Effectiveness of Alcohol-Oriented Road Safety Measures in Selected EU Countries

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Background

In its Road Safety Charter, the European Union proposed that the 2001 number of fatal injuries should be lowered by 50% by 2010.

Although the member states are pursuing a progressive approach to road safety interventions, the numbers of fatal injuries suffered in road accidents remain unacceptably high.

Reportedly, the major causes of fatalities involve road user's behaviours, such as speeding, alcohol and drug use, fatigue, and the failure to use seatbelts (ETSC, 2008).

Study objectives

The study seeks to identify the effectiveness of different **alcohol-oriented road safety measures** across the countries under investigation using road safety indicators.

Our aim was to provide a summary of countries according to their levels of road safety and the numbers of road safety interventions being implemented.

In addition, we intended to present specific road safety measures and their effectiveness, expressed by the degree of closeness of their relationship with road safety indicators across the countries under study.

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Measures

The road safety measures under study include:

a) The permitted level of blood alcohol in drivers (BAC)

b) Different BAC for risky drivers (young drivers, drivers involved in accidents) - *yes/no*

c) Penalty/demerit point system *- yes/no*

d) Probationary licence for novice drivers - *yes/no*

Measures

The road safety measures under study include:

e) Licence withdrawal (when offence commited)
   (no/ up to 3 m/ up to 12m / up to 36m and more)

f) Imprisonment (when offence commited)
   (no/ up to 200 days/ more than 200 days)

g) Fine (when offence commited)
   (up to 1000 EUR, up to 5000 EUR, more than 5000 EUR)

Indicators

The following road safety indicators were selected:

a) alcohol-related accidents with injury

b) road accidents with injury in general

c) alcohol-related fatalities

d) fatalities in general

e) drivers detected and punished for different offences in the previous 3 years

f) the number of motorists checked for the influence of alcohol (RBT)

g) offences detected – impaired driving

h) SPI* (Standard Performance Indicator) for Alcohol

*SPI -(Hakkert, Gitelmanova & Viss, 2007)

Selected countries

Austria	France	Portugal
Belgium	Germany	Slovakia
Croatia	Greece	Slovenia
Cyprus	Hungary	Spain
Czech	Ireland	Sweden
Denmark	Italy	Switzerland
Estonia	Netherlands	United Kingdom
Finland	Poland	

Data collection

The data cover the period 2007-2008 and were obtained from the following sources:

1. CARE - EU road accident database

2. SafetyNet Project - SPI (Hakkert, Gitelmanova & Viss, 2007)

3. OECD IRTAD database

4. WHO

Statistical data processing

The following methods were used to conduct the statistical processing of data:

- Wilcoxon Signed-Rank Test for related samples
- Spearman Correlation Coefficient
- Mann-Whitney U Test
- Hierarchical cluster analysis
- Kruskal Wallis Test

- Given the limited number of observations, it was decided to use non-parametric statistics

- Tested at the 0.05 level of significance

Results I - Effectiveness of observed measures

	Road safety measures - penalty /demerit point system	Road safety measures - probationary license	Different BAC for risky drivers
	Sig.	Sig.	Sig.
Fatalities per 100 000 persons	0,41	0,19	0,22
Fatalities alcohol per 100 000 persons	0,49	0,28	0,75
Accident with injury per 100 000 persons	0,44	0,25	0,07
Accidents involving alcohol per 100 000 persons	0,44	0,39	0,11
Number of motorists checked - alcohol per 100 000persons	0,61	0,71	0,68
Number of offences detected - alcohol per 100 000 persons	0,16	0,22	0,74

Mann-Whitney U Test, alpha = 0.05

Results I - Effectiveness of observed measures

	Licence withdrawal	Imprisonment	Fine
	Sig.	Sig.	Sig.
Fatalities per 100 000 persons	0,07	0,03	0,47
Fatalities alcohol per 100 000 persons	0,78	0,43	0,21
Accident with injury per 100 000 persons	0,32	0,7	0,95
Accidents involving alcohol per 100 000 persons	0,5	0,07	0,25
Number of motorists checked - alcohol per 100 000persons	0,17	0,03	0,33
Number of offences detected - alcohol per 100 000 persons	0,15	0,03	0,3

Kruskal Wallis Test, alpha = 0.05

Results I - Effectiveness of observed measures

No significant difference between countries were found in observed measures and indicators, besides measure **imprisonment.**

In countries with measure **imprisonment** (category up to 200 days and more than 200 days) we observed significantly lower fatalities (general), lower number of offences detected (alcohol) and lower number of motorists checked (alcohol).

We can conclude that the selected measures (Penalty/demerit point system, Probationary license, Different BAC for risky drivers, Licence withdrawal and Fine) do not have any effects on the indicators under scrutiny (Fatalities, Accidents and Offences committed).

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Results II - Correlations

|		Fatalities per 100 000 persons	Fatalities alcohol per 100 000 persons	SPI	Number of motorists checked – alcohol	Number of offences detected – alcohol	
BAC limit for general driver	Correlation Coefficient	-,404	-,073	,366	-,459	-,218	
	Sig. (2-tailed)	,056	,739	,103	,055	,385	
	N	23	23	21	18	18	
Fatalities per 100 000 persons	Correlation Coefficient	1,000	,516	-,138	-,135	,027	
	Sig. (2-tailed)	.	,012	,552	,593	,916	
	N	23	23	21	18	18	
Fatalities alcohol per 100 000 persons	Correlation Coefficient	,516	1,000	,770	,104	,015	
	Sig. (2-tailed)	,012	.	,000	,681	,951	
	N	23	23	21	18	18	
Number of motorists controlled – alcohol	Correlation Coefficient	-,135	,104	,115	1,000	,762	Spearman Correlation Coefficient
	Sig. (2-tailed)	,593	,681	,660	.	,000	
	N	18	18	17	18	18	

Results II - significant correlations observed:

- BAC in general x fatalities in general (negative correlation, r=-0.404, sig=0.56)

- BAC in general x no. of motorists checked for alcohol (negative correlation, r=-0.459, sig=0.55)

- Fatalities in general x fatalities involving alcohol (positive correlation, r=0.516, sig=0.12)

- Fatalities involving alcohol x SPI (positive correlation, r=0.77, sig=0.00)

- No. of motorists checked for alcohol x no. of offences committed under the influence of alcohol (positive correlation, r=0.762, sig= 0.00)

Results III
Cluster analysis

Graphical summary of the cluster solution. The cases are listed along the left vertical axis. The horizontal axis shows the distance between clusters when they are joined.

Dendrogram using Complete Linkage

Rescaled Distance Cluster Combine
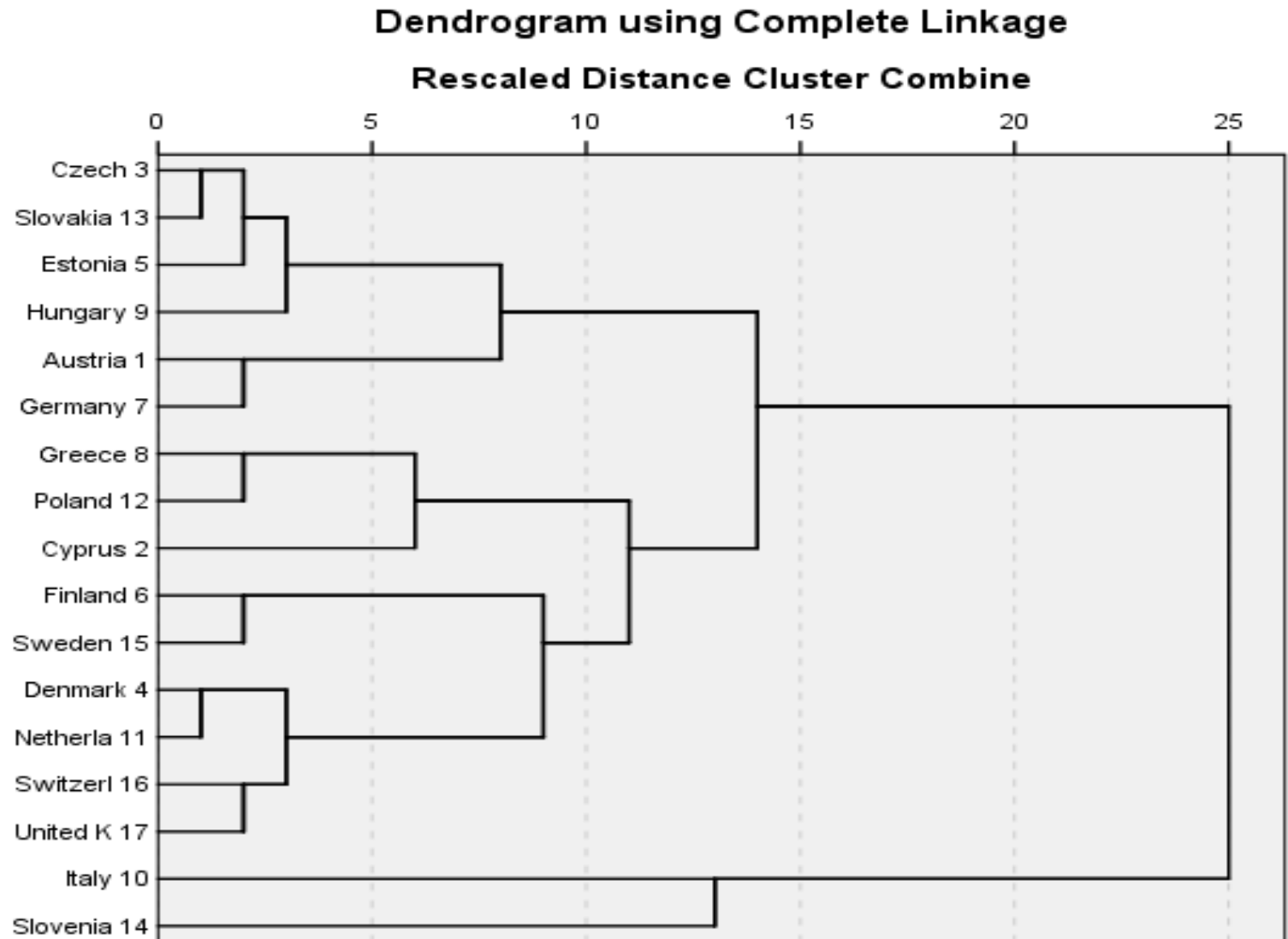
Results III - Cluster analysis

The sample is divided into two sub-samples:

1. Italy and Slovenia
2. all the other countries

Subsequently, the countries may be divided into four additional groups:

1. Italy, Slovenia
2. Finland, Sweden, Denmark, Netherlands, Switzerland, UK
3. Greece, Poland, Cyprus
4. Czech Republic, Slovakia, Estonia, Hungary, Austria, Germany

In addition to the observed criteria (indicators and measures), the geographical proximity of the countries under study appears to be another unifying criterion.

Limitations

- Inconsistency in the data under comparison (originating from different sources)

- Inconsistency in the countries' data reporting systems

- Not all the data for the same year were available

- A large number of variables which affect the indicators were not considered

Discussion

- The study did not show any relationship between the measures and indicators under observation (with the exception of imprisonment measure).
- The indicators showed certain correlations of minor significance.
- The negative correlation between BAC and Fatalities General raises a question yet to be answered.
- A strong correlation between SPI and Fatalities Alcohol was shown. However, this results from the definition of SPI (the Fatalities Alcohol variable is incorporated in the SPI calculation).

- The member states must report better and more compatible data to ensure the clearer identification of the key factors of effective road safety interventions.

The study provided very small evidence of relationship between the measures and indicators under observation. Therefore, it is not possible to evaluate their effectiveness.

Thank you for your attention

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