13:10-15:00, December 7, 2024
Tokyo Convention Hall

Panel Discussion

International Perspective on Traffic Safety Culture

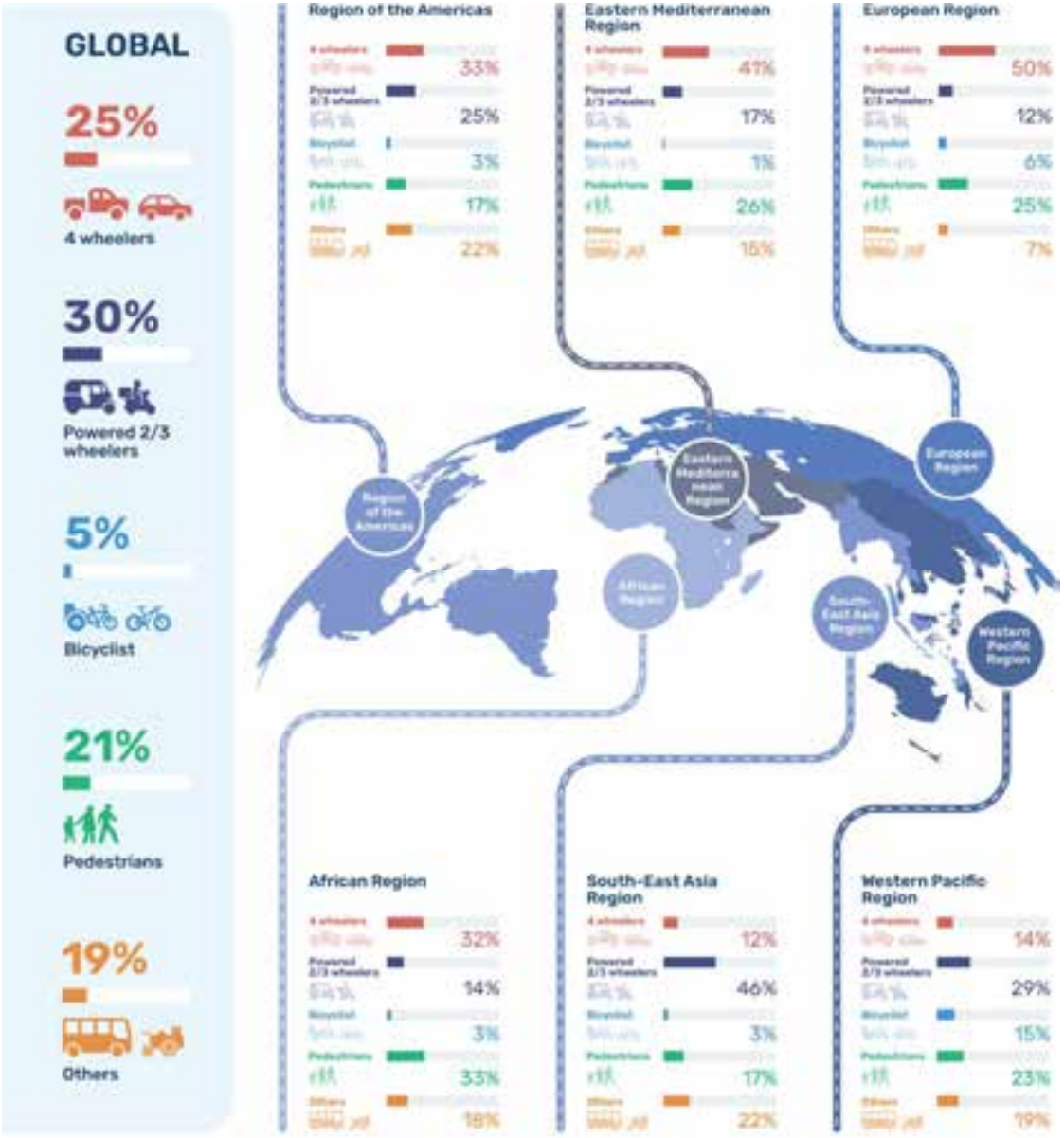
by

IATSS International Collaborative Research Project #2400R

Coordinator: Dr. Hideki Nakamura
Member of IATSS, Project Leader
Professor, Nagoya University

Present Situation of Road Traffic Safety

- 1.19 million road traffic deaths in 2021 (WHO)
  - Region
  - Climate
  - Income level
  - Road user
  - …
  - Traffic safety culture?



Source: WHO, Global status report on road safety 2023

International Association of Traffic and Safety Sciences

The 10th GIFTS 2024

Introduction of panelists

Ms. Susanna Zammataro

- Chief Executive of the International Road Federation (IRF) in Geneva, Switzerland
  - Untiring advocate for road safety
  - Served as Chairperson of the "Safer Roads and Mobility" Pillar of the UN Road Safety Collaboration Group (UNRSC)
  - Number of other initiatives supporting the road safety agenda

IRF | INTERNATIONAL ROAD FEDERATION

Dr. Wouter Van den Berghe

- Director of Tilkon Research & Consulting
  - Member of IATSS international research project
  - Research Director of VIAS institute (Brussels) 2014-2022
  - In-depth understanding of road safety, education and policy issues
  - World expert in the field of road safety performance indicators

TILKON

Dr. Ghassan Abu-Lebdeh

- Associate Professor at Marshall University in Huntington, West Virginia, USA
  - Member of IATSS international research project
  - Expert in Traffic operations, transportation system, and public health
  - Worked in American University of Sharjah in the United Arab Emirates (UAE) until recently

Dr. Azusa Toriumi

- Research associate at the University of Tokyo
  - Traffic engineer and a member of IATSS international research project since 2016
  - Leading the Country Fact Survey, an original international survey on road safety of the project

Structure of the PD session

1. Brief overview of the International Collaborative Research Project of IATSS
   - Results of the structural equation model (SEM)
   - Summary of the country fact survey (CFS)
2. Short presentations by panelists
3. Discussions
4. Concluding remark

International Association of Traffic and Safety Sciences

The 10th GIFTS 2024

07.12.2024

A brief overview of International Collaborative Research Project #2400R

International Collaborative Research Project Team

Project members

- Ghassan Abu-Lebdeh (American University of Sharjah, UAE)
- Mohamed Shawky Ahmed (Ain Shams University, Egypt)
- Wael Alhajyaseen (Qatar University, Qatar)
- Nicola Christie (University College London, UK)
- Tina Gehlert (German Insurance Association, Germany)
- Yuichi Inoue (IATSS Counsellor, Japan)
- Nan Kang (Nanjing Tech University, P.R. China)
- Babak Mehran (Manitoba University, Canada)
- Lorenzo Mussone (Politecnico di Milano, Italy)
- Hideki Nakamura (Nagoya University, Japan)
- Yasuhiro Shiomi (Ritsumeikan University, Japan)
- Kazufumi Suzuki (Shizuoka Institute of Science and Technology, Japan)
- Koji Suzuki (Nagoya Institute of Technology, Japan)
- Keshuang Tang (Tongji University, P.R. China)
- Azusa Toriumi (The University of Tokyo, Japan)
- Wouter Van den Berghe (Tilkon Research & Consulting, Belgium)
- Axel Wolfermann (Hochschule Darmstadt, University of Applied Sciences, Germany)

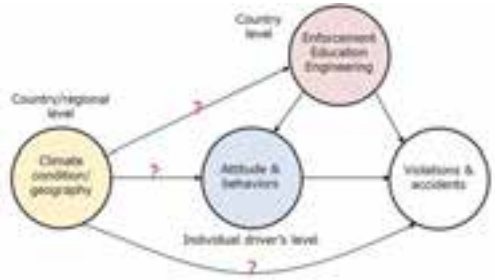
UCL, November 2019

Politecnico di Milano, March 2023

Research question and objectives

➢ Research question

– How traffic safety culture affects crash risks?



➢ Objectives

– Indicate a cause and effect relation mechanism between infrastructure, social systems, behavior, traffic safety culture, etc. and the number of fatalities

– Suggest road traffic safety policy recommendations by considering different traffic safety culture

➢ Main research items

– Development of a **structural equation model (SEM)** for fatal crash risks

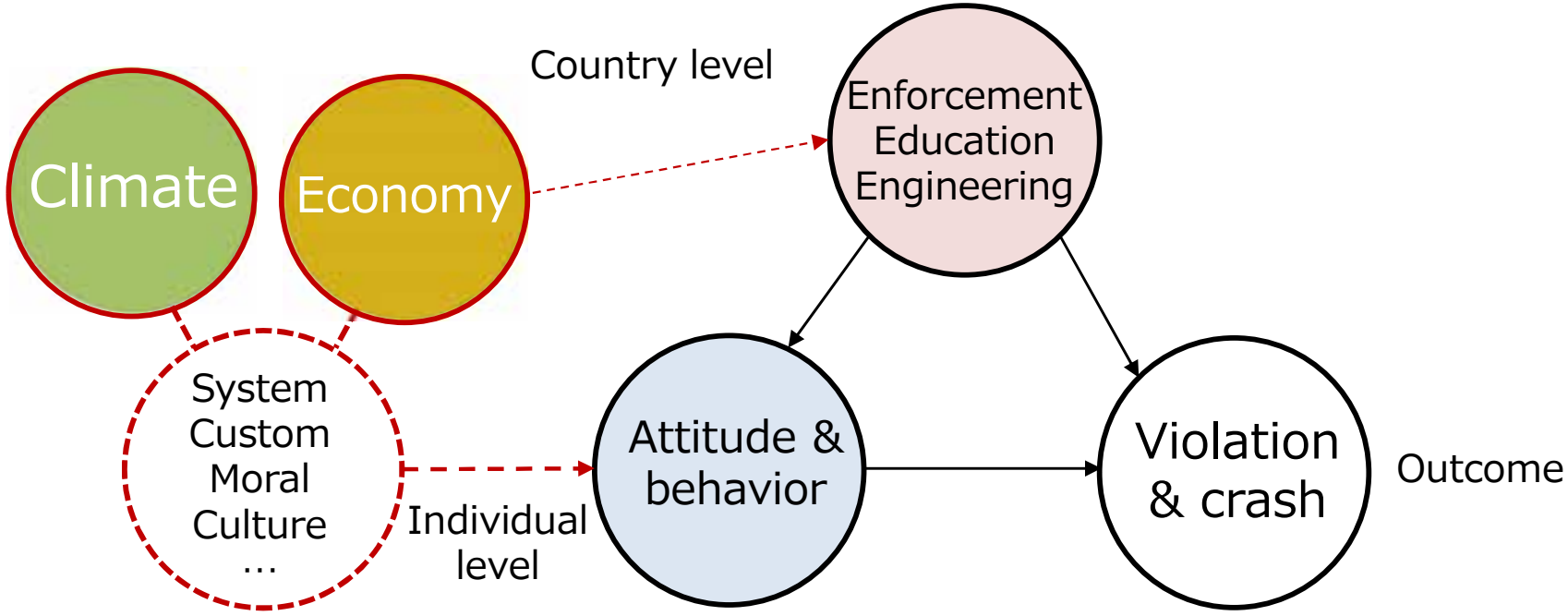
– Data collection through the **country fact survey (CFS)** on road traffic safety

Structural Equation Modelling (SEM) for Traffic Safety Culture

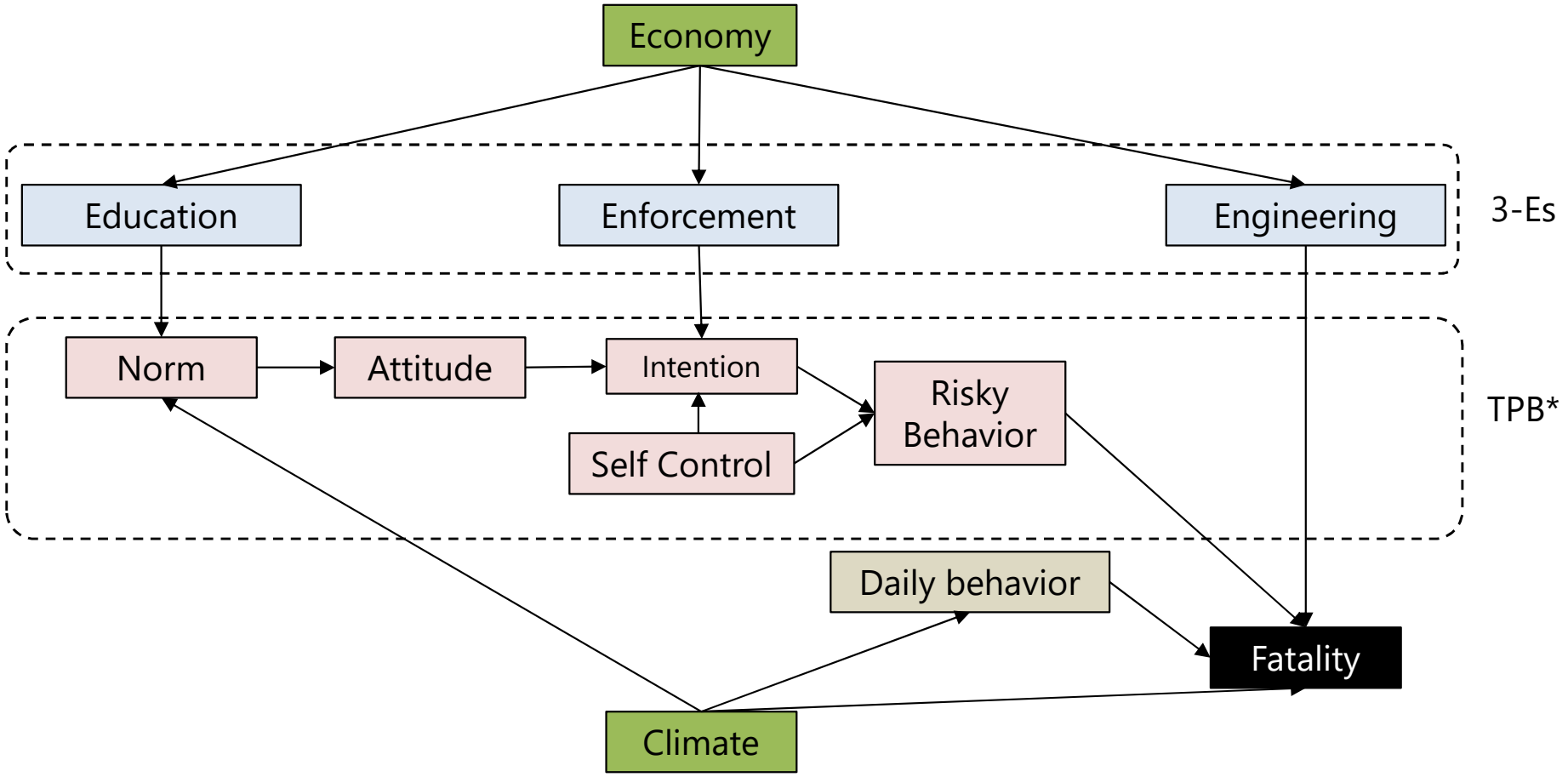
Project member, Dr. Yasuhiro Shiomi
Ritsumeikan University, Japan

Objectives

- Structurize the casual structure between traffic safety culture and road crashes based on SEM
- Propose road traffic safety policy depending on country/region status



Hypothetical structure of SEM



*TPB: Theory of Planned Behavior (Ajzen,1985)

Data used for the analysis

➢ ESRA2 survey

- 1st wave (2018-2019) + 2nd wave (2019-2020)
- 48 countries

Australia, Austria, Belgium, Benin, Bulgaria, Cameroon, Canada, Colombia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Ghana, Greece, Hungary, Iceland, India, Ireland, Israel, Italy, Ivory Coast, Japan, Kenya, Lebanon, Luxembourg, Malaysia, Morocco, Netherlands, Nigeria, Norway, Poland, Portugal, Republic of Korea, Serbia, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Tunisia, Uganda, United Kingdom, United States, Vietnam, Zambia

- 45,114 samples

➢ World statistics

- WHO, World Bank, CIA
  - Missing data of some countries is filled with other data base or substituted by other country data of the same region and the same economic level
- Climate data: UK's Natural Environment Research Council (NERC) and the US Department of Energy

Variables and data sources

- **Economy**
  - GNI per capita (WHO)
  - GINI coefficient (CIA)
- **Climate***
  - Temperature by month (NERC)
  - Precipitation by month (NERC)
- **Fatality**
  - Number of fatalities per capita (WHO)
- **Education**
  - Higher education rate (WB)
- **Engineering**
  - Infrastructure
    - Road length per area (WHO)
  - Motorization
    - Number of registration vehicles per capita (WHO)
- **Enforcement**
  - Likelihood to be coughed (ESRA2 Q20)
- **Frequency of transportation modes****
  - Walk (ESRA2 Q10)
  - Motorcycle (ESRA2 Q10)
  - Bicycle (ESRA2 Q10)
  - Private car (ESRA2 Q10)
- **Attitude*****
  - **Acceptance of no-seatbelt** by myself (ESRA2 Q14)
- **Norm *****
  - **Acceptance of no-seatbelt** by others (ESRA2 Q13)
- **Self control**
  - **Support for rigid enforcement** (ESRA2 Q19)
- **Intention**
  - Number of **self-reported violations** in 2 years (ESRA2 Q12)
- **Risky behavior**
  - Number of injured crashes in 2 years (ESRA2 Q23)

* A climate data of capital city is used.

** Higher value means more frequent.

*** Higher value means better attitude and norm.

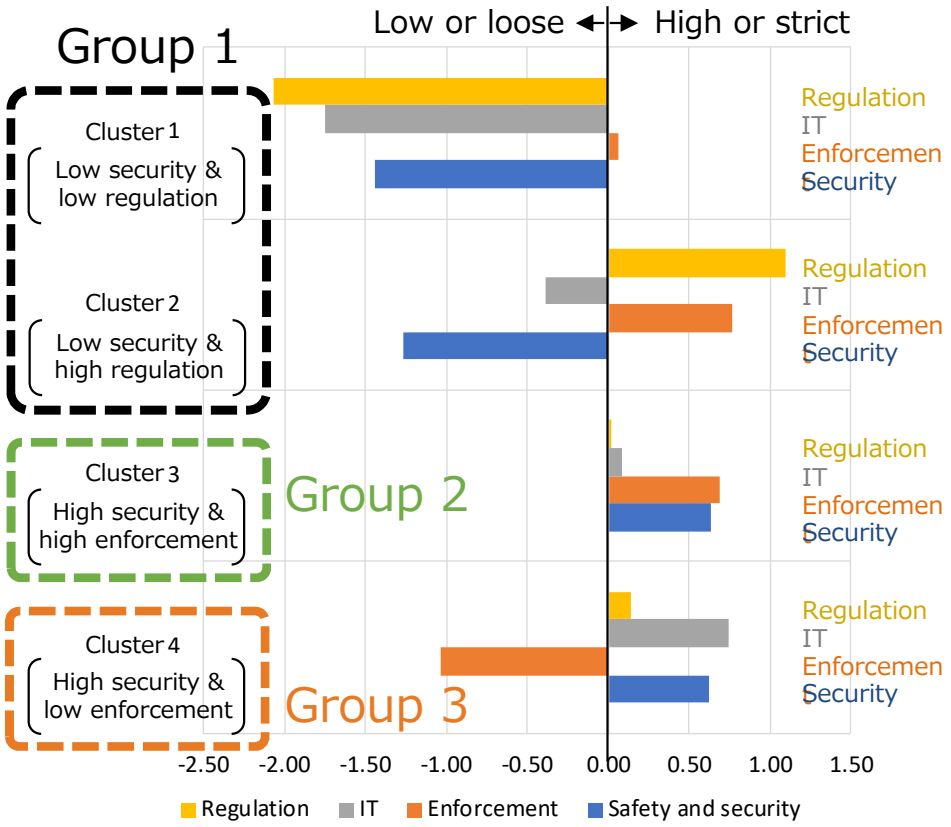
Clustering countries

- Factor analysis on traffic safety related variables (source: WHO, WB, ESRA)
- 48 countries are categorized into three groups (1-3)

Variables	Factors			
	Safety and security	Enforcement	IT	Regulation
Frontal impact standard	0.929	-0.021	-0.029	-0.100
Total registered vehicles*	0.777	0.042	0.082	0.172
Total physicians*	0.770	-0.110	-0.062	0.081
Higher education rate	0.741	-0.034	-0.028	0.088
Total beds*	0.689	-0.119	0.011	0.046
Gini coefficient	-0.739	-0.262	-0.196	0.304
Enforcement level (drug)	-0.070	0.879	0.063	-0.207
Enforcement level (speed)	0.179	0.860	-0.001	0.329
Enforcement level (mobile)	-0.296	0.849	0.123	-0.124
Enforcement level (alcohol)	0.225	0.843	-0.122	0.162
Enforcement level (seatbelt)	-0.348	0.805	0.001	0.001
Internet users	0.265	0.021	0.798	0.094
Ban on hands-free mobile phone use	-0.395	-0.204	-0.031	-0.653
SS loadings	5.252	3.949	1.484	1.216
Proportion Var	0.263	0.197	0.074	0.061
Cumulative Var	0.263	0.460	0.534	0.595

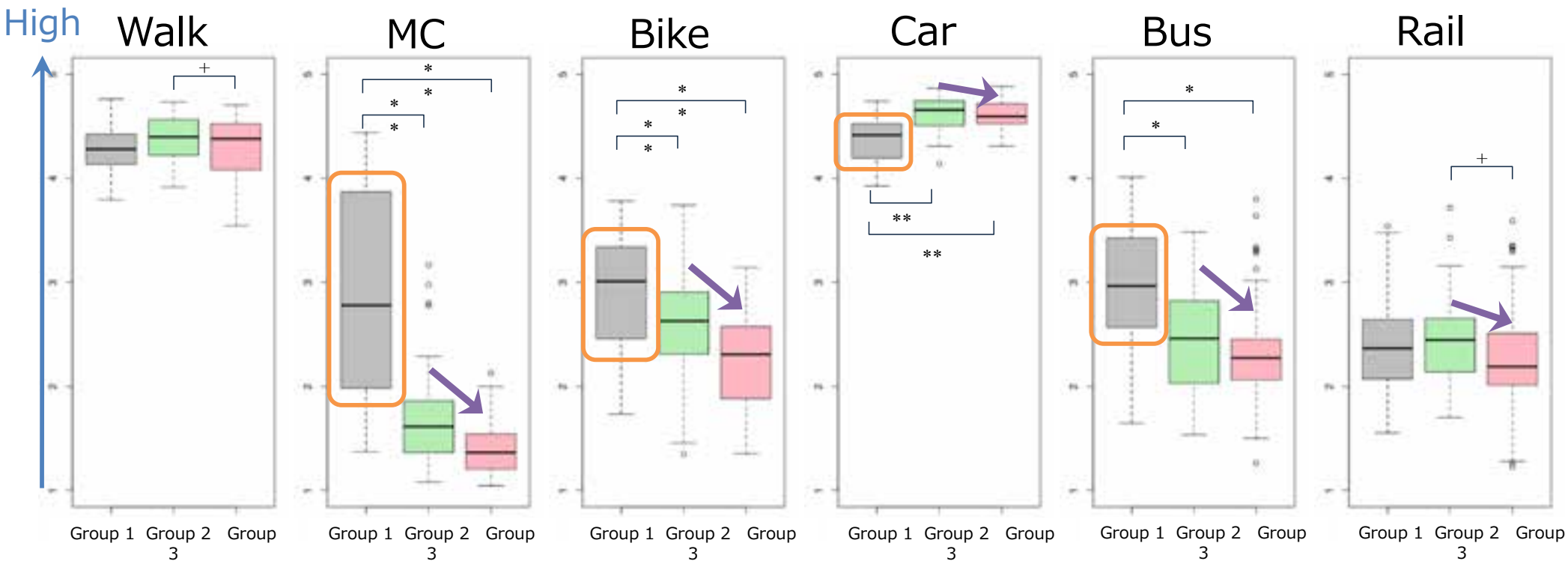
* per capita

- k-means clustering by factors



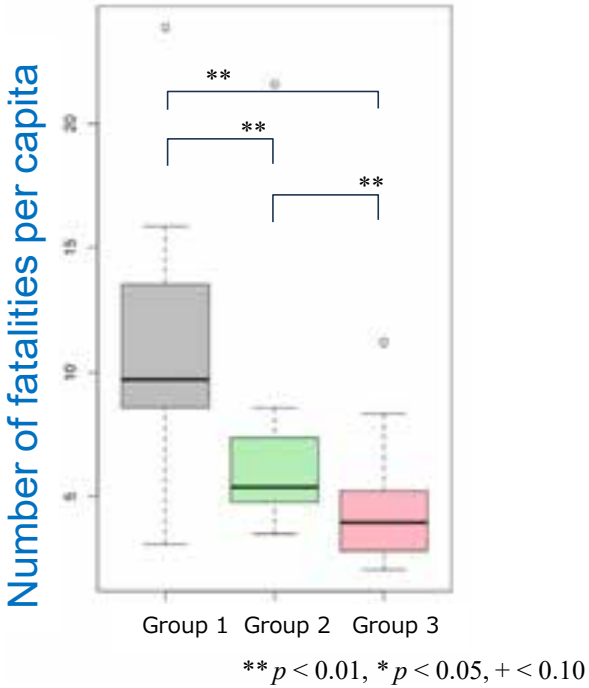
Transportation modes in each group

- Frequency of each transportation mode
  - Group 1 is categorized as **"pre-motorization"** state
  - Group 2 and 3 are **"motorized"**
  - Lower frequency to go out in Group 3



$^{**}p < 0.01$, $^{*}p < 0.05$, $+ < 0.10$

Grouping countries



** $p < 0.01$, * $p < 0.05$, + < 0.10

Group 1: Pre-motorization

India, Benin, Cameroon, Colombia, Ghana, Ivory Coast, Kenya, Morocco, Nigeria, Serbia, South Africa, Thailand, Tunisia, Uganda, and Vietnam.

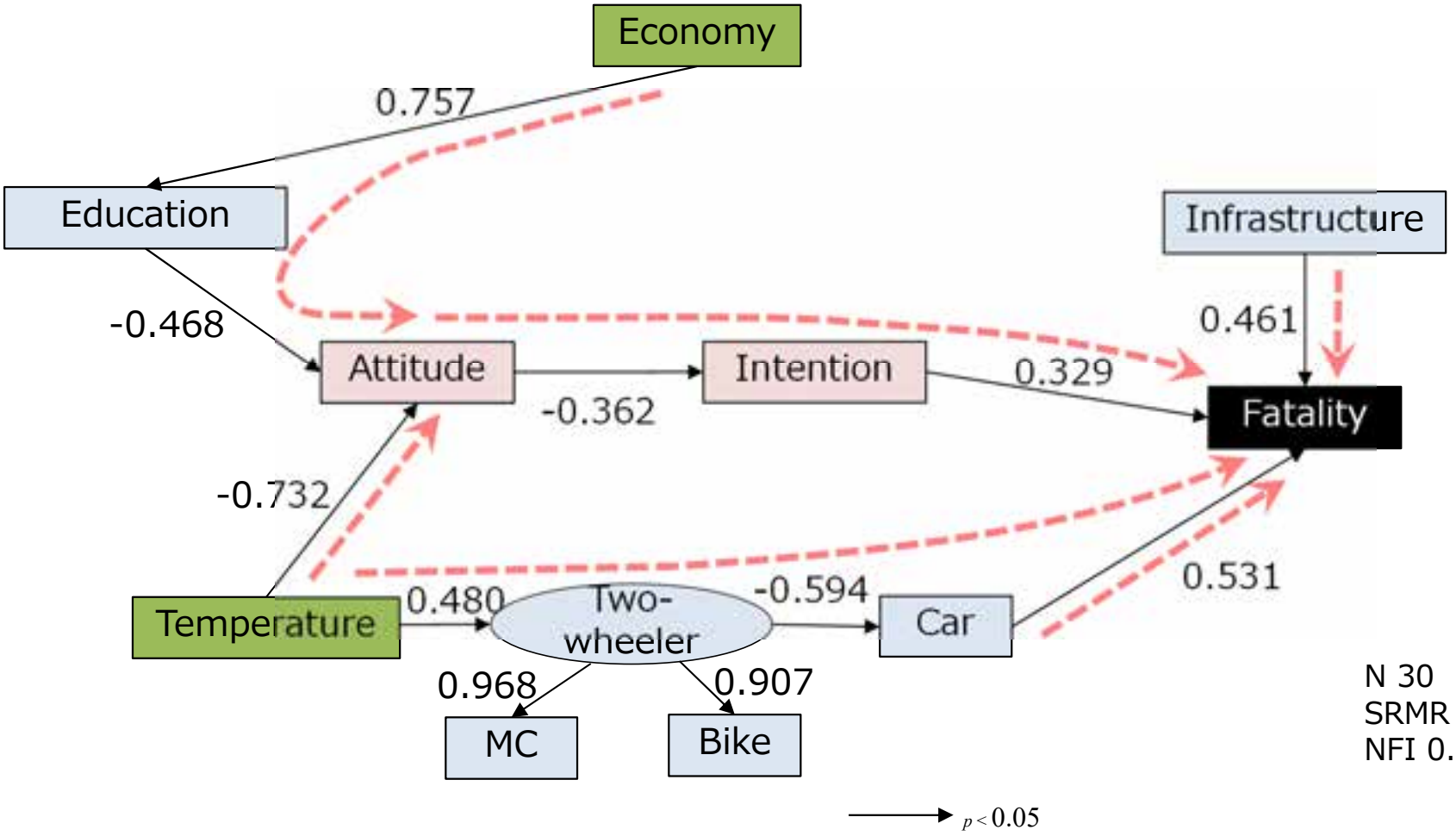
Group 2: Controlled safety

Australia, Belgium, Bulgaria, Czech, Egypt, Greece, Hungary, Iceland, Italy, Malaysia, The Netherlands, Poland, Portugal, Slovenia, and Spain.

Group 3: Self-disciplined safety

Austria, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Japan, Lebanon, Luxembourg, Norway, Sweden, Switzerland, Republic of Korea United Kingdom, and United States.

Group 1: Pre-motorization countries

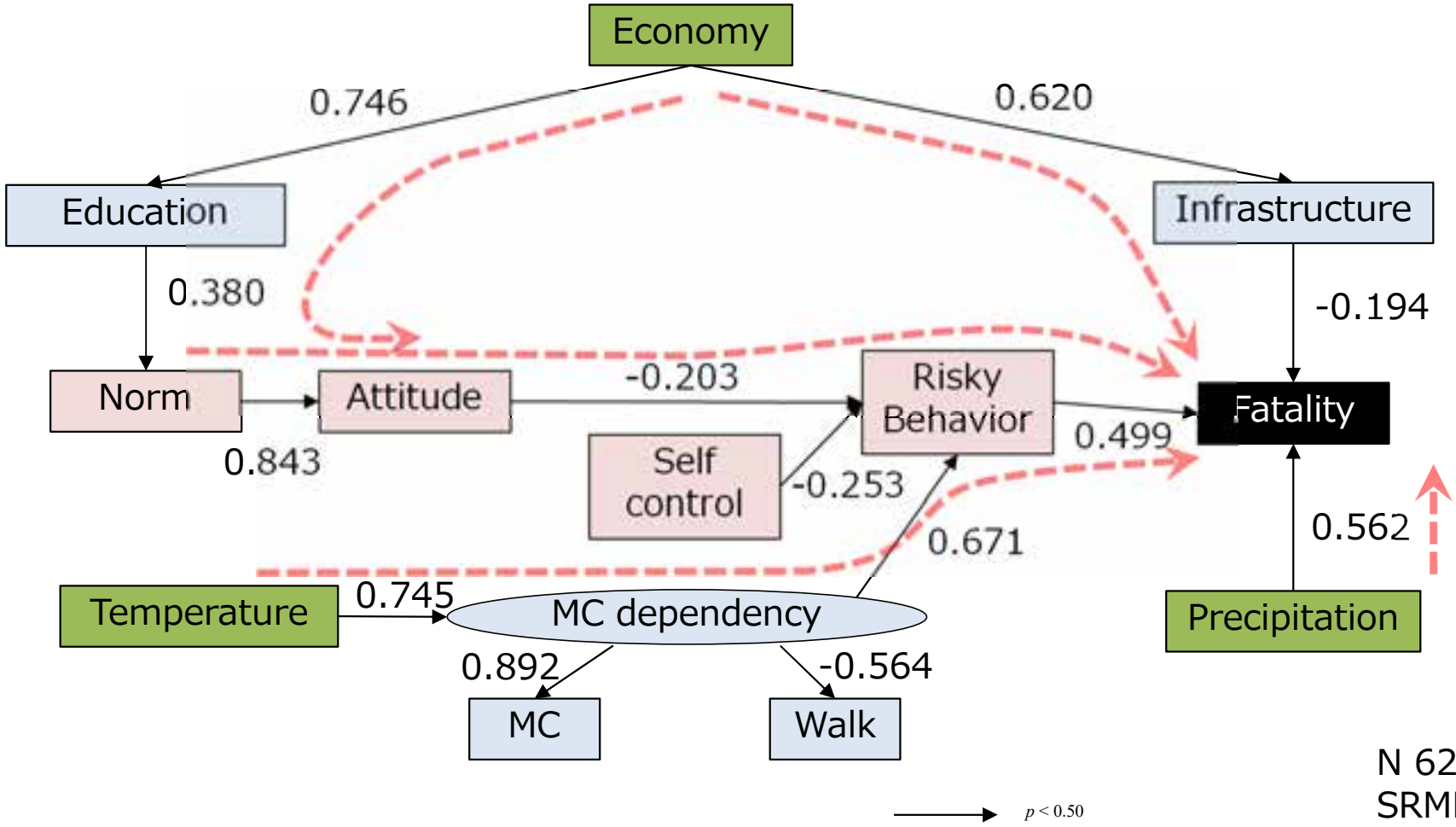


Group 1: Pre-motorization countries

➢ Total effect on fatality

- **Mixed traffic** conditions
- Along with infrastructure development,
  - promote safety education for motorcycle users
  - transition to a safer environment for car use

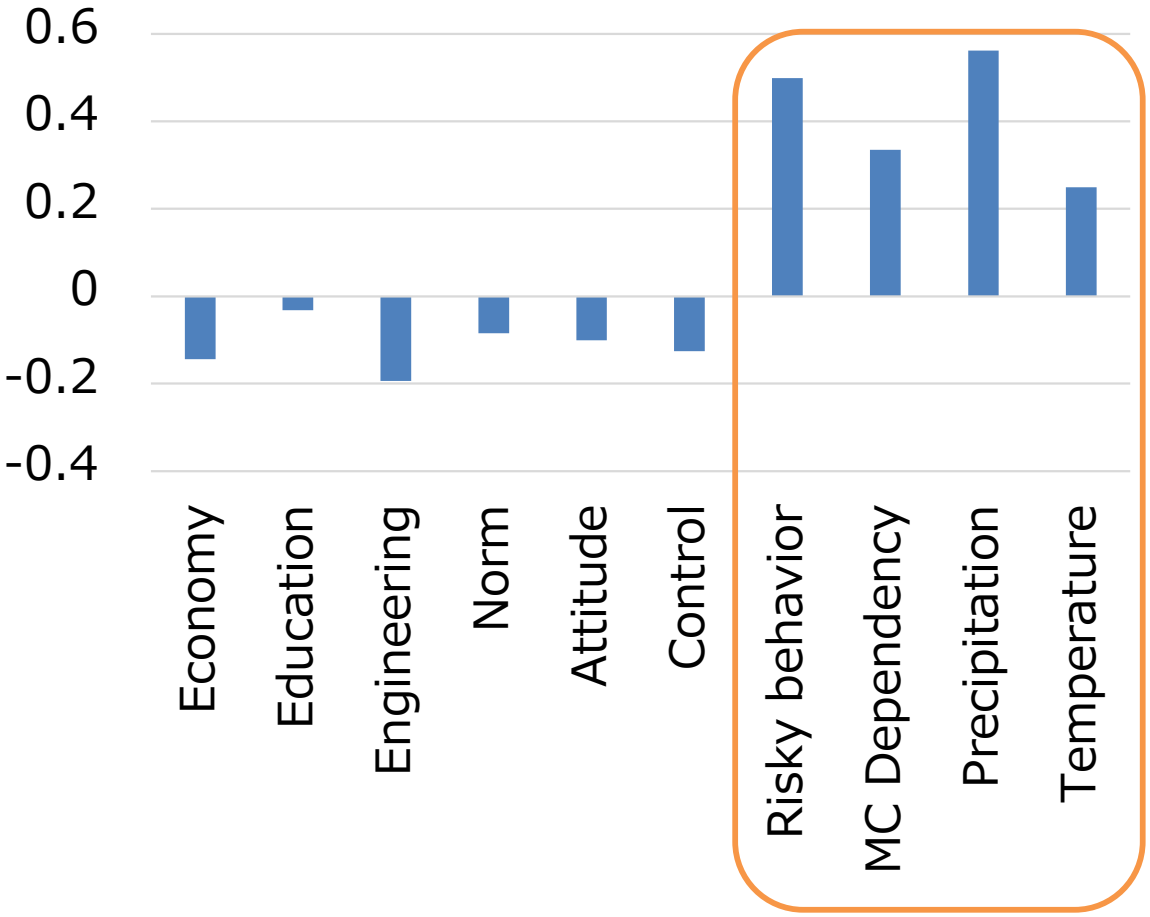
Group 2: Controlled safety countries



N 62
SRMR 0.082
NFI 0.891

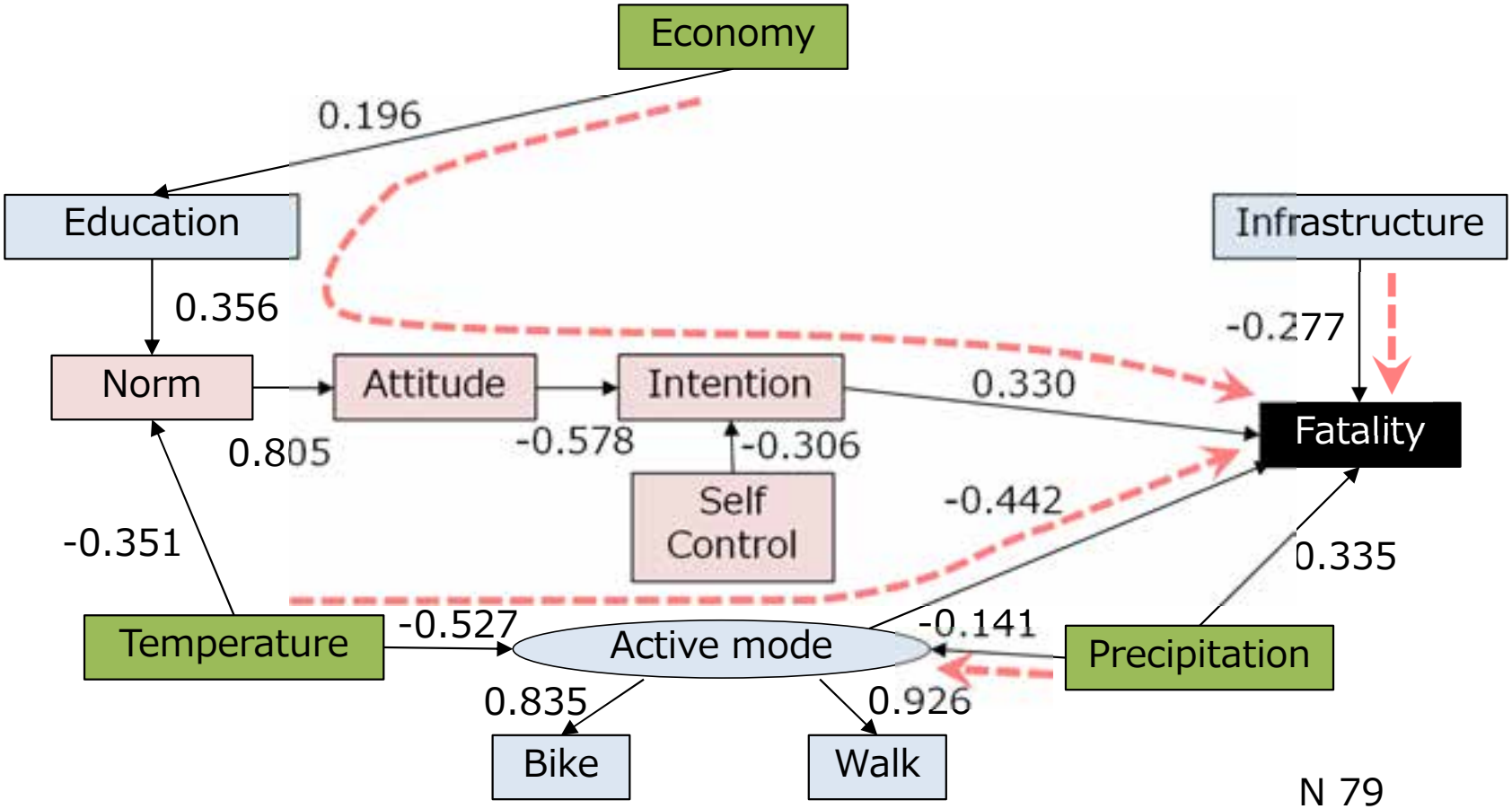
Group 2: Controlled safety countries

➢ Total effect on fatality



- The impact of **weather conditions** is significant in MC dependent countries
- Necessary to implement measures tailored to the traffic characteristics in each region

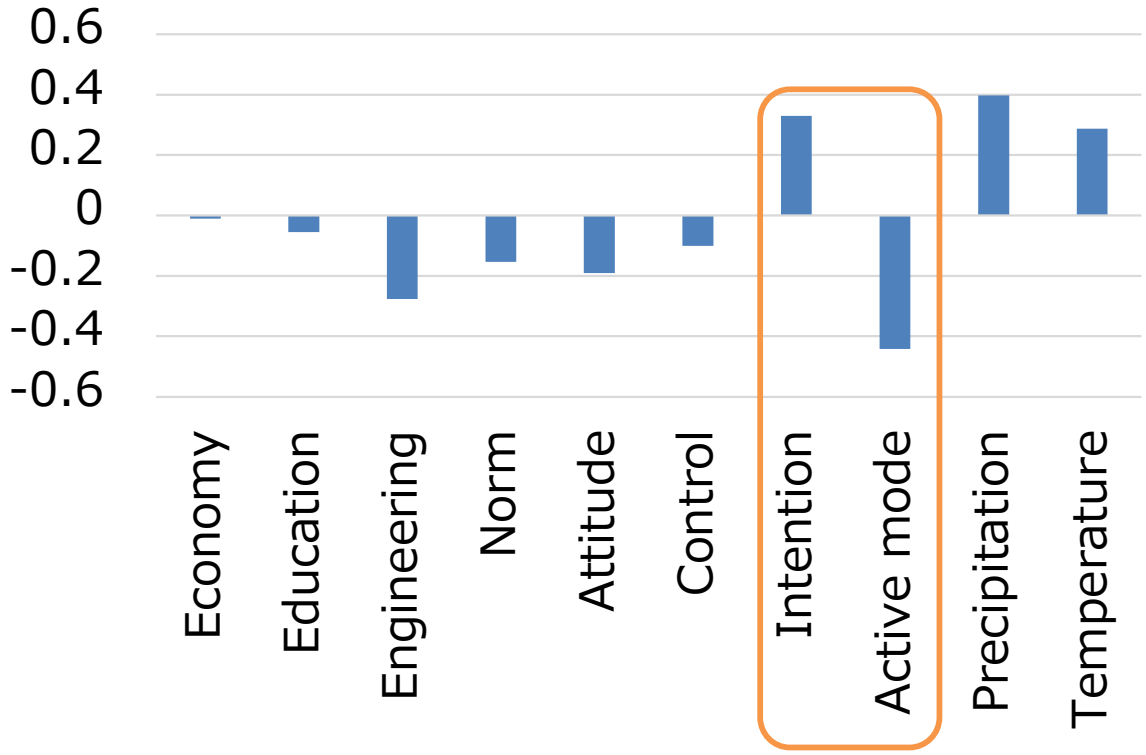
Group 3: Self-disciplined safety countries



N 79
SRMR 0.075 (< 0.1)
NFI 0.866 (< 0.9)

Group 3: Self-disciplined safety countries

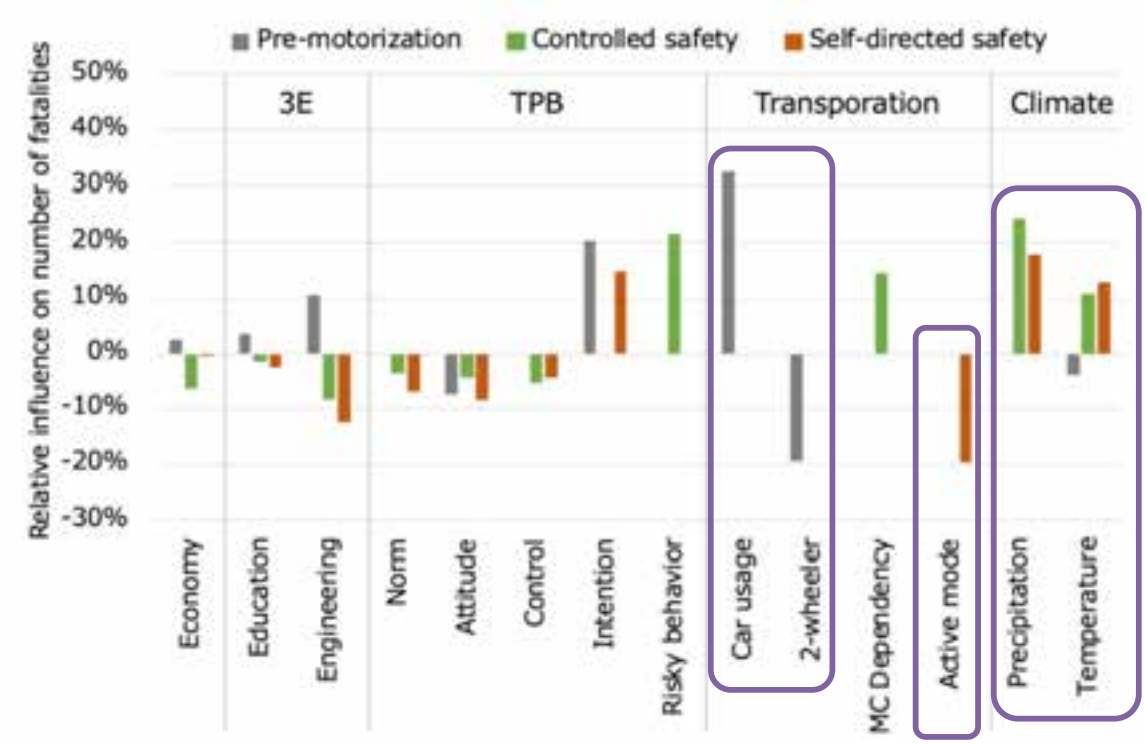
➢ Total effect on fatality



- important to promote a shift from cars to **active modes** such as cycling and walking through infrastructure improvements
- Regultions that will not lead to the **intention** of violation may be useful

Discussions

- Relative influences of each variable on the number of fatalities
  - Common TPB structures on road traffic safety are found
  - The impact of climate is less significant in **pre-motorization countries**
  - In **pre-motorization countries**, economic growth and motorization worsen the traffic safety
  - Promoting active modes contributes to reduce the road fatalities in **self-disciplined countries**



Policy recommendations

➢ Pre-motorization countries

- Transition **from motorcycle use to car use** is expected in the future; concern about the deterioration of the road traffic safety environments
- Necessary to **promote safety awareness and improve the quality of roads** rather than simply extending them

➢ Self-controlled safety countries

- Tendency for a higher crash risks in countries with high temperature and heavy dependence on motorcycles with heavy rainfall
- Motorcycle use is stable; motorcycle-oriented road traffic safety measures are required

➢ Self-disciplined countries

- Those countries where climate conditions are **suitable for active modes** such as walking or cycling, tend to have better traffic safety levels
- Promoting the development of walkable/bikeable cities and shift from car use will be effective in further reducing road crashes

Country Fact Survey (CFS) on Road Traffic Safety

Project member, Dr. Azusa Toriumi
The University of Tokyo, Japan

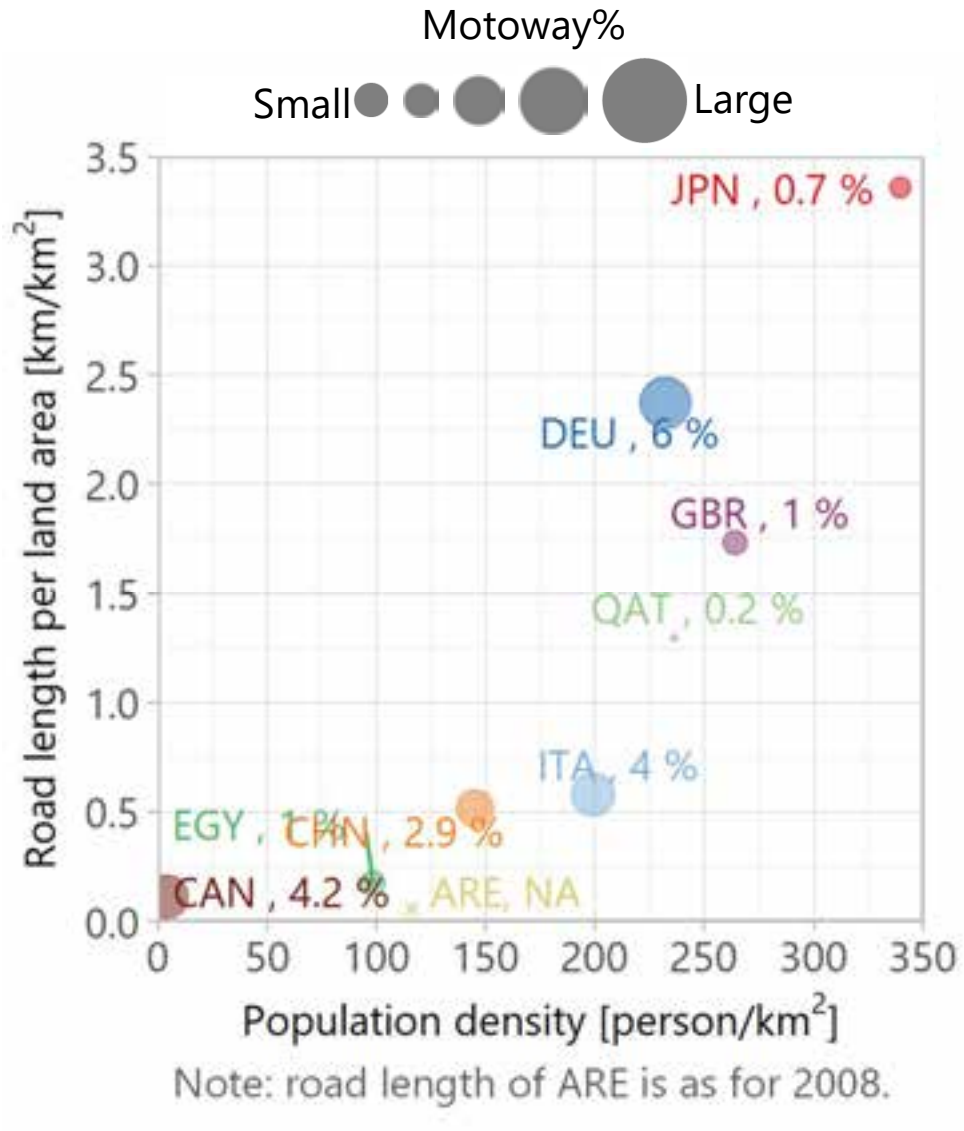
Country Fact Survey

- Aim: to highlight the importance of international comparison of road safety systems by a set of **national indicators** and facts.
- Subject countries: 9 countries in collaboration under IATSS.
- Data were collected and **reorganized into a common format wherever possible**.

Country		Subject year
United Kingdom (Great Britain)	**GBR**	2018
Germany	**DEU**	2017/2018
Italy	**ITA**	2017
Egypt	**EGY**	2018
Qatar	**QAT**	2017
United Arab Emirates	**ARE**	2017
China	**CHN**	2018
Japan	**JPN**	2017
Canada	**CAN**	2019

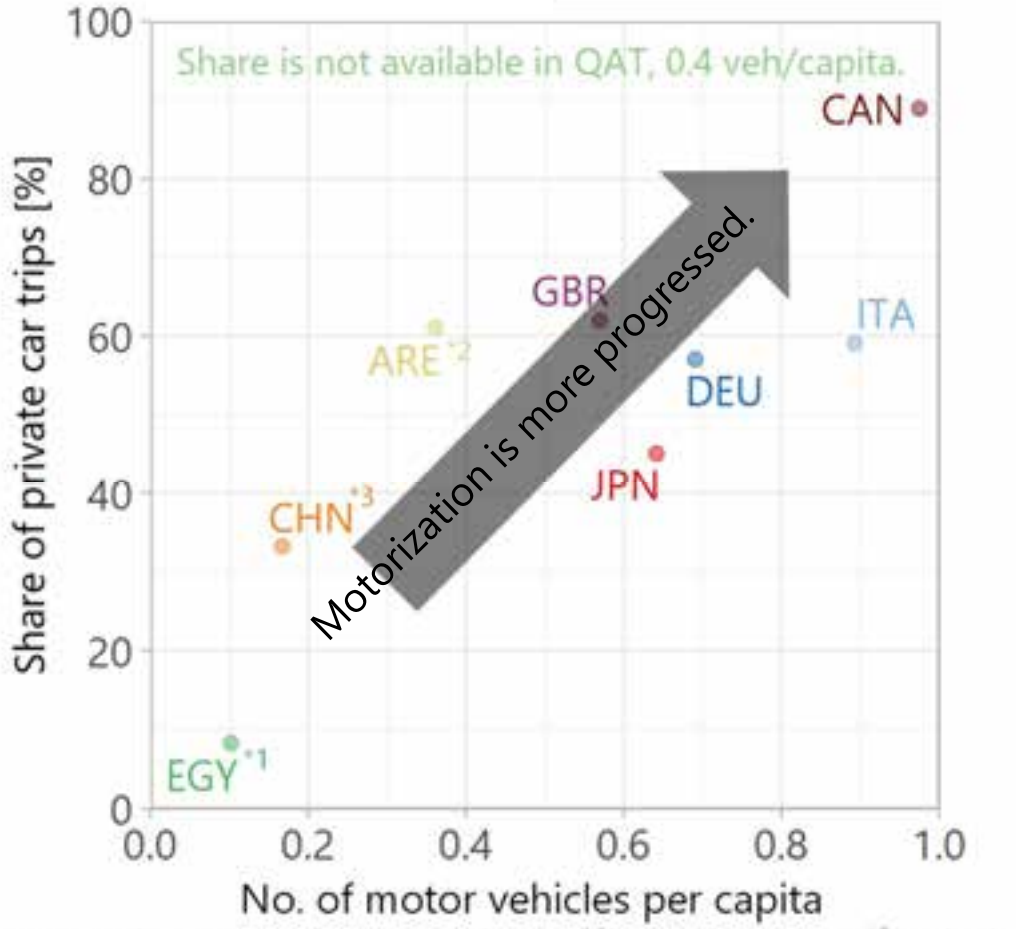
Road development and motorization

- Difference in road development



Note: road length of ARE is as for 2008.

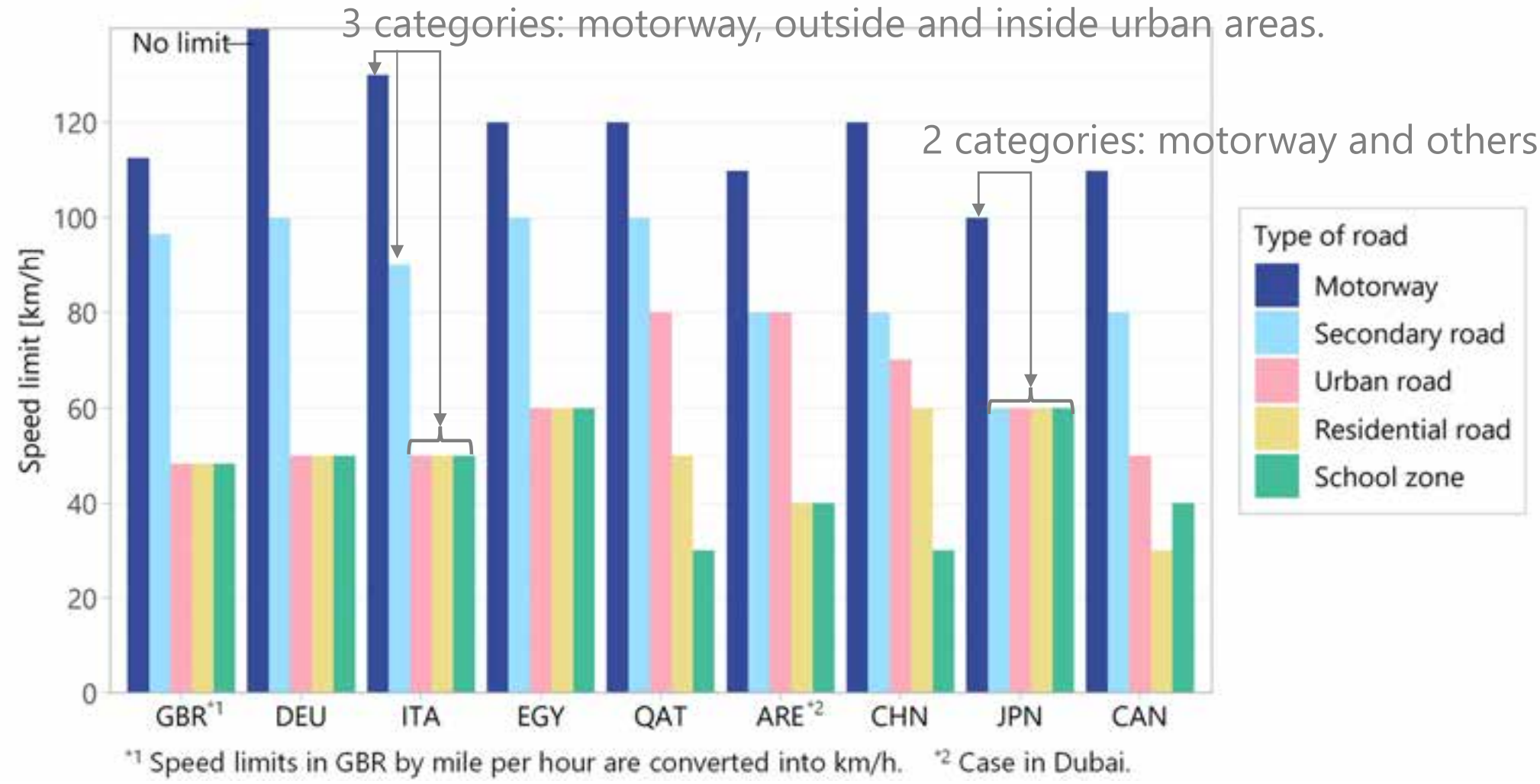
- Difference in motorization



Note: shares are based only on *1intercity trips, *2Dubai, and *3Shanghai, respectively.

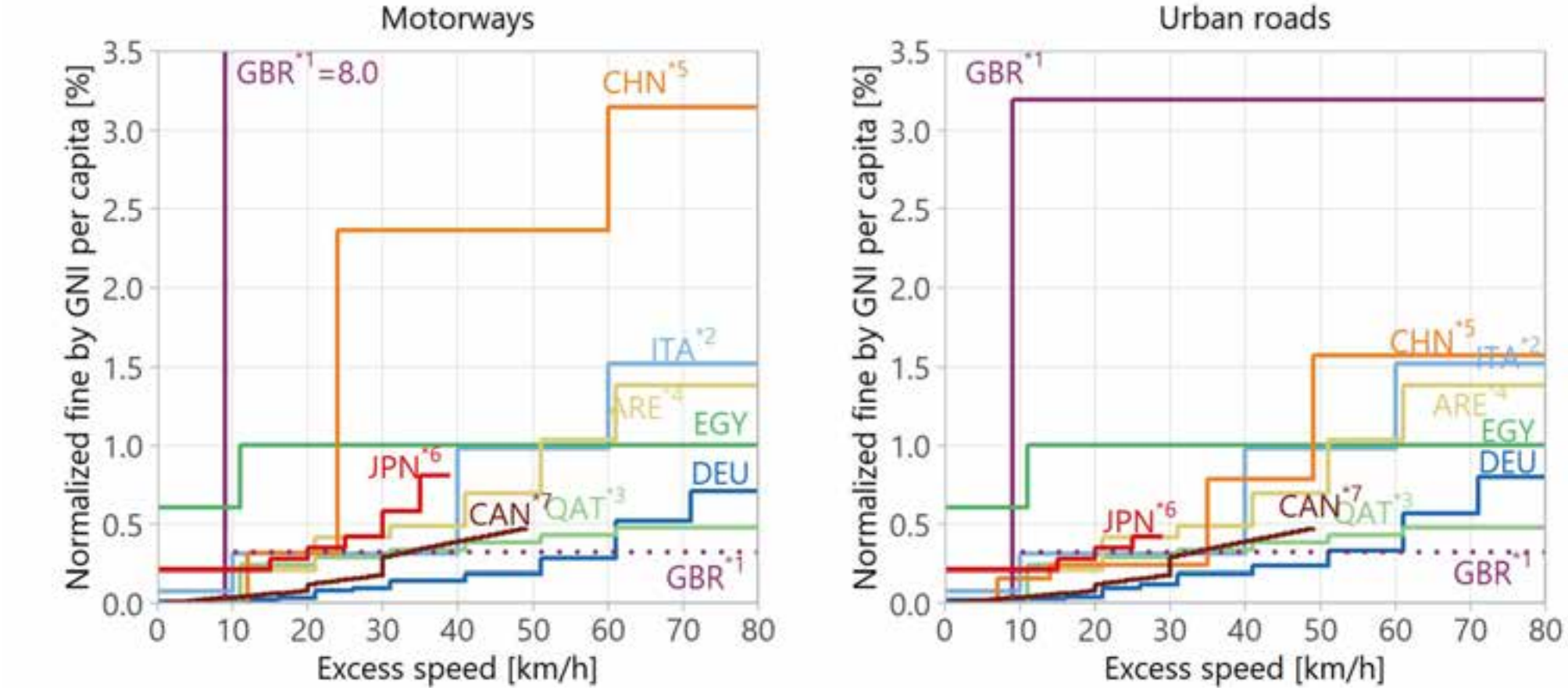
Maximum speed limit in different countries

- Road classification for differentiating statutory maximum speed limits differs by country.
- Speed limits on residential road and school zone is not uniformly defined in all countries.
  - Locally adjustment of posted speed limit is rather common (e.g., Zone 30).



Over-speeding fine by excess speed

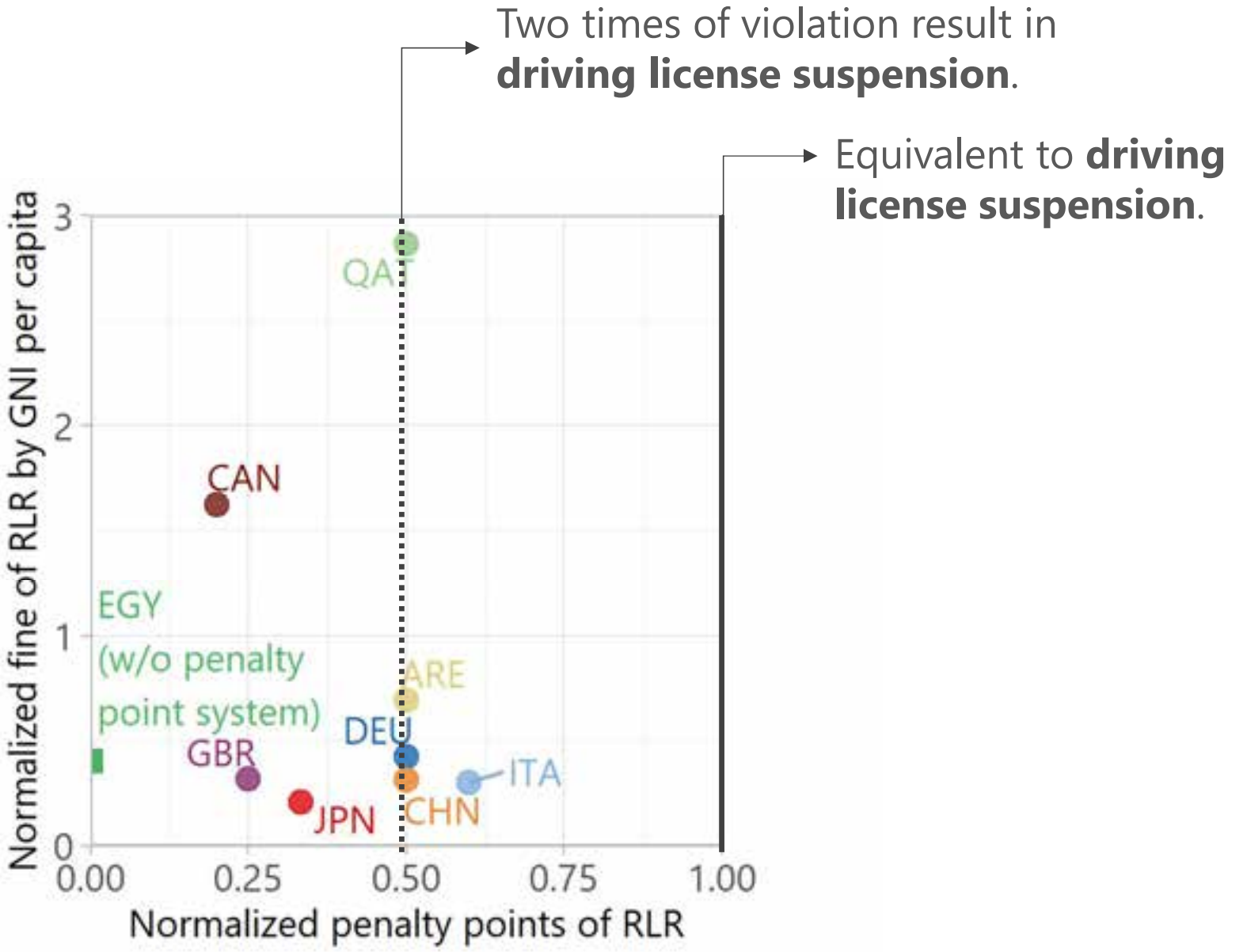
- Many countries apply step-wise increase of speeding fine according to the excess speed, but its amount varies.
- Not many countries defines speeding fine differently for different types of roads.



Note: *1: solid and dotted lines represent the maximum and minimum fines. *2: fine increases by one third if the offense occurs during nighttime (10p.m.-7a.m.)
*3: fines for excess speed greater than 60km/h are set at maximum amounts. *4: case in Dubai. *5: assuming the speed limit of 120km/h and 70km/h for motorways and urban roads, respectively.
*6: fines for excess speed greater than 30km/h on motorways and 40km/h on other roads are decided by the courts. *7: case in Ontario province. Fines for excess speed greater than 50km/h are decided by the courts.

Penalty of red-light running (RLR)

- Balance of fine and penalty points of offence varies.

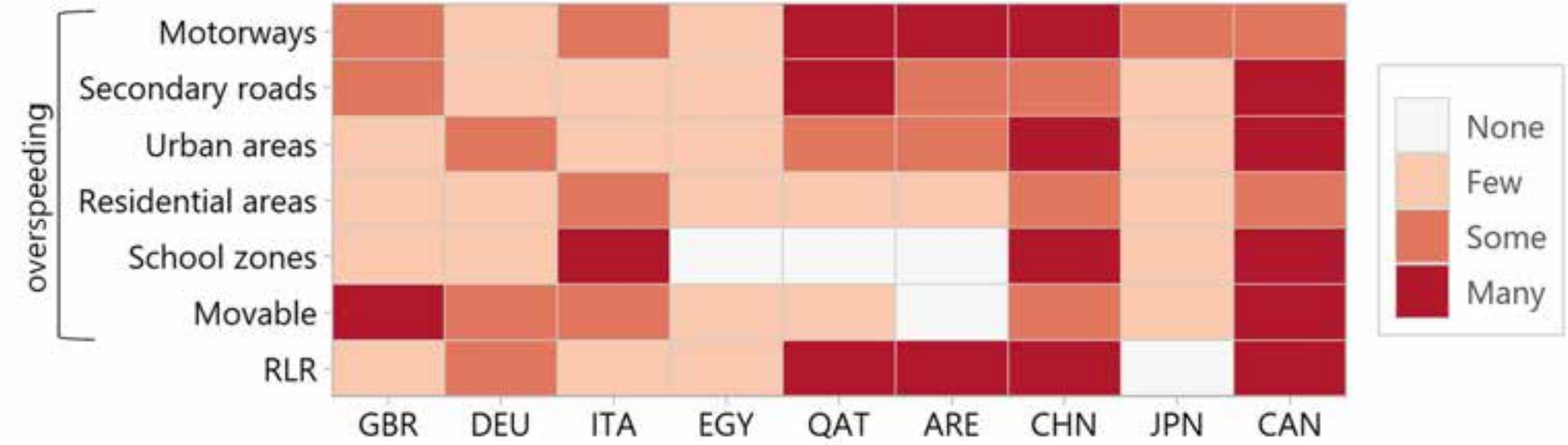


Enforcement

- Different countries have different enforcement intensities.
  - Emerging countries may have more strict enforcement than developed countries.
- Different countries have different policies on where to concentrate enforcement.

Amount of enforcement cameras for detecting offences

(based on subject assessment of the researchers in each country)



Driver education – sustainable education

- Renewal of driving license is the potential opportunity of sustainable education of drivers, but it is less frequent with few contents in many countries.

Country	GBR	DEU	ITA	EGY	QAT	ARE	CHN	JPN	CAN
Frequency of license renewal (general driver) [every – years]	10	15	10	10	10 or 5*	10 or 5*	10	5	5
First license renewal [after – year]	10	15	10	10	10 or 5*	2	6	3	5
Renewal of personal photocopy	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Visual acuity test	No	No	Yes	No	No	Yes	Yes	Yes	Yes
Class lecture	No	No	No	No	No	No	No	Yes	No
Practical training	No	No	No	No	No	No	No	No	No

* 10 years for Qatari citizens / UAE citizens and Gulf nationals and 5 years for others.