



ADVANCING ROAD SAFETY THROUGH TWINNING

# PhD SEMINAR SESSIONS

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# Assessment of influential factors on motorcyclists' safety on rural roads

## Behavioral Characteristics Among Motorcyclists

Presented by Marija Ferko



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# About Ph.D. project

- Investigating the factors that influence motorcyclist safety with a focus on rural roads
  - Human factors and infrastructure influence
    - Studying rider behavior
    - Past crash data
    - Perception of road infrastructure elements



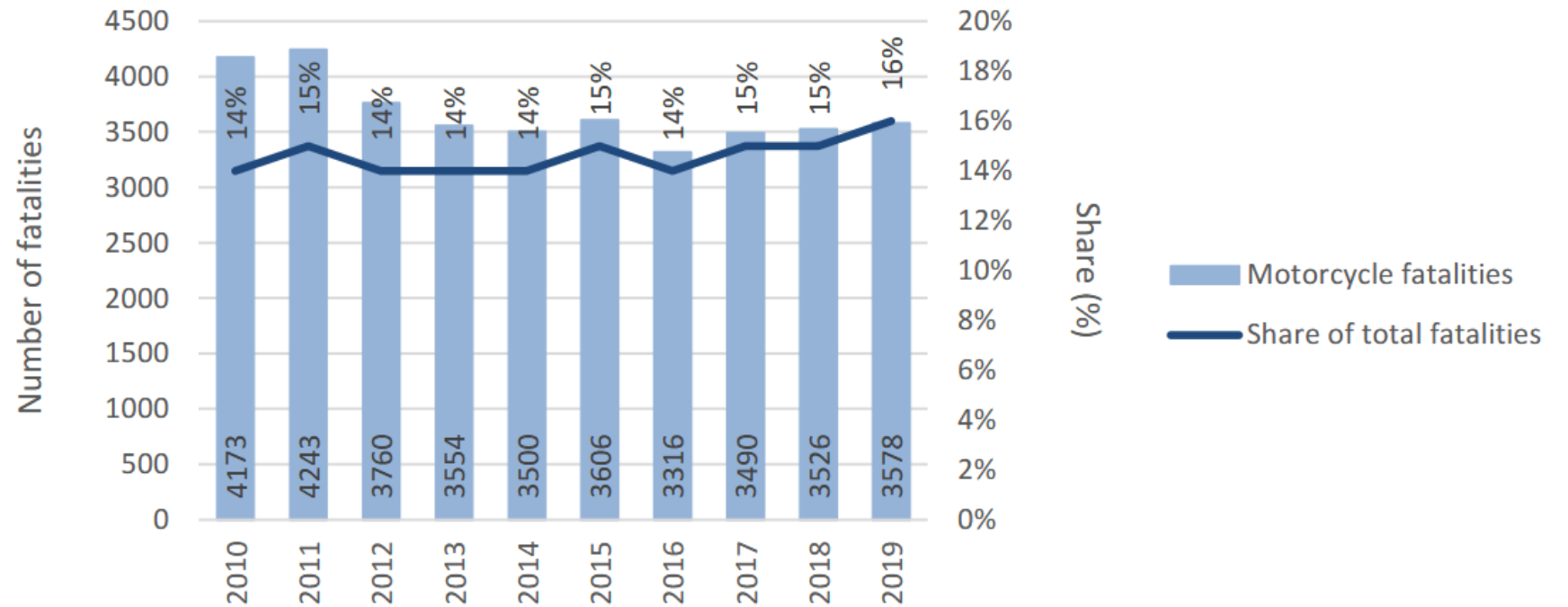
# Introduction

- Vulnerable road users
- Need for targeted research on motorcycle safety
- Study context:
  - Focused on Croatian motorcyclists.
  - Extended Motorcycle Rider Behavior Questionnaire (MRBQ).



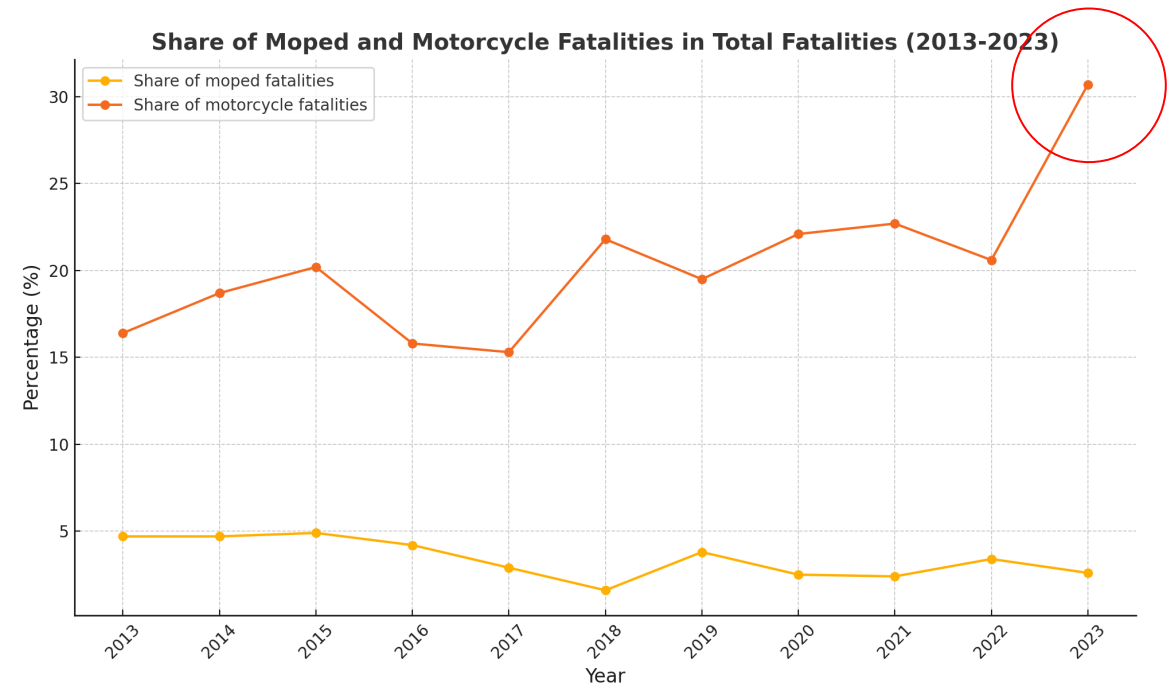
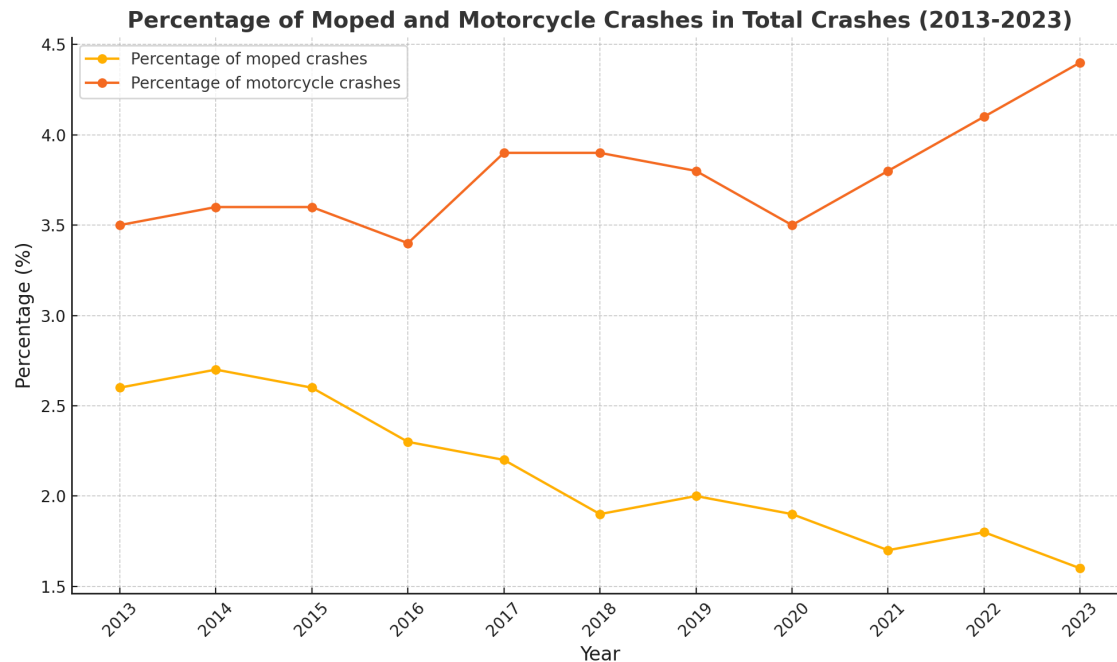
# Introduction

Annual number of motorcycle fatalities, and their share in the total number of fatalities in the EU27 (2010-2019)



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# Introduction



Crash data from Croatia, 2013-2023



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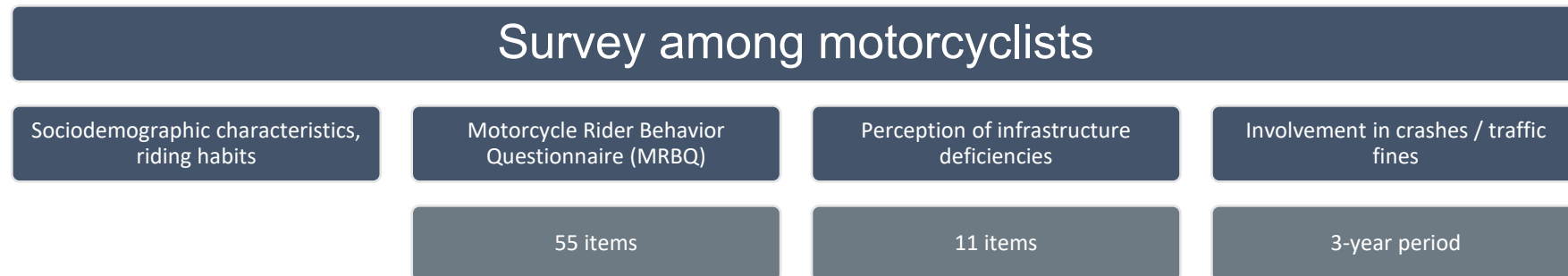
# Introduction

- Primary objectives
  - Investigate behavioral and perceptual factors influencing risky riding.
  - Assess the role of infrastructure and demographic factors.
- Key questions
  - How do MRBQ factors relate to risky behaviors?
  - Are infrastructure elements perceived as risks?
  - Do demographic characteristics influence risky outcomes?



# Research methodology

- Survey design
  - Adaptation and expansion of MRBQ
  - Inclusion of infrastructure perception items



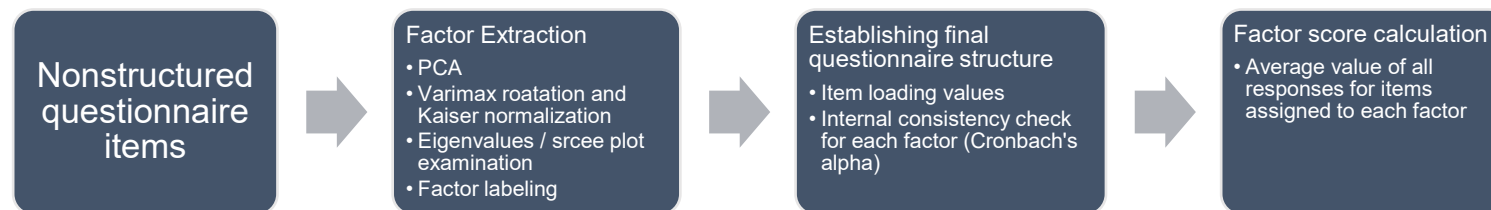
# Research methodology

- Data collection
  - Conducted among 906 Croatian motorcyclists (2023)
  - After data cleaning, the valid dataset consisted of 842 motorcyclists
  - Online recruitment through motorcycle clubs and social platforms



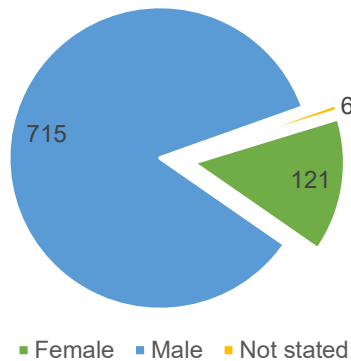
# Research methodology

- Data analysis
  - PCA for factor structure
  - Logistic regression for behavioral predictors

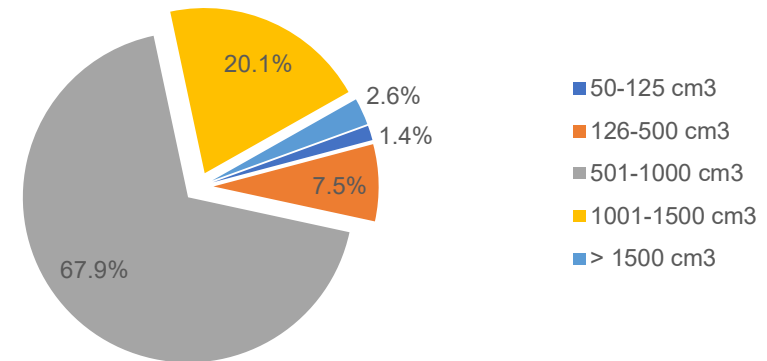


# Results – About the participants

Participant gender



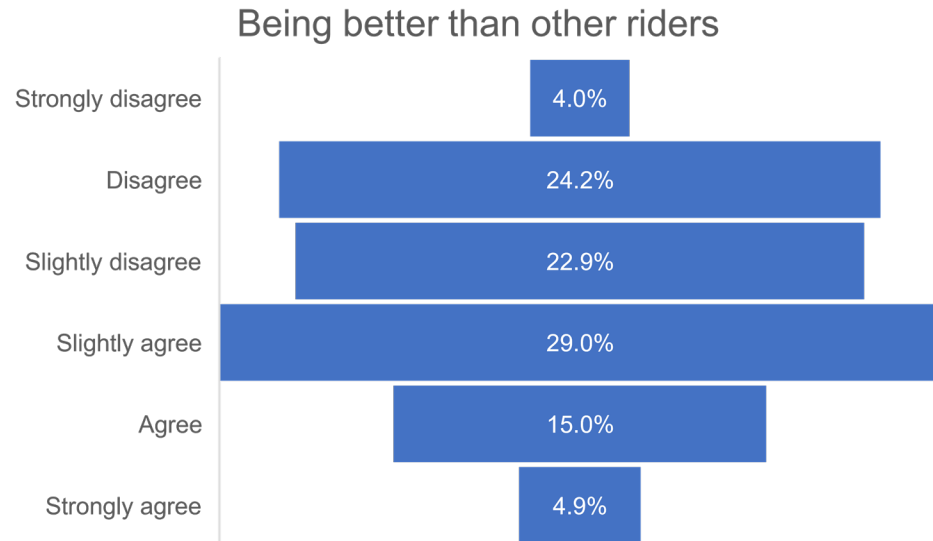
Motorcycle engine capacity



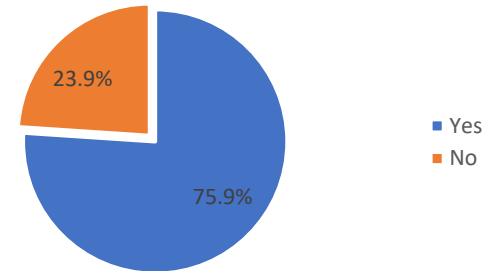
	Mean	Min	Max	Std. Dev.
Participant age (yrs.)	38.12	18	69	10.65
Motorcycle license age (yrs.)	12.94	0	50	10.84
Average km/year	8805.23	100	150000	9133.39



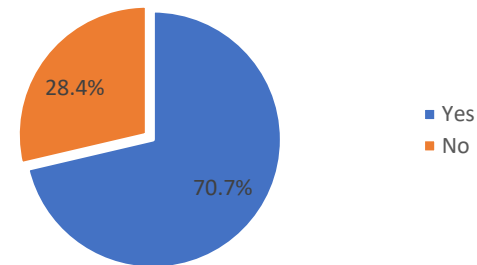
# Results – About the participants



Rode moped before motorcycle



Rode motorcycle before getting license

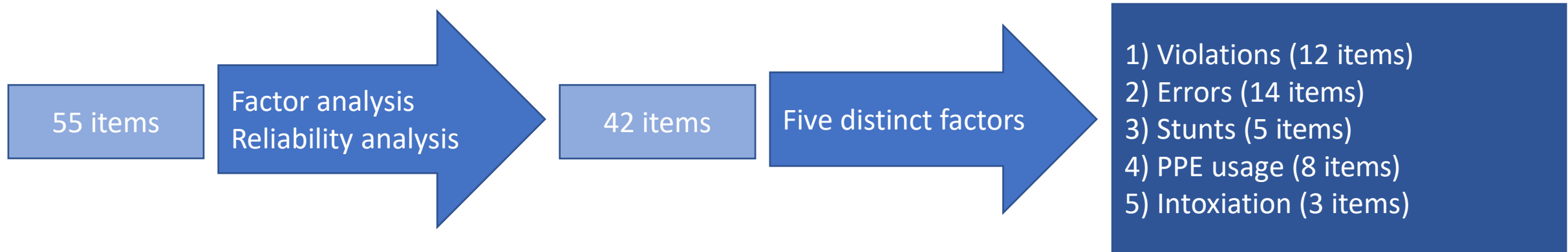


# Results – Crash involvement

Variable		Frequency	Percent
Single-vehicle crash	None	585	79.6
	One	127	<b>17.3</b>
	Two	17	2.3
	Three or more	6	0.8
Multi-vehicle crash	None	641	87.4
	One	81	<b>11.1</b>
	Two	10	1.4
	Three or more	1	0.1
Single-vehicle near crash	None	399	54.7
	One	148	<b>20.3</b>
	Two	65	<b>8.9</b>
	Three or more	118	<b>16.2</b>
Multi-vehicle near crash	None	213	29.2
	One	181	<b>24.8</b>
	Two	91	<b>12.5</b>
	Three or more	245	<b>33.6</b>
Fined as motorcycle rider	No	602	83.4
	Yes	120	<b>16.6</b>



# Results – MRBQ factor structure



# Results – MRBQ factor structure

- Five factors cumulatively account for **43.37%** of the total variance
  - Factor 1 contributing 13.70%, Factor 2 contributing 10.29%, Factor 3 contributing 7.71%, Factor 4 contributing 7.61%, and Factor 5 contributing 5.06%

Reliability analysis of MRBQ factors and MRBQ factor score statistics

Factor	Questionnaire		Factor scores				
	No. of Items	Cronbach's Alpha	Min	Max	Mean	Std. Er.	Std. Dev.
1 Violations	12	0.891	1	5.67	2.891	0.03187	0.92468
2 Errors	14	0.787	1	3.64	1.634	0.01543	0.44763
3 Stunts	5	0.831	1	5.2	1.610	0.02862	0.81646
4 PPE	8	0.748	1	6	4.393	0.03225	0.89196
5 Intoxication	3	0.749	1	6	1.335	0.02207	0.64049



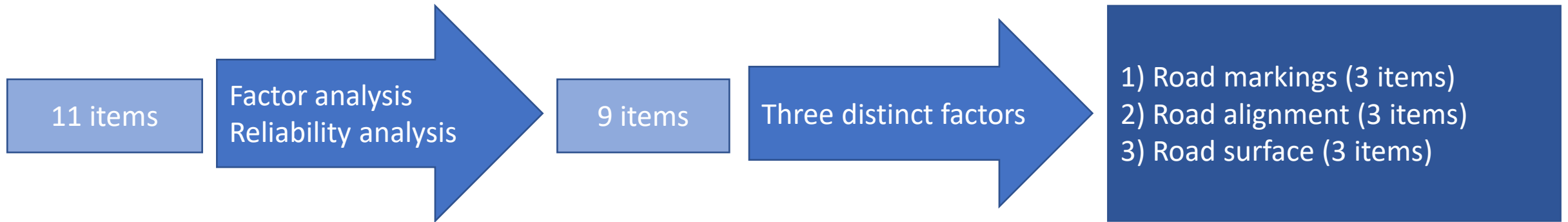
# Results – Predicting risky behavior

Summary of logistic regression analysis

Outcome	Variable	B	Exp(B)	95% C.I. (Lower - Upper)	Significance
Crash involvement	<b>Errors</b>	0.62	1.859	1.221 - 2.831	0.004
	Avg. km/year	0	1.000	1.000 - 1.000	0.008
	Rider Age	-0.042	0.959	0.934 - 0.984	0.001
Near-crash involvement	<b>Errors</b>	0.846	2.331	1.376 - 3.947	0.002
	Avg. km/year	0	1.000	1.000 - 1.000	0.008
	Rider Age	-0.036	0.965	0.942 - 0.988	0.003
Traffic Fines	<b>Violations</b>	0.356	1.428	1.101 - 1.852	0.007
	<b>Stunts</b>	0.29	1.336	1.033 - 1.729	0.028
	Avg. km/year	0	1.000	1.000 - 1.000	0.001



# Results – Road infrastructure



# Results – Road infrastructure

- The three components explain **73.09%** of the total variance after rotation
  - Factor 1 accounted for 27.68%, Factor 2 for 22.84%, and Factor 3 for 22.58% of the variance

Reliability analysis road infrastructure factors and factor score statistics

Factor	Questionnaire		Factor scores				
	No. of Items	Cronbach's Alpha	Min	Max	Mean	Std. Er.	Std. Dev.
1 Road markings	3	0.894	1	5.67	2.891	0.03187	0.92468
2 Road alignment	3	0.737	1	3.64	1.634	0.01543	0.44763
3 Road surface	3	0.752	1	5.20	1.610	0.02862	0.81646



# Results – Road infrastructure

- Riders who tend to make more errors are more likely to blame deficiencies in road infrastructure for their crashes
- More experienced riders are less likely to blame road alignment deficiencies for their crashes

Correlation analysis between road infrastructure perception factors and other variables

	Errors	Stunts	Age	License age	Average km/year	Motorcycle engine capacity	Fined as motorcycle rider
Road markings	<b>0.137**</b>	0.026	0.046	0.029	-0.053	0.036	<b>-0.074*</b>
Road alignment	<b>0.144**</b>	<b>-0.081*</b>	-0.062	<b>-0.101**</b>	<b>-0.126**</b>	-0.012	<b>-0.081*</b>
Road surface	<b>0.111**</b>	<b>0.110**</b>	<b>-0.152**</b>	<b>-0.114**</b>	-0.04	<b>-0.092*</b>	-0.04

\*\*Correlation is significant at the 0.01 level (2-tailed). \*. Correlation is significant at the 0.05 level (2-tailed).



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# Conclusions





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**Thank you for your attention!**

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