOTIVATION	46.6	45.2	36.9	64.3
LONG_ORIENT	32.7	24.6	53.5	51.9
POPULATION	60.3	66.7	67.7	36.8

The clustering results (Table 3 and Figure 3) show a stratification of the behavioral patterns of the countries in the sample. Group 4 (green) stands out the most, with the highest values in sports performance, economic development, Individualism, and Motivation, but a lower average population. This cluster includes the wealthier nations of North America, Western Europe, as well as Australia, New Zealand, and Japan. Group 3 (blue) mirrors the behavior of Group 4 but with less spectacular values; both cultural indicators and sports performance exceed the global average. This group mainly includes countries from Northern and Eastern Europe, as well as the most developed countries in South America. Groups 1 (yellow) and 2 (red) have low values across all relevant indicators, with Group 2 showing extreme values (e.g., GDP per capita of \$1766 or an average Individualism of 16.4 out of 100). Consequently, their sports performance is very low, especially relative to their populations. In Africa, there are only countries from Groups 1 and 2, but these groups also include less developed nations with lower sports performance in Latin America and Asia.

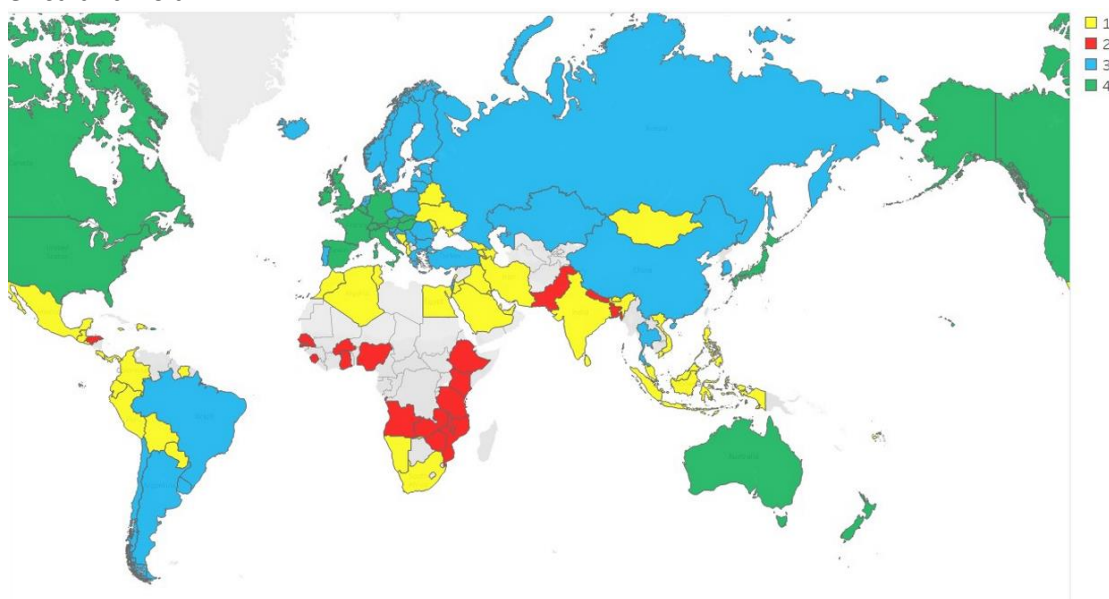


Figure 3. Grouping of countries in the sample according to hierarchical clustering

Conclusions

This study is important because it shows that both economic factors and cultural values significantly impact a nation's success in elite sports. By identifying key cultural indicators like individualism and motivation, it provides valuable insights for improving sports strategies and policies. Understanding these influences helps nations tailor their sports programs for better performance and international success. Our study's regression analysis shows that economic development ($\ln\text{GDP_CAP}$) is highly significant, as higher GDP per capita allows for greater investment in sports infrastructure, training, and facilities, crucial for nurturing athletic talent. Income inequality is not statistically significant, suggesting that the wealth distribution within a country does not directly impact elite sports opportunities provided by specialized programs and institutions. Additionally, certain cultural indicators like individualism, motivation, and long-term orientation significantly influence elite sports performance, validating our hypothesis that these traits foster personal ambition, goal-setting, and sustained effort critical for achieving high levels of athletic success. To understand the mechanisms behind national sports performance development, we used hierarchical

clustering with variables significant in regression analysis, standardizing non-cultural variables for equal contribution. The clustering results show a stratification of countries' behavioral patterns, with Group 4 (wealthier nations) excelling in sports performance and economic development, Group 3 showing above-average values, and Groups 1 and 2 (less developed nations) having low sports performance, especially in Africa, Latin America, and Asia. This study has several limitations. Firstly, the cross-sectional design only provides a snapshot in time and does not account for changes in economic development and cultural values over time. Secondly, the reliance on Hofstede's cultural dimensions, which may not capture all nuances of cultural influences, could limit the comprehensiveness of the analysis. Lastly, the exclusion of certain variables that might influence sports performance, such as government sports policies and investment levels, might overlook other critical factors.

Future research could explore longitudinal data to assess how changes in economic development and cultural values over time impact sports performance. Additionally, incorporating other cultural models and variables, such as government policies and investments in sports, could provide a more holistic understanding of the factors influencing sports success. Expanding the sample size to include more countries and regions could also enhance the generalizability of the findings and uncover region-specific patterns. This study is scientifically important because it provides a comprehensive analysis of how economic development and cultural factors influence national sports performance, using data from 112 countries. The authors make a significant contribution by adjusting the traditional sports performance metrics to account for population size, ensuring a more accurate comparison between nations. Their use of advanced statistical methods, such as OLS regressions with White's correction and hierarchical clustering, allows for a nuanced understanding of the relationships between economic and cultural indicators and sports success. The findings offer valuable insights for policymakers, sports organizations, and researchers by highlighting the critical role of cultural traits like individualism and motivation in achieving high athletic performance, particularly in economically developed countries.

The findings of this study suggest that policymakers should consider both economic and cultural factors when designing strategies to improve national sports performance. Investments in sports infrastructure, training programs, and health and education systems are decisive for nurturing athletic talent. Additionally, fostering cultural traits such as individualism, motivation, and long-term orientation can enhance personal ambition and sustained effort among athletes. Governments should also focus on creating inclusive sports programs that provide equal opportunities regardless of socio-economic status, ensuring that talent from all segments of society can be developed and supported.

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