A Cross-Country Region-wise Analysis of Adolescent Delinquency

Team 6

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DATA Visualization

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MOTIVATION

Why do you choose this title for the data?

The Title ‘A Cross-Country Region-wise Analysis of Adolescent Delinquency’ is meant to compare, analyze and draw insights from data across multiple countries to identify if there are any similarities, common factors or differences in adolescent delinquency. We have added ‘Adolescent Delinquency’ specifically to highlight problematic behaviors exhibited by adolescents, such as engaging in minor criminal activities, violating social norms, and engaging in risky behaviors.

Do you have any evidence to support your title/motivation? (Literature review)

Journal Title:

Self-reported youth delinquency in Europe and beyond: First results of the Second International Self-Report Delinquency Study in the context of police and victimization data.

Link:

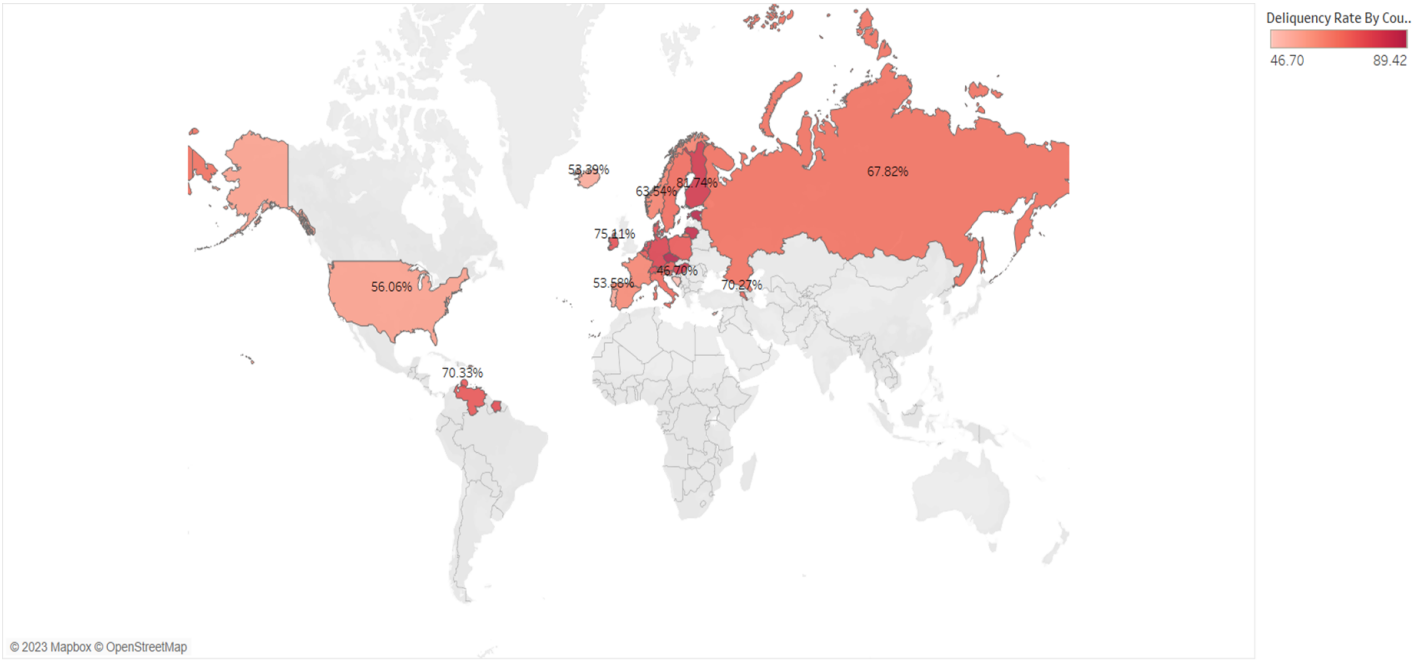
https://journals.sagepub.com/doi/pdf/10.1177/1477370809358018?casa_token=jnj1jU5vmeoAAAAA:PkTIpHEkwSB5vzjvQrzo2GNPVhdLYBqAsghuEEl1ySSltEAWA0_zAJkwactI7CUeEpqiyWH0F74

We thought “A Cross-Country Region-wise Analysis of Adolescent Delinquency” is appropriate after going through the above research project which explains in detail the adolescent delinquency in different countries. The research project has collected data countrywise on various types of delinquent behaviors, such as theft, vandalism, violence, drug abuse as well as risk factors and protective factors that may influence

delinquent behavior. The study includes 31 countries and our grouped it into 6 clusters namely Anglo-Saxon countries, Northern European countries, Western European countries,, Mediterranean countries, Latin American countries, Eastern and Central European countries and has constant comparison between countries to gain a larger perspective on the issue and better understand how it varies across different social-economic contexts.

Data Visualizations

1st Data Visualization: Delinquent Behaviors Across Different Countries - Geospatial Map:



Formulas

1. **IsDeliquent**

IF (([Male] = 0 or [Male] = 1)
AND

```
        [Agegroup] < 7
        AND
        ([Beerltp] = 1 OR [Spirltp] = 1 OR [Hashltp] = 1 OR [Xtcltp] = 1 OR [Lhcltp]
= 1 OR [Vandltp] = 1
OR [Shopltp] = 1 OR [Burgltp] = 1 OR [Bictltp] = 1 OR [Cartltp] = 1 OR ([Downltp]
= 1 AND [Downill]=1) OR [Hackltp] = 1
OR [Carbltp] = 1 OR [Snatltp] = 1 OR [Weapltp] = 1 OR [Extoltp] = 1 OR [Gfigltp]
= 1 OR [Asltltp] = 1
OR [Drudltp] = 1))
THEN 'Delinquent'
END
```

2. **IsMale**

```
IF ([Male]=1 AND [Agegroup] < 7 )THEN 1
END
```

3. **IsFemale**

```
IF ([Male]=0 AND [Agegroup] < 7 )THEN 1

END
```

What are the marks and channels?

Marks: Area

Channels: Position, Color

Why do you choose these marks and channels (problem-specific not general)?

Marks:

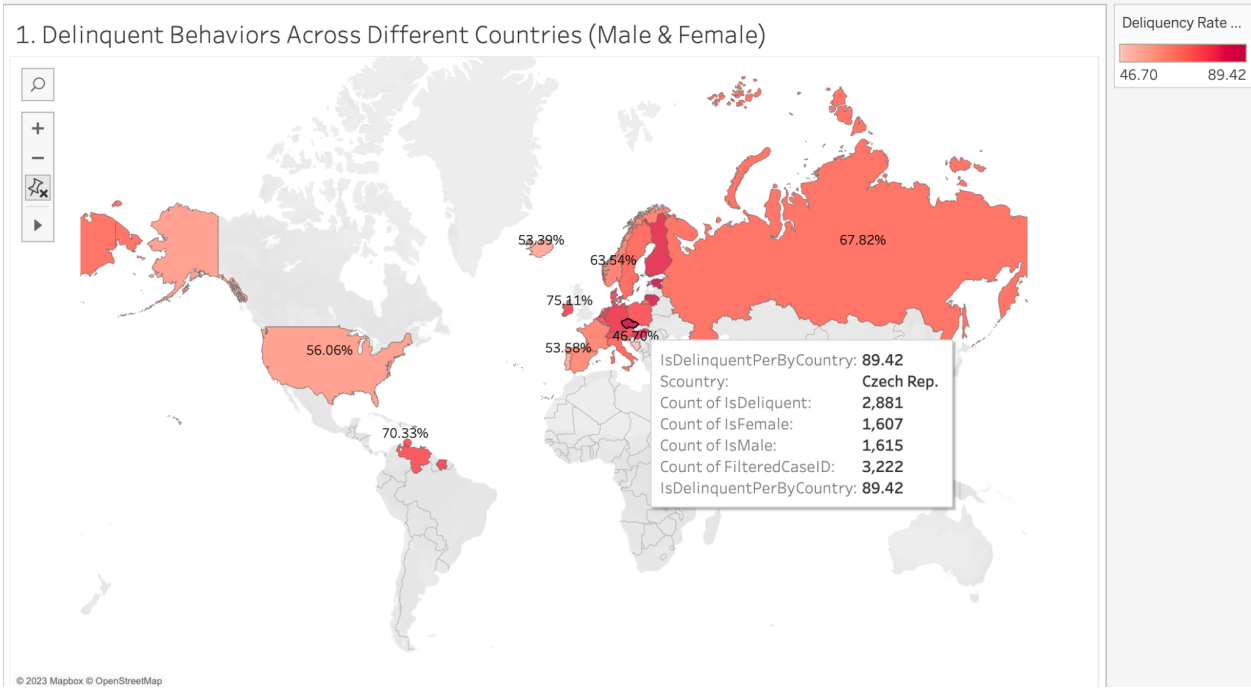
We chose the marks as Area to show the delinquency percentage for each country in Geospatial data

Channels:

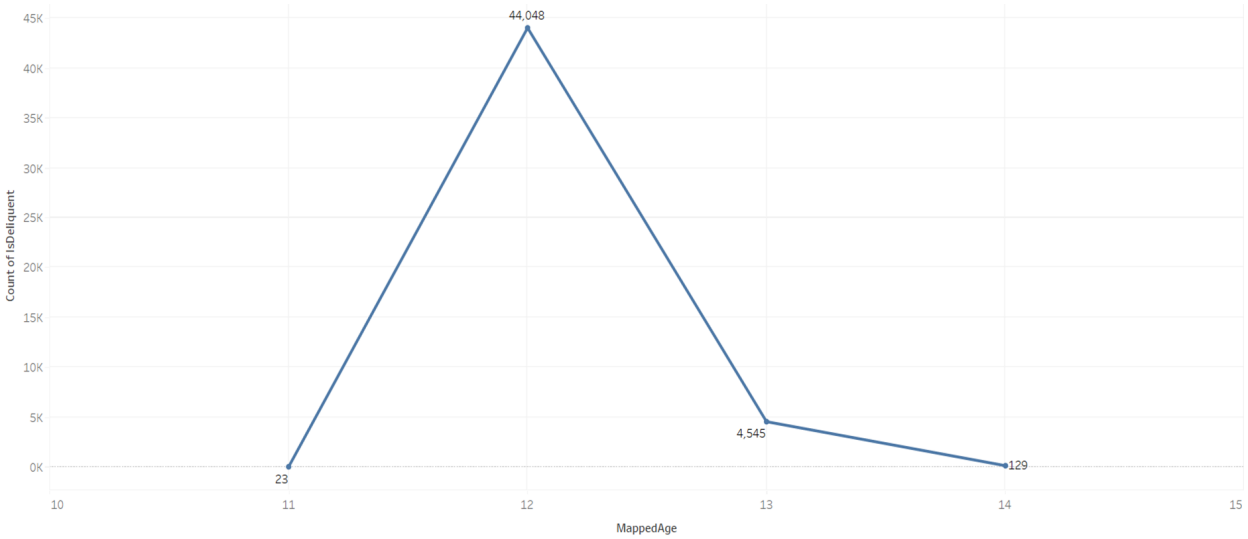
We chose the channel as Color- Red and used a Sequential Colormap to show high to low delinquency per country(position) with dark red as highest and light red as lowest.

What do you want to show/describe from this visualization?

We wanted to compare the level of delinquent behavior across different countries to identify any similarities and differences in percentages. This helped us to identify trends in delinquency that might have not appeared so clearly from a simple analysis of the data. We have also labeled male and female counts to have a further analysis on male and female counts per country.



2nd Data Visualization:Number of Delinquents In Each Age Group - Line Chart



Formulas:

1. **FilteredCaseId**

   IF ([Male] = 0 or [Male] = 1) AND [Agegroup] < 7 THEN 'filteredcase'

   END

Derived Formulas:

1. **MappedAge**

   IF [Agegroup] = 0 THEN 11
   ELSEIF [Agegroup] = 1 THEN 12
   ELSEIF [Agegroup] = 2 THEN 13
   ELSEIF [Agegroup] = 3 THEN 14
   ELSEIF [Agegroup] = 4 THEN 15
   ELSEIF [Agegroup] = 5 THEN 16
   ELSEIF [Agegroup] = 6 THEN 17
   ELSEIF [Agegroup] = 7 THEN 18
   END

What are the marks and channels?

Marks: Points and Lines, Link - Connection

Channels: Position - Both(X-axis as Horizontal, Y-axis as Vertical)

Why do you choose these marks and channels (problem-specific not general)?

Marks:

We used points as marks to represent the number of delinquents at every age and lines to show a transition as age changed. The position of the point on the chart indicates the age group and the number of delinquencies.

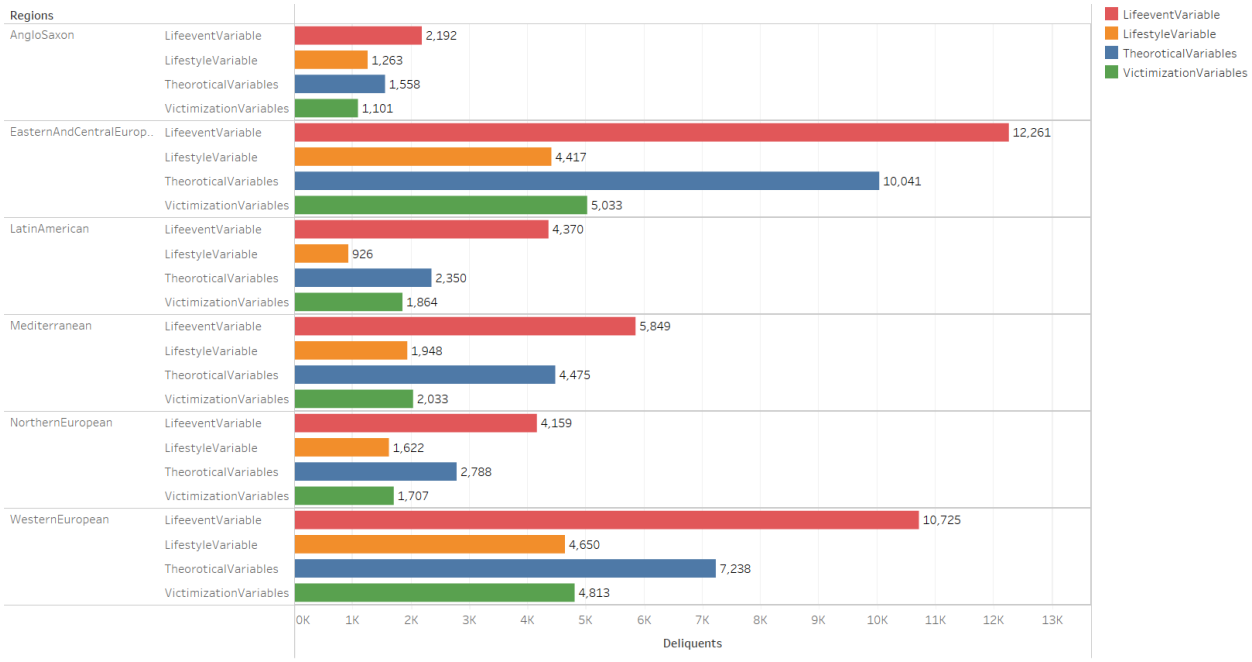
Channels:

By using position as a channel for the x and y axes, it is easy to see the relationship between age and delinquency, as well as the changes in delinquency nature over time.

What do you want to show/describe from this visualization?

We want to show changes in data over time using a line chart. We see an increase in delinquency at age 12 followed by a decrease as age increases, a line chart effectively communicated this trend to us and viewers.

3rd Data Visualization: Factors Affecting Delinquents - Grouped Bar Chart



Formulas:

1. **LifestyleVariable**

```
IF ((([Male] = 0 or [Male] = 1) AND [Agegroup] < 7 )
        AND
        ([Grpillac] = 1 OR
        [Grpilldo] = 1)
        AND
        ([IsDeliquent] = 'Delinquent'))

        THEN 1
END
```

2. **LifeeventVariable**

```
IF ((([Male] = 0 or [Male] = 1) AND [Agegroup] < 7 )
        AND
        ([Lifeev01] = 1 OR
        [Lifeev02] = 1 OR
```

[Lifeev03] = 1 OR
[Lifeev04] = 1 OR
[Lifeev05] = 1 OR
[Lifeev06] = 1 OR
[Lifeev07] = 1 OR
[Lifeev08] = 1)
AND
([IsDeliquent] = 'Delinquent'))
THEN 1
END

3. **<u>TheoroticalVariables</u>**

IF ((([Male] = 0 or [Male] = 1) AND [Agegroup] < 7)
AND
([Getalfa] = 1 OR [Getalfa] = 2 OR
[Getalmo] = 1 OR [Getalmo] = 2 OR
[Knowfr] = 1 OR
[Telltime] = 0 OR
[Attsch] = 1 OR [Attsch] = 2 OR
[Truancy] = 3)

AND
([IsDeliquent] = 'Delinquent'))

THEN 1
END

4. **<u>VictimizationVariables</u>**

IF ((([Male] = 0 or [Male] = 1) AND [Agegroup] < 7)
AND

([Vicrobbp] = 1 OR
[Vicassap] = 1 OR
[Victhefp] = 1 OR
[Vicbullp] = 1)

AND
([IsDeliquent] = 'Delinquent'))

THEN 1
END

Derived data: Regions

1. **AngloSaxon**
   IF
   [Scountry] = "Ireland" AND
   [Scountry] = "USA"
   THEN "Anglo-Saxon countries"
   END

2. **Eastern and central Europe**
   IF
   [Scountry] = "Czech Republic" AND
   [Scountry] = "Bosnia"
   [Scountry] = "Armenia" AND
   THEN "Eastern and central Europe countries"
   END

3. **Latin America**
   IF
   [Scountry] = "Netherlands" AND
   [Scountry] = “ Aruba"
   THEN "Latin America countries"
   END

4. **Mediterranean**
   IF
   [Scountry] = "Portugal" AND
   [Scountry] = "Italy"
   THEN "Mediterranean countries"

END

5. **Northern European**

   IF
   [Scountry] = "Denmark" AND
   [Scountry] = "Finland" AND
   [Scountry] = "Iceland" AND
   [Scountry] = "Norway" AND
   [Scountry] = "Sweden"
   THEN "Northern European countries"
   END

6. **Western European**

   IF
   [Scountry] = "Austria" AND
   [Scountry] = "Belgium" AND
   [Scountry] = "Germany" AND
   [Scountry] = "Switzerland "
   THEN "Western European countries"
   END

What are the marks and channels?

Marks: Lines

Channels: Color, Size: Length, Position: Both(X-axis as Horizontal, Y-axis as Vertical)

Why do you choose these marks and channels (problem-specific not general)?

Marks:

The bars/lines represent the number of delinquent behavior associated with specific factors within each category.

Channels:

Color is used to differentiate between the different categories of factors.

Size (length) is used to represent the number of delinquent behavior associated with specific factors within each category. For example, within the family factors category, the length of the bars could represent the number of delinquent behavior associated with family conflict, parental monitoring, and parental involvement. Longer bars indicate higher prevalence rates, while shorter bars indicate lower prevalence rates.

Position is used to represent country clusters on horizontal (x) axis and number of delinquent behavior on vertical (y) axis.

What do you want to show/describe from this visualization?

There are a lot of factors affecting the number of delinquents. So, we have grouped the factors by category,

1. Life Events category which consists of parental conflicts, death or serious illness of family members and divorce or separation of parents, school factors, peer factors,
2. Lifestyle category consists of factors like leisure occupancies and peer relationships
3. Theoretical category consists of factors like relationships with parents, attachment to school and commitment towards school
4. Victimization category consists of Physical violence, theft and bullying.

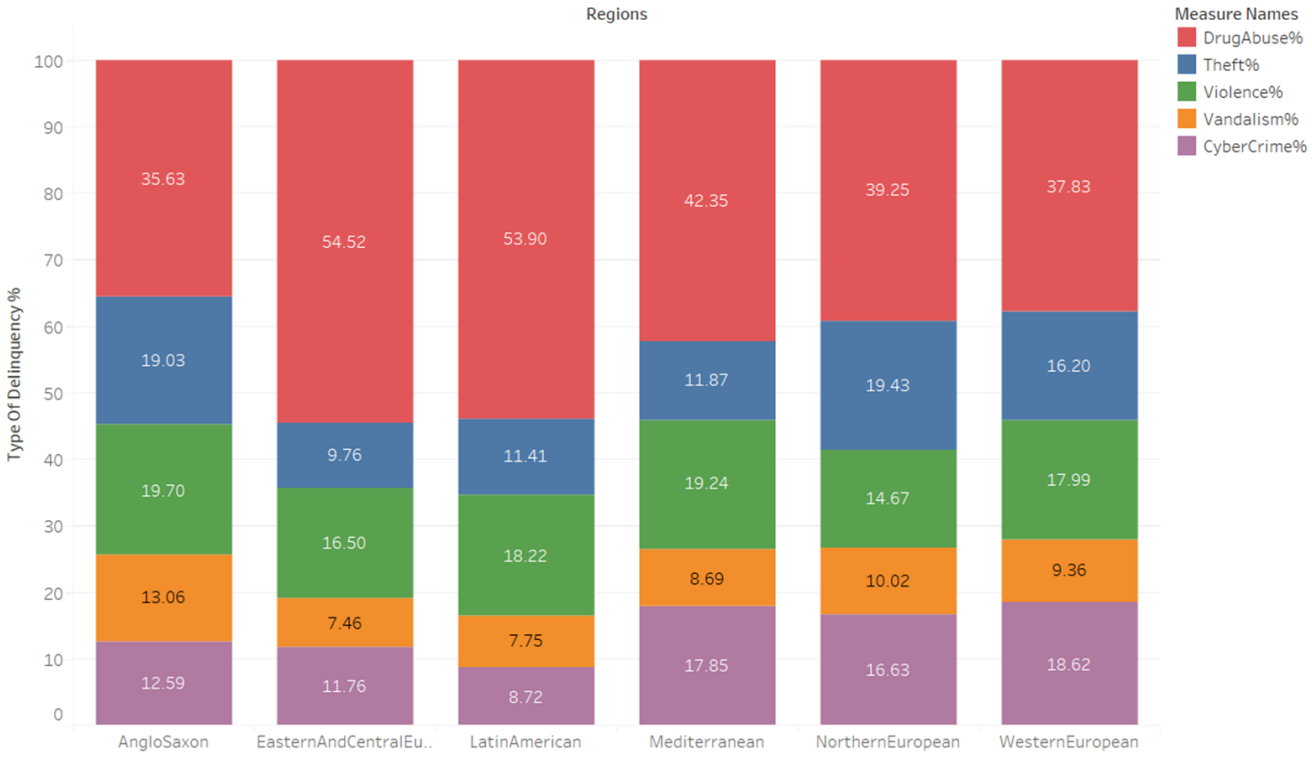
Dividing the factors into categories will make it simple for viewers to see which categories have the greatest impact on delinquent behavior across countries. From the graph we can see that, the Life Events category is the most contributing category for the increase in delinquent behavior while the lifestyle category is the least contributing category.

Also, here we have grouped different countries based on their region so that we could compare the number of delinquents in all the countries. There are 6 regions in our visualization.

S.no.	Region	Countries present in that region
1.	Anglosaxon	USA, Ireland
2.	Eastern and central Europe	Czech Republic, Bosnia and Armenia
3.	Latin America	Netherlands and Aruba
4.	Mediterranean	Portugal and Italy
5.	Northern European	Denmark, Finland, Iceland, Norway, Sweden
6.	Western European	Austria, Belgium, Germany, Switzerland

Grouping of countries helps us to involve all the countries and compare the number of delinquents easily.

4th Data Visualization: Observations For Different Delinquent Behavior Categories - Stacked Bar Chart



Formulas:

1. **DrugAbuse**

   If [Beerltp]=1 THEN 1
   ELSEIF [Spirltp] =1 THEN 1
   ELSEIF [Hashltp]=1 THEN 1
   ELSEIF [Xtcltp] =1 THEN 1
   ELSEIF [Lhcltp] =1 THEN 1
   ELSEIF [Drudltp]=1 THEN 1
   ELSE 0
   END

2. **Theft**

   if [Shopltp]=1 then 1
   ELSEIF [Burgltp]=1 THEN 1
   ELSEIF [Bictltp]=1 THEN 1
   ELSEIF [Cartltp]=1 THEN 1
   ELSEIF [Carbltp]=1 THEN 1
   ELSEIF [Snatltp]=1 THEN 1
   ELSE 0
   END

3. **Violence**

   IF [Weapltp] = 1 THEN 1
   ELSEIF [Extoltp]=1 THEN 1
   ELSEIF [Gfigltp]=1 THEN 1
   ELSEIF [Asltltp]=1 THEN 1
   ELSE 0
   END

4. **Vandalism**

   IF [Vandltp] = 1 THEN 1 ELSE 0
   END

5. **CyberCrime**

   IF ([Downltp]=1 AND [Downill]=1) OR [Hackltp]=1 THEN 1
   ELSE 0
   END

Derived Data:

1. **DrugAbuse%**

   ({FIXED [Scountry] :
   (SUM([DrugAbuse])/(SUM([DrugAbuse])+SUM([Theft])+SUM([Vandalism])+SUM(
   [Violence])+SUM([CyberCrime])))*100})

2. **Theft%**

   ({FIXED
   [Scountry]:(SUM([Theft])/(SUM([DrugAbuse])+SUM([Theft])+SUM([Vandalism])+
   SUM([Violence])+SUM([CyberCrime])))*100})

3. **Violence%**

   ({FIXED [Scountry] :
   (SUM([Violence])/(SUM([DrugAbuse])+SUM([Theft])+SUM([Vandalism])+SUM([Vi
   olence])+SUM([CyberCrime])))*100})

4. **CyberCrime%**

   ({FIXED [Scountry] :

   (SUM([CyberCrime])/(SUM([DrugAbuse])+SUM([Theft])+SUM([Vandalism])+SUM
   ([Violence])+SUM([CyberCrime])))*100})

5. **Vandalism%**

   ({FIXED [Scountry] :
   (SUM([Vandalism])/(SUM([DrugAbuse])+SUM([Theft])+SUM([Vandalism])+SUM([
   Violence])+SUM([CyberCrime])))*100})

What are the marks and channels?

Marks: Lines

Channels: Color, Size: Length (stacks), Position: Both(X-axis as Horizontal, Y-axis as Vertical)

Why do you choose these marks and channels (problem-specific not general)?

Marks:

The total height is the total percentage with height of each stack within a bar representing the proportion of individuals within the demographic category who engage in various types of delinquent behavior.

Channels:

We have used Colors to differentiate between the different types of delinquent behavior represented in the chart. By assigning each type of behavior a different color, such as red for alcohol and drug use, blue for theft, green for violence, yellow for vandalism and Cybercrime is represented by purple so that viewers can easily distinguish between the different types of behavior.

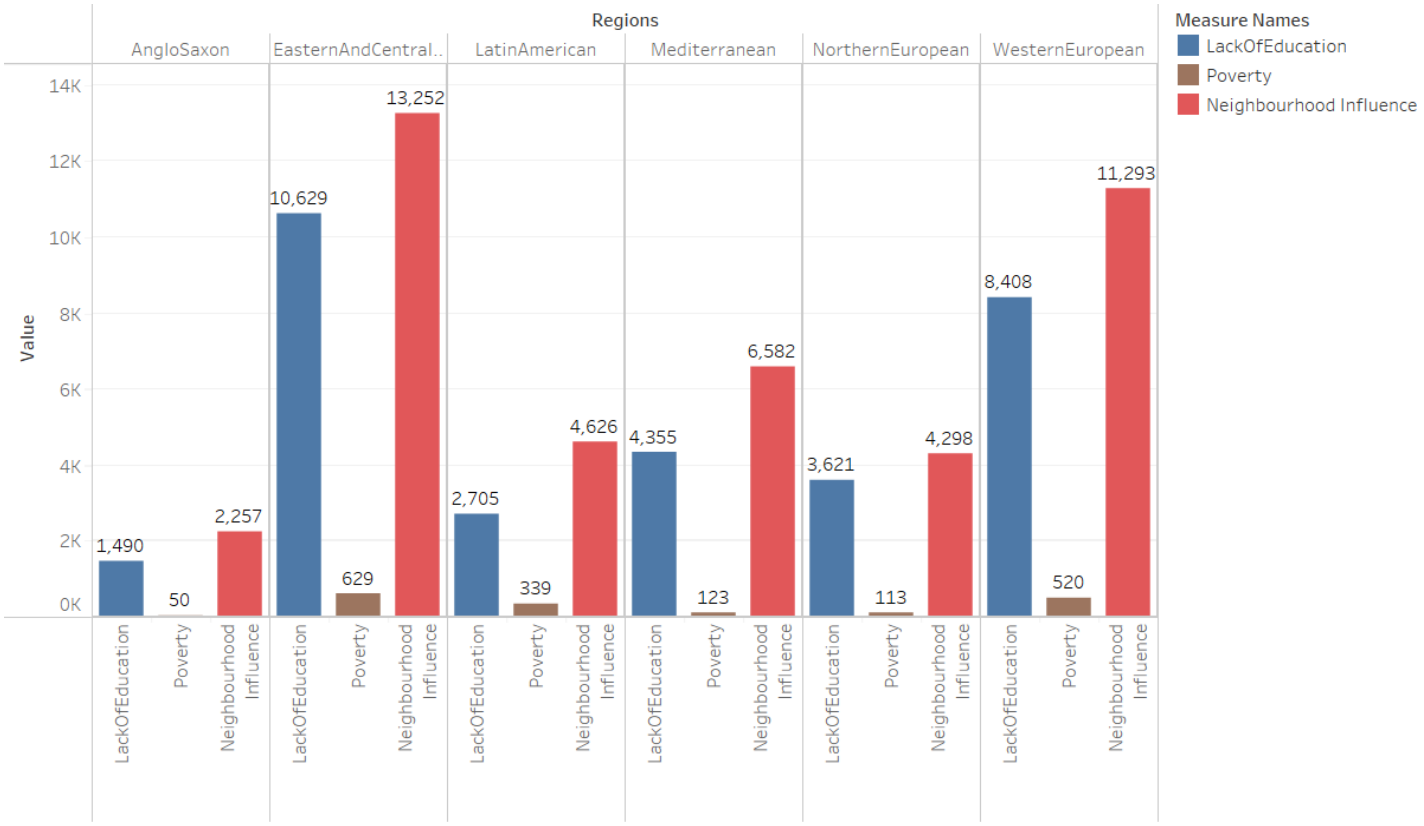
We have used Size (length) to represent the relative frequency of each type of delinquent behavior within the population. Longer stacks indicate a higher frequency of that type of behavior, while shorter stacks indicate a lower frequency.

Position is used to represent country clusters on horizontal (x) axis and number of delinquent behavior on vertical (y) axis.

What do you want to show/describe from this visualization?

By using a stacked bar chart, it becomes easy to see which type of delinquent behaviors are most prevalent within the population, and how the prevalence of different types of behavior varies by region.

5th Data Visualization:Impact of Socio-Economic Factors on Delinquency- Grouped Bar Chart



Formulas:

Social demographic: Neighborhood influence, Poverty and Lack of eductaion

1. **<u>Neighbourhood Influence</u>**

```
IF (([Nhood05] = 3 OR [Nhood05]= 4 OR
        [Nhood06] = 3 OR [Nhood06]= 4 OR
        [Nhood07] = 3 OR [Nhood07]= 4 OR
        [Nhood08] = 3 OR [Nhood08]= 4 OR
        [Nhood09] = 3 OR [Nhood09]= 4 OR
        [Nhood12] = 3 OR [Nhood12]= 4 OR
        [Nhood13] = 3 OR [Nhood13]= 4 ) AND [IsDeliquent] = 'Delinquent')
THEN 1
END
```

2. **<u>Poverty</u>**

```
IF (((([Workfath] = 4 OR
  [Workfath] = 5 OR
  [Workfath] = 6 OR
  [Workfath] = 7)
  AND
  ([Workmoth] = 4 OR
  [Workmoth] = 5 OR
  [Workmoth] = 6 OR
  [Workmoth] = 7))

  OR

  (([Workfath] = 4 OR
        [Workfath] = 5 OR
        [Workfath] = 6 OR
        [Workfath] = 7)
        AND
        [Ownroom] = 0
        AND
        [Familcar] = 0)

        OR

        (([Workmoth] = 4 OR
        [Workmoth] = 5 OR
        [Workmoth] = 6 OR
        [Workmoth] = 7)
        AND
        [Ownroom] = 0
        AND
        [Familcar] = 0))


AND [IsDeliquent] = 'Delinquent')

THEN 1
```

END

3. **LackOfEducation**

```
IF (([Attsch] = 1 OR  [Attsch] = 2
        OR [Atsch02] = 1 OR [Atsch02] = 2
        OR [Atsch04] = 1 OR [Atsch04] = 2
        ) AND [IsDeliquent] = 'Delinquent' )

THEN 1
END
```

What are the marks and channels?

Marks: Line

Channels: Position (X axis, Y axis) , Length, Color

Why do you choose these marks and channels (problem-specific not general)?

Marks: Lines - Represent the delinquency in each country cluster.

Channels: Position: Different country clusters on X-axis and Percentage of delinquency on Y axis.

Length: Represents the socio-economic effect on delinquency.

What do you want to show/describe from this visualization?

We wanted to analyze how the socio economic factors affect the delinquency rate. Here we have made a grouped bar chart where we have grouped the socio economic factors like Lack of education, poverty and Neighborhood influence. We have analyzed there factors for every region.

Arrangement

Why did we choose these five visualizations?

To provide a comprehensive overview of different aspects of delinquent behavior and can help identify the key factors that contribute to delinquency.

1. **Delinquent Behaviors Across Different Countries with Gender Division**

Provides insights on similarities and differences across different countries and genders.

2. **Number of Delinquents In Each Age Group**

Helps identify age groups that are most vulnerable to delinquent behaviors.

3. **Factors Affecting Delinquents**

Help identify the root cause of delinquency by identifying various factors.

4. **Observations For Different Delinquent Behavior Categories**

Provides insights in two different types of delinquent behavior that are most common.

5. **Impact of Socio-Economic Factors on Delinquency**

Provides insights into if socio economic factors have an impact on delinquency behavior.

Why do you choose a certain order of visualization?

1. By choosing the above order we wanted to start from an high level overview of the issue of delinquent nature across countries and gender and set the stage for subsequent visualizations.

2. Next, by plotting the age group we wanted to provide more details on the age related patterns affected by delinquency and further to develop age appropriate prevention programs.

3. Additionally, by looking in-depth at the factors we wanted to get to the root cause from which we can inform the development of effective prevention programs

4. Further we went in-detail to observe different delinquent behaviors, that provided insights on most common types of delinquent nature.

5. Finally, the impact of socio-economic factors provided us the roots of delinquency which can be further used to develop policies and programs.

Summary

Based on our analysis,

- Delinquency behavior is highest in the Eastern and Central European countries with Male gender involved more.
- Age is the key factor in delinquent behavior with the highest rates of delinquency observed at the age of 12.
- Several factors contribute to delinquent behavior like dysfunctional families, exposure to violence, trauma and peer relations with trauma being the highest key factor.
- Different types of delinquent behaviors are associated with various risk factors. Drug abuse being the most common delinquent behavior
- Impact of socio-economic factors on delinquency is complex, with poverty, Neighborhood, Lack of educational opportunities playing a role in the development of delinquent behavior. While the Neighbourhood influence is contributing towards more development of delinquent behavior.

To summarize further, We have managed to answer the following questions and got answer as follows:

1. **Is Juvenile Delinquency Normal,ubiquitous,and transitional?**
   We have made our best attempts to answer this question with Graph 1 and Graph 2.

We found that delinquent behavior had mostly a lot of similar patterns over the demographic region and were found across various populations, ofcourse, the severity differed, factors differed. From our point of view , considering this, it is ubiquitous.

We also found that many adolescents who engage in delinquent behavior go through a transitional phase and there is a particular age where we observed a lot of delinquency but we also saw that as age increased they eventually grow out of it.

As we saw that adolescents grow out of it after attaining maturity, we think it can be considered normal but ofcourse, for some, delinquent behavior can persist into adulthood and lead to more serious consequences like drug abuse.

2. **Is there a pattern of similarity in the offending behavior of juveniles across countries or are there any important differences?**
   While there are some similarities in offending behavior among juveniles across countries, there are also some important differences. We found out that Poland, Russia, Sweden have more female delinquents and when it comes to France, Portugal it is approximately equal.(Graph 1) When we consider delinquent behavior, theft is more in Northern-European and Anglosaxon countries compared to Eastern and Central European countires, etc. (Graph 4)

3. **Descriptive comparisons of crime rates will call for explanations, especially if differences are observed. What are the national socio-economic or cultural differences, or the characteristics of legal or criminal policies that can explain such differences?**

   We have tried to summarize these questions using graph 5 mostly, but Graph 2 has an important role to answer this question. Differences in poverty rates, unemployment rates, income inequality, and education levels contributed to

differences in crime rates. We found that areas with bad neighborhoods and lack of education tend to have higher crime rates.