The Programme for International Student Assessment (PISA) Test Performance By Gender

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GSU - Data Visualization
HW3
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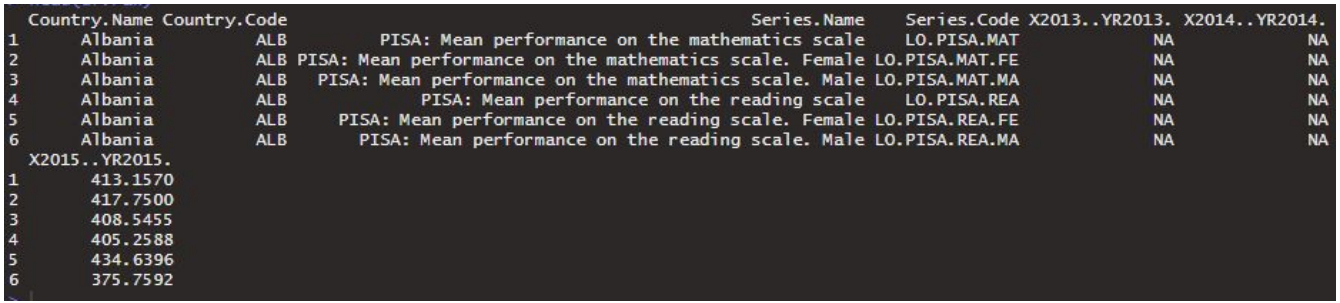
Content

Business Question: Is there material differences in PIMA test performance between males and females?

- Introduction to the dataset
- Data Preparation & Cleaning
- Overall performance by country
- Measures of central tendency by subject & gender
- Comparing performance by gender and country
- Concluding remarks

Data set

- **PISA**: The Programme for International Student Assessment (PISA) is a worldwide study by the Organisation for Economic Co-operation and Development (OECD) in member and non-member nations intended to evaluate educational systems by measuring 15-year-old school pupils' scholastic performance on mathematics, science, and reading (source: https://en.wikipedia.org/wiki/Programme_for_International_Student_Assessment)
- **Dataset**: 1166 observations and 7 columns.
- **Columns**: Country Name, Country Code, Series Name, Series Code, Yr 2013, Yr 2014, Year 2015
  - 4 Character, 2 None, 1 Float
- **Head**:



	Country.Name	Country.Code	Series.Name	Series.Code	X2013..YR2013.	X2014..YR2014.	X2015..YR2015.
1	Albania	ALB	PISA: Mean performance on the mathematics scale	LO.PISA.MAT	NA	NA	413.1570
2	Albania	ALB	PISA: Mean performance on the mathematics scale. Female	LO.PISA.MAT.FE	NA	NA	417.7500
3	Albania	ALB	PISA: Mean performance on the mathematics scale. Male	LO.PISA.MAT.MA	NA	NA	408.5455
4	Albania	ALB	PISA: Mean performance on the reading scale	LO.PISA.REA	NA	NA	405.2588
5	Albania	ALB	PISA: Mean performance on the reading scale. Female	LO.PISA.REA.FE	NA	NA	434.6396
6	Albania	ALB	PISA: Mean performance on the reading scale. Male	LO.PISA.REA.MA	NA	NA	375.7592

Data Preparation

1. Make each row in the dataset corresponds to ONLY one country: Use spread() function in tidyverse package
2. Make only useful columns and rows are kept: Use drop_na() and data subsetting
3. Rename the Series Code column for meaningful interpretation: Use rename()

Filter

	Country.Name	Maths	Maths.F	Maths.M	Reading	Reading.F	Reading.M	Science	Science.F	Science.M
1	Albania	413.1570	417.7500	408.5455	405.2588	434.6396	375.7592	427.2250	439.4430	414.9576
2	Algeria	359.6062	363.0725	356.4951	349.8593	366.2082	335.1854	375.7451	383.2209	369.0352
3	Argentina	409.0333	400.4431	418.3884	425.3031	432.9581	416.9666	432.2262	424.9944	440.1020
4	Australia	493.8962	490.9855	496.7613	502.9006	518.8658	487.1855	509.9939	508.9216	511.0493
5	Austria	496.7423	483.1330	510.0982	484.8656	495.0752	474.8460	495.0375	485.5268	504.3712
6	Belgium	506.9844	499.7390	514.0026	498.5242	506.6386	490.6642	501.9997	496.0319	507.7805
7	Brazil	377.0695	369.5493	385.0406	407.3486	418.5617	395.4633	400.6821	398.7000	402.7830
8	Bulgaria	441.1899	442.1631	440.3189	431.7175	456.5986	409.4498	445.7720	453.9011	438.4966
9	Canada	515.6474	511.1417	520.1661	526.6678	539.7624	513.5355	527.7047	527.1562	528.2548
10	Chile	422.6714	413.4490	431.7981	458.5709	464.5616	452.6422	446.9561	439.6174	454.2186
11	Colombia	389.6438	384.4883	395.3911	424.9052	432.2819	416.6816	415.7288	411.0316	420.9651
12	Costa Rica	400.2534	392.3129	408.4516	427.4875	434.8748	419.8605	419.6080	410.8349	428.6660
13	Croatia	464.0401	457.9612	470.5987	486.8632	499.5858	473.1367	475.3912	472.5863	478.4173
14	Cyprus	437.1443	439.5341	434.7064	442.8443	468.6583	416.8271	432.5964	440.9482	424.1478
15	Czech Republic	492.3254	488.6656	495.7942	487.2501	500.6527	474.5475	492.8300	488.3983	497.0304
16	Denmark	511.0876	506.3748	515.7565	499.8146	510.9516	488.7816	501.9369	498.9027	504.9427
17	Dominican Republic	327.7020	329.7459	325.5866	357.7377	372.7806	342.1682	331.6388	330.8290	332.4770
18	Estonia	519.5291	516.8728	522.0804	519.1429	533.3620	505.4863	534.1937	532.5228	535.7986
19	Finland	511.0769	514.9650	507.4528	526.4247	550.5112	503.9746	530.6612	540.5118	521.4797
20	France	492.9204	489.9540	495.9317	499.3061	513.7640	484.6293	494.9776	494.0342	495.9353
21	Georgia	403.8332	410.5960	397.7478	401.2881	431.8820	373.7585	411.1315	419.6164	403.4965
22	Germany	505.9713	497.5311	514.1177	509.1041	519.6741	498.9021	509.1406	503.8121	514.2837

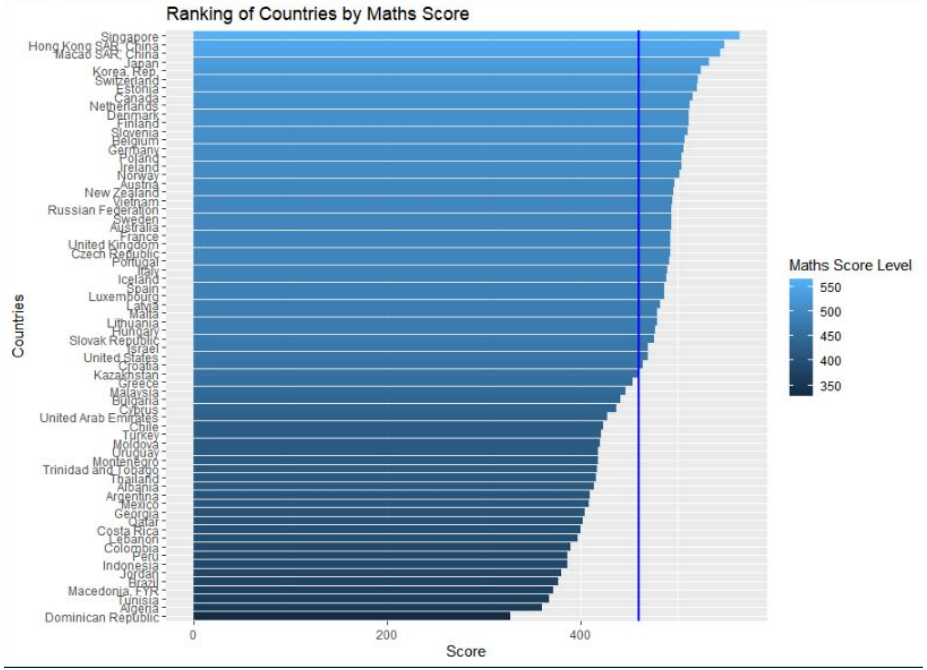
Showing 1 to 23 of 68 entries, 10 total columns

Visualization

Ranking Math Scores By Country

Observations:

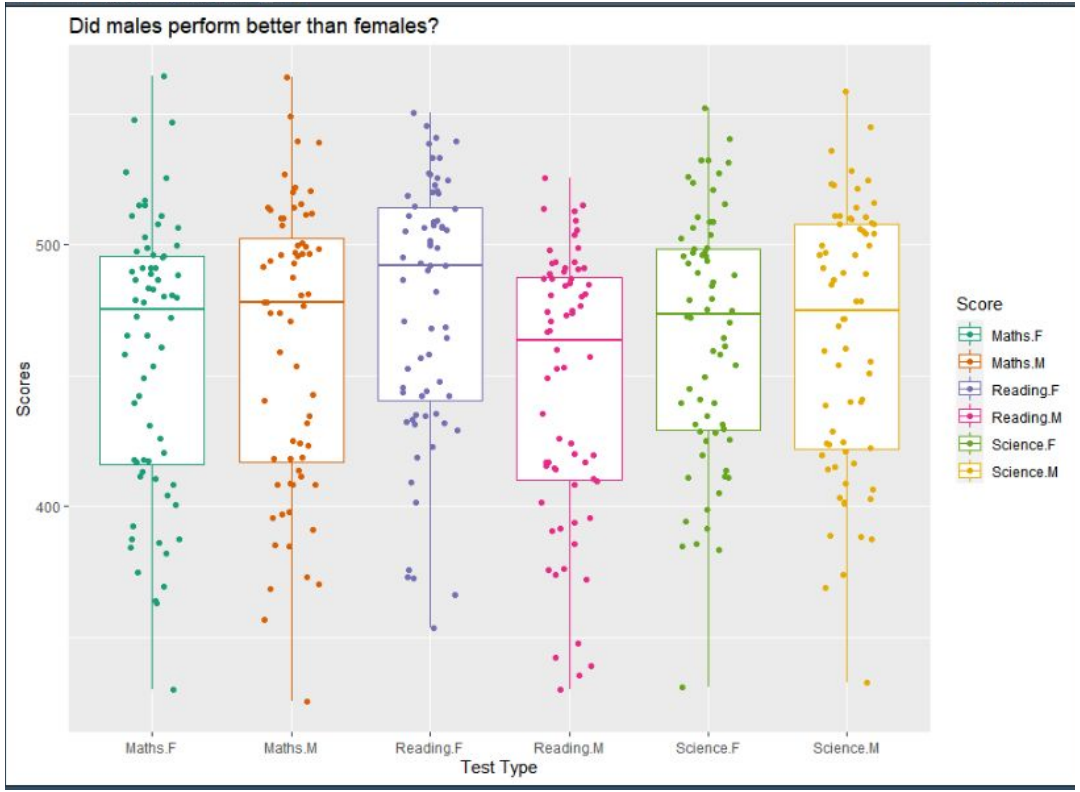
- We can clearly see that the top countries in terms of score are Singapore, China and Japan and lowest DR, Algiers and Tunisia.



Visualization
Box Plot

Observations:

- Reading.F scores on average tend to be higher with Read.M being the lowest, indicating a difference in performance by gender.
- The other distributions of scores by quartile are similar.

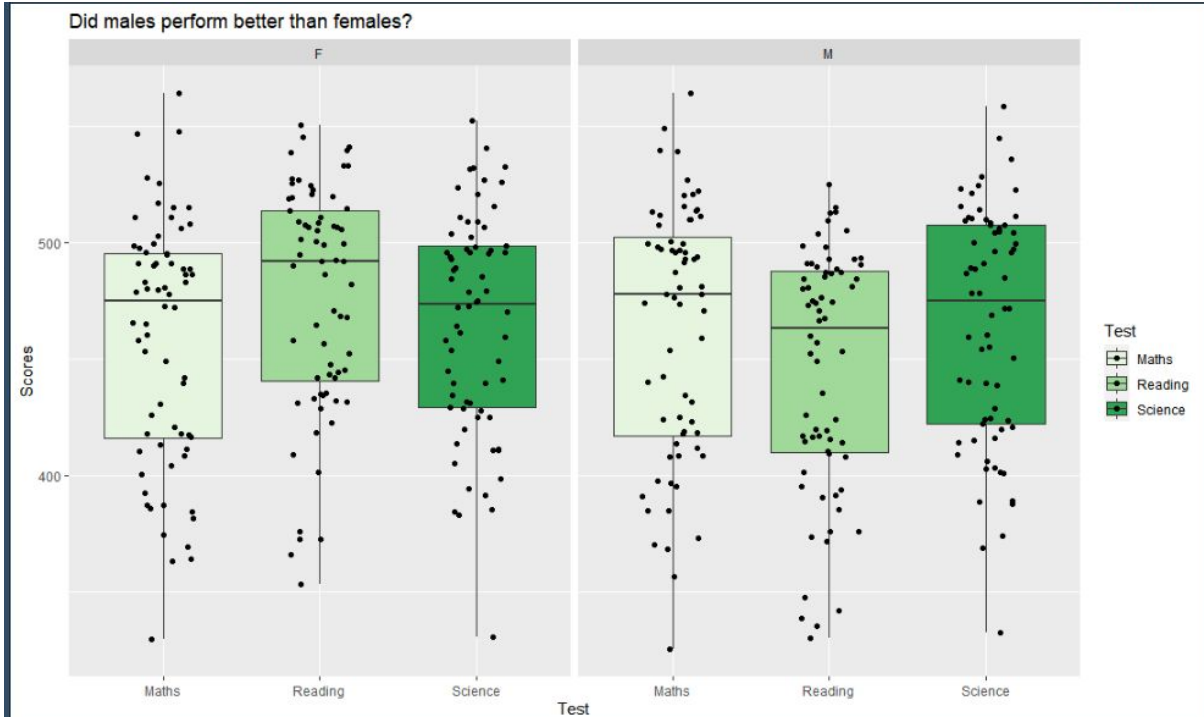


Visualizations

Do Males Score Higher Than Females?

Observations:

- It would appear that Men perform better in sciences and math while females perform better win reading.

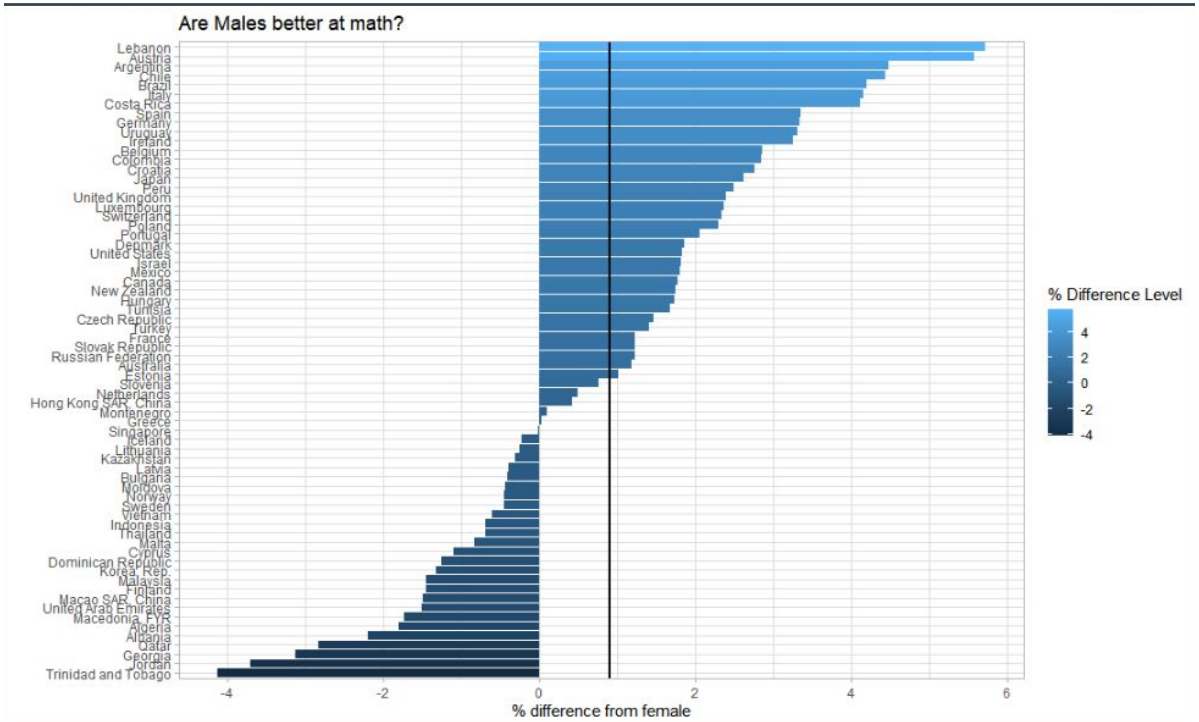


Visualizations

Do Men Perform Better At Math By Country?

Observations:

- It depends on which country.
- In the countries at the bottom of the barplot men performed worse and at the top better.

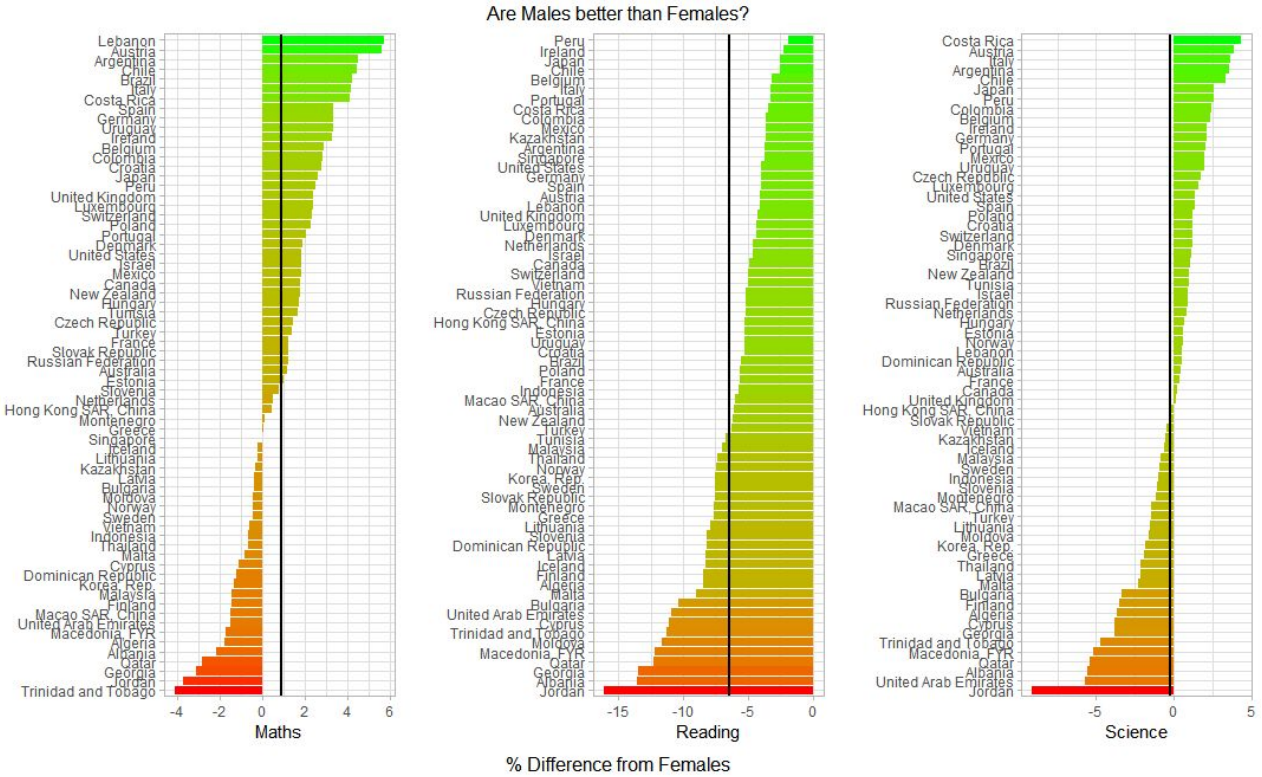


Visualizations

Do Men Perform Better At All Subjects By Country?

Observations:

- Overall, country appears to be an important factor in determining the performance differences of males and females..



Concluding Remarks

- Initial results indicated that males outperform women in math and women outperform men in reading.
- Further inspection revealed that performance is highly dependent on the country and subject matter.
- Further research should be conducted into socioeconomic and cultural phenomena before making any conclusions or assertions about male or female scholastic performance.