**Exploring the Trends and Transformations in the Modern Olympic Games
(1896 – 2022)**

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Overview

The modern Olympic Games consist of Summer and Winter competitions that put the best
athletes from all around the world against one another. I have always looked forward to the
Olympics when they come around, especially the Winter games as I enjoy watching the ice
hockey competition.

This report will utilize the "Olympic Summer & Winter Games, 1896-2022" dataset
(https://www.kaggle.com/datasets/piterfm/olympic-games-medals-19862018/) from Kaggle. This
dataset includes information about 74,000+ athletes, 162,000+ event results, and over 21,000
medal results dating back to the first modern Olympic games at Athens in 1896.

Throughout this report, I will be attempting to answer five major questions about the Olympics:

- Have any countries consistently performed well overall? In specific events?

- How have the Olympic events changed over time?

- Are any countries better at team events vs. solo events?

- Which athletes have won the most medals?

- Is there any evidence of host country advantage in the Olympics?

Dataset Exploration

The main dataset that I used throughout this exploratory analysis was of results from the
Olympic events. The dataset that I am working with includes information about the discipline
(sport), event name, the Olympic games it was in, athlete name, representing country, and their

finishing position/medal for the event. With this data, I will be able to find valuable insights

about the modern Olympic Games.

	discipline_title	event_title	slug_game	participant_type	medal_type	athletes	rank_equal	rank_position	country_name	country_code	country_3_letter_code	athlete_url	athlete_full_name	value_unit	value_type
0	Curling	Mixed Doubles	beijing-2022	GameTeam	GOLD	[('Stefania CONSTANTINI', 'https://olympics.co...	False	1	Italy	IT	ITA	NaN	NaN	NaN	NaN
1	Curling	Mixed Doubles	beijing-2022	GameTeam	SILVER	[('Kristin SKASLIEN', 'https://olympics.com/en...	False	2	Norway	NO	NOR	NaN	NaN	NaN	NaN
2	Curling	Mixed Doubles	beijing-2022	GameTeam	BRONZE	[('Almida DE VAL', 'https://olympics.com/en/at...	False	3	Sweden	SE	SWE	NaN	NaN	NaN	NaN
3	Curling	Mixed Doubles	beijing-2022	GameTeam	NaN	[('Jennifer DODDS', 'https://olympics.com/en/a...	False	4	Great Britain	GB	GBR	NaN	NaN	NaN	NaN
4	Curling	Mixed Doubles	beijing-2022	GameTeam	NaN	[('Rachel HOMAN', 'https://olympics.com/en/ath...	False	5	Canada	CA	CAN	NaN	NaN	NaN	NaN

(Source: author)

The first insight that I was able to collect from the data was the number of Olympic Games that

there have been. Since 1896, there have been 53 events. The first recorded event was at Athens,

Greece in 1896, and the most recent at Beijing, China in 2022.

```
['beijing-2022' 'tokyo-2020' 'pyeongchang-2018' 'rio-2016' 'sochi-2014'
 'london-2012' 'vancouver-2010' 'beijing-2008' 'turin-2006' 'athens-2004'
 'salt-lake-city-2002' 'sydney-2000' 'nagano-1998' 'atlanta-1996'
 'lillehammer-1994' 'barcelona-1992' 'albertville-1992' 'seoul-1988'
 'calgary-1988' 'los-angeles-1984' 'sarajevo-1984' 'moscow-1980'
 'lake-placid-1980' 'montreal-1976' 'innsbruck-1976' 'munich-1972'
 'sapporo-1972' 'mexico-city-1968' 'grenoble-1968' 'tokyo-1964'
 'innsbruck-1964' 'rome-1960' 'squaw-valley-1960' 'melbourne-1956'
 'cortina-d-ampezzo-1956' 'helsinki-1952' 'oslo-1952' 'london-1948'
 'st-moritz-1948' 'berlin-1936' 'garmisch-partenkirchen-1936'
 'los-angeles-1932' 'lake-placid-1932' 'amsterdam-1928' 'st-moritz-1928'
 'paris-1924' 'chamonix-1924' 'antwerp-1920' 'stockholm-1912'
 'london-1908' 'st-louis-1904' 'paris-1900' 'athens-1896']
53
```
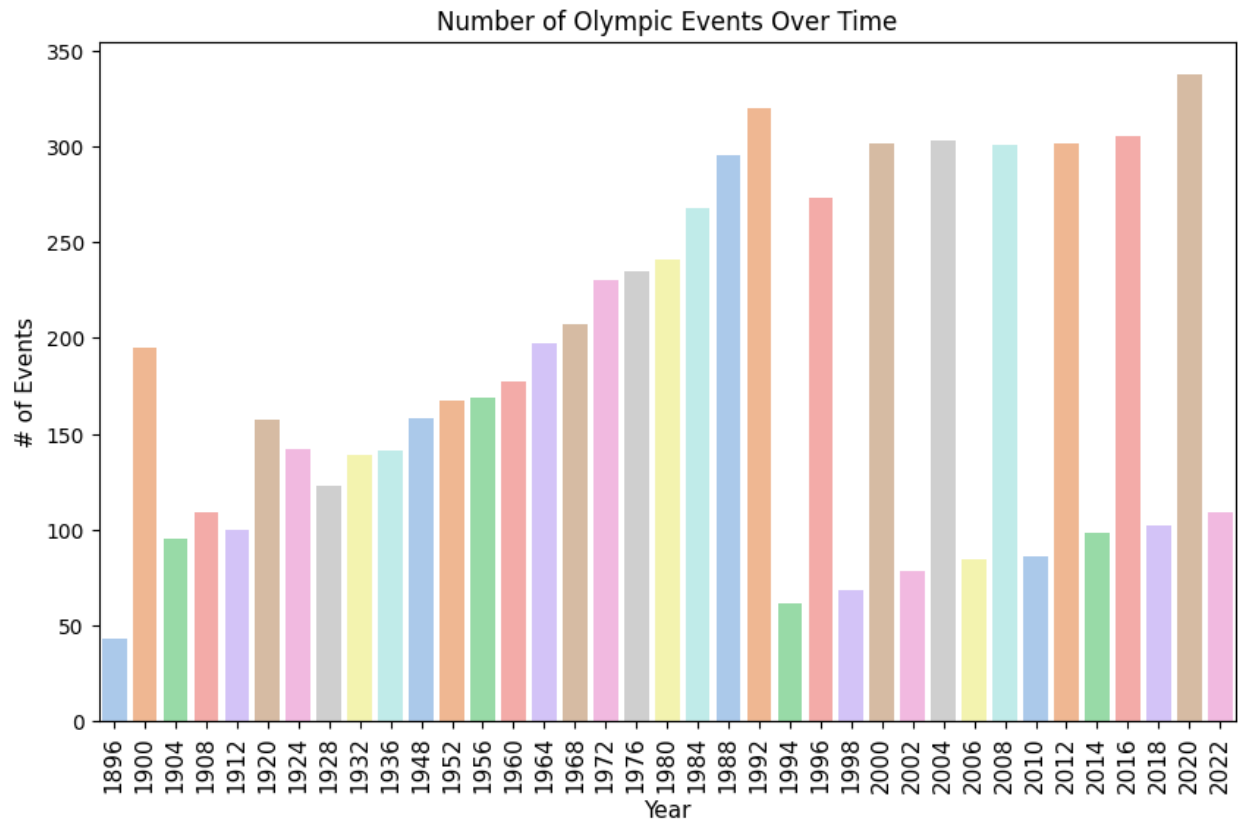
(Source: author)

Due to the international nature of the Olympics, many countries, past and present, have

competed in the games. 238 countries have competed in the Olympics since 1896. This includes

former instances of modern countries, such as Czechoslovakia, which is now the Czech

Republic, and the now-unified South Vietnam.

```
['Italy' 'Norway' 'Sweden' 'Great Britain' 'Canada' 'Czech Republic'
 'Switzerland' 'United States of America' "People's Republic of China"
 'Australia' 'Japan' 'Republic of Korea' 'Denmark' 'ROC' 'Finland'
 'Kazakhstan' 'France' 'New Zealand' 'Ireland' 'Austria' 'Spain' 'Germany'
 'Estonia' 'Chile' 'Brazil' 'Belarus' 'Ukraine' 'Netherlands' 'Hungary'
 'Croatia' 'Poland' 'Belgium' 'Latvia' 'Hong Kong, China' 'Israel'
 'Turkey' 'Malta' 'Andorra' 'Slovenia' 'Bulgaria' 'Slovakia' 'Romania'
 'Georgia' 'Armenia' 'Lithuania' 'Azerbaijan' 'Mexico'
 'Bosnia and Herzegovina' 'Republic of Moldova' 'Argentina'
 'Chinese Taipei' 'Puerto Rico' 'Kyrgyzstan' 'Colombia' 'India' 'Portugal'
 'San Marino' 'Philippines' 'Lebanon' 'Uzbekistan' 'Albania' 'Montenegro'
 'Greece' 'Kosovo' 'Luxembourg' 'Madagascar' 'Cyprus' 'Malaysia' 'Haiti'
 'Thailand' 'Pakistan' 'Democratic Republic of Timor-Leste' 'Iceland'
 'Monaco' 'Serbia' 'Liechtenstein' 'Bolivia' 'Morocco' 'Ghana' 'Jamaica'
 'Eritrea' 'Saudi Arabia' 'Peru' 'Ecuador' 'Islamic Republic of Iran'
 'Virgin Islands, US' 'American Samoa' 'Mongolia' 'North Macedonia'
 'Nigeria' 'Trinidad and Tobago' 'Egypt' 'Indonesia' 'Cuba' 'Oman'
 'Venezuela' 'Bangladesh' 'Afghanistan' 'Singapore' 'Bhutan' 'Algeria'
 'Sri Lanka' 'Nepal' 'Refugee Olympic Team' 'Qatar' 'Kuwait' 'Bahrain'
 'Senegal' 'Guatemala' 'Iraq' 'Jordan' 'Yemen' 'Tunisia' 'Aruba' 'Myanmar'
 'Vietnam' 'Nicaragua' 'United Arab Emirates' 'Dominican Republic'
 'South Africa' 'Sao Tome and Principe' 'Samoa' 'Cook Islands'
 'Mozambique' 'Belize' 'Ethiopia' 'Costa Rica' 'Paraguay' 'Namibia'
 'Rwanda' 'Burkina Faso' 'Panama' 'Zambia' "Côte d'Ivoire" 'Honduras'
 'Mauritius' 'Eswatini' 'Uganda' 'Cameroon'
 ...
 'Yemen Arab Republic' 'Yemen Democratic Republic' 'South Vietnam'
 'Rhodesia' 'United Arab Republic' 'Malaya' 'West Indies Federation'
 'North Borneo' 'Saar' 'MIX' 'Australasia' 'Bohemia' 'Newfoundland']
Unique Countries:  238
```

(Source: author)

Analysis and Insights

The Games of the I Olympiad that took place in 1896 are not the same Olympic games that we put on today. Throughout the years, there has been much development and evolution in the events, the international representation, and relevancy of the games. Up until 1924, the Olympics consisted of only the Summer Games. From 1924 until 1992, the Winter and Summer Games took place in the same year, amounting to great popularity and anticipation. In 1994, the schedule would change so that the Winter and Summer Games would alternate every two years, resulting in 4 years between each instance of the competition.

(Source: author)

There was a steady increase in the number of events, peaking in 1992 right before the decision to split the games. We can see that the Winter Games has significantly less events than the Summer Games. The Winter Games have around 100 events, while the Summer Games have had 300, peaking at 338 for the 2020 Tokyo Summer Games.

Fencing, swimming, and running events have been mainstays at every single Summer Olympic Games. Cross country skiing, figure skating, and ice hockey have been at every single Winter Olympic Games. In Appendix A, we can see a heatmap for the events that were performed at every Winter and Summer Olympics. Pictured below are the top 10 most prevalent events for all of the Olympic Games.

```
Athletics               1061
Swimming                 586
Wrestling                428
Gymnastics Artistic      368
Shooting                 286
Rowing                   267
Boxing                   265
Weightlifting            227
Fencing                  223
Speed skating            205
```
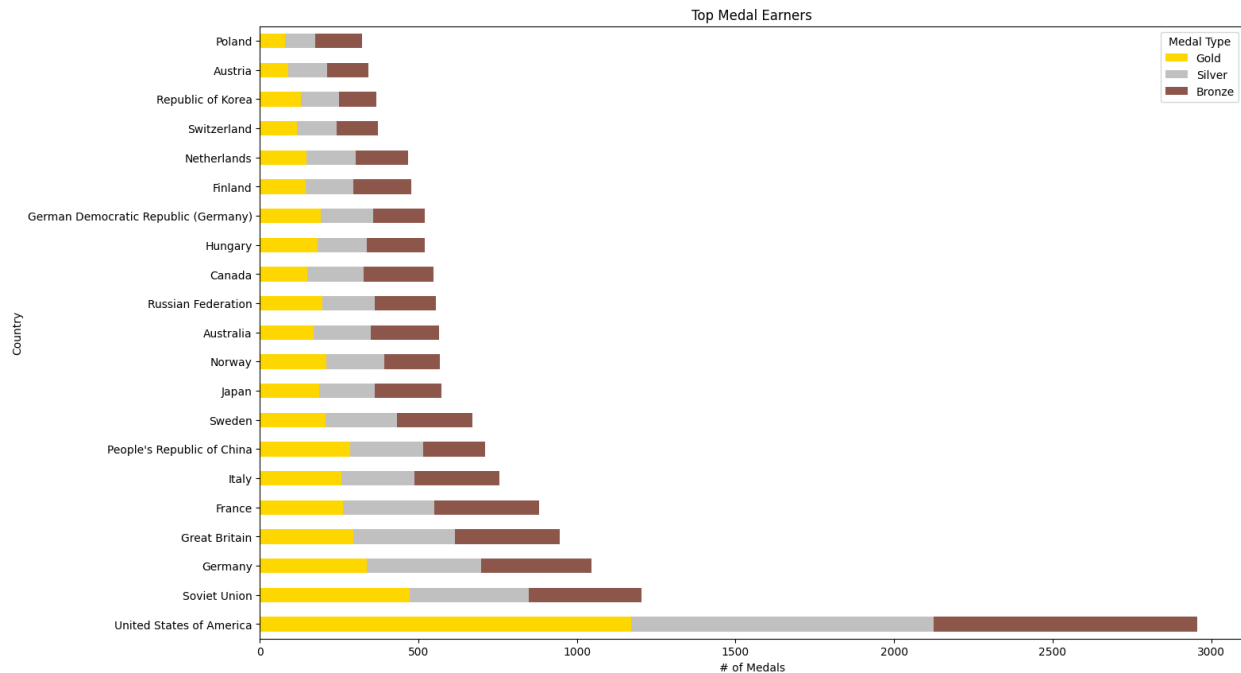
(Source: author)

The "Athletics" event for the Summer Games encompasses running, jumping, throwing, and walking events. Given the high variance of these events, I decided to look deeper into the most common Athletics events.

Jumping (triple jump, high jump, long jump), running (hurdles, marathon, sprints) and throwing (shot put, discus) were the most common events, taking place at 28 out of the 32 total Summer Games.

Next, I decided to look into which countries have won the most medals. Surprisingly, I found that the United States has over double the number of medals as the next country, the former Soviet Union.

```
triple jump men           28
high jump men             28
long jump men             28
110m hurdles men          28
400m men                  28
marathon men              28
shot put men              28
discus throw men          28
1500m men                 28
pole vault men            28
100m men                  28
800m men                  28
200m men                  27
hammer throw men          27
400m hurdles men          26
3000m steeplechase men    25
javelin throw men         25
10000m men                24
4x400m relay men          24
4x100m relay men          24
5000m men                 24
decathlon men             24
high jump women           21
100m women                21
discus throw women        21
```
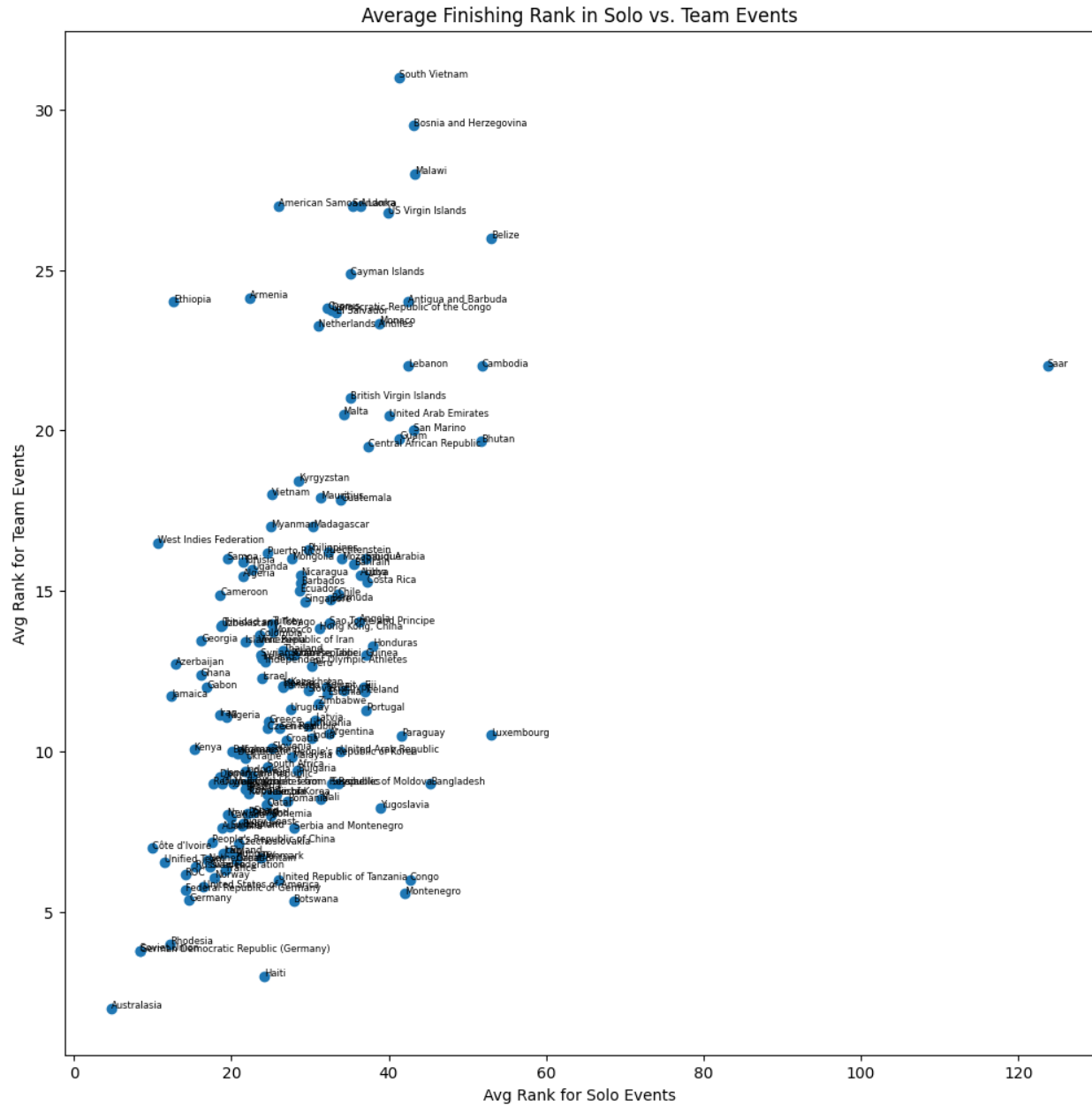
(Source: author)

(Source: author)

The dominance of the United States could be attributed to its great diversity, as well as the cultural importance that the Olympic Games have in the country. However, their abundance of medals does not amount to dominance in every event. I decided to take a look at the five most prevalent Olympic events, and see which countries had the most Gold medals in those events. All five graphs are located in Appendix B. The USA has far and away the most medals in Athletics, Swimming, and Shooting. Interestingly, the Soviet Union still leads in Gold medals for Wrestling and Artistic Gymnastics.

Next, I decided to see if any countries were more dominant in team events versus solo events. Due to the nature of the events, there are typically more overall placements in solo events (up to 100+) than there are in team events (~30). The full page scatterplot is located in appendix C.

Average Finishing Rank in Solo vs. Team Events

(Source: author)

Australasia, Haiti, German Democratic Republic, Soviet Union, and Rhodesia (located in modern-day Zimbabwe) are all countries that have low average placement in both solo and team events.

Another insight I gathered from the dataset is which athlete has won the most medals. I was able

to gather the top twenty medal earners for each medal type.
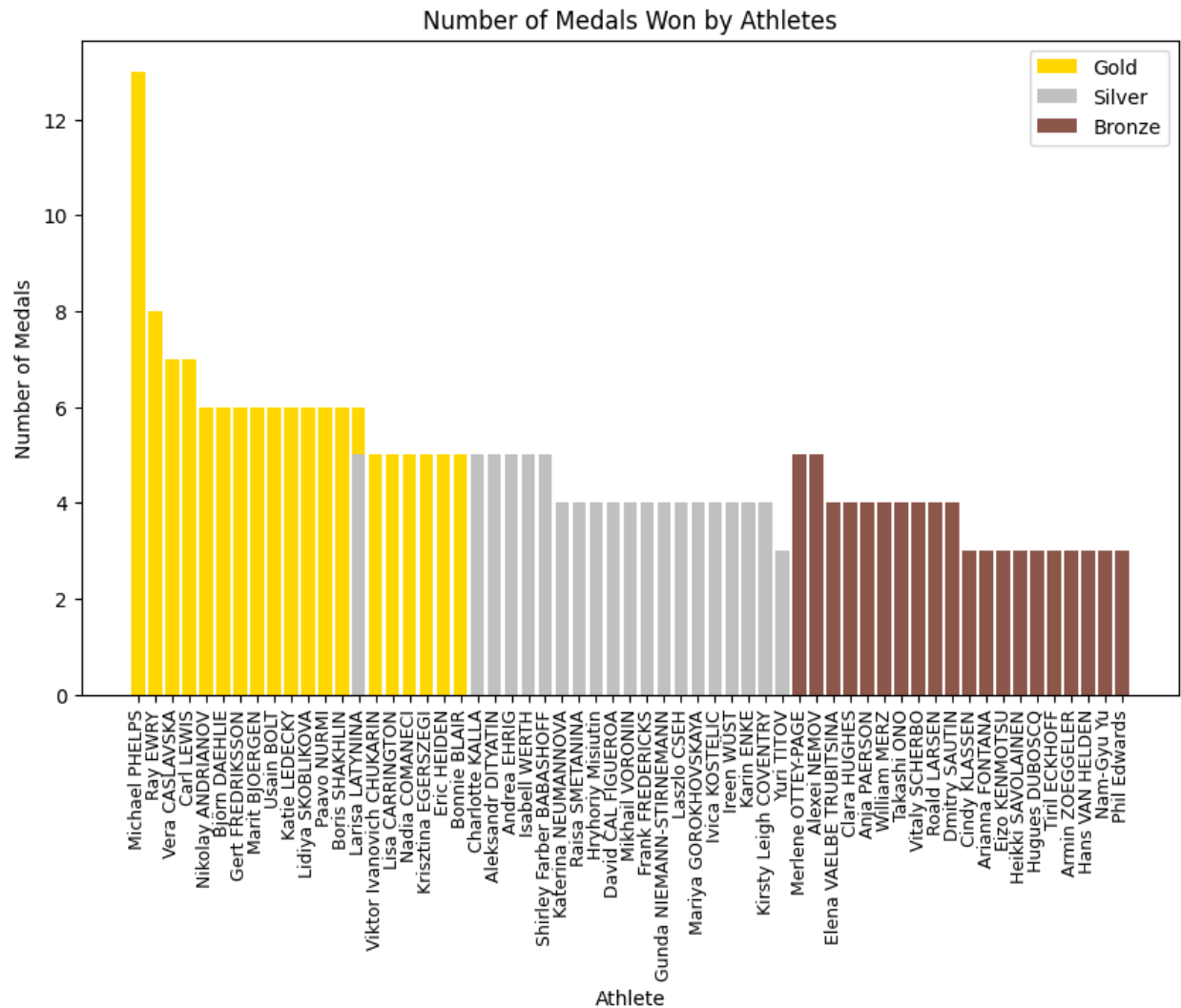
(Source: author)

Michel Phelps far and away has the most gold medals, being listed with 13 in this dataset. Other

notable medalists are Soviet-gymnast Larisa Latynina and Finnish-runner Paavo Nurmi.

The final research question I wanted to ask was if there was any evidence of the host country having an inherent advantage. I decided to find the number of medalists that were from the host country in each of the 53 Olympic Games.

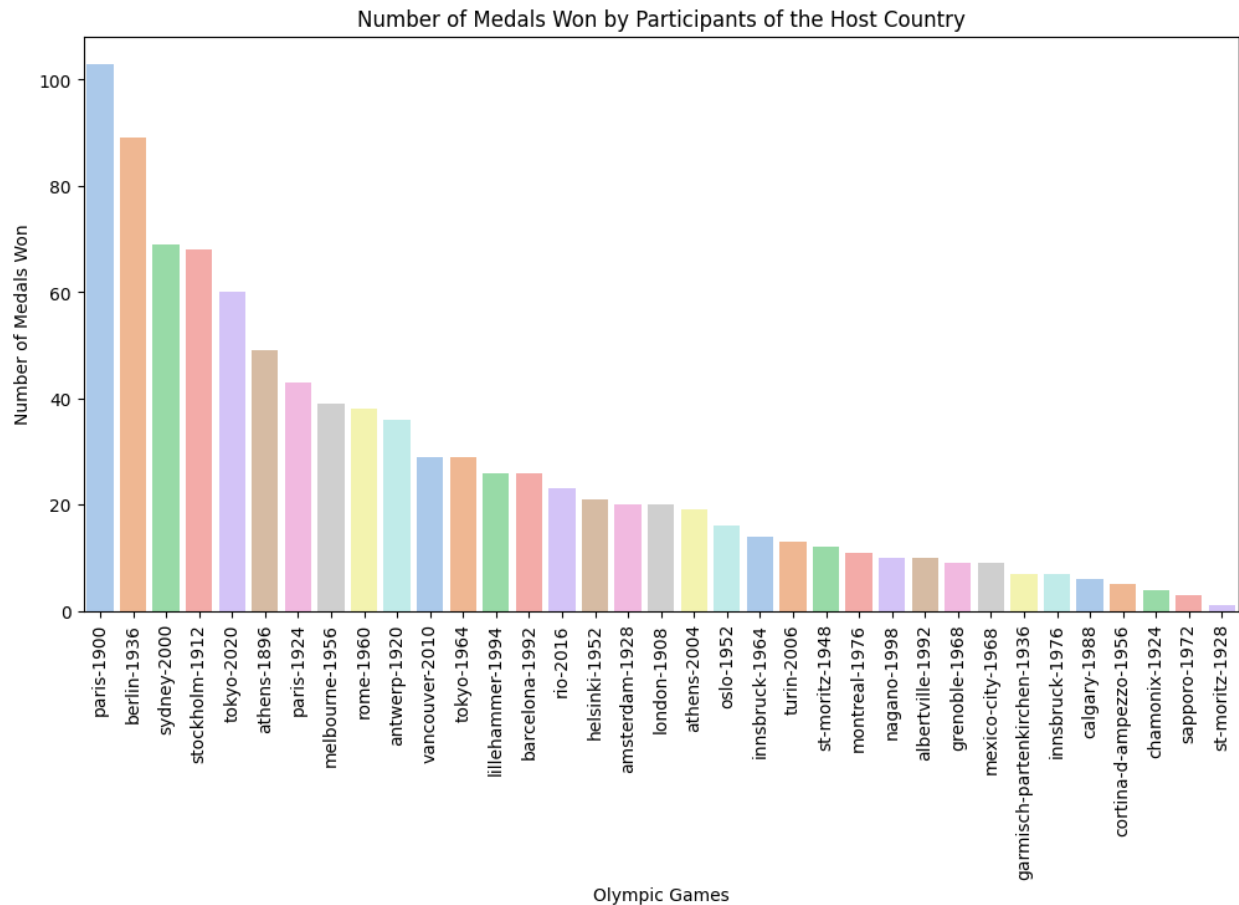(Source: author)

The 1900 Paris Summer Games and the 1936 Berlin Summer Games both had significantly more home born medal-earners than the other games. In the 1900 Games, there were 21 countries that won a medal, with France winning 103 of the 284 total. In the 1936 Games, there were 32 countries that won a medal, with Germany winning 89 of the 417 given out. With the increase in the competitors and events as the Olympics continue to develop, any host advantage that would be there seems to be negligible.

Conclusion

It is evident that the Olympic Games have changed a lot over the years. From its origins in

Athens, the Olympics have continued to be the leading example of athleticism and global

competition. In this report, we have explored the top-performing countries, the events that have

come and gone over time, the most-winning athletes, and the idea of a host country advantage.

As the Olympic Games continue to evolve, I hope my analysis can serve as a foundational

reference for understanding its historical context and competitive trends.

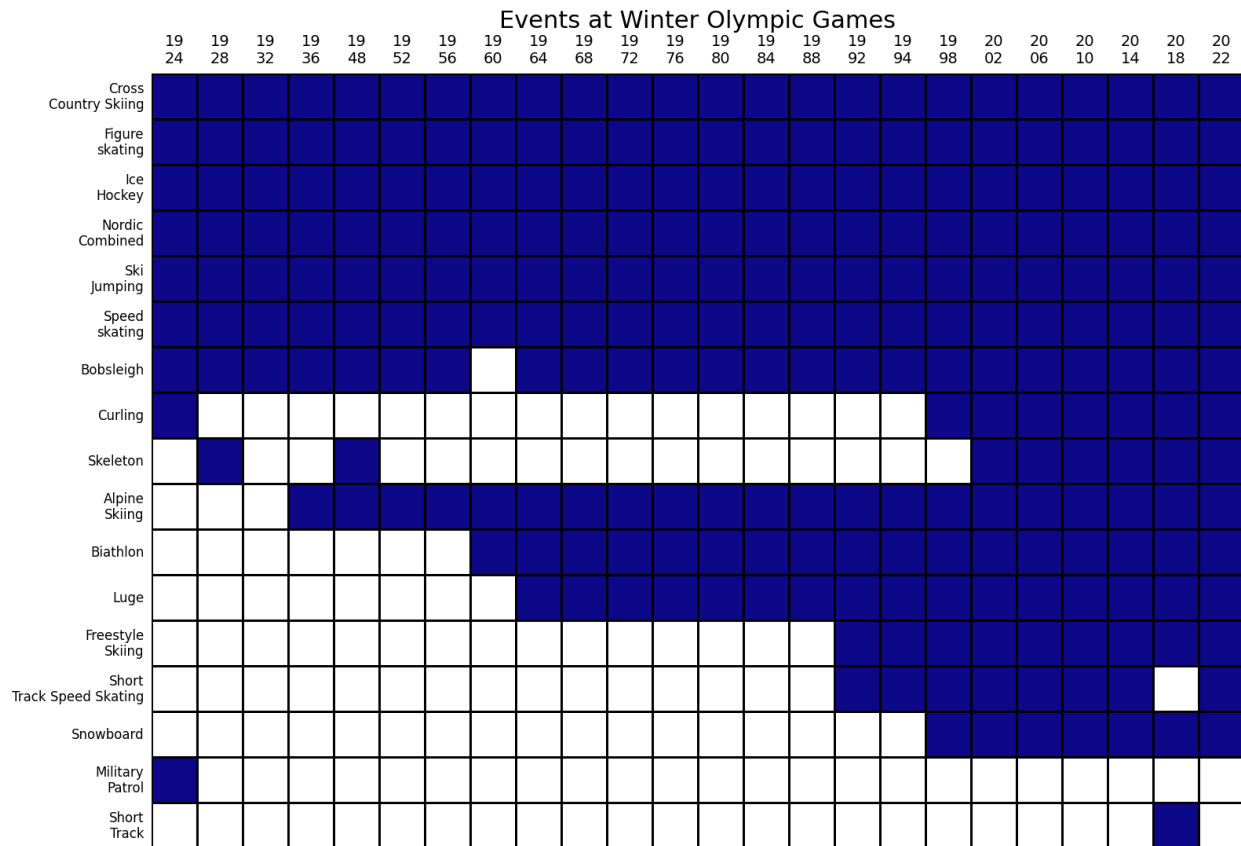**References**

International Olympic Committee. (n.d.). *Olympics*. Olympics. https://olympics.com/en.

Petro. (2023, March). *Olympic Summer & Winter Games, 1896-2022*. Kaggle.

   https://www.kaggle.com/datasets/piterfm/olympic-games-medals-19862018.

Appendix A – Heatmap of Events from Winter and Summer Games

Events at Winter Olympic Games

	19 24	19 28	19 32	19 36	19 48	19 52	19 56	19 60	19 64	19 68	19 72	19 76	19 80	19 84	19 88	19 92	19 94	19 98	20 02	20 06	20 10	20 14	20 18	20 22
Cross Country Skiing																								
Figure skating																								
Ice Hockey																								
Nordic Combined																								
Ski Jumping																								
Speed skating																								
Bobsleigh																								
Curling																								
Skeleton																								
Alpine Skiing																								
Biathlon																								
Luge																								
Freestyle Skiing																								
Short Track Speed Skating																								
Snowboard																								
Military Patrol																								
Short Track																								

Events at Summer Olympic Games

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Column headers (years): 1896, 1900, 1904, 1908, 1912, 1920, 1924, 1928, 1932, 1936, 1948, 1952, 1956, 1960, 1964, 1968, 1972, 1976, 1980, 1984, 1988, 1992, 1996, 2000, 2004, 2008, 2012, 2016, 2020

Row labels (events):
- Athletics
- Fencing
- Swimming
- Tennis
- Cycling Track
- Shooting
- Wrestling
- Weightlifting
- Cycling Road
- Rowing
- Water Polo
- Football
- Archery
- Golf
- Sailing
- Diving
- Boxing
- Hockey
- Modern Pentathlon
- Basketball
- Canoe Sprint
- Handball
- Volleyball
- Judo
- Canoe Slalom
- Table Tennis
- Badminton
- Beach Volleyball
- Cycling Mountain Bike
- Taekwondo
- Triathlon
- Marathon Swimming
- 3x3 Basketball
- Artistic Gymnastics
- Artistic Swimming
- Baseball/Softball
- Cycling BMX Freestyle
- Cycling BMX Racing
- Equestrian
- Karate
- Rhythmic Gymnastics
- Rugby Sevens
- Skateboarding
- Sport Climbing
- Surfing
- Trampoline Gymnastics
- Gymnastics Artistic
- Tug of War
- Polo
- Rugby
- Equestrian Jumping
- Basque Pelota
- Cricket
- Croquet
- Lacrosse
- Roque
- Figure skating
- Jeu de Paume
- Rackets
- Water Motorsports
- Equestrian Dressage
- Equestrian Eventing
- Equestrian Vaulting
- Ice Hockey
- Canoe Marathon
- Gymnastics Rhythmic
- Synchronized Swimming
- Baseball
- Softball
- Trampoline
- Cycling BMX

Appendix B – Gold Medal Earners for Top 5 Sports

Countries with Most 'Athletics' Gold Medals

Countries with Most 'Swimming' Gold Medals

Countries with Most 'Wrestling' Gold Medals

Countries with Most 'Gymnastics Artistic' Gold Medals

Countries with Most 'Shooting' Gold Medals
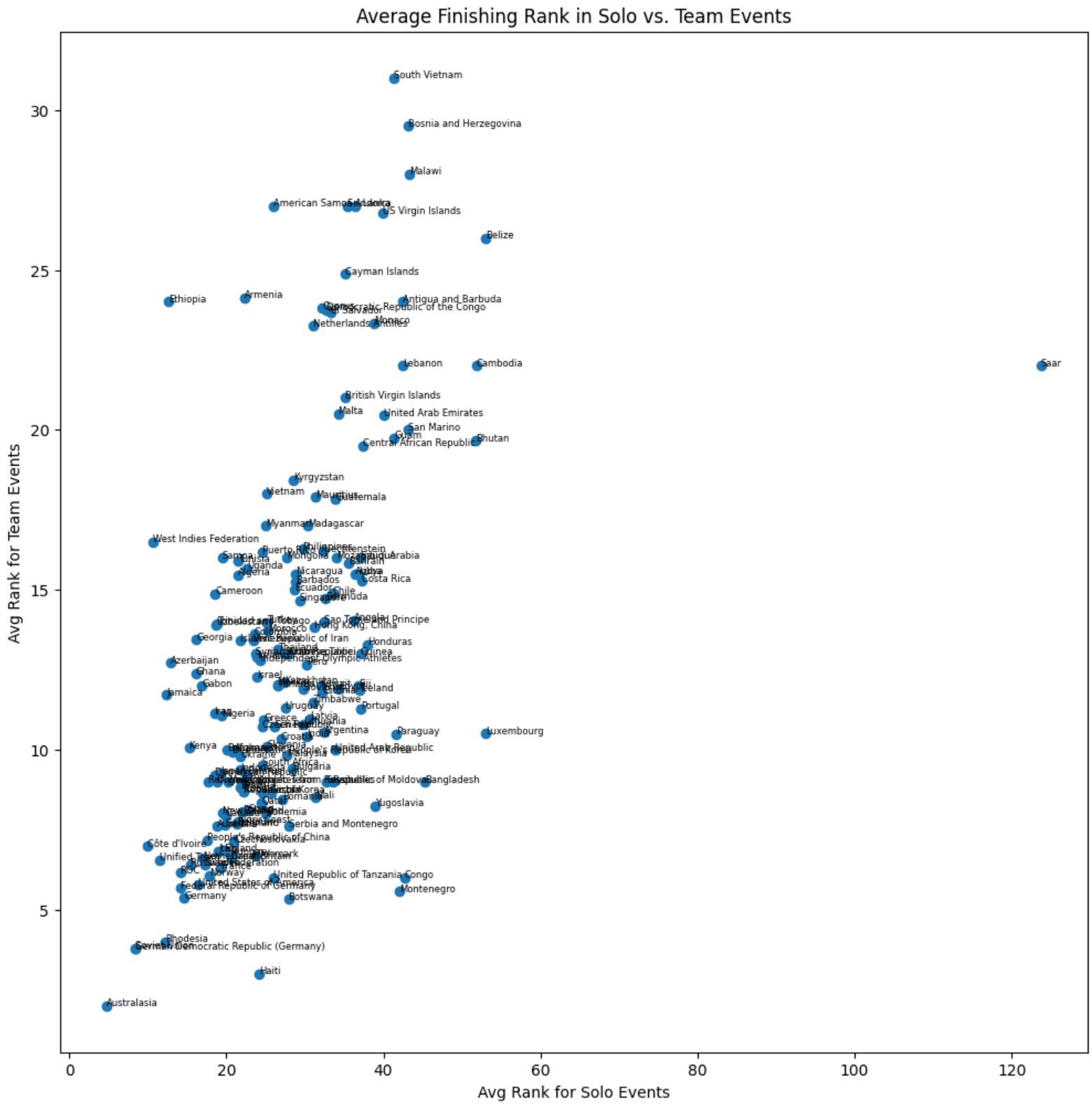
Appendix C – Average Finishing Rank in Solo vs. Team Events
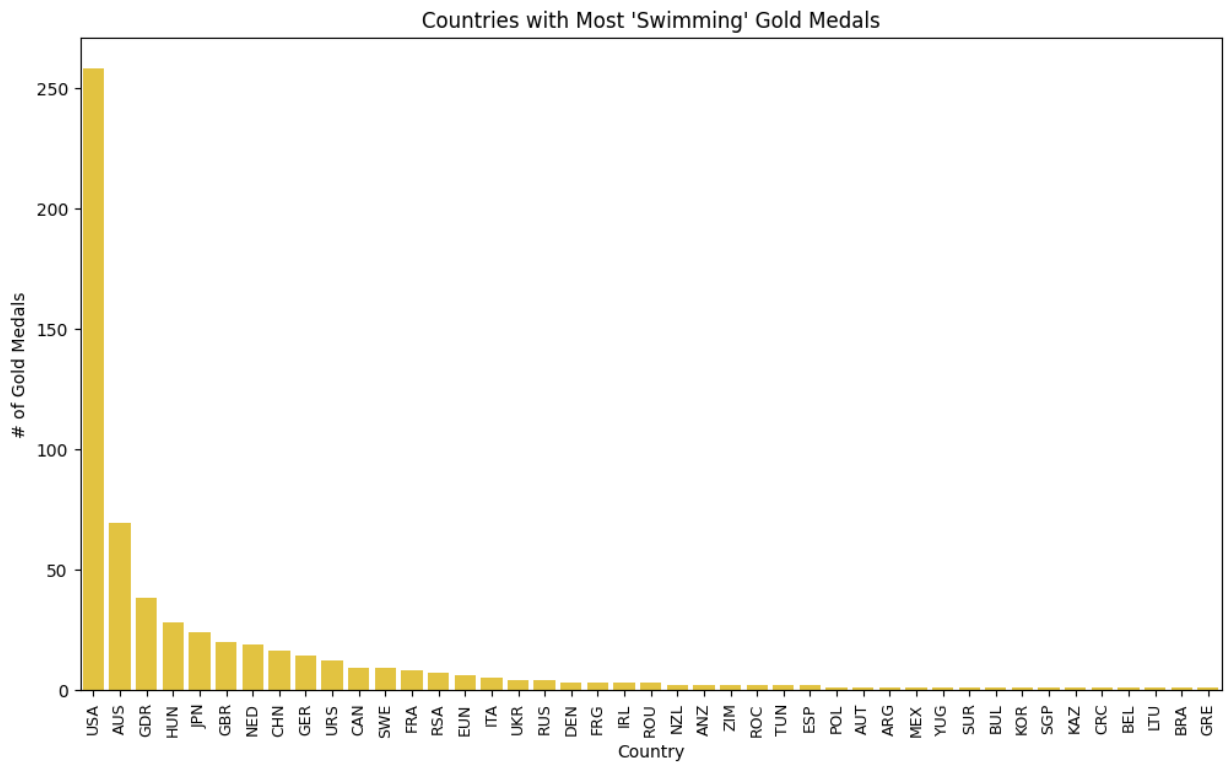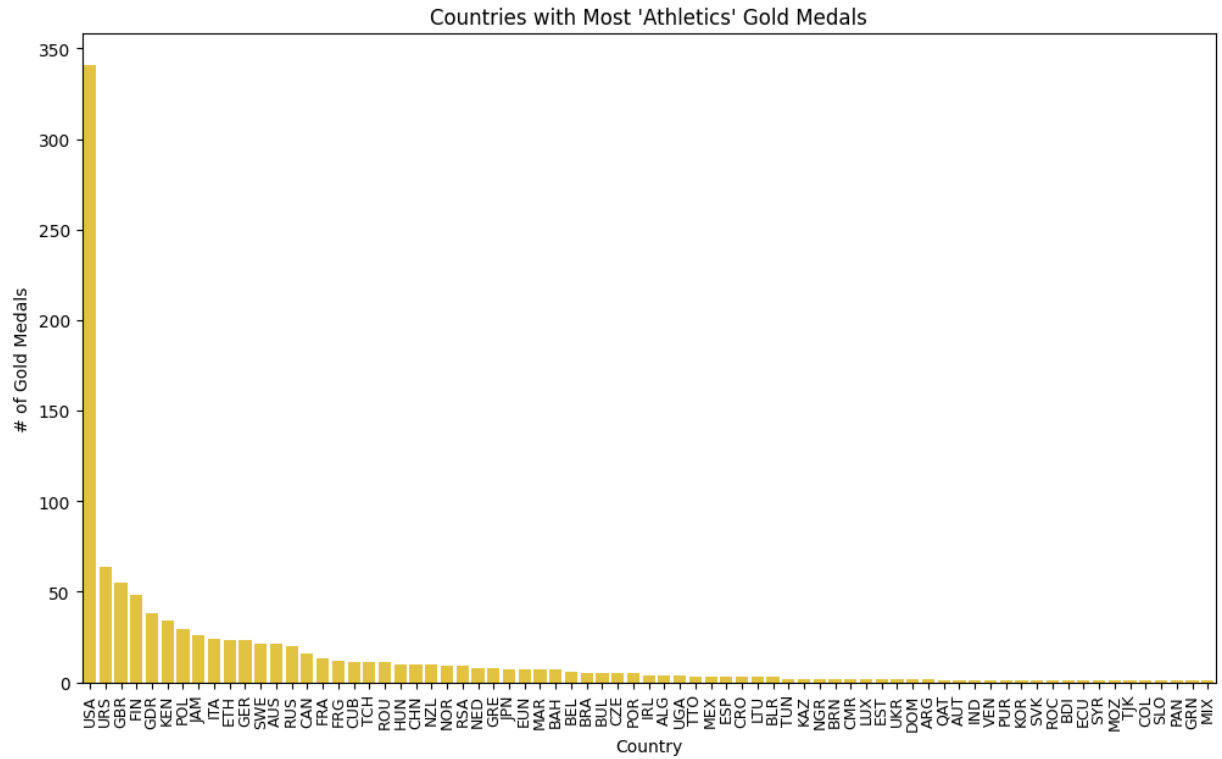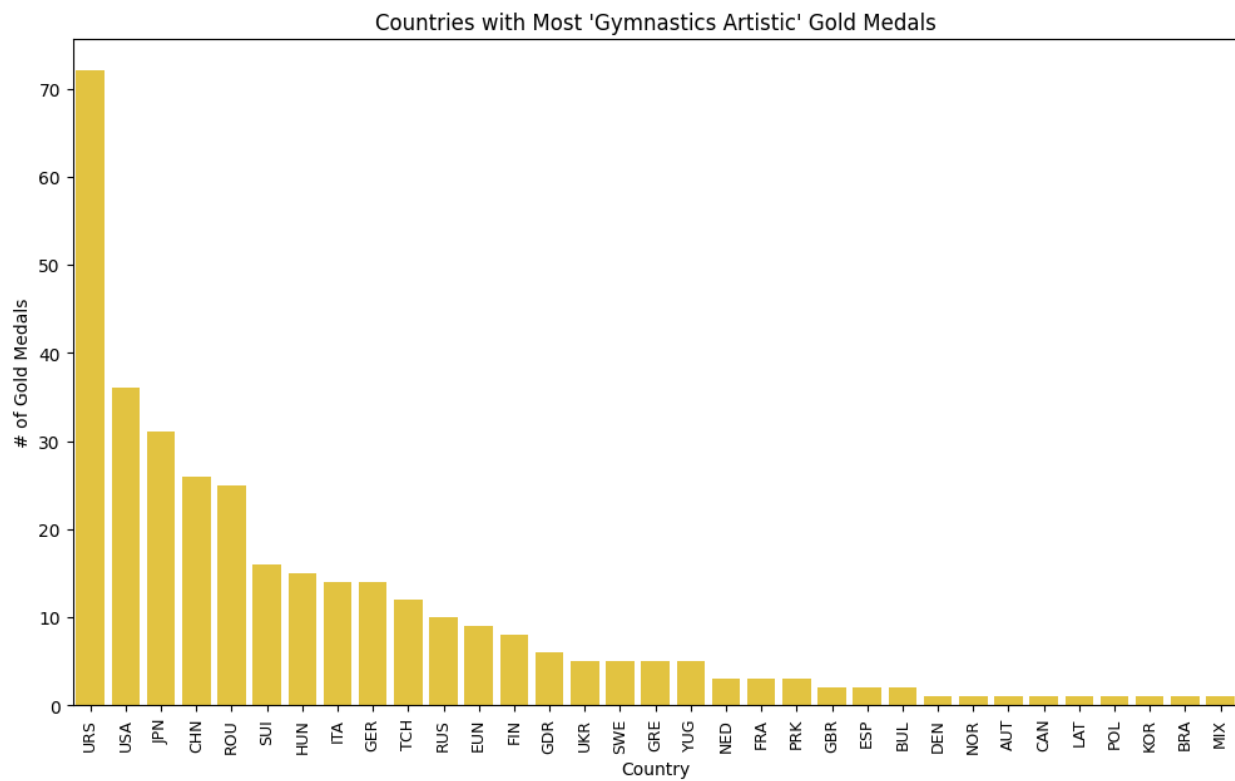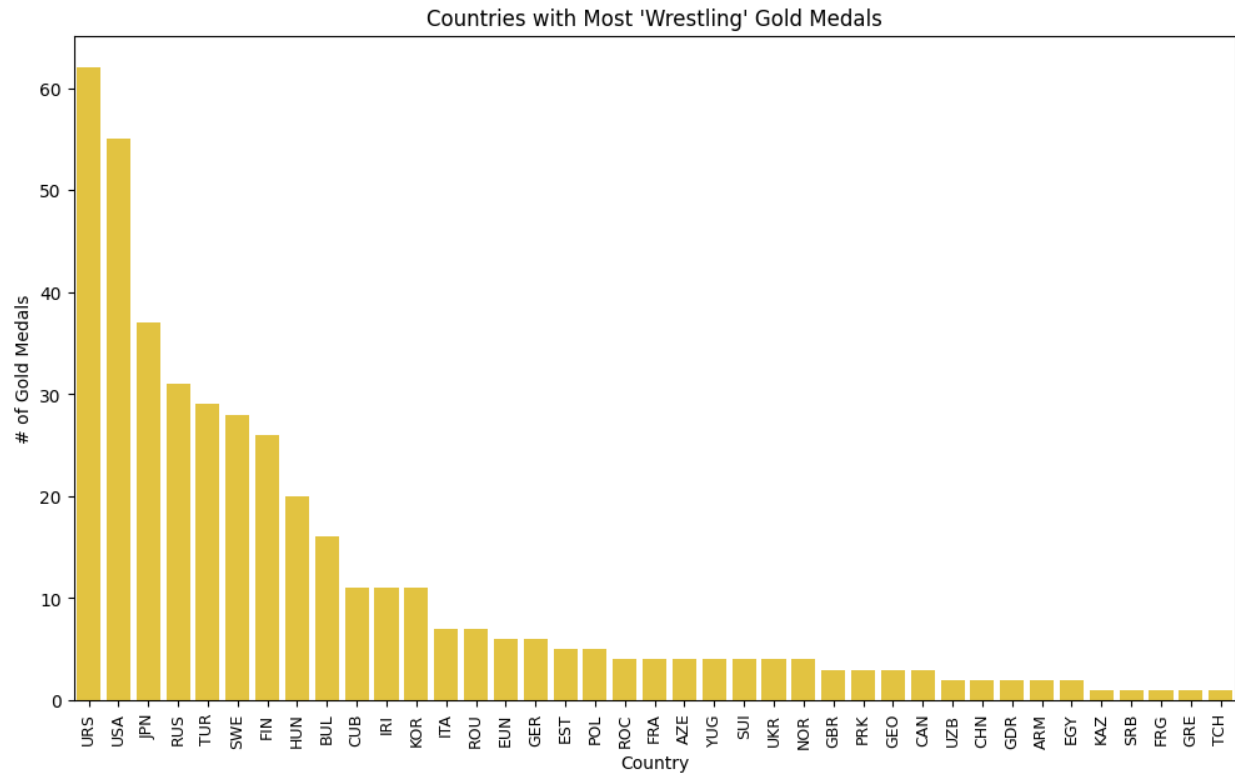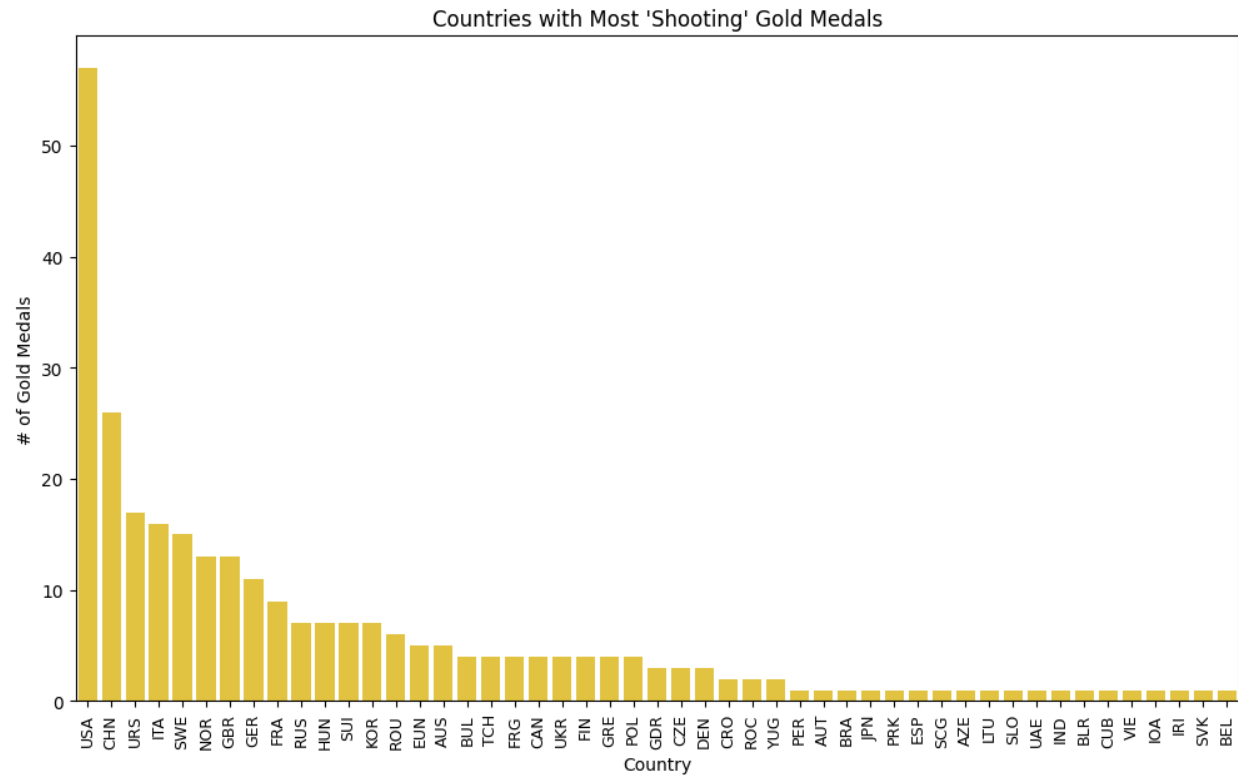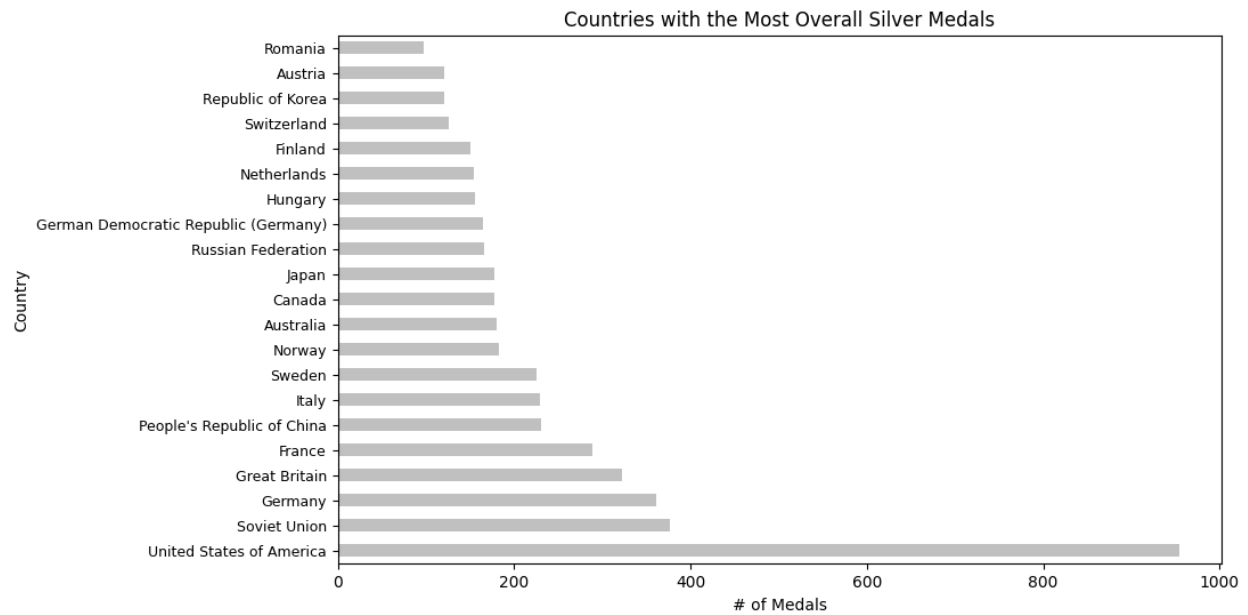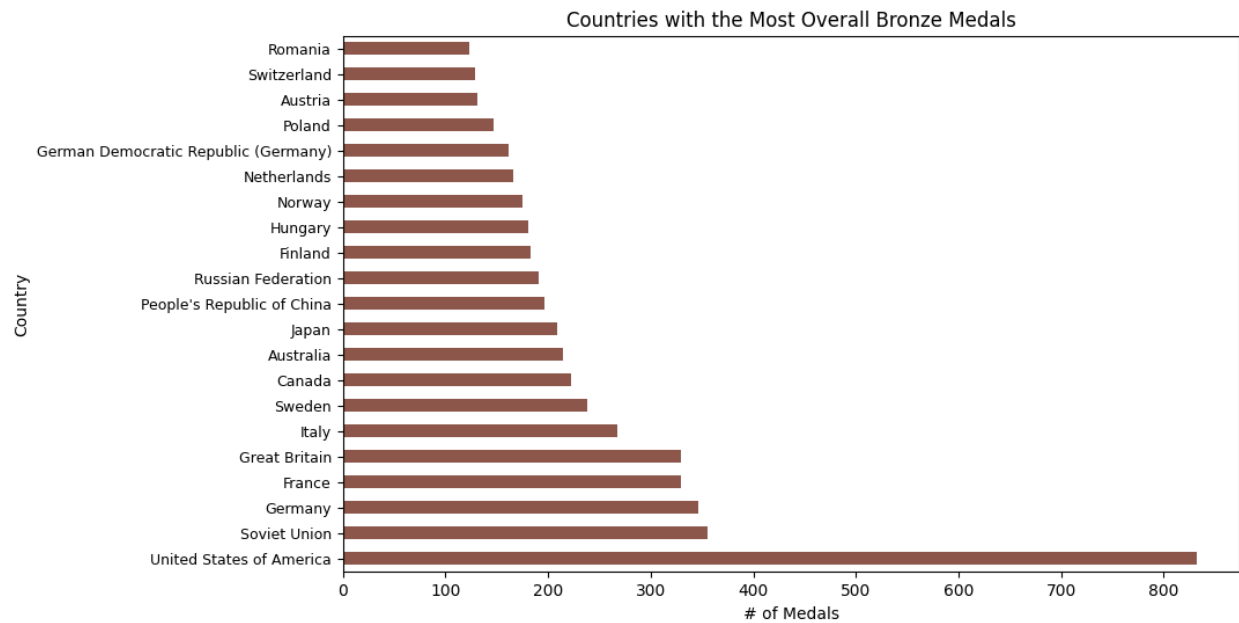

Average Finishing Rank in Solo vs. Team Events

Appendix D – Countries with the Most Overall Silver Medals

Countries with the Most Overall Silver Medals

Appendix E – Countries with the Most Overall Bronze Medals

Countries with the Most Overall Bronze Medals

Appendix F – Average Finishing Place for Top 5 Most Winning Countries

Average Finishing Position for Most Winning Countries