

The tip of the iceberg: The Russian doping scandal reveals a widespread doping problem

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Abstract

The Russian doping scandal hit the sporting world hard. Thousands of Russian athletes had been tested regularly by anti-doping officials, yet despite the revelation of state sponsored doping few failed these tests. Previous research has shown that doping may be more widespread than commonly believed. This research uses the Russian doping scandal as a framework to investigate to what extent this problem may be a bigger issue than has been revealed through official anti-doping statistics. An investigation of sporting performance records, including Olympic medal counts and performances, dating back to the 1800's was undertaken. The results revealed that the Russian doping scandal was only the tip of the iceberg, that there is evidence that doping is far more widespread than previously believed and that perhaps countries once thought of as clean may have in the past run similar doping programs.

Keywords

Sports, drugs, PED's, statistics.

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Introduction

The scandal involving Russian sports sent shockwaves throughout the sporting world. Spectators, media outlets and sporting bodies around the world were appalled by the widespread nature of doping in Russia. Research from numerous sources demonstrated that state sponsored, systematic and widespread doping had taken place in Russia from at least 2011 to 2016 (ARD, 2014; WADA, 2016a). Calls for universal bans, questions on the presumption of innocence (IOCa, 2016) and demands for sanctions on Russia rang out throughout the world. As much as this was a surprise to some, to others, this revelation was not altogether unexpected. To many, the issue with Russian sports is but a single drop in a sea of worldwide doping problems.

In their 2013 paper entitled 'The Doping Myth: 100 m sprint results are not improved by 'doping'', and their 2014 paper entitled 'Long term effects of doping in sporting records: 1886-2012', Hermann and Henneberg provided two major statements with regard to doping. Either 1) Doping as practiced today is not helping to improve results as expected, and/or 2) Doping is seriously widespread. At the time, these were two very controversial statements, since, however, events throughout the sporting world have begun to shed new light on the realities of the sporting system and doping in sports. As such, new scandals and related information have aided to support the conclusions made in the above mentioned papers by Hermann & Henneberg. The Russian doping revelations in many ways help to further justify these conclusions. Given this, the purpose of this paper is to provide a greater insight into the extent to which doping is a problem in the sporting world and to what extent the commonly held beliefs about the effects of doping and the nature of doping should still be considered valid. Moreover, this paper also aims to demonstrate that current anti-doping systems can cause inequalities and unequal treatment throughout the sporting world. This will be done through analysis of sporting records from the 19th to 21st centuries. This analysis will investigate trends relating to the performance of various top performing sporting nations around the world with the intent to compare and contrast those nations with known doping histories and those without.

Methods

Data pertaining to historic Olympic results, more specifically data relating to overall positions on medal table, number of gold medals and total number of medals obtained in each year of participation in the Olympics were collected for this research. These data pertained to 6 of the top nations (or their precursors) in Olympic history. These nations were selected based on final medal standings over multiple Olympic Games (throughout the 19th and 21st centuries); those who consistently rank within the top 10 were thus selected. Additional data were obtained relating to nations with high performance during certain intervals and in contrast to the overall trend. An analysis was also conducted relating to East Germany, which is often argued as the example of successful systematic doping, and because from the period of the 1960's to the 1980's it was among the most successful nations at the Olympics. These data were obtained from the International Olympic Committee (IOC, 2016) specifically historical archives and results. These data are the official results that currently stand as per the IOC, confirmed doping cases were thus treated in accordance with IOC policies on results. Data were then plotted by year and assessed using linear regression and trend line analysis.

Results and Discussion

The case of Russia

Firstly, if one is to refer to the performance of Russian athletes since their transformation from what once was the USSR and compare it to the performance at the 2016 Olympics, one does not see any major difference in results.

Table 1. Russia Summer Olympic Results 1996 - 2016

	1996	2000	2004	2008	2012	2016
Place	2	2	3	3	4	4
Gold (No. of Medals)	26	32	28	22	21	19
Total (No. of Medals)	63	89	90	65	75	56

Reference to table 1 clearly demonstrates that Russia regularly appears in the top 3-5 nations in medal results (IOC, 2016b).

This has not changed significantly over the past 20 years and 6 Olympics. In the 2016 Olympics one could argue that there should have been a much lower likelihood of Russian athletes doping, especially during the Olympics, because of all the added scrutiny and surveillance they would be under. Given this, one is able to observe no significant difference in Russia's overall results even with the exclusion of a number of athletes because of their doping backgrounds. It should be noted that these results are currently in a state of flux, retesting of samples collected during the 2008, 2012 and 2016 Olympics is ongoing and may yet yield more positive tests, which would in turn potentially lead to a reduction in the medal count for Russia. In any case, at the moment there is a general overall trend of gradual decline, this cannot as of yet be said to be significant. On the surface when one compares the 2000 Russian medal count with the 2016 count there seems to be significant difference, there is, however, no difference when this is placed in the context of the overall position; there was only a 2 place drop. Similar results regarding the medal count can be seen for other nations. As such, it can perhaps be said that some nations who were not historically competitive in the Olympics have begun to rise in their prominence, Singapore being one such example.

Moreover, even if we were to conclude that vast majority of Russian athletes were doping both historically and during this Olympics, then why were they not dominating the medals like was the case with East Germany and the USSR during the 80's?

Table 2. USSR Summer Olympic Results 1968-1992

	1968	1972	1976	1980	1988*	1992**
Place	2	1	1	1	1	1
Gold (No. of Medals)	29	50	49	80	55	45
Total (No. of Medals)	91	99	125	195	132	112

* 1984 Excluded as the USSR did not compete
 **Unified team of former USSR nations excluding Baltic states

Table 3. East Germany Summer Olympic Results 1968-1992

	1968	1972	1976	1980	1988*	1992**
Place	5	3	2	2	2	3
Gold (No. of Medals)	9	20	40	47	37	33
Total (No. of Medals)	25	66	90	126	102	82

* 1984 Excluded as the East Germany did not compete
 **As a part of Germany

As can be seen in tables 2 and 3 (IOC, 2016b) both the USSR and East Germany during the 1960's through to the 1980's were dominate in the summer Olympics. It was well known that during this period both nations had systematic and structured doping programs supported by the nation's governments and various scientific bodies within. If doping is supposed to boost the performance of an athlete, should not then the Russian athletes have achieved success in all their events to this day, as was the case during the 1960's, 1970's and 1980's? Unless, of course, one is to believe that all Russian athletes are inferior to other athletes around the world, and that doping simply brings them up to a reasonably competitive level. Such a belief would imply that all Russian athletes have been competing only through Performance Enhancing Drugs (that the results they achieved are tainted) and moreover the statement would begin to dangerously fall into the realm of ethnic superiority ideologies and racism. Therefore, one of two conclusions can be made from this.

Firstly, doping as practiced today is not improving results in the way that is generally believed. That is to say each athlete's physiology is different and so different drugs will react differently in each athlete, which at times will result in a performance decrease or at least no observable change in performance. Given the major doping scandals of the past 30 years, information may have become more difficult to obtain, nations more cautious in the application of doping and as such cut corners or use more trial and error systems which result in diminished performance, even in cases where systematic and state structured doping is performed. It may also support the suggestion that at least to some extent doping has a more beneficial effect psychologically (placebo effect) than physiologically.

The second possibility, and the more likely one, is that doping is so widespread in the sporting world that one cannot truly compete and hope to achieve victories without doping. Moreover, the usage of doping agents simply levels the playing field due to many other athletes engaging in the practice.

As such it seems necessary to compare the performance of Russia to a nation with a known systematic and successful doping programme, East Germany.

Figure 1. East Germany and Russia Summer Olympic Results since compared (horizontal axis depicts the comparative years between the two nations, these years differ for each of the nations but show the respective years of the beginning of the nation's rise to sporting power, 1968 for East Germany and 1996 for Russia) (Note: 1992 for East Germany was as part of unified Germany).

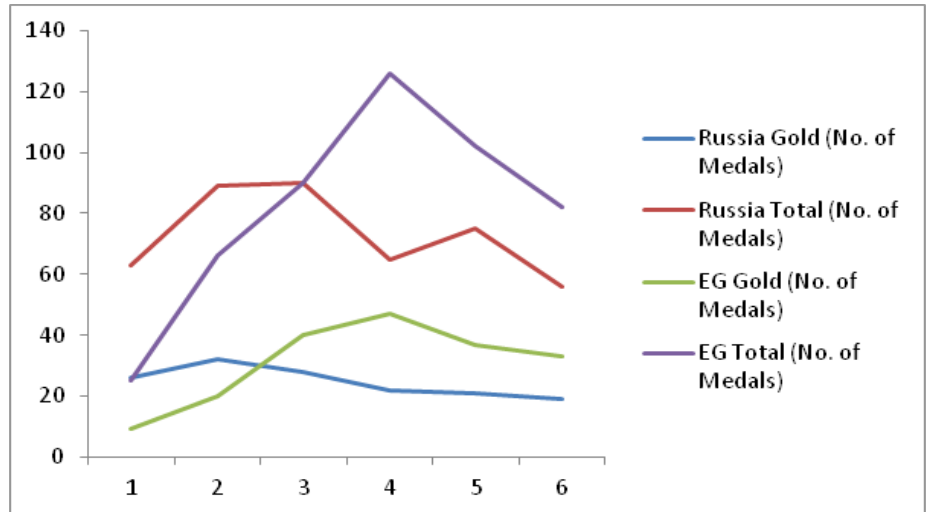


Figure 2. East Germany and the USSR Summer Olympic Results since compared (horizontal axis depicts the comparative years between the two nations, 1968 to 1992) (Note: 1992 for East Germany was as part of unified Germany and for the USSR as part of the unified team of former USSR nations excluding Baltic States)

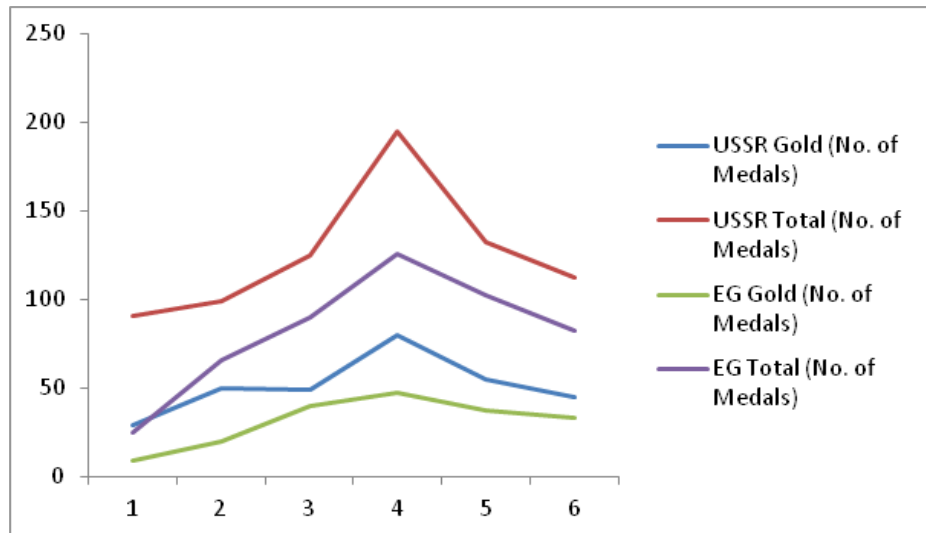


Figure 1 demonstrates that when the total number of medals and total number of gold medals are compared between the two nations, little similarity can be observed. On the other hand, when East Germany is compared with the USSR, two known systematic

doping nations, an interesting trend emerges (see figure 2).

Figure 2 demonstrates that there were strikingly similar performance results between both the USSR and East Germany, and whilst it may be argued that given the ties between the two nations at the time, similar systems may have been exchanged, this cannot account for genetic, economic nor demographic differences. One question of note is, why then do we not see similar results when comparing Russia and East Germany? It could be a fault in the comparison, but as will be demonstrated in the following sections, there is further evidence to corroborate the approach. It may therefore be indicative of the approaches to doping between the 1960's – 1980's period and today. To elaborate, the East Germany and USSR scandals have had an impact, not only on anti-doping policy and systems but more generally to sporting systems globally. As such, more modern doping techniques, such as micro-doping, and an enhanced desire to keep doping clandestine, will therefore no doubt also influence the overall performance changes in any such nation engaging in the practice. As such, it is necessary to perform further analyses on other top performing nations in the Olympics. Interesting parallels to Russia appear when comparing it to other top nations.

Table 4. United States Summer Olympic Results 1996-2016

	1996	2000	2004	2008	2012	2016
Place	1	1	1	2	1	1
Gold (No. of Medals)	44	37	36	36	46	46
Total (No. of Medals)	101	93	101	110	103	121

Table 5. China Summer Olympic Results 1996-2016

	1996	2000	2004	2008	2012	2016
Place	4	3	2	1	2	3
Gold (No. of Medals)	16	28	32	51	38	26
Total (No. of Medals)	50	58	63	100	88	70

Table 6. Britain Summer Olympic Results 1996-2016

	1996	2000	2004	2008	2012	2016
Place	36	10	10	4	3	2
Gold (No. of Medals)	1	11	9	19	29	27
Total (No. of Medals)	15	28	30	47	65	67

The interesting points to note are 1) the United States' complete dominance in the Summer Olympic, 2) the similarities between China's and Russia's recent results, 3) the parallels between China's and East Germany's results (figure 3), 4) despite the well documented systematic doping system of East Germany during the 60's through to the 80's (Spitzer, 1998; Latzel, 2009; Dimeo, et. al., 2011) three of the six years of their participation they finished behind the United States and other nations (table 3), and 5) the dramatic rise of Britain to a dominant sporting power (table 6) despite a number of limiting factors (including population levels, global competition etc.).

The case of the United States

In order to fully address these points further elaboration is required; firstly, with relation to the United States dominance. The United States has, since the earliest modern Olympics been a successful nation. Table 7 depicts the first 6 Olympics and the United States' performance. Even if one disregards the farce that was the Saint Louis 1904 Olympics (Crossen, 2004; Abbott, 2012), the United States has always been a major investor in sports, sports training and the Olympics and this is shown in their medal results. The point that does however remain is that throughout the 1960's, 1970's and 1980's, during the period of known systematic state sponsored doping, the U.S. was still a dominant power - why was this? Were U.S. athletes and training so superior to the rest of the world that other nations, even with highly developed doping systems, could not compete with the natural talent of a U.S. athlete? Has the history of immigration and genetic introduction made the U.S. gene pool so superior as to dominate the rest of the world? Or is this perhaps indication that undisclosed enhancements were taking place in the U.S. during this period as well?

Table 7. United States Summer Olympic Results 1896-1912

	1896	1900	1904	1906	1908	1912
Place	1	2	1	2	2	1
Gold (No. of Medals)	11	19	78	12	23	25
Total (No. of Medals)	20	47	239	24	47	63

The case of China

The second point of note can be seen in the similarities between Russia's and China's results in the past six Olympics. The doping taking place in Russia for the past several years has been well documented by numerous media outlets and a WADA investigation (2016b). It has been said, that Russian athletes' results and improved performance were unfair. If these results are then comparable and similar to those of Chinese athletes, this would seem to indicate two things. Either 1) Chinese athletes are vastly superior to Russian athletes and their natural abilities exceed those of 'doped' Russians, or 2) There are issues of widespread, but clandestine doping taking place in China also. Given the recent claims by a number of past Chinese athletes (Beech, 2016; Griffiths, 2016), this second claim seems to be supported.

The third point of interest relates to the similarities between the performance of China in recent Olympics and those of East Germany in their prime. From the 1960's to the 1980's East Germany was a dominant power at the Olympics. It was subsequently discovered that this was in part due to the systematic doping which took place during the period. Numerous parallels that have been drawn between East Germany and China, with at least one author going as far as stating China was seen as taking the mantle from East Germany (Mehlman, 2009). More than this, similarities between the sporting systems of the two nations mean that a comparison seems useful.

Figure 3. East Germany and China Summer Olympic Results since compared (horizontal axis depicts the comparative years between the two nations, these years differ for each of the nations but show the respective years of the beginning of the nation's rise to sporting power, 1968 for East Germany and 1996 for China). (Note: 1992 for East Germany was as part of unified Germany)

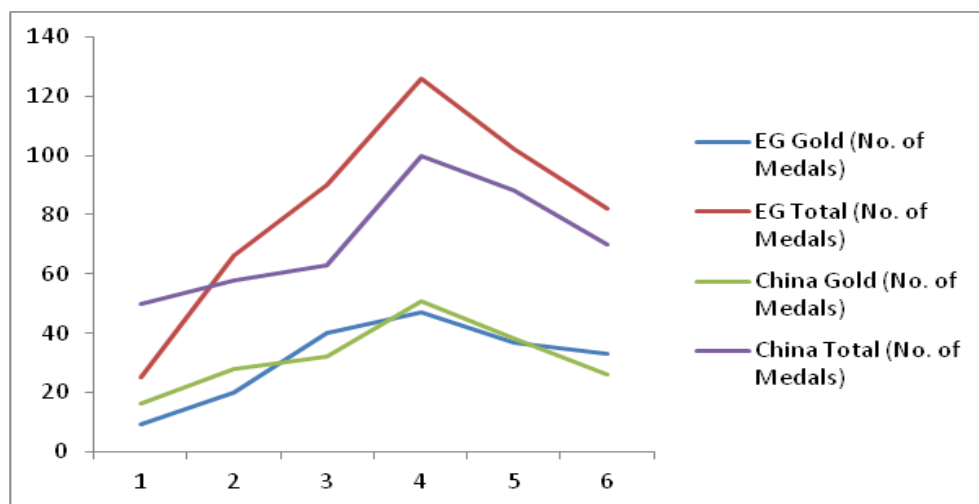
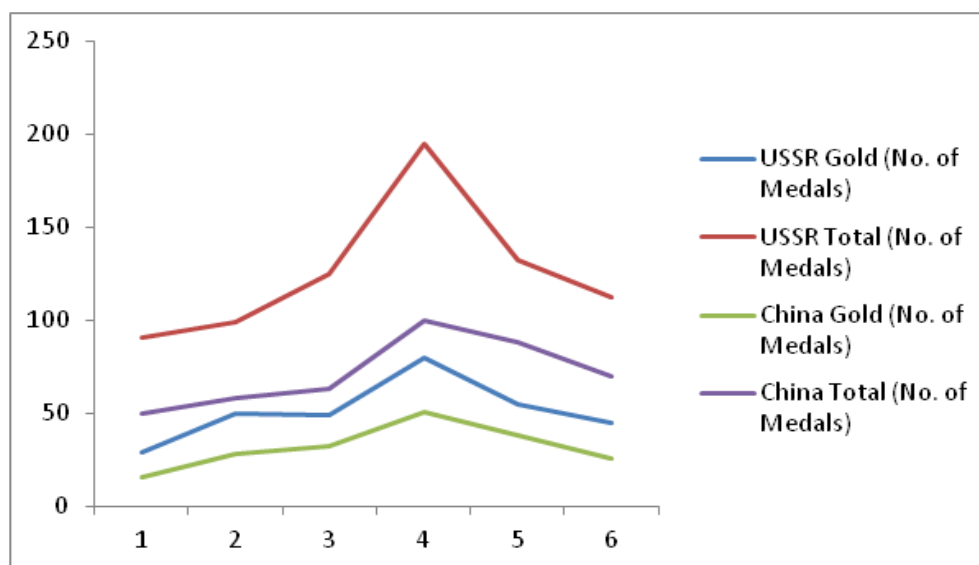


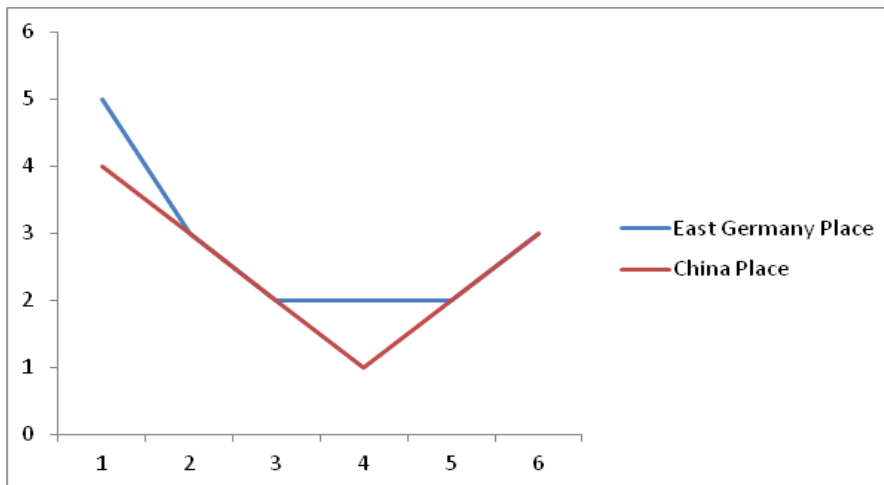
Figure 4. The USSR and China Summer Olympic Results since compared (horizontal axis depicts the comparative years between the two nations, these years differ for each of the nations but show the respective years of the beginning of the nation's rise to sporting power, 1968 for the USSR and 1996 for China). (Note: 1992 for the USSR was as part of unified team of former USSR nations excluding Baltic States)



As can be seen by figure 3 and 4, China's rise to sporting

powerhouse has taken a very similar course to that of East Germany and the USSR. In fact the gold medal results of China since 1996 are almost identical to those of East Germany during the 70's and 80's. The same peaks occur at each country's fourth respective Olympics also. If one was to similarly investigate the overall placing of East Germany and China (figure 5), a similar trend could be observed.

Figure 5. East Germany and China Overall Place Comparison



As can be seen in figure 5, the overall ranking performance of China was in fact better than that of East Germany, a nation known for its systematic and successful doping regime. There are, however, some additional influencing factors which must be taken into consideration here. Firstly, the population of China is significantly larger than that of East Germany. This would result in a larger pool from which to select athletes. Secondly, the investment in sports in China is again significantly greater than that from East Germany. This is not however the case with a comparison to the USSR; the genetic diversity with the USSR could be argued as larger than China and population size was still relatively large under the USSR (larger than the US). The limited economic growth and development of East Germany would have resulted in a limit of funds to invest in sporting endeavours. These financial limitations are not shared by China, one of the world's largest economies. As such, the sheer investment into sports could result in better performance, if for no other reason but to ensure continued investment from China.

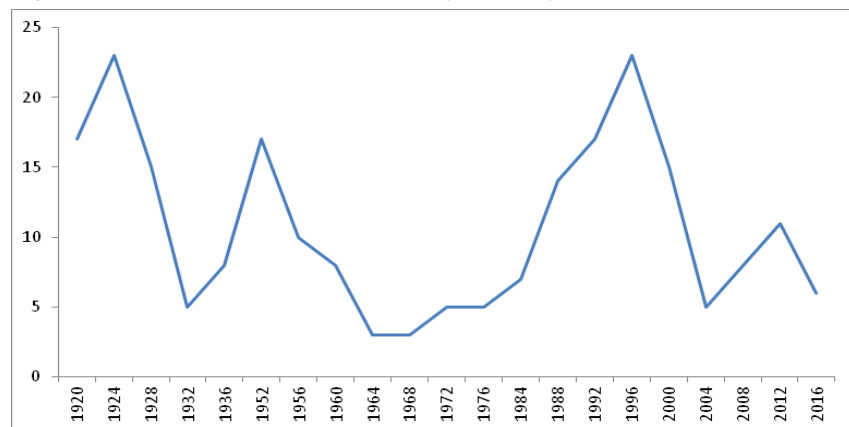
The case of East Germany

The next point is that of East Germany's performance in 1968 & 1972. In 1968, during the period when systematic doping was being practiced, East Germany only managed to finish 5th on the medal table. At this time it was beaten by the United States in 1st place, the USSR in 2nd place, Japan in 3rd place, and Hungary in 4th place. Similar in 1972, they were still behind the United States and the USSR. Firstly, it should be pointed out that the results of the USSR (as above East Germany) were to be expected due to the systematic doping and larger population from which to select the best athletes. On the other hand, both the United States and Japan, two countries without known histories of systematic doping, appear above East Germany. Whilst it is notable that both nations had populations larger than that of East Germany and the financial capabilities to invest larger amounts into sports, the fact remains that if doping is supposed to be some magical tool for success, then either 1) the U.S. and Japan were also undertaking it or 2) again both nations have athletes naturally superior to 'doped' East Germans.

The case of Japan

This brings rise to another interesting point, Japan's performance in Olympic history (figure 6).

Figure 6. Japan Overall Position in Olympics by Year



As can be seen in figure 6, at the same time as systematic doping was occurring in East Germany and the USSR, Japan was also obtaining the best results in their history of Olympic participation. The cultural element of *mentsu* (face), with regards to saving

or loosing of one's face (such as in cases of honour), at least historically, was an important element of Japanese culture. It was during the early part of the 20th century that the term obtained its more figurate meaning related to honour (Haugh, 2005). As such, during the Japanese imperial period in the 1920's/1930's the Japanese government may have viewed a lack of success as a loss of face for the Japanese empire, something to be avoided. In the period before systematic doping was possible, i.e. the 1930's (Hermann & Henneberg, 2014), the results for Japan were somewhat limited, despite this they generally do show poorer performance. Could this perhaps be evidence that during the 1960's – 1980's Japan too had systematic doping in place, or were there other factors playing a role?

The case of Britain

The final point is that of the rise of Britain as a new sporting power. When one observes the history of Britain at the Summer Olympics a number of interesting observations can be made. To begin with, there is the two periods of amazing results for the British. This can be observed in the period 1896 – 1924 and then again between 2000 – 2016. With reference to the early Olympic period, there are a couple of interesting points. Of these Olympics, 2 took place in Anglo nations (including in Britain), 1 in Greece, and 3 in countries with large Francophone populations. With the exception of the 1912 Olympics (Sweden), each hosting country was an ally of Britain during WWI. Whilst politics and sports are said to be separate, too many historic situation have proven otherwise (Nazi Germany, 1980 & 1984 Olympic boycotts etc.). As such, it could be said that global politics at the time may have played a role in the early British performance.

There is also the matter of the limited number of competing nations in the first several Olympics, Britain being one of the nations contributing the largest funds and most competitors which, given the limited competition, provide a positive impact on their results. As such, it can reasonably be said that these early results were influenced by a number of external factors and do not necessarily represent the performance levels of Britain with respect of the total world.

Following this, from 1928 – 1992, one can observe a very constant and consistent set of results from Britain. For this period, more than half a century, the results of the British at the Summer Olympics varied very little (table 8).

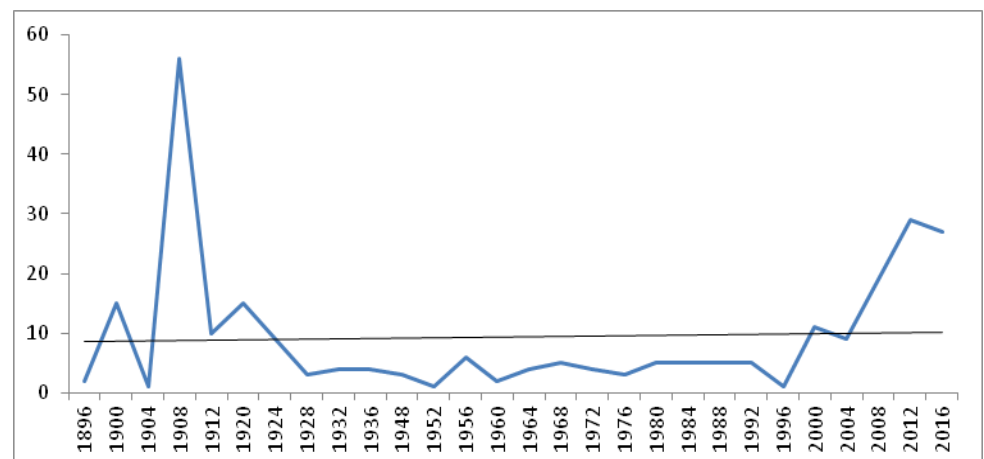
Table 8. Britain overall medals and gold medals compared by Olympics 1928 – 1992

Olympic Year	Overall Position	Number of Gold Medals
1928	11	3
1932	8	4
1936	10	4
1948	12	3
1952	18	1
1956	8	6
1960	12	2
1964	10	4
1968	10	5
1972	12	4
1976	13	3
1980*	9	5
1984	11	5
1988	12	5
1992	13	5
s.d.	2.46	1.33
MEAN	11.27	3.77
MEDIAN	11	4

*1980 year the Olympics were boycotted by a number of 'western' nations.

If these data are then plotted in comparison with all Olympic years, an interesting point of comparison emerges (figure 7).

Figure 7. Britain number of gold medals per Olympics (x-axis: Olympics event year; y-axis: number of gold medals)



This period (1928–1992) encompasses the largest sporting changes in modern times. This includes: the move to professionalism; dramatic increases in sports funding; international expansion of many sports; isolation of doping substances (systematic doping became possible); the introduction of anti-doping; transfer of allegiance rules; improvements in sports nutrition and technology; and the introduction of mass media (television etc.). Despite all these changes and the systematic doping that was taking place in nations such as East Germany, the USSR etc. the results of Britain did not vary significantly over this period; in fact it was surprisingly constant. Even during the 1980 Olympics, the year of the Eastern bloc boycott, when one would expect Britain to win at least a couple of medals normally going to Eastern bloc countries, there was no change. This would seem to indicate that as a nation, Britain's athletes together (excluding external factors and influences), have the natural ability to obtain on average 4 gold medals per games, and finish with an overall position of 11th (given the modern Olympic and sporting systems and regulations). Moreover, this would seem to indicate that during the 'dark period' of doping between the 1960's and the 1980's Britain may not have been participating in systematic doping.

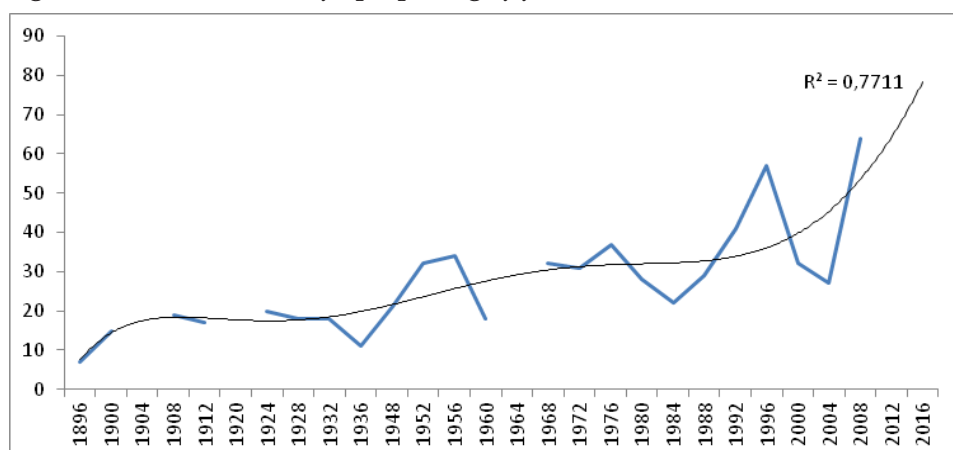
Observation of the results of Britain since 2000, however, seems to paint a very different picture. The question that arises is how is it that this performance has so dramatically increased in such a short period and in total contradiction to the entire sporting history of the nation (the pre-1928 period explained above)? This performance, particularly over the past 3 Olympics, is between 3-6 times better than the historical average. One must ask what external factor is now playing a part in the performance of the British team, which apparently has never been a factor in history? It cannot be a decrease in doping of other nations, the Russian and Chinese situations are proof of this. It cannot be just an increase in funding, as Britain has always been a major contributor to global sporting funding etc. Nor can it be due to increase in training and genetic diversity, as this has been a constant part of British sporting history. Perhaps then, this is indication of the opposite, doping is becoming more of a problem in the British team.

Random Cases

For the purposes of comparison, and so to ensure a more comprehensive analysis of the situation, a series of countries were

chosen. Three random nations with strong sporting traditions were selected to see if similar results could be discovered elsewhere. The nations chosen were Austria, France, and New Zealand. Austria was chosen because it has a long history of sporting prowess; they have been a part of the modern Olympic movement since its foundation and they generally invest large amounts into sport, training and education. However, more so they were selected as they are one of the world's leading winter sport nations, whereas summer sports are not considered such a focus, this provided a useful comparative tool. France was selected because of their high level performance in all manner of sports; their contribution to the formation of modern global sporting systems and financial contributions. New Zealand was chosen because of their focus on sports despite the population and financial limitations in comparison to other developed nations. The results of this investigation showed differences to the nations investigated previously.

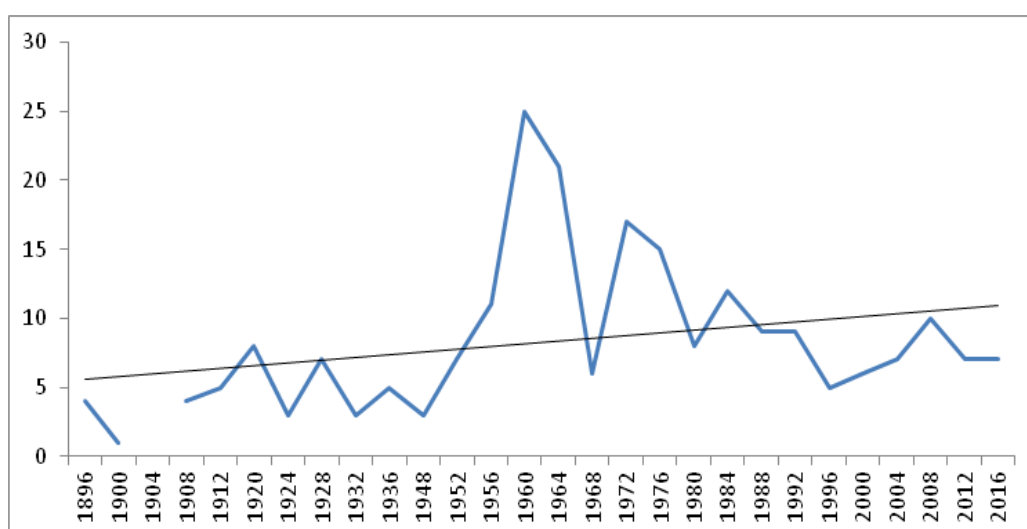
Figure 8. Austria overall Olympic placing by year



Firstly, in reference to figure 8, Austria's overall positions, there are a number of factors influencing the result. For example, 1) the 1920 Olympics, Austria was banned from taking part because of WWI, 2) in the 1904 Olympics, Austria's results are skewed because of actions of the IOC; specifically Austrian medals were awarded to the United States instead of Austria, 3) the 1936 Olympics saw many Austrian refuse to compete because of Nazi Germany, some in protest of the Nazi regime, some because they refused to compete for Germany. However, despite these points a few interesting observations can be made. Firstly, Austrian results were significantly better before systematic doping was possible.

Whilst it is true, fewer nations took part in the Olympics at this time (pre-1930's), it still seems to indicate that Austria has negatively been affected by the doping epidemic. More than this, since the end of WW2 Austrian Summer Olympic results have been decreasing, particularly during the 1950's – 1980's, the period of systematic doping. Whilst they have improved somewhat since then, they are still at a level inferior to that before WW2. This may in part be because of the loss of population and genetic diversity resulting from WW1 and WW2, the subsequent allied occupation and the policies in place during said occupation.

Figure 9. France overall Olympic placing by year

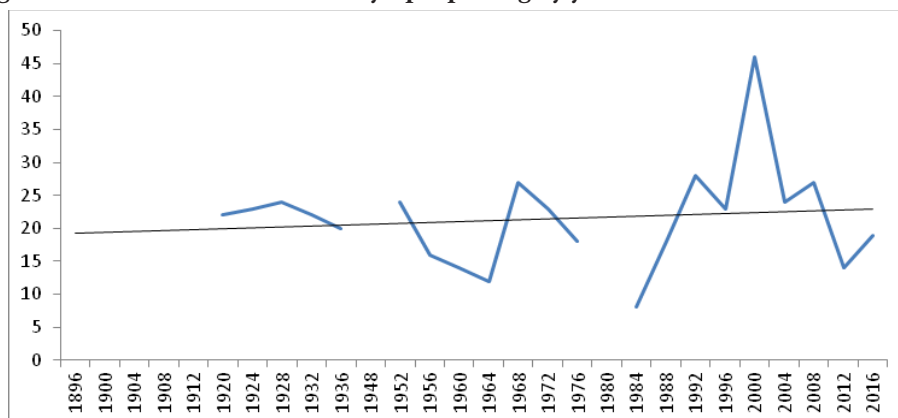


**Note: 1904 Olympic St. Louis France did not send a team*

The 1904 results are missing from the French results because of France's refusal to send a team. In general there has been little change in the French performance over the past 100+ years. France regularly appears in the top 10 nations overall. However, it is worth noting that, like Austria, the performance of the French team did drop dramatically during the so called systematic doping period (1950's – 1980's). As such, France suffered as a result of the widespread doping occurring during that period. This could also indicate that, like Austria, France did not have systematic doping program and/or generally less doping was happening in the country at the time in comparison to other top performing nations. Evidence of this can be seen in the 1968 Olympics result. The 1968 Olympics were the first Olympics where doping was banned and punishable. The result of this ban no doubt would have scared some athletes and nations into either reducing their

doping rates or removing them all together. As such, the French athletes would have been competing in a more level playing field, their natural abilities, enhanced training techniques, and additional funding would therefore have enabled them to obtain a better result, and it is in 1968 that a peak in the French teams results were realised.

Figure 10. New Zealand overall Olympic placing by year



New Zealand's early results are skewed by the system the IOC had in place for the participation. During their history New Zealand athletes have competed as part of both Britain and Australasian teams. However, generally the results do not show any significant points. The two peaks (1984 and 2000) can be explained by situations at the time. New Zealand's results in the 1984 Olympics may have been influenced by the Summer Olympics boycott by the eastern bloc nations at the time. This boycott resulted in a redistribution of medals. Those medals that would normally have been won by Eastern bloc nations, at least some, were won by New Zealand. Similarly in 2000, the worst performance of New Zealand could be explained by the fact that the games were held in Sydney, Australia. Traditionally both Australia and New Zealand excel in similar sports, as Australia was the host they therefore had added impetus and drive to perform, as such some of the medals which New Zealand would have normally won, instead went to Australia. Beyond these two peaks, New Zealand's performance has been somewhat constant.

Conclusions

Factors influencing Olympic performance are not easy to quantify. There has been considerable research undertaken in the area in an attempt to understand the magic formula to ensure Olympic success. To this end studies have shown that there are a number of important factors which influence success at an Olympics including: coaching (quality, ability, etc.) (Gould et. al., 1999; Olusoga et. al., 2012; Currie & Oates-Wilding, 2012), economic factors (Hogan & Norton, 2000; Hoffmann, Ging, & Ramasamy, 2004), physical fitness (García-Pallarés et. al. 2011), psychology (Raglin, 2001; Szabo, 2014), and many other. With a few exceptions (Hermann & Henneberg, 2013) a direct correlation between doping and Olympic success has been claimed. However, these factors are complex and interrelated, and overall, given the nature of doping (and more generally sports), it is difficult to fully prove some of the findings from this research. There are other factors which could come into play (such as corruption) which could influence the results. As such, these findings, given the available evidence, do, on the balance of probability, indicate a widespread doping problem. However, given the secretive nature of doping, the lack of willingness of participants to speak up, and the lack of available information in general, it makes such research difficult. Furthermore, the Winter Olympics were not chosen to be directly compared at this point due to a number of mitigating factors. Firstly, the nature of the topic would make it far too vast to be included in a single paper given limitation of many journal paper lengths. Furthermore, many nations which excel at the Winter Olympics do not at the Summer Olympics, thus making it difficult to compare them directly. The choice to include one nation (Austria), which excels at the Winter Olympics (as opposed to the Summer Olympics), was done in order to provide a point of comparison. However, more generally, the role doping plays in many Winter Olympic sports differs mainly because of their construct and rules. This coupled with evidence showing that there are less sports prone to doping in the Winter Olympics than the Summer Olympics (WADA, 2017), means that the Winter Olympics were not chosen for comparison at this point.

Moreover, it should be pointed out that this research does not in any way say that all athletes in the 'questionable' nations mentioned previously are doped, even if some doping scandals

have occurred in these nations, such as the Chinese swimmers case (Jeffery, 2008). Nor do these results conclude that there is systematic doping taking place in any of the discussed nations, but in any case it does paint an interesting picture of global sports; there is an old saying 'where there is smoke there is fire'. The notion that doping is needed to compete at the highest levels has been well supported by retired and disgraced athletes, who believed it was the only option in many cases (Cycling News, 2008; 2010). That is to say doping is widespread in numerous nations around the world and moreover that state-sponsored programs are likely being undertaken. Perhaps it can instead be said that money is the only determining factor for sporting success, each of the dominant sporting powers would seem to support this notion. Moreover, perhaps it is that doping is more widespread today than it was during the 1960's, 1970's and 1980's, and simply that athletes, coaches, trainers, nations, medical practitioners and sports scientists have become more adept at hiding it. The result of this is that even Russian athletes who were doped were simply on the 'same level' as a number of the other athletes and as such were unable to achieve greater success. This would therefore indicate that the doping problem is indeed a global phenomenon and one that is far worse than many people would like to believe. Moreover, it demonstrates that the treatment of Russian athletes was unfair and unjust. To punish one nation for a problem, which is clearly widespread and involves numerous other nations worldwide (some of which have evidence to support the supposition), is simply excessive and unreasonable.

There is a particularly important point that should be made however. In law, many global legal systems support the notion of innocent until proven guilty, and even though sport law and specifically strict liability would seem to contradict this (at least in some instances), in general it is not possible to punish an athlete who has not specifically been proven to have breached the rules. Russian athletes were caught and thus must face the legal consequences. Other nations' athletes have not been shown to have doped and thus cannot be punished for something that has not been proven. However, what this analysis does show is that there are other factors at play even in the case of the Russian doping scandal. As such, it should be pointed out that international sporting bodies are stuck between a rock and a hard place when it comes to punishment for doping offences; there is no simple quick fix.

Additionally, this research in no way suggests that Russia is completely without fault, rather that the global systems and policies in place are in fact problematic and clearly need changes in order to make sports fairer and just for competitors and spectators alike. Overall, these doping revelations aid in supporting earlier findings and demonstrate the problems with the current system of anti-doping in the world.

There is one final possible conclusion which can be drawn from the above evidence and the plethora of wider evidence in the sporting arena. Given recent and historical cases of corruption in sports, perhaps the Olympic results are so skewed not because of the impact of undiscovered and unreported doping, but also because of widespread corruption. The level of corruption involved in the recent Olympic host city selection process has been well reported, and given historical cases such as the 1904 St. Louis Olympics, the Olympics following both world wars, the 1980 and 1984 Olympic boycotts, the 2000 Olympics vault controversy, the Jan Košir controversy in the 2018 Winter Olympics, and many more, there are likely factors influencing the results and victories which go beyond doping.

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