Safety effects of infrastructure road safety measures

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Risk Factors and Measures

Problem:

• Evidence-based road safety policies are becoming more widespread
• Linking of risks and measures is imperative:
  – Specific effects are required
  – Current knowledge is dispersed amongst several countries and repositories
  – Effects are not comparable and reported dissimilarly

Solution:

• SafetyCube meets this need by generating new knowledge about risk factors and measures to be integrated in the Road Safety Decision Support System (DSS) www.safetyscube-project.eu
• This knowledge is attained by gathering, assessing and meta-analyzing research
SafetyCube Methodology

1. Creating taxonomies of road safety measures
2. Exhaustive literature review and rigorous study selection criteria
3. Use of a standardized template for coding studies
4. Carrying out meta-analyses to estimate the effects of measures.
5. Drafting Synopses summarizing results of measures, including a “colour code” denoting their impacts.

- Stakeholders: Hot topics & additional risk factors and measures
- Rigorous assessment of the quality of the data / study methods
- Systematic and case-by-case approach:
  - links between infrastructure, user and vehicle risks and measures

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SafetyCube Infrastructure Taxonomy

The Taxonomy endeavors to:

• Capture all elements of road safety studied worldwide:
  – 11 infrastructure elements including
  – 24 general measures including
  – 94 specific measures

• Examine parameters on a road safety measure basis

• Link scientifically researched appropriate measure(s) in a case-by-case approach with risk factors
Challenges and Criteria

• Several challenges when examining road safety studies:
  – Considerable variations at study design levels (e.g. cross-sectional vs. case-control studies etc.)
  – Inclusion of all relevant parameters (e.g. different road users, scenarios), topic complexity (e.g. land use regulations)
  – Relevant outputs to road safety, quantifiable impacts (e.g. impact on crashes, driver behavioral variables)

• Rigorous criteria for study inclusion:
  – Study year: 1990 or newer
  – Document type: Journal (unless more studies are required)
  – Existing meta-analyses prioritized at all times
  – Good overall quality, verification and transferability of results
Synopses: Concise Knowledge

Every topic adequately studied is summarized in a Synopsis:

• Pertinent studies are grouped and assessed
• A relevant analysis is conducted (Meta-analysis when possible, vote-count or review-type analysis alternatively)
• Synopses assign a colour code: Ranking of measures
• Quality control at all stages ensures verified and accurate outcomes
Main Results (1/3)
For Road Safety infrastructure measures:
- 48 synopses have been compiled
- Most include existing meta-analyses, 2 include new meta-analyses
- 16 measures -> **Green** (consistent evidence of a positive effect on road safety)
- 19 measures -> **Light Green** (probably effective - likely positive effect on road safety)
- 14 measures -> **Grey** (unclear – no clear conclusions)
- Contributions by 9 SafetyCube partners
Main Results (2/3)
For Road Safety infrastructure measures:
• Overall 250 studies were coded
• 160 studies had ‘before-after’ designs (>50%)
• Studies included over 1800 road safety effects
• Examined outcomes (times examined):
  – Accident rate/risk (96)
  – Vehicle speed (58)
  – Behaviour of drivers/pedestrians (52)
  – Injury or Casualty rate/risk (38)
  – Conflicts (5)
  – CMF (4)
  – Other (3)
Main Results (3/3)

To determine color code, affected road safety outcomes were examined:

• Crash risk: number of crashes per unit of exposure
• Crash frequency
• Crash severity of the injuries sustained by crash casualties
• Measures examined by road type applicability (with overlap):
  – Motorways (25 measures)
  – Rural Roads (39 measures)
  – Urban roads (38 measures)
Vote Count Analyses Results

[Graph depicting vote count analyses results]
Conclusions

• Implementation of a standardized methodology
• Exhaustive scope for all road safety aspects from many databases
• Meta-analyses utilization: concise and comprehensive knowledge
• High-Quality, recent studies have been exploited
• Prioritizing European Studies for transferability
• Ranking of road safety infrastructure measure effectiveness
Integration to the DSS

• Addressing current knowledge gaps on the effectiveness of infrastructure road safety measures

• The SafetyCube DSS provides a means for concise standardization-documentation of research results

• Continuous research and respective updating of SafetyCube DSS will lead to a road safety encyclopaedia

• Available at: https://www.roadsafety-dss.eu
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