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**Exploration of Cultural Experience throughout Europe
Final Report**

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Dashboard 1- Cultural Participation by Tertiary Education Level

Tertiary Education Cultural Participation



Figure 1. Scatterplots of Participation in different recreational events (Cinema, Sports Events, Live Performances; % of Population) vs. Participation in Cultural Activities (% of Population)- Tertiary Education Level

These scatterplots illustrate the relationship between participation in recreational events and participation in cultural activities, where each country is represented by a different color. All measures are for the percentage of the population that have a tertiary level of education.

These charts show that there is a positive correlation between participation in both recreational events and cultural activities.

Therefore, it can be speculated that activity in recreational events such as cinema, sports events, or live performances points toward a similar level of participation in different cultural activities.

Scatterplot of Participation in Cinema vs. Participation in Cultural Activities

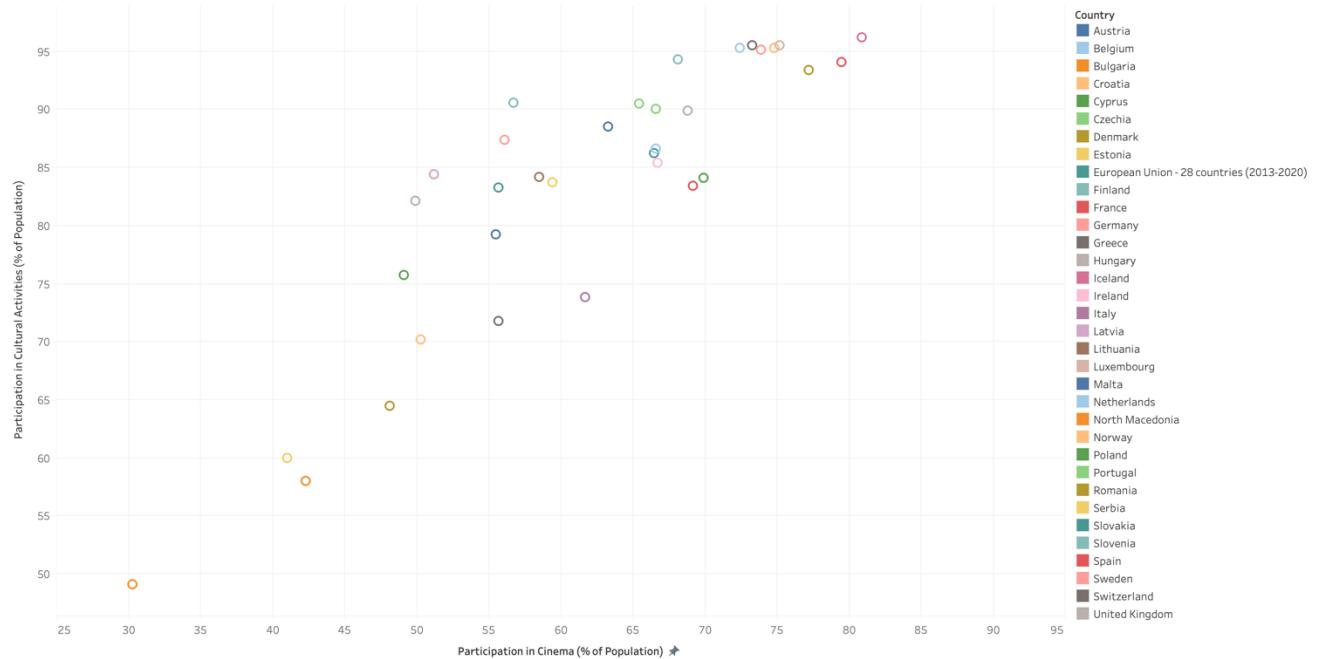


Figure 1a. Scatterplot of Participation in Cinema (% of Population) vs. Participation in Cultural Activities (% of Population)- Tertiary Education Level

The scatterplot above represents how participation in cinema relates to and is affected by participation in cultural activities. Each country in Europe (including a measure that aggregates all of them together- denoted as “European Union- 28 countries) is represented by a different color within our chart legend.

Of all the charts represented in *Dashboard 1*, this figure has the most linear relationship with a positive slope.

It can be inferred that as the percentage of the population participating in cinematic activity increases, that same population becomes more avidly involved in cultural activities. Further, it can be said that participation in cinema and cultural activities have the strongest correlation among our 3 different recreational activities within a population with a tertiary level of education.

Scatterplot of Participation in Sports Events vs. Participation in Cultural Activities

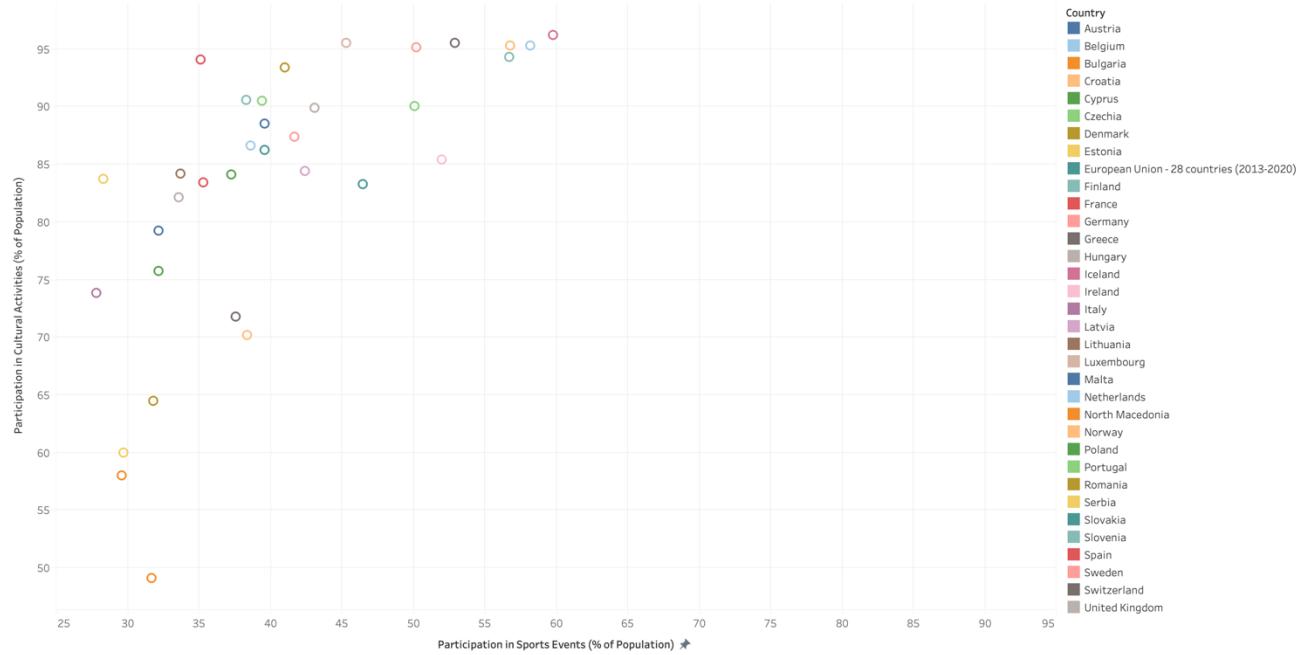


Figure 1b. Scatterplot of Participation in Sports Events (% of Population) vs. Participation in Cultural Activities (% of Population)- Tertiary Education Level

This chart depicts the relationship between sport event attendance and activity and the amount of participation in cultural activities. Equivalent to the rest of the charts within this dashboard, all countries are represented by a different color.

This illustration is very right-skewed compared to the other plots within *Dashboard 1* with more of a logarithmic relationship rather than being linearly related.

The chart points toward a weak relationship between participation in sports events and cultural activities as a linear line-of-best-fit does not represent the data well.

Scatterplot of Participation in Live Performances vs. Participation in Cultural Activities

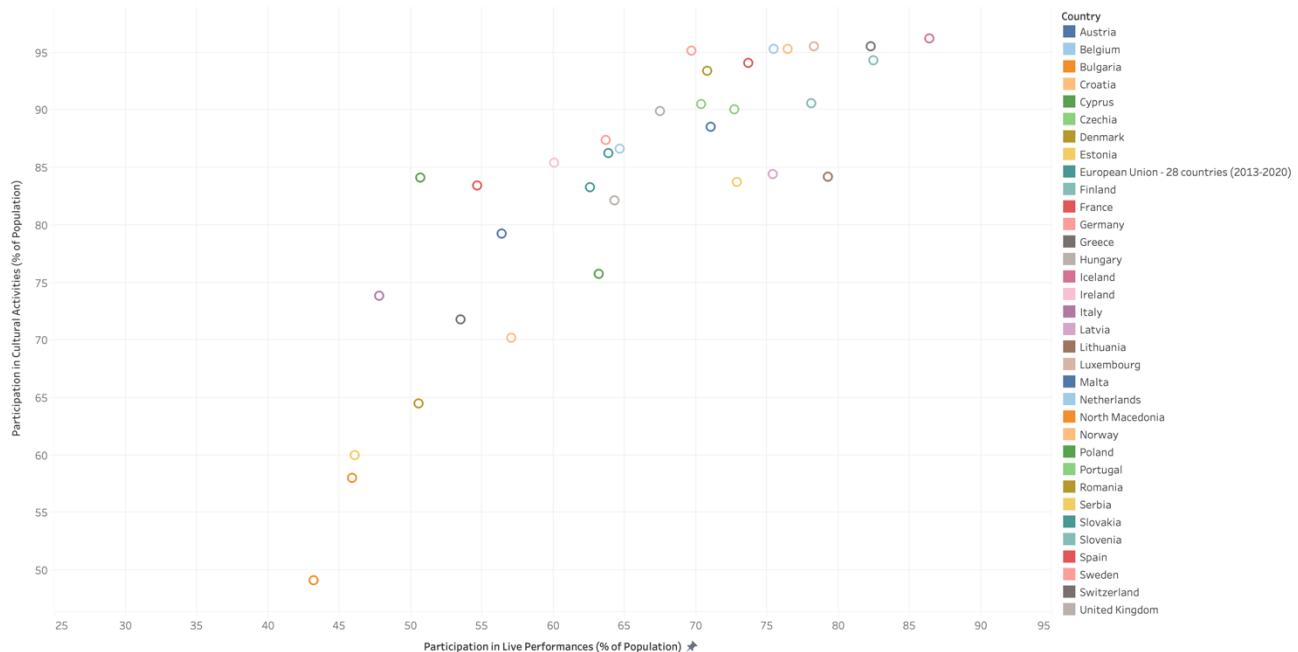


Figure 1c. Scatterplot of Participation in Live Performances (% of Population) vs. Participation in Cultural Activities (% of Population)- Tertiary Education Level

Our final figure within *Dashboard 1* visualizes how participation in live performances is related to participation in cultural activities. Color in these charts serves to indicate which countries generally have the highest participation throughout all of our categories of interest.

Much like figure 1a, this chart has a positive correlation, although the relationship is not as strong as the one shown within figure 1a.

This illustration does however resemble a 1-to-1 relationship, where an increase in one variable leads to a corresponding increase in the other. As a result, we can infer that participation in live performances and cultural activities are strongly correlated, however, it is not the strongest relationship among charts in *Dashboard 1* for the population with a tertiary level of education.

Dashboard 2- Cultural Participation by Primary/Secondary Education Level

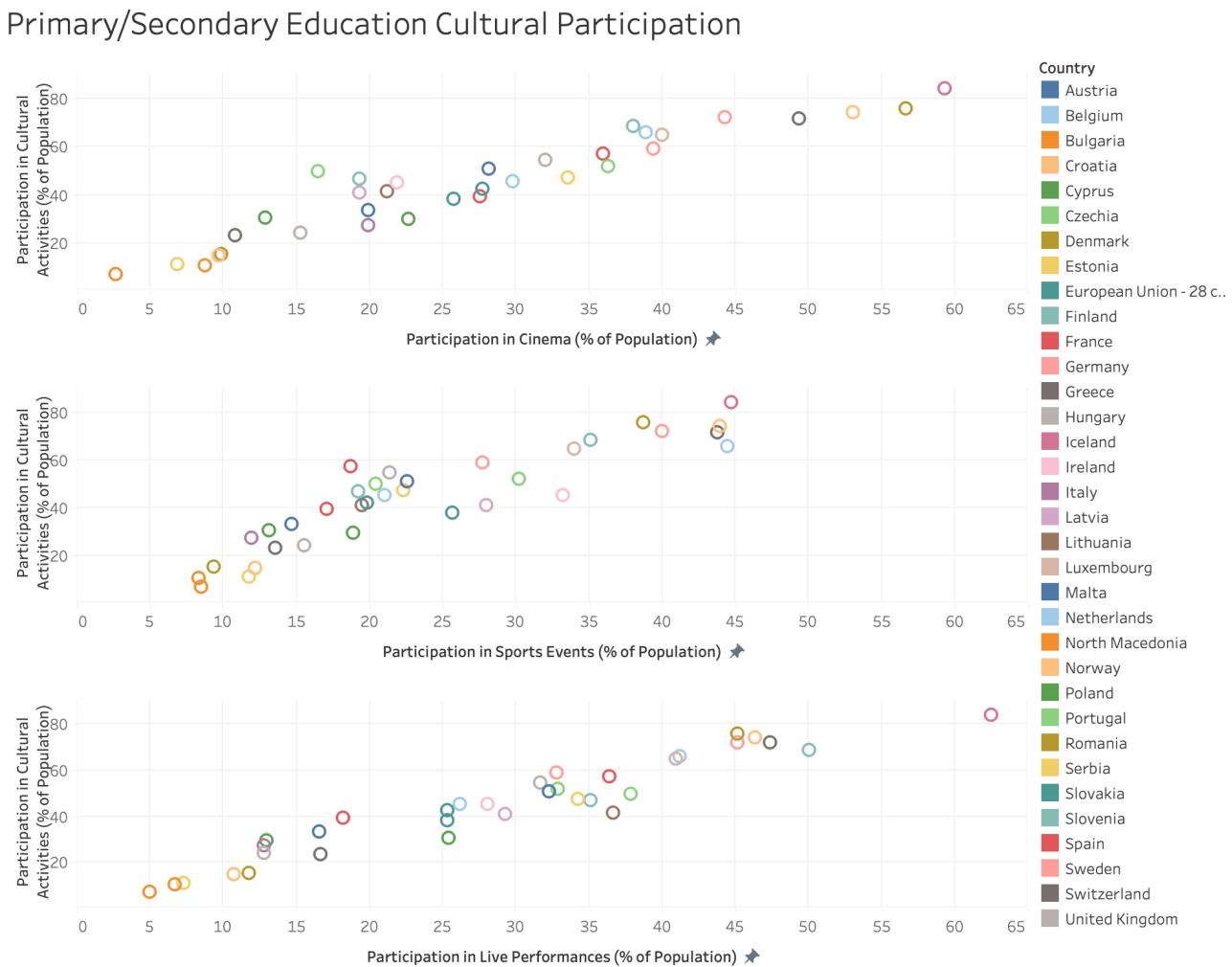


Figure 2. Scatterplots of Participation in different recreational events (Cinema, Sports Events, Live Performances; % of Population) vs. Participation in Cultural Activities (% of Population)- Primary/Secondary Education Level

These scatterplots illustrate the relationship between participation in recreational events and participation in cultural activities for a population with only a primary or secondary level of education. Countries are identically colored as in *Dashboard 1*.

These charts show that there is a positive correlation between participation in both recreational events and cultural activities, however, they are more right-skewed than the visuals from above.

It can be implied that activity in these recreational events point toward a similar level of participation in cultural activities, but does not have as much of the population participation percentage as those who have a tertiary level of education.

Scatterplot of Participation in Cinema vs. Participation in Cultural Activities

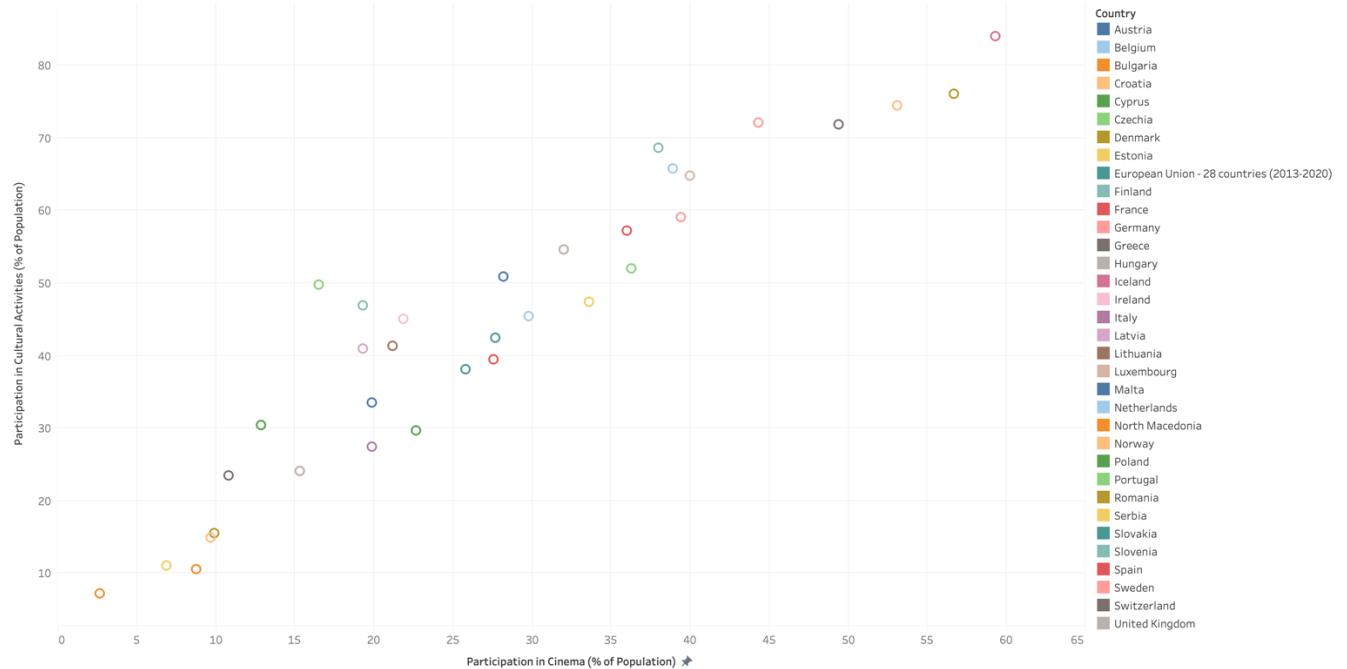


Figure 2a. Scatterplot of Participation in Cinema (% of Population) vs. Participation in Cultural Activities (% of Population)- Primary/Secondary Education Level

Much of the observations and inferences from charts contained within *Dashboard 1* are applicable for figures 2a-2c. A main difference between the charts involves the level of participation for each recreational activity and cultural activities- the maximum percentage of population participating in cultural activities for those with a primary or secondary level of education is ~82%, whereas each chart in *Dashboard 1* has a maximum of ~95%.

Aside from these discrepancies, the accompanying charts share many common characteristics.

Scatterplot of Participation in Sports Events vs. Participation in Cultural Activities

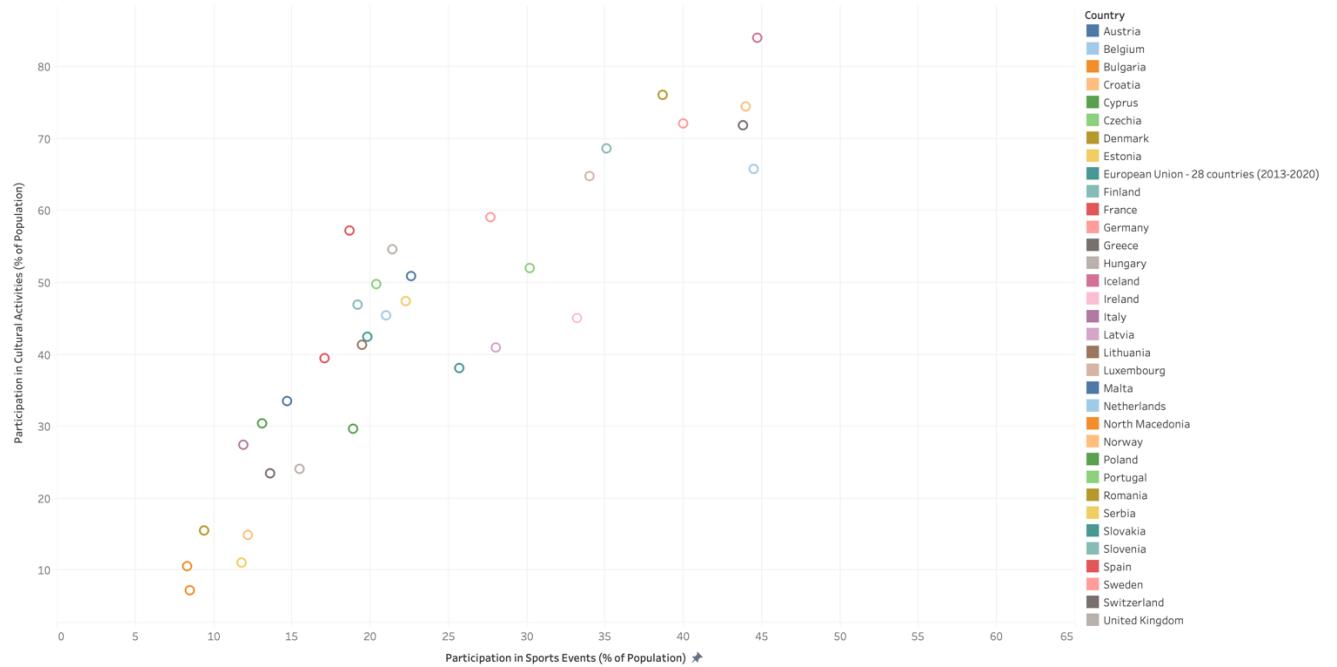


Figure 2b. Scatterplot of Participation in Sports Events (% of Population) vs. Participation in Cultural Activities (% of Population)- Primary/Secondary Education Level

Scatterplot of Participation in Live Performances vs. Participation in Cultural Activities

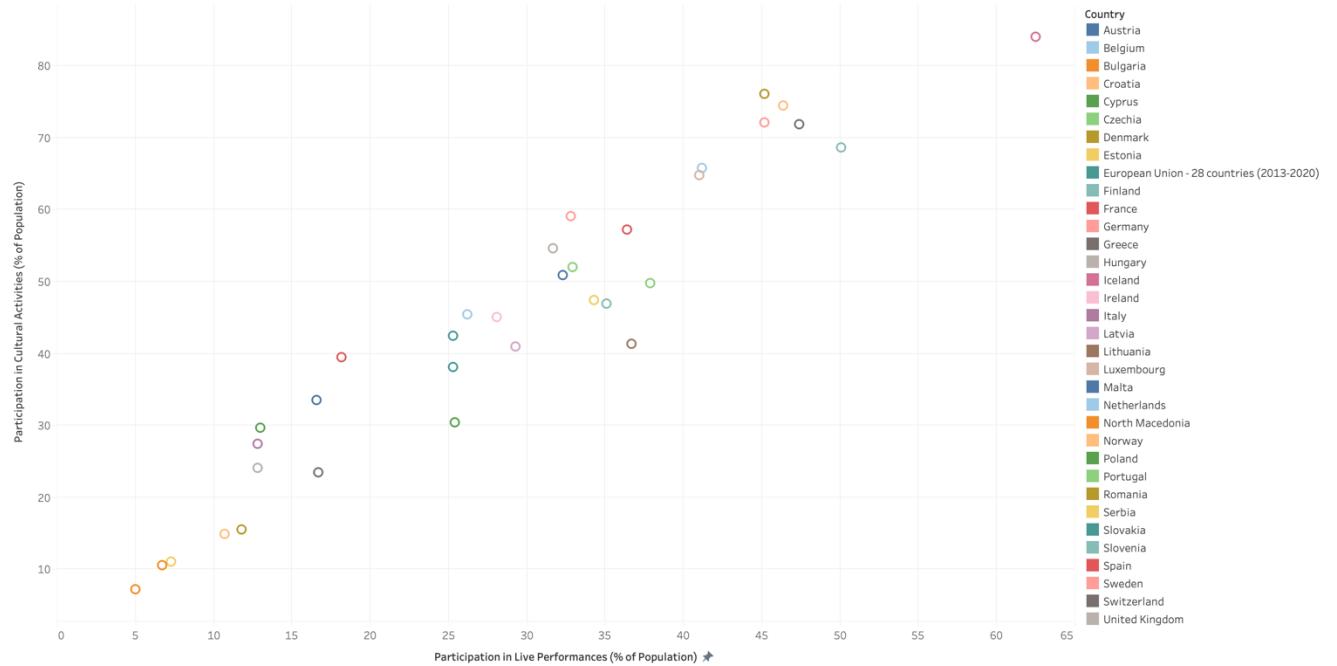


Figure 2c. Scatterplot of Participation in Live Performances (% of Population) vs. Participation in Cultural Activities (% of Population)- Primary/Secondary Education Levels

Dashboard 3: Cultural Participation, Country-level breakdown

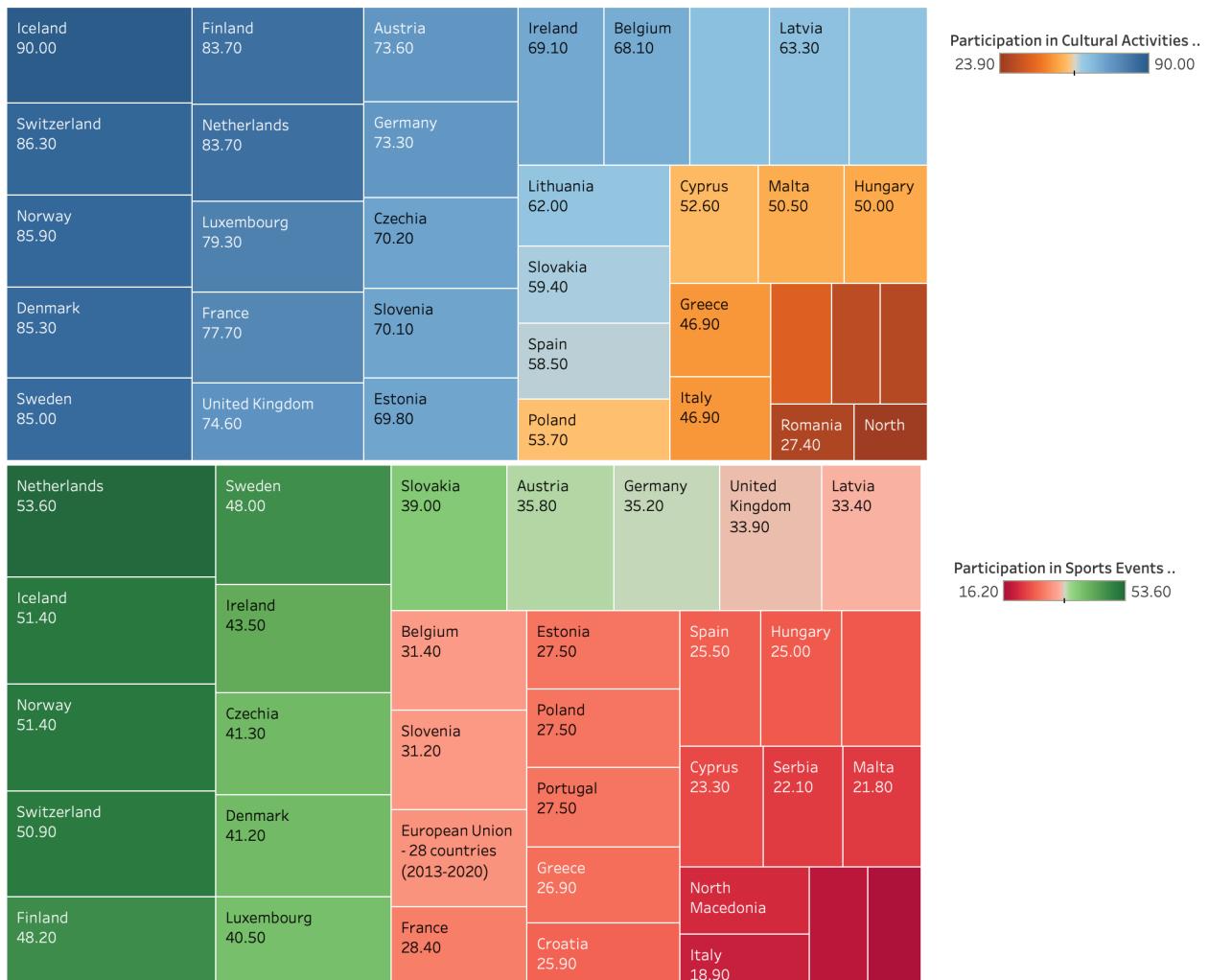


Figure 3. Treemaps of Participation in Cultural Activities/Sports Events (% of Population) by Country

The charts included within *Dashboard 3* depict how participation in cultural activities differs from participation in sports events for each European country- education level is not a factor within these visualizations.

There are clear leaders in both categories, as Iceland has the highest cultural participation and second-highest participation in sports events. This is a common trend for the top countries in each category as they are the leaders in both measures.

This reinforces the relationship discovered from figures 1c and 2c, depicting the relationship between sport event and cultural activity participation. It can further be implied that certain countries value this type of participation over others.

Treemap of Participation in Cultural Activities by Country

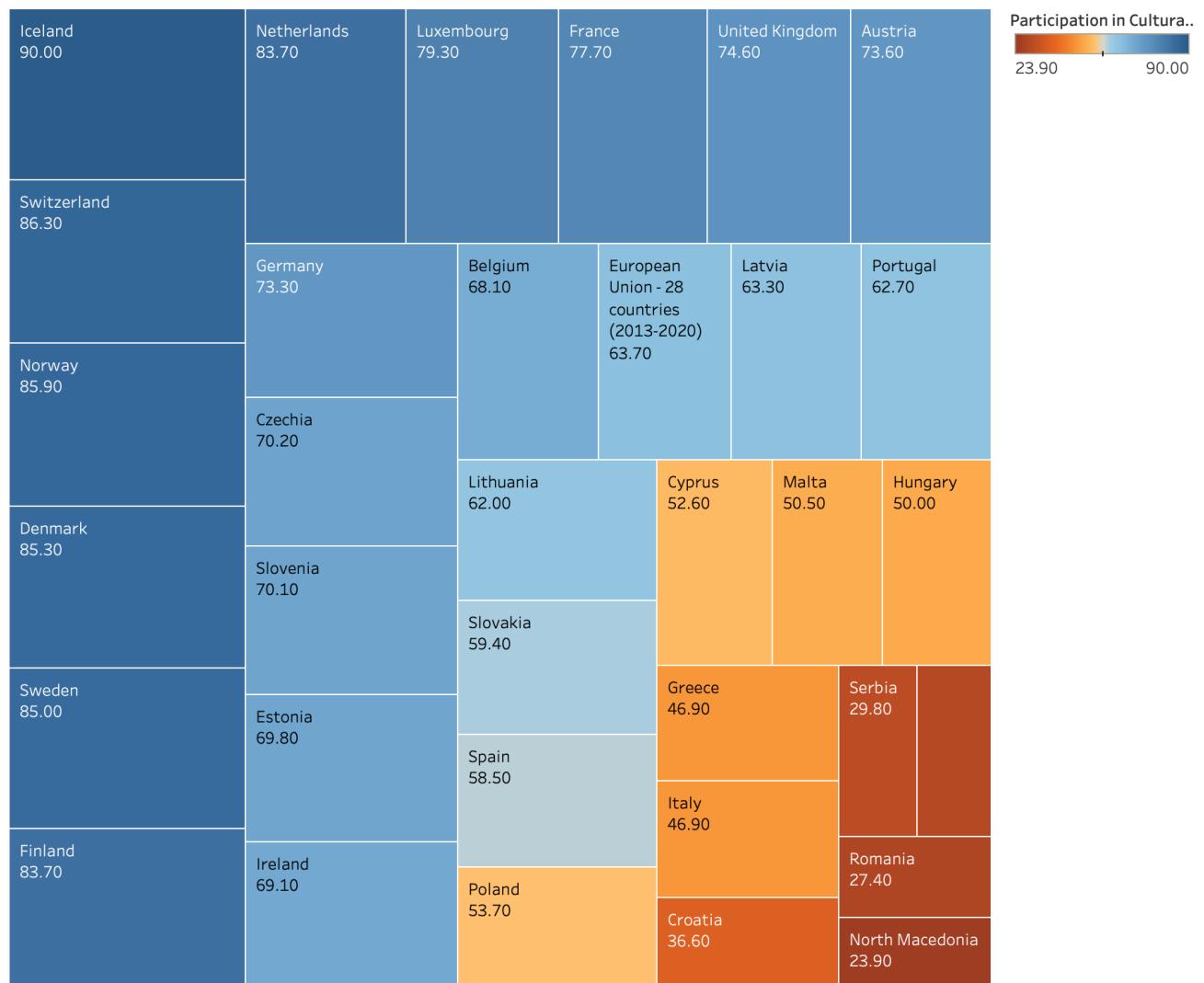


Figure 3a. Treemap of Participation in Cultural Activities (% of Population), broken down by Country

This chart breaks down how each country participates in cultural activities and compares them among each other. There is a wide array of participation percentage, from 90% in Iceland to 23.9% in North Macedonia (a 66.1% change).

The heat map in figure 4 illustrates this situation in context of European geography to further understand how culture relates to geographical location.

Treemap of Participation in Sports Events by Country

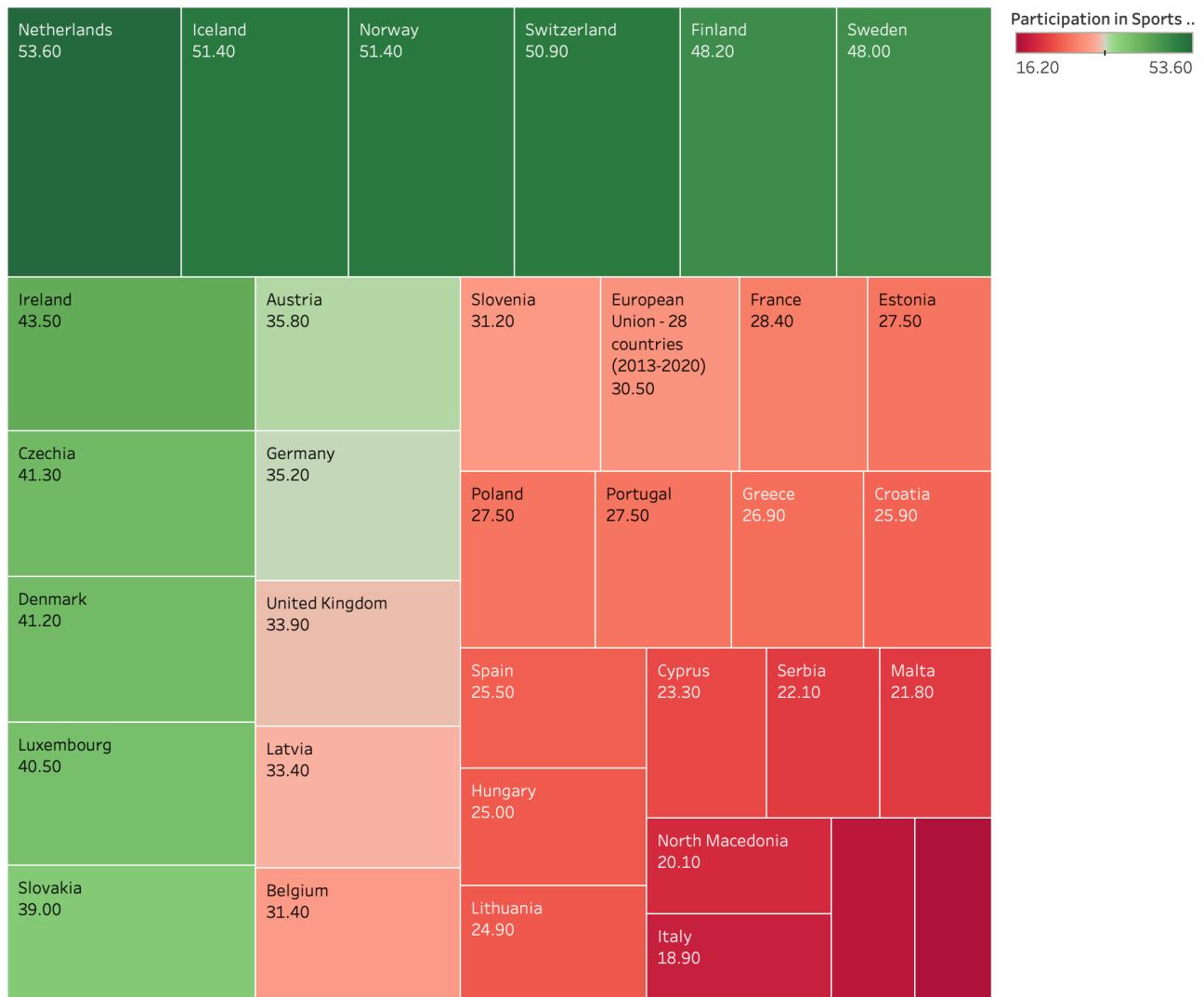


Figure 3b. Treemap of Participation in Sports Events (% of Population), broken down by Country

Similarly to figure 3a, this illustration breaks down country participation in sports events. The difference between the top country (Netherlands, 53.6% of population participation) and bottom country (Romania, 16.2% population participation) is not as large as figure 3a but there are many similarities between the two charts.

Geographical Heat Map of Participation in Cultural Activities

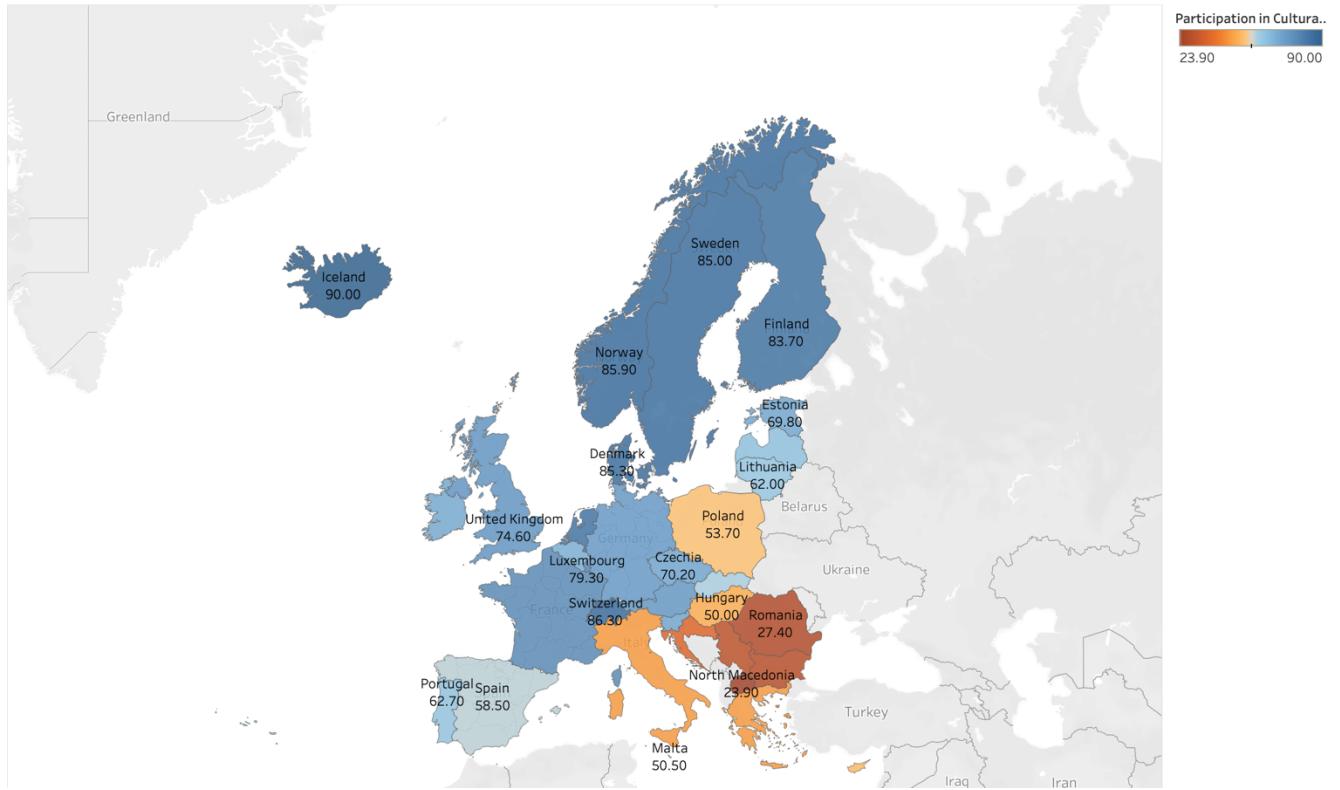


Figure 4. Geographical Heat Map of Participation in Cultural Activities (% of Population)

The above figure visualizes cultural participation in terms of geographic location, highlighting each country's percent participation along with the value. The geographic heat map depicts Europe in this context, with dark blue representing the greatest participation and dark orange representing the lowest.

It can be concluded that the Northern and Western countries are a lot more involved in cultural activities than Southeastern European countries as there is a clear shift from blue (higher values) to orange (lower values) as you move south within Europe.

The culture of Northern Europe can be attributed as more participatory than Southern Europe as the leading 4 countries in cultural participation are the 4 northernmost countries. This relationship is further explored when categorizing the countries by geographic location (North, South, West, Central/East) through figure 8 (*Dashboard 6*).

Geographical Heat Map of Participation in Sports Events

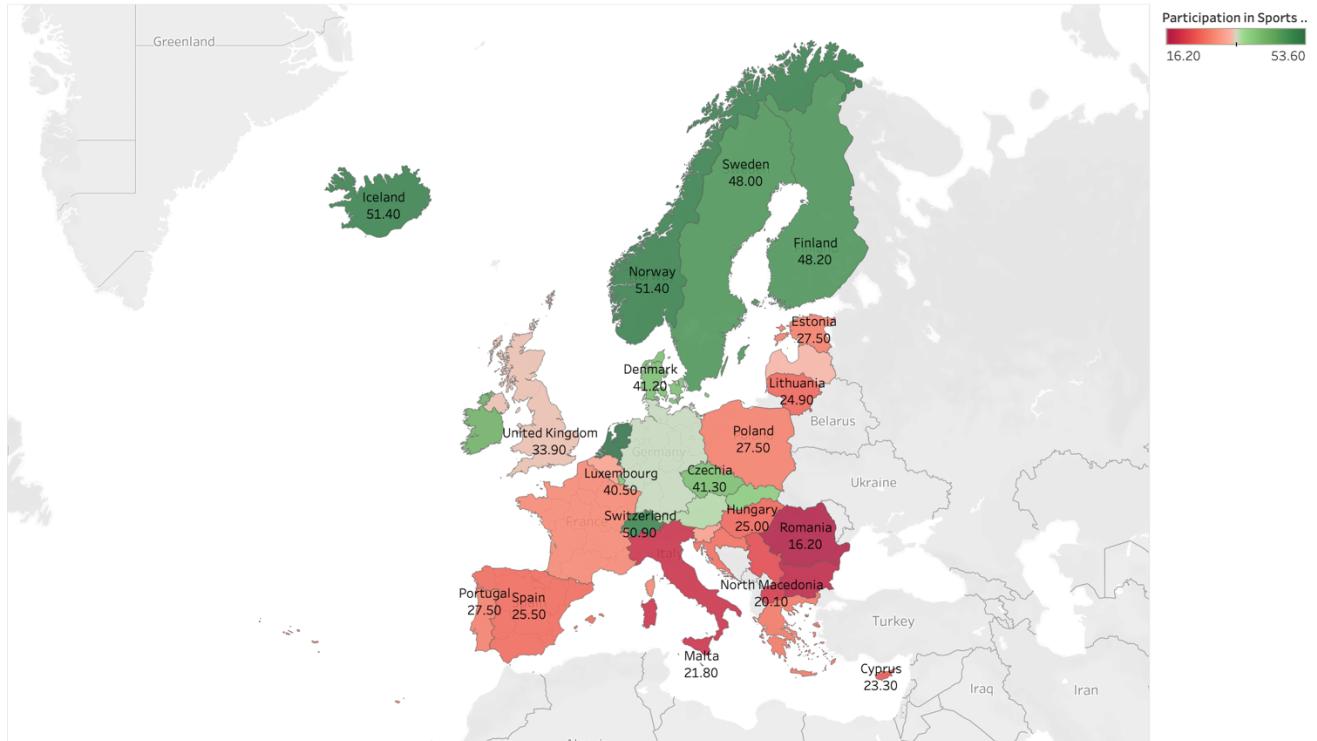


Figure 5. Geographical Heat Map of Participation in Sports Events (% of Population)

The above figure visualizes sports event participation in terms of geographic location, highlighting each country's percent participation along with the value. The geographic heat map depicts Europe in this context, with dark green representing the greatest participation and dark red representing the lowest.

It can be concluded that the Northern and Western countries are a lot more involved in sports events than Southeastern European countries as there is a clear shift from green (higher values) to red (lower values) as you move south within Europe.

This mirrors the depiction in figure 4, however, the focus of greatest participation is limited to Northern countries and does not extend West as in figure 4. The culture of Northern Europe can again be attributed as more participatory than Southern Europe as the leading 4 countries in sports event participation are the 4 northernmost countries. This relationship is further explored through figure 8 (*Dashboard 6*).

Dashboard 4: Cultural Participation by Income Quintile (1st/5th Quintiles)

Income Quintile Cultural Participation

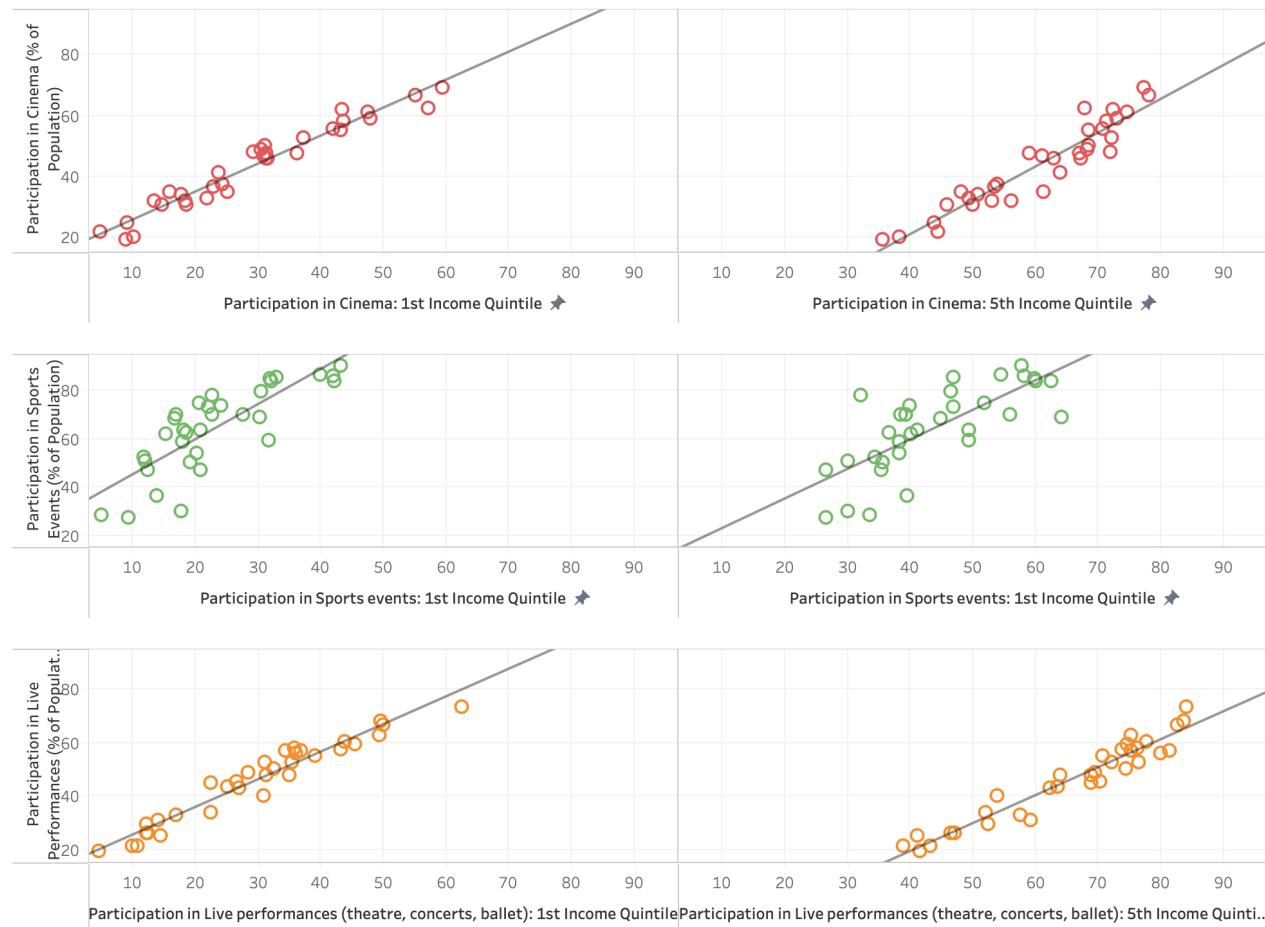


Figure 6. Scatterplots of Participation in different recreational events (Cinema, Sports Events, Live Performances; % of Population) by Income Quintile vs. Participation in different recreational events (Cinema, Sports Events, Live Performances; % of Population)

Dashboard 4 explores participation in recreational activities while taking into account the income quintile for each population. The 1st and 5th income quintiles were used to depict how the lower level of society differs from the upper class in cultural participation.

Although each plot has a strong positive correlation, skewness is determined by the indicators income quintile. There is a general trend of 1st income quintile being right-skewed and 5th income quintile being left-skewed throughout each chart.

Scatterplot of Participation in Cinema (Income Quintile vs. Total Participation)

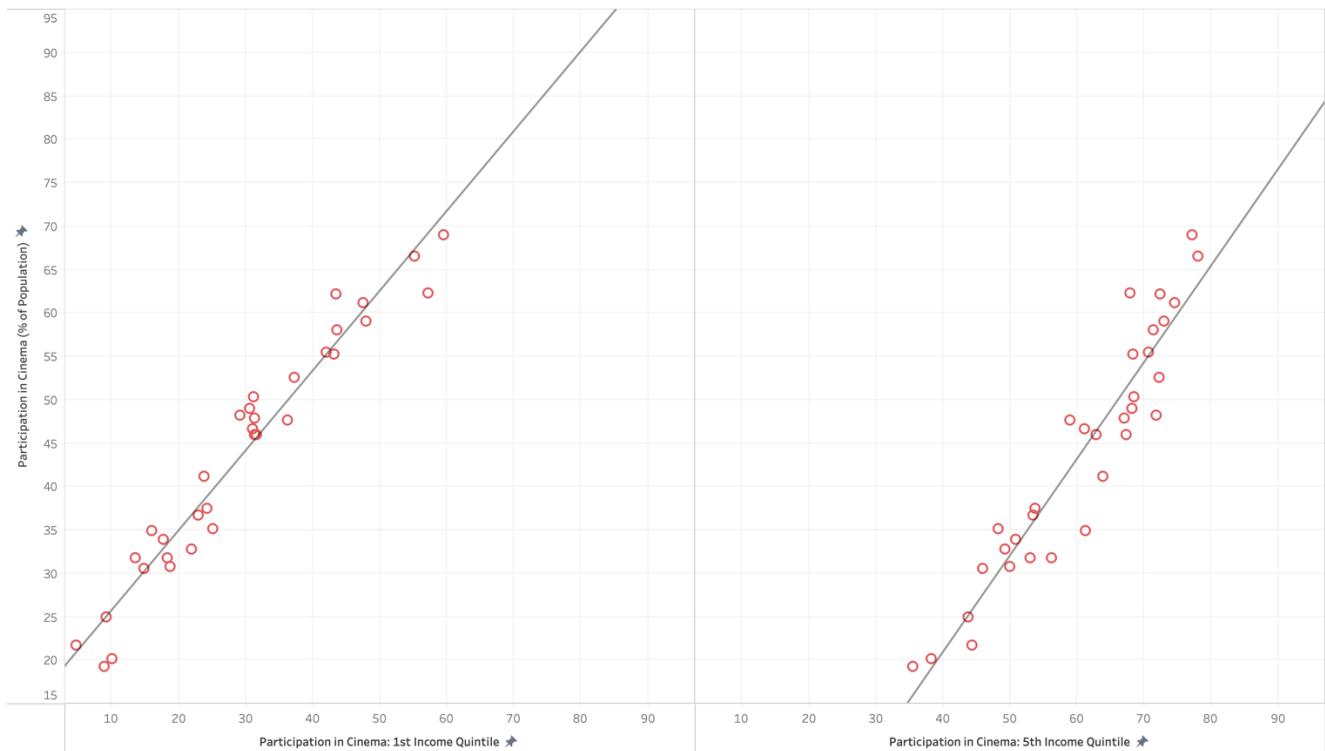


Figure 6a. Scatterplot of Participation in Cinema (1st/5th Income Quintile; % of Population) vs. Participation in Cinema (Total % of Population)

The first chart in *Dashboard 4* explores participation in cinema through the lens of each population's income quintile. The trend line is used to depict how strong the relationship is between each income quintile and the overall population participation.

The above visuals depict a very strong positive correlation, with R^2 values of 0.949 and 0.894, respectively. Although the 1st income quintile has a stronger correlation, it is very right-skewed in comparison to the data points for the 5th income quintile.

When split based on population income quintile, participation in each group is very indicative of participation as a whole. To accurately understand this relationship, however, it is key to identify that participation in cinema for the 1st income quintile is very low (starts from ~2%) in comparison to that of the 5th income quintile (starts from ~35%).

Scatterplot of Participation in Sports Events (Income Quintile vs. Total Participation)

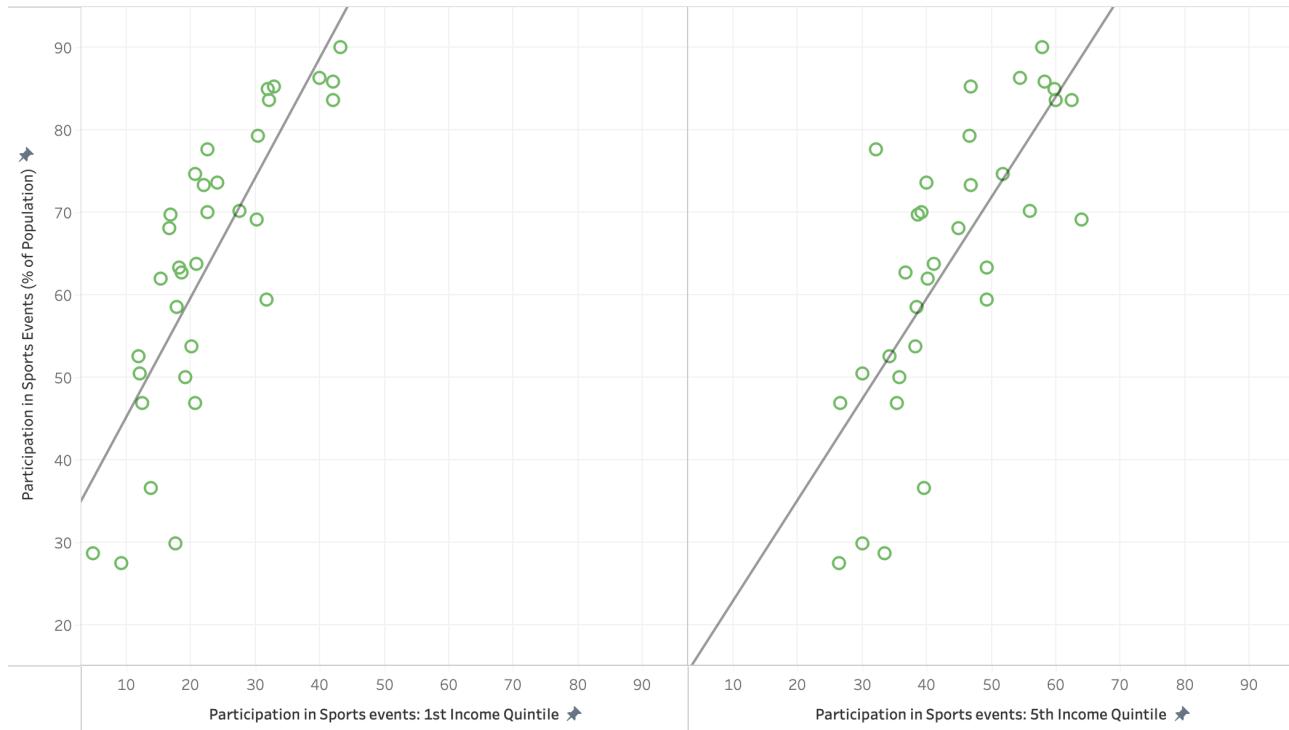


Figure 6b. Scatterplot of Participation in Sports Events (1st/5th Income Quintile; % of Population) vs. Participation in Sports Events (Total % of Population)

The above chart illustrates how participation in sports events based on income quintile relates to total participation in sports events (income is not a factor).

Among the 3 charts in *Dashboard 4*, this visual has the weakest correlation with R^2 values of 0.661 and 0.566, respectively. The charts also do not differ in skewness to the extent that they do in figure 6a.

The similarities between both sides of this visual indicate that for sport event participation, the income quintile is not as influential as in figure 6a. The lower R^2 values also imply a relationship that is rather inconsequential when compared to the other charts in *Dashboard 4*.

Scatterplot of Participation in Live Performances (Income Quintile vs. Total Participation)

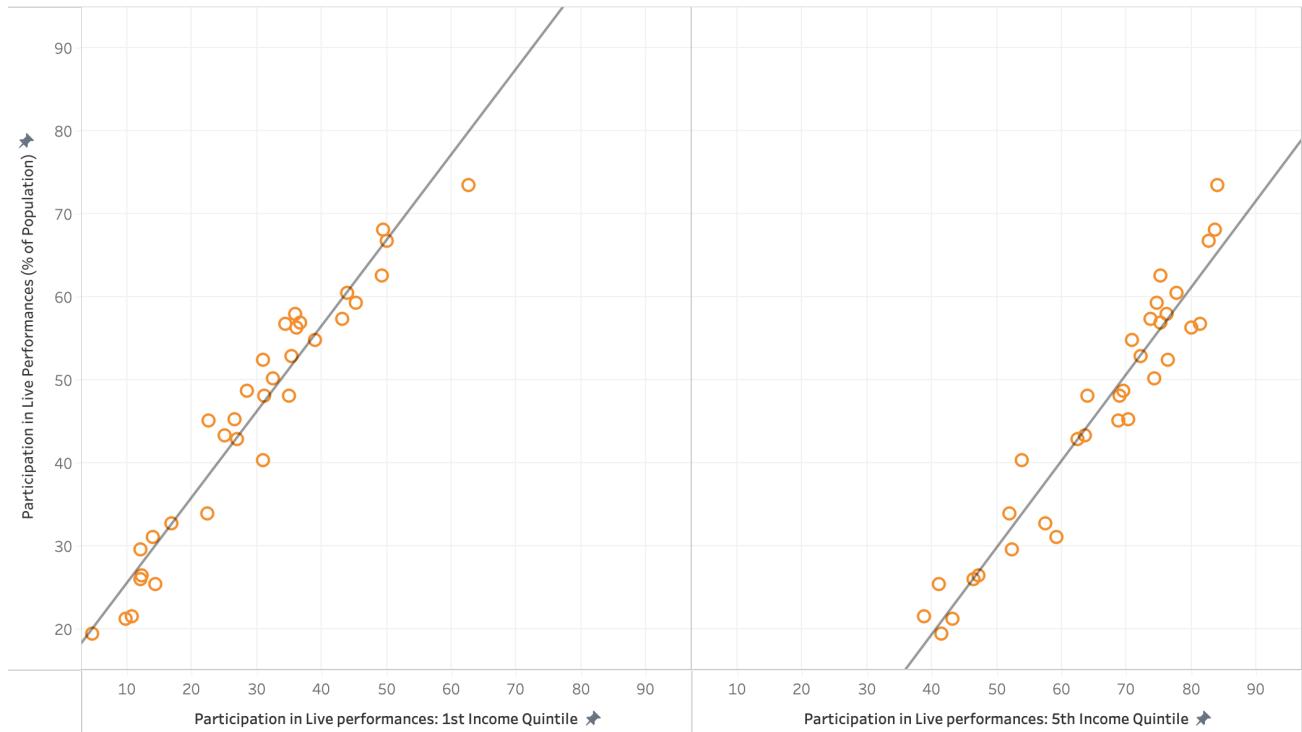


Figure 6c. Scatterplot of Participation in Live Performances (1st/5th Income Quintile; % of Population) vs. Participation in Live Performances (Total % of Population)

The above chart illustrates how participation in live performances based on income quintile relates to total population. The trend line further reinforces the strength of this relationship.

Among the 3 charts in *Dashboard 4*, this visual has the strongest correlation with R^2 values of 0.941 and 0.926, respectively. Similar to figure 6a, the 1st income quintile is very right-skewed (starts at ~2%) whereas the 5th income quintile arises from ~39% population participation.

For participation in live performances, each income quintile studied is very indicative of the population as a whole. It is also very important to take into account the skewness of the 1st income quintile group- this implies that although there is a very strong correlation, participation in live performances is rather low within this group. It is also interesting to note that for figures 6a-6c, the 1st income quintile has a higher R^2 value than the 5th income quintile. Therefore, it can be inferred that the lower class of society aligns closer to the total population than the upper class does.

Dashboard 5: Frequency Practicing Artistic Activities vs. Participation in Cultural Activities by Income Quintile (1st/5th Quintile)

Practicing Artistic Activities vs. Participation in Cultural Activities by frequency (1st and 5th income quintiles)

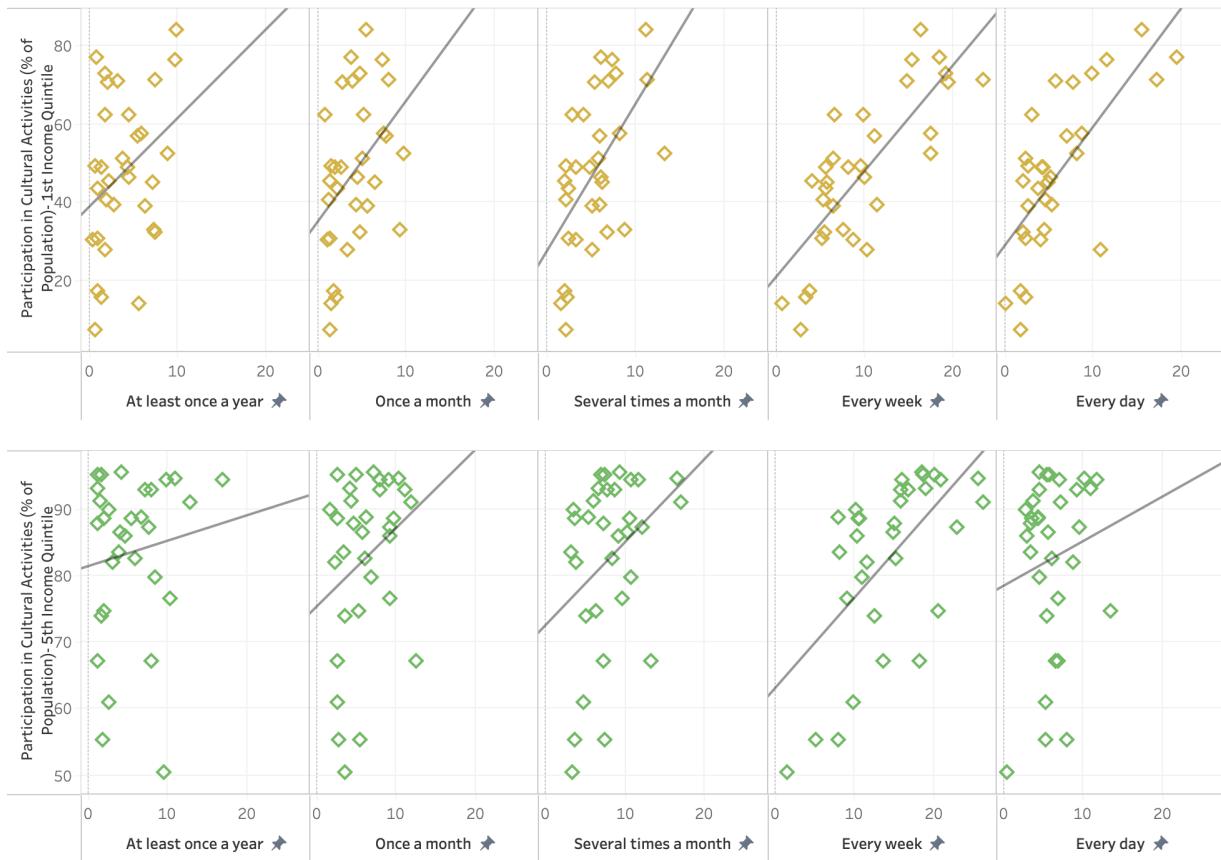


Figure 7. Scatterplots of Frequency of Practicing Artistic Activities vs. Participation in Cultural Activities (1st/5th Income Quintiles; % of Population)

The above chart is comparing different frequencies of practicing artistic activities with cultural participation in terms of income quintile. The 1st and 5th income quintiles were used to depict how the lower level of society differs from the upper class in cultural participation.

Throughout all of these plots, there is not much of a correlation between artistic activity and cultural participation.

Therefore, it can be implied that frequency of artistic activity is not very indicative of participation in cultural activities. There are a couple exceptions, but this exists as the general relationship among each category of frequency.

Scatterplot of Frequency of Practicing Artistic Activities vs. Participation in Cultural Activities

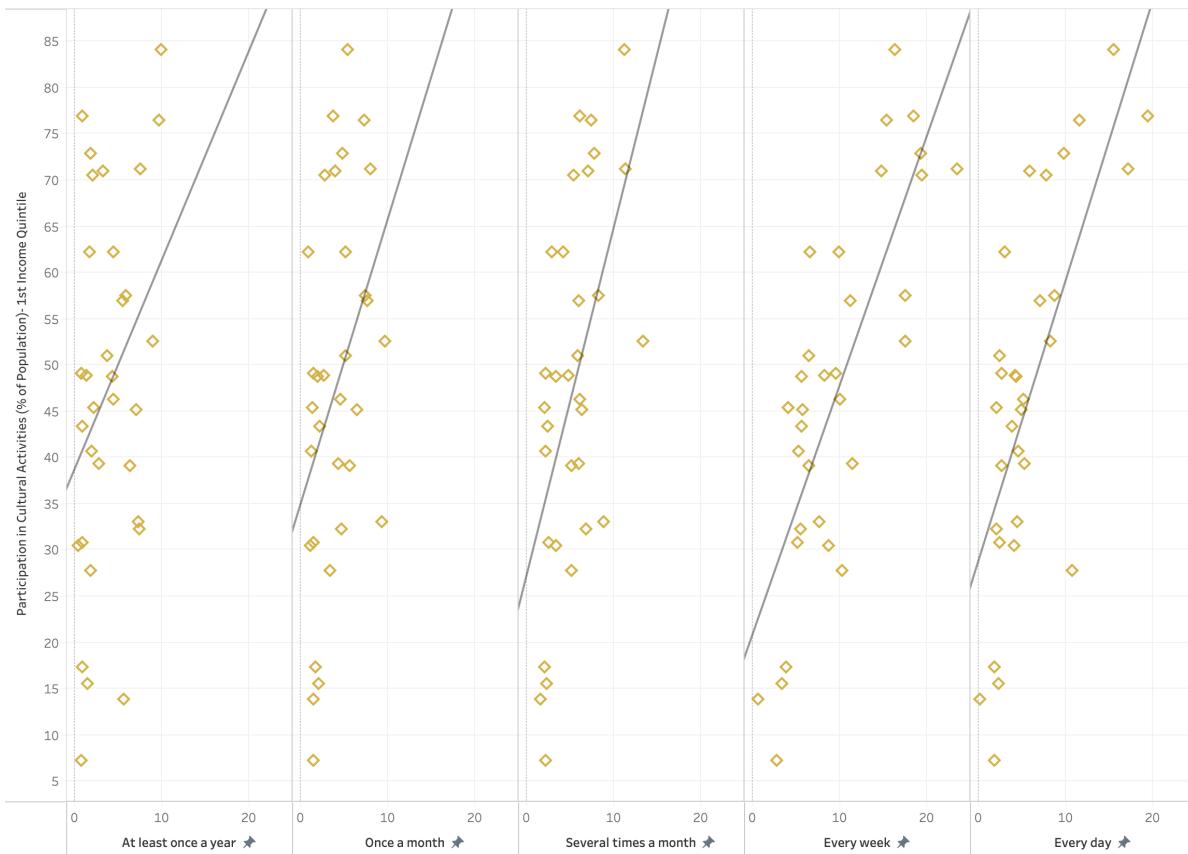


Figure 7a. Scatterplot of Frequency of Practicing Artistic Activities vs. Participation in Cultural Activities (% of Population)- 1st Income Quintile

This scatterplot compares the different frequencies of practicing artistic activities with cultural participation for the population within the 1st income quintile. Accompanying trend lines help to visualize how strong the relationship is over each of the 5 frequency categories.

Throughout this chart, the correlation between practicing artistic activities and participation in cultural activities strengthens as the frequency increases (strongest correlation with those who practice every day).

As a result, it can be inferred that for those within the 1st income quintile, cultural participation is positively correlated with the frequency of artistic activity practice. This is reinforced by our trend lines, which have R^2 values of 0.11 for "At least once a year" and 0.511 for "Every day". Further, the trend line for "Every day" has a p-value < 0.0001, therefore the relationship is statistically significant.

Scatterplot of Frequency of Practicing Artistic Activities vs. Participation in Cultural Activities

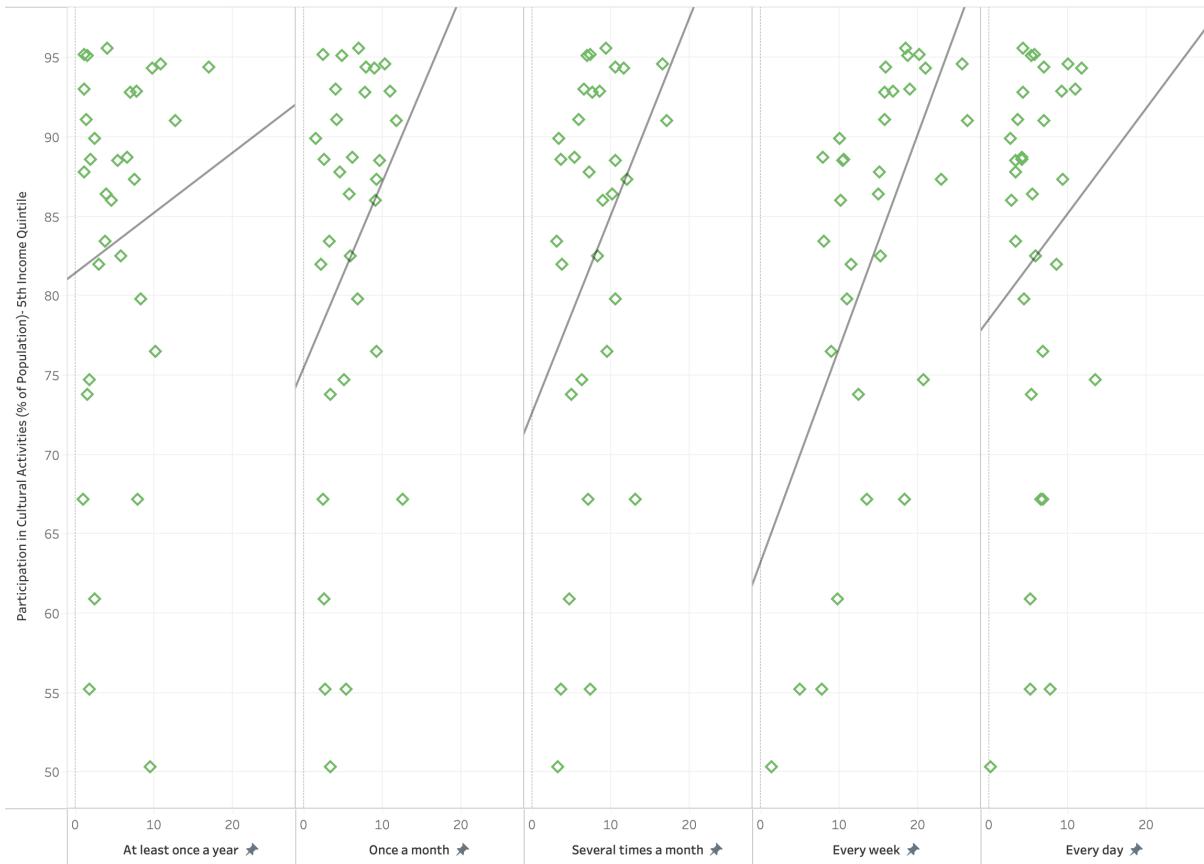


Figure 7b. Scatterplot of Frequency of Practicing Artistic Activities vs. Participation in Cultural Activities (% of Population)- 5th Income Quintile

This visualization is depicting the frequencies of artistic activities plotted against cultural participation for the population within the 5th income quintile. Equivalent to figure 7a, the trend lines help to easily identify how this relationship changes over each of the 5 different frequencies.

Similar to the previous chart, the relationship explored is slightly increasing as the frequency increases (for the most part)- this trend is not the case for “Every day” participants, however.

Values of R^2 range from 0.016 for those practicing “At least once a year” to 0.368 for “Every week”, showing a significant increase ($p\text{-value} < 0.05$). The R^2 value of 0.368, although considerably greater than 0.016, is not nearly strong enough to conclude that there is a clear correlation between our variables. This differs from our conclusions in figure 7a, which is that cultural participation and frequency of practicing artistic activities have a strong positive correlation- it is now apparent that this is only the case for the 1st income quintile population.

Dashboard 6: Average Participation in Culture, by Geographical Region (Northern, Southern, Western, and Eastern/Central Europe)

Avg Participation in Culture by Euro Region



Figure 8. Bar Charts of Average Participation in different recreational events (Cultural Activities, Live Performances, and Sports Events) for each Region

Dashboard 6 explores a relationship that has been emphasized throughout this report but in context of European countries grouped by geographical region. The average participation in cultural activities and other recreational activities is depicted by these charts.

A clear trend throughout this visual involves Northern and Western Europe leading in all categories for average participation- this mirrors insights found in the geographical heat maps from figures 4 and 5.

This reinforcement of previous conclusions drawn indicates that there's a different culture in Northern and Western countries, where participation in these activities is a large part of society.

Bar Chart of Average Participation in Cultural Activities for each Region

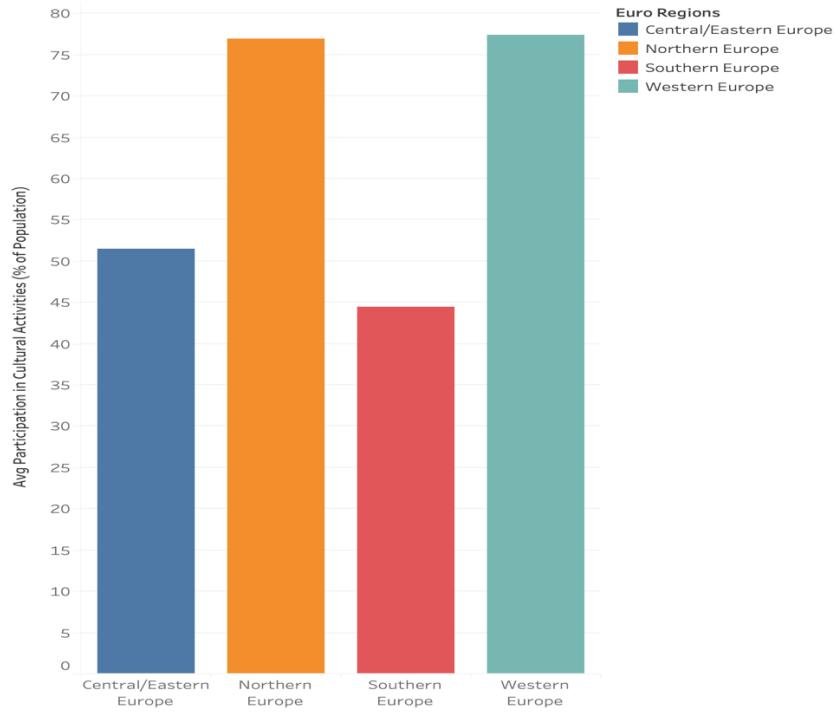


Figure 8a. Bar Chart of Average Participation in Cultural Activities (Total % of Population) for each Geographical Region

This bar chart illustrates how each region of Europe participates in cultural activities in terms of population percentage. Northern and Western Europe are clear frontrunners, supporting insights drawn from our geographic heat map in figure 4.

Participation in Northern and Western Europe is almost double that of Southern Europe- this discrepancy is very interesting and calls for further investigation.

Bar Chart of Average Participation in Live Performances for each Region

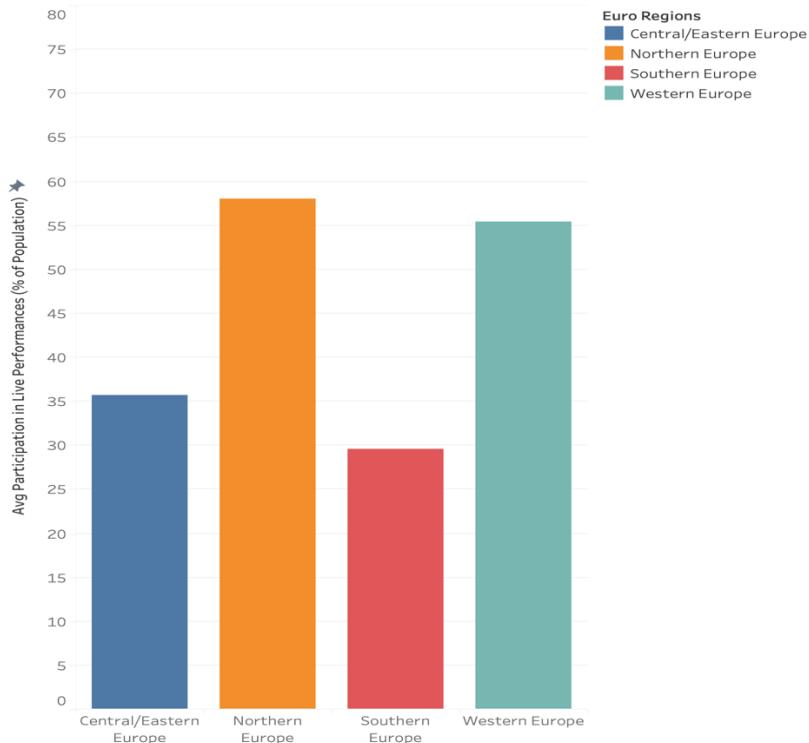


Figure 8b. Bar Chart of Average Participation in Live Performances (Total % of Population) for each Geographical Region

This figure depicts participation live performances in terms of population percentage differs among the different regions. Northern and Western Europe again are clear frontrunners, pointing toward an underlying trend within these countries.

Participation in Northern and Western Europe is again almost double that of Southern Europe—this discrepancy is prevalent and it would benefit to further explore how this arises to understand why it does.

Bar Chart of Average Participation in Sports Events for each Region

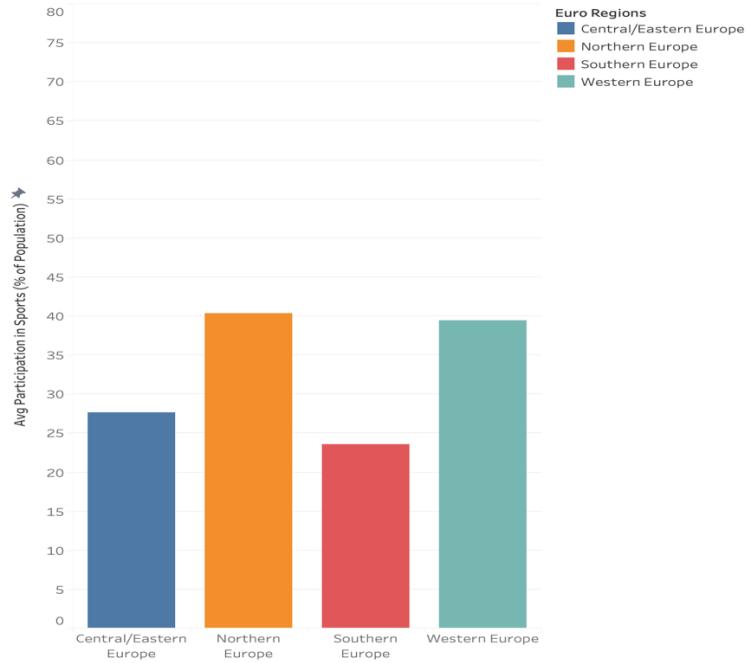


Figure 8c. Bar Chart of Average Participation in Sports Events (Total % of Population) for each Geographical Region

The last chart in *Dashboard 6* depicts average participation in sports events across these geographical regions. As stated in figure 8, Northern and Western Europe again have the highest population percentage. This mirrors implications from our geographic heat map in figure 5, where this trend can be seen geographically.

Throughout figures 8a-8c, Southern Europe has consistently had the lowest population participation percentage in comparison to the other 3 regions. A comprehensive study of cultural discrepancies between Northern and Southern Europe could reveal insights into why this is a prevalent trend.

Dashboard 7: Average Household Expenditure on Cultural Goods/Services by Income Quintile (1st/5th Quintile) for each Geographical Region

Cultural Goods/Services Expenditure by Income Quintile

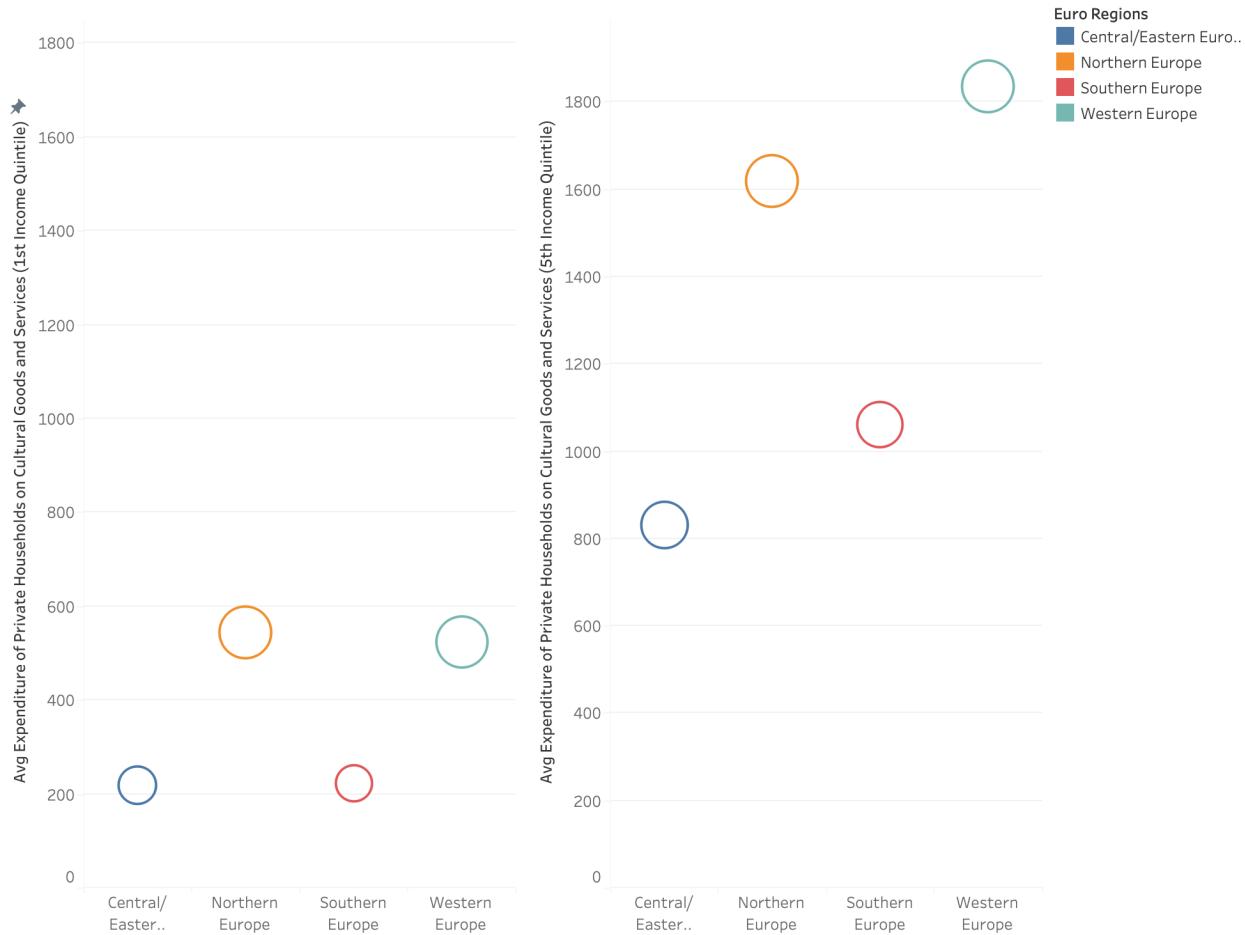


Figure 9. Bubble Charts of Average Household Expenditure on Cultural Goods/Services by Income Quintile (1st/5th Quintile) for each Region

The above visualization is showing how the average expenditure on cultural goods and services differs among each geographic region. This chart further explores how expenditure varies depending on the income quintile (1st and 5th income quintiles utilized).

Paralleling insights from figure 8 (*Dashboard 6*), Northern and Western Europe have the highest expenditure regardless of the income quintile. This directly relates to the same paradigm existing for cultural and recreational participation for these income groups.

Average expenditure is directly affected by the income quintile, however, the distribution between geographic region exists regardless of income class as in figure 8.

Bubble Chart of Average Household Expenditure on Cultural Goods/Services for each Region

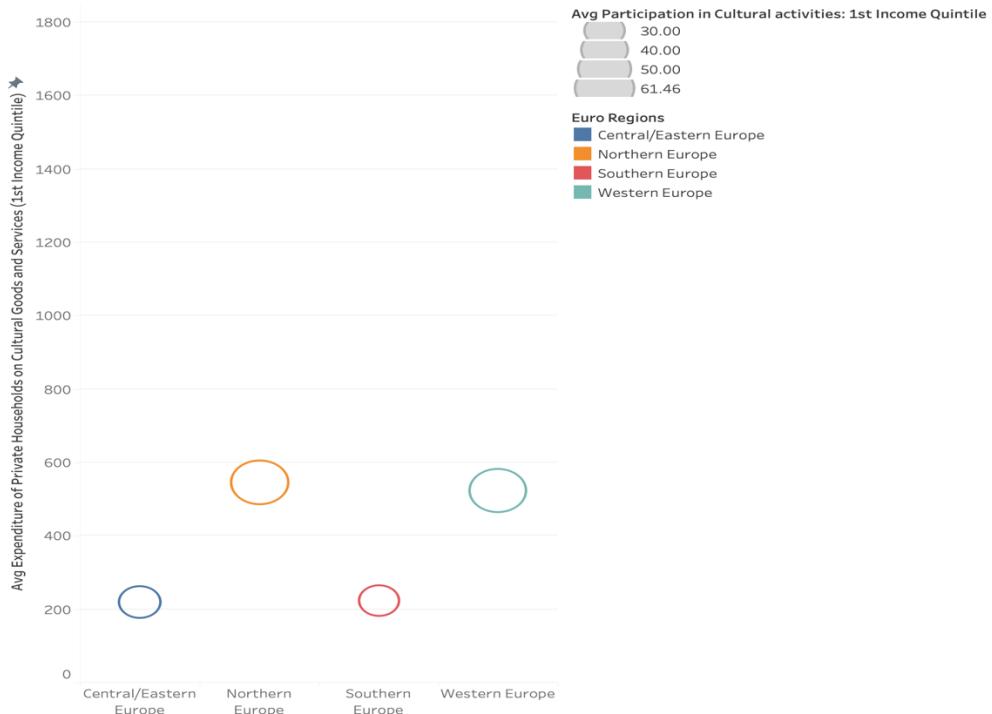


Figure 9a. Bubble Chart of Average Household Expenditure on Cultural Goods/Services for each Geographical Region- 1st Income Quintile

This chart is depicting how average expenditure on cultural goods and services is dependent on the region in which the country resides in. The bubbles are sized based on average participation in cultural activities- the population in question for both measures is specifically within the 1st income quintile.

Unsurprisingly, as expenditure increases, the average participation in cultural activities also increases. This shows an underlying positive correlation between cultural participation and expenditure on cultural goods and services.

As represented in several previous charts, Northern and Western Europe are the most involved in cultural participation- this now includes expenditure on cultural goods and services. The ongoing trend warrants further exploration into cultural differences between each region.

Bubble Chart of Average Household Expenditure on Cultural Goods/Services for each Region

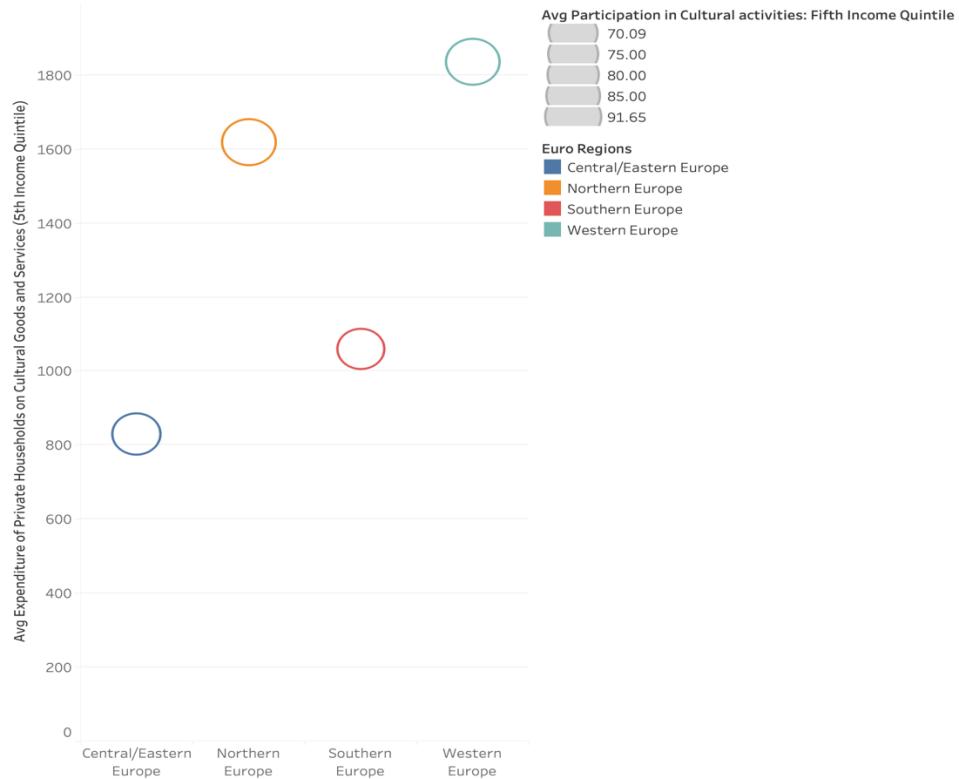


Figure 9b. Bubble Chart of Average Household Expenditure on Cultural Goods/Services for each Geographical Region- 5th Income Quintile

The second chart in *Dashboard 7* is illustrating how average expenditure on cultural goods and services is still dependent on the region in which the country resides in even when the income quintile is different. The bubbles are sized based on average participation in cultural activities—the population in question for both measures is specifically within the 5th income quintile.

The relationship between expenditure on and participation in culture is not as prevalent as in figure 9a, however, it does follow the same pattern. This reinforces the underlying positive correlation between these two indicators.

Northern and Western Europe are again the most involved in cultural participation. This trend arises in each chart that explores cultural participation in terms of geographic region and highlights a very interesting difference. Unlike figure 8, however, Southern Europe does not have the lowest expenditure even though it has the lowest participation rate.

Dashboard 8: Participation in Cultural Activities vs. % Population reading books by Education Level for each Region

Participation in Cultural Activities vs. % Population reading books by Education Level

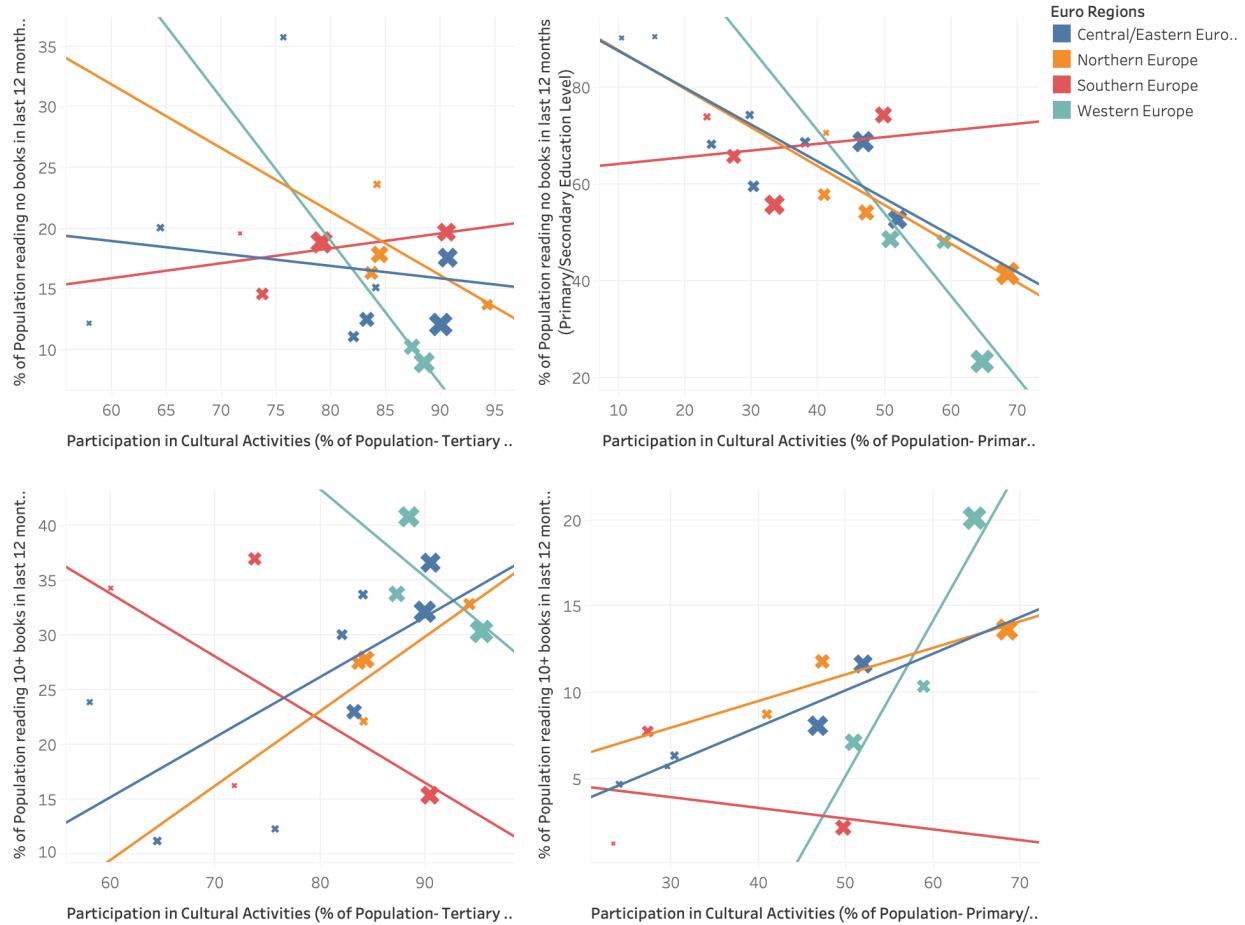


Figure 10. Scatterplots of Participation in Cultural Activities (% of Population) vs. % of Population reading different amounts of books (no books, 10+ books) in last 12 months for each Geographical Region with accompanying trend lines, by Education Level (Tertiary and Primary/Secondary)

Dashboard 8 above represents scatterplots of participation in cultural activities plotted against the population percentage reading different amounts of books (either no books or 10+ books in the last 12 months). Participation in cultural activities is divided based on level of education (either tertiary or primary/secondary) and countries are grouped based on geographic region. Trend lines show how the relationship between participation in cultural activities and population percentage reading different amounts of books exists for each region.

Scatterplot of Participation in Cultural Activities vs. % of Population reading no books for each Region

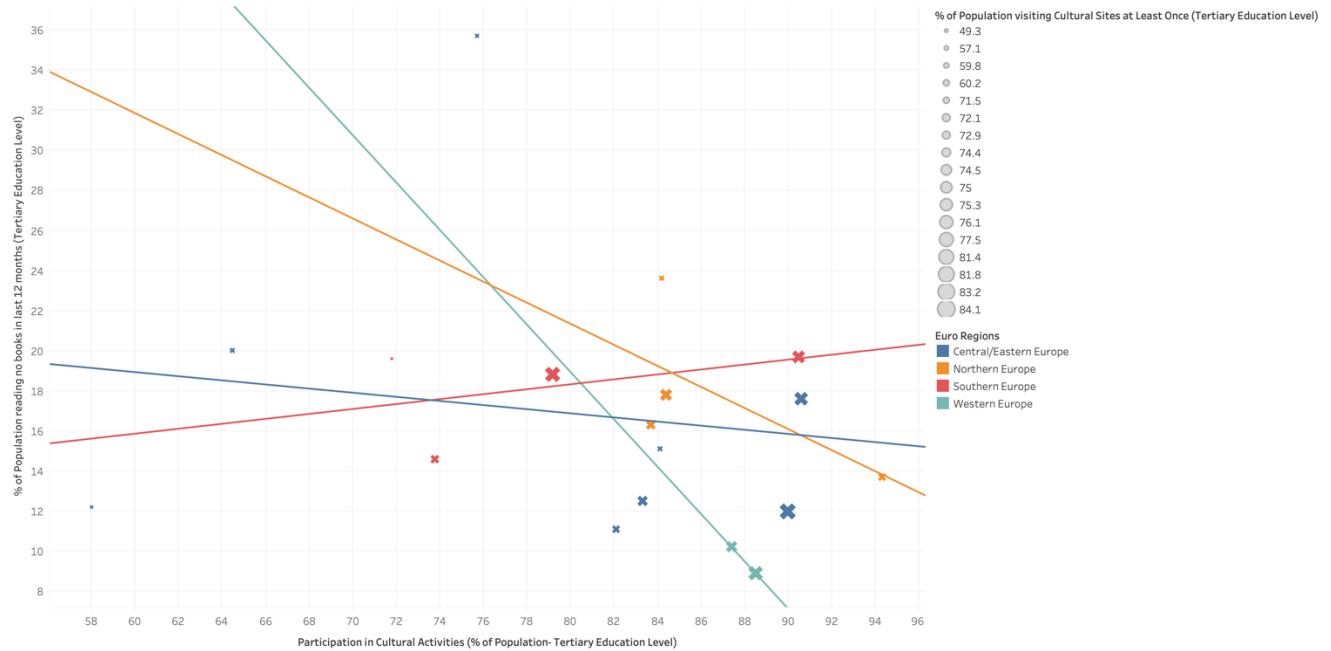


Figure 10a. Scatterplot of Participation in Cultural Activities (% of Population) vs. % of Population reading no books in last 12 months for each Geographical Region-Tertiary Education Level

The above figure explores how cultural participation for the tertiary education level population relates to the percent of this population reading no books in the last 12 months. The data points are also sized based on the percent of the population visiting cultural sites at least once in the past year (population containing a tertiary level of education).

There is a general negative correlation between the variables in question, with only Southern European countries having a positive slope on the trend line- although this is the case, an R^2 value of 0.183 implies that this relationship is very weak. For each trend line, the p-value is very high and therefore inconclusive of strength of relationship.

Although the trend lines do not convey much information, the general negative slope of this scatterplot implies that as cultural participation increases within this education group, the number of people who haven't read any books in the past 12 months decreases. The following figures will further explore this relationship.

Scatterplot of Participation in Cultural Activities vs. % of Population reading 10+ books for each Region

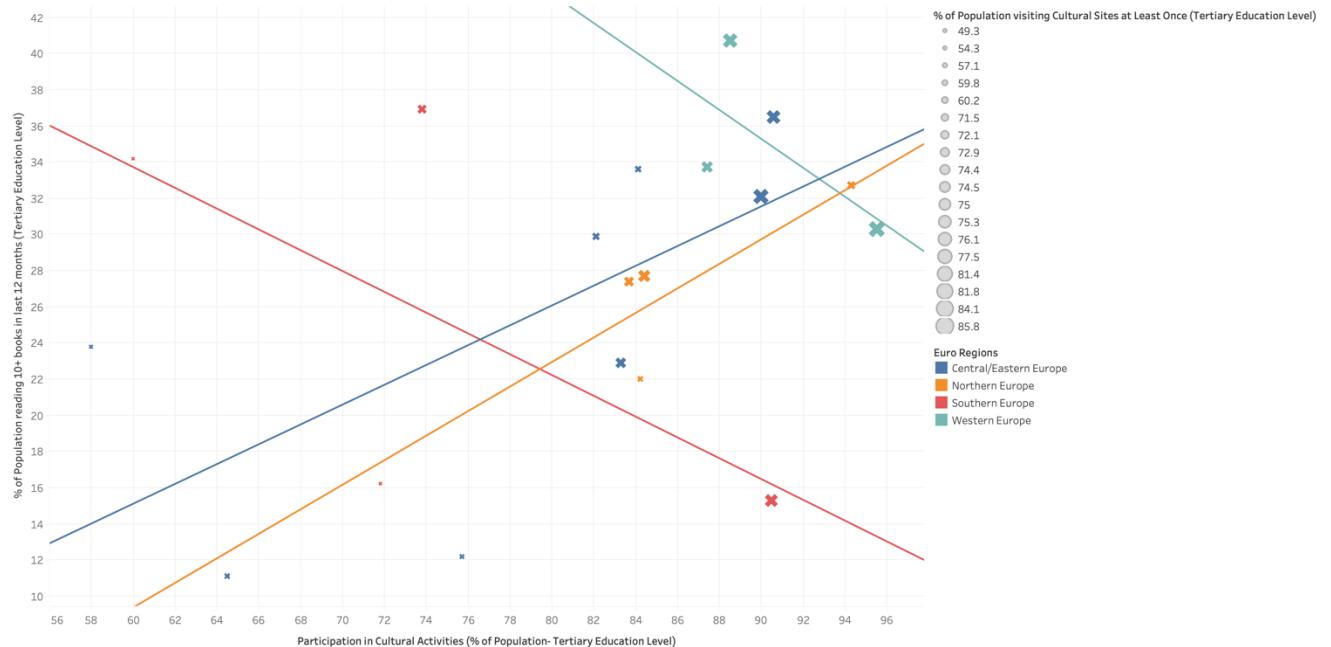


Figure 10b. Scatterplot of Participation in Cultural Activities (% of Population) vs. % of Population reading 10+ books in last 12 months for each Geographical Region- Tertiary Education Level

The above figure explores how cultural participation for the tertiary education level population relates to the percent of this population reading 10+ books in the last 12 months. The data points are also sized based on the percent of the population visiting cultural sites at least once in the past year (population containing a tertiary level of education).

This chart has a general positive correlation between the variables in question, with only Northern European countries having a high R^2 value for the trend line (0.628). Although this is the case, a p -value > 0.05 indicates that this relationship is not statistically significant.

Although the trend lines are not statistically significant, the general positive slope of this scatterplot implies that as cultural participation increases within this education group, the number of people who have read 10+ books in the past 12 months increases. This supports the implications in figure 10a, where the opposite was the case when comparing against the percent of the population reading no books.

Scatterplot of Participation in Cultural Activities vs. % of Population reading no books for each Region

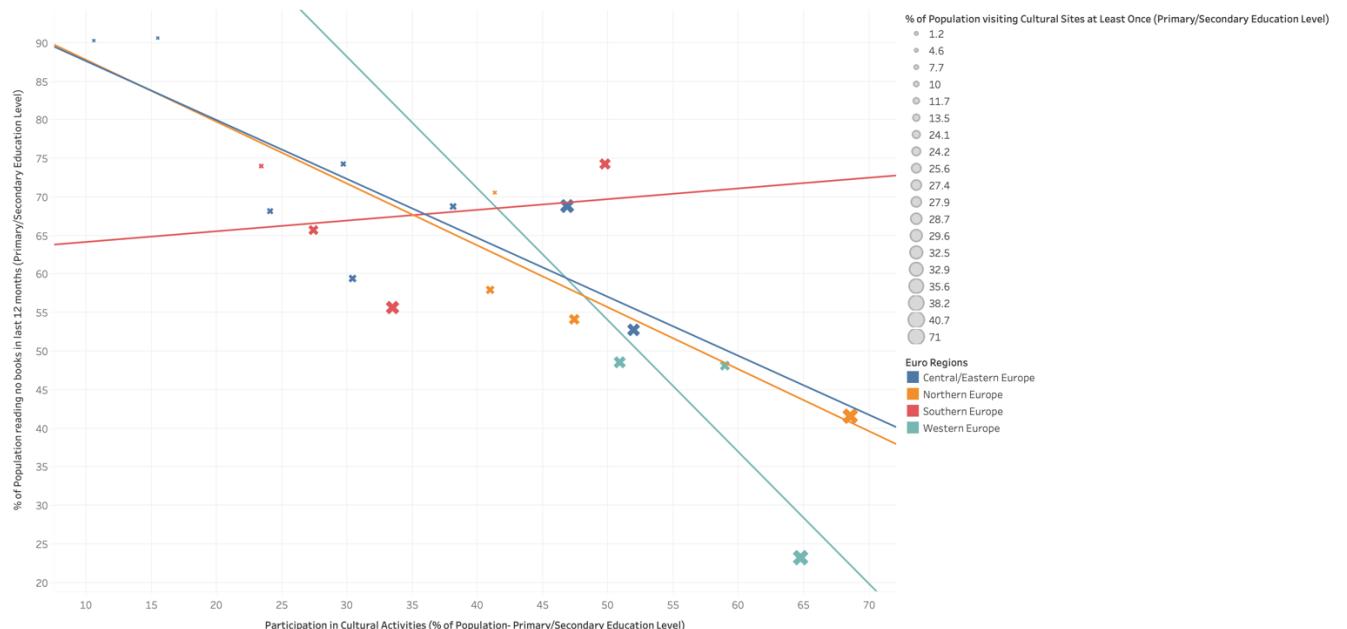


Figure 10c. Scatterplot of Participation in Cultural Activities (% of Population) vs. % of Population reading no books in last 12 months for each Geographical Region- Primary/Secondary Education Level

The above chart explores how cultural participation for the primary or secondary education level population relates to the percent of this population reading no books in the last 12 months. The data points are sized based on the percent of the population visiting cultural sites at least once in the past year (population containing a primary or secondary level of education).

There is a slightly negative slope within the scatterplot as a whole, with 3 out of the 4 trend lines containing a negative slope. In this figure, the trend line for Central/Eastern Europe has an R^2 value of 0.678 with a p-value < 0.05- this trend line illustrates a statistically significant relationship among the x- and y-axis.

The negative slope of the general plot and significance of negative slope for Central/Eastern Europe imply that as cultural participation increases, the percentage of population reading no books decreases. This shows a direct link between cultural participation and ability or motivation to be well-read. Figure 10d will further uncover this relationship within a population containing a primary or secondary level of education.

Scatterplot of Participation in Cultural Activities vs. % of Population reading 10+ books for each Region

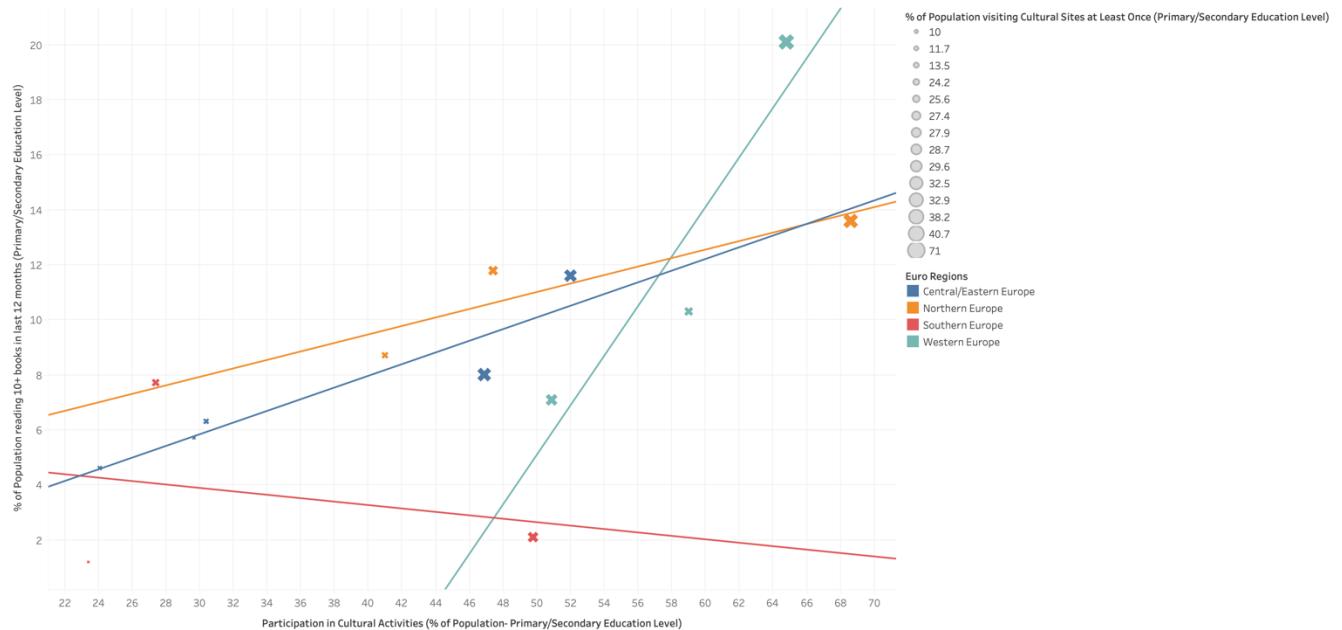


Figure 10d. Scatterplot of Participation in Cultural Activities (% of Population) vs. % of Population reading 10+ books in last 12 months for each Geographical Region- Primary/Secondary Education Level

The above chart explores how cultural participation for the primary or secondary education level population relates to the percent of this population reading 10+ books in the last 12 months. The data points are sized based on the percent of the population visiting cultural sites at least once in the past year (population containing a primary or secondary level of education).

There is a slightly positive slope within the scatterplot as a whole, with 3 out of the 4 trend lines containing a positive slope. In this figure, the trend line for Central/Eastern Europe has an R^2 value of 0.887 with a p-value < 0.05- this trend line illustrates a statistically significant relationship among the x- and y-axis. Although other R^2 values are high, none of the other p-values are low enough for the trend line to significantly interpret the relationship.

A statistically significant positive slope alongside a general positive trend indicates that the percentage of population reading 10+ books in the last 12 months increases as cultural participation increases. Synthesizing figures 10a-10d suggests that there is a positive correlation between participation in cultural activities and amount of books read, regardless of educational attainment level. Therefore, average number of books read for a population is a good indicator of cultural activity and participation.