A Rapid Evidence Review of Methods: Autonomous Vehicle Security and Human Behaviour

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Introduction

 Aim: Identify methods for investigating behavioural change in autonomous vehicles and how this may compromise security



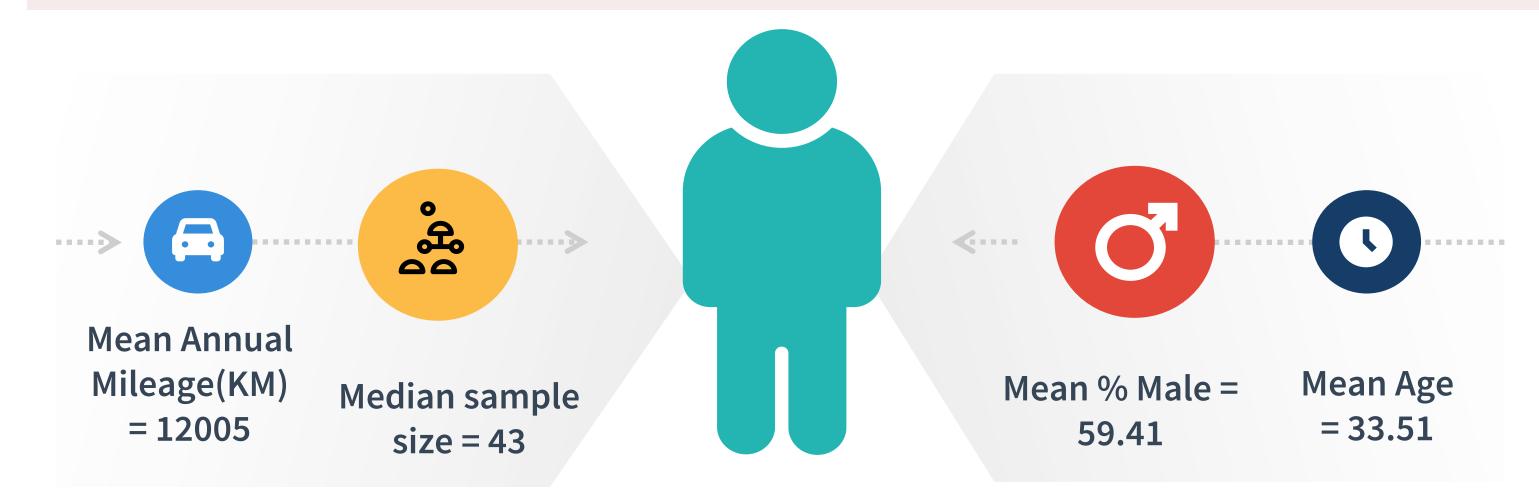
Engineering and Physical Sciences Research Council





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Participant Descriptives



Results: Research Methods



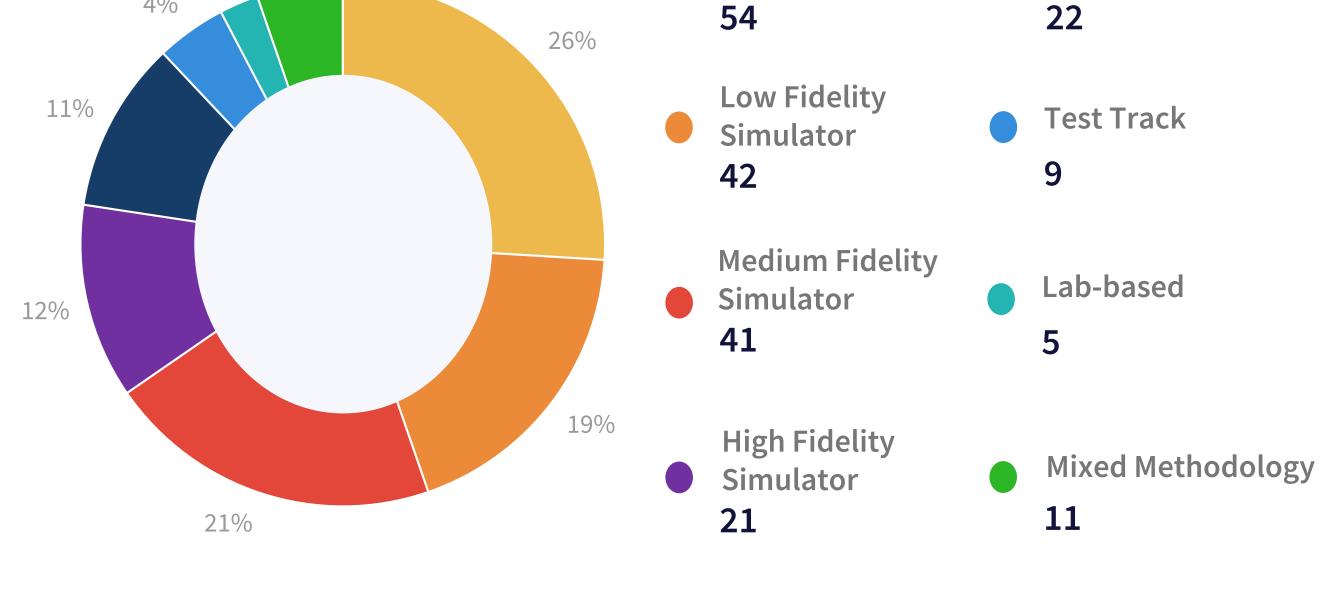


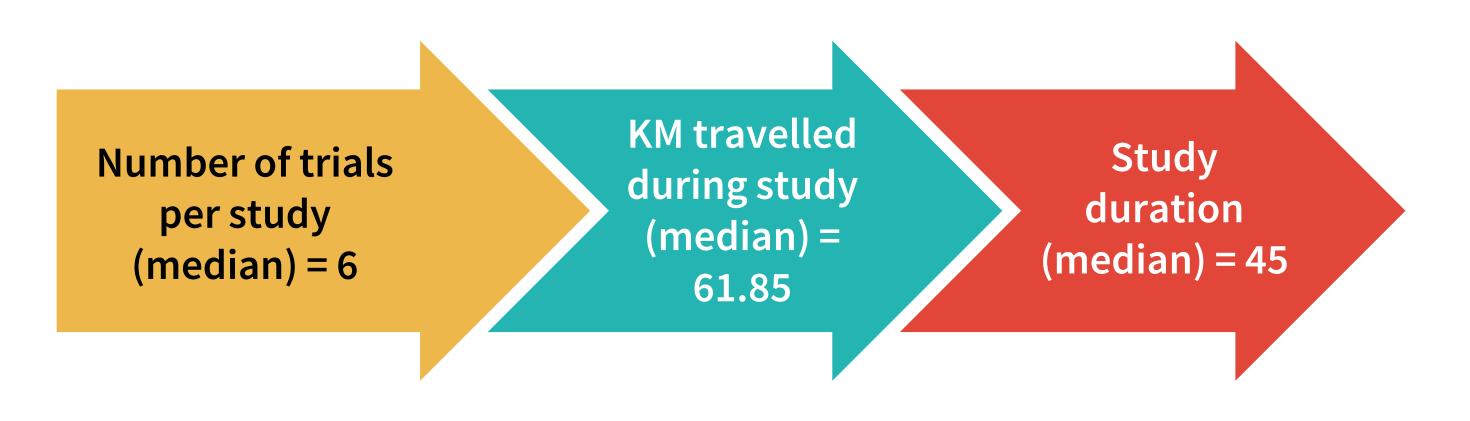
Public Roads

- Authorship expertise in socio-technical aspects of security, human factors, librarianship, psychology and driver behaviour
- A modified Cochrane HSSS used: Academic Search Ultimate, PsycInfo, SOCIndex, ACM Digital, IEEE Xplore, Science Open, Scopus, Web of Science
- Protocol followed systematic review and PRISMA reporting guidelines

Research Questions for Search Strategy:

- What are the mental models that guide how humans interact with Autonomous Systems (AS)?
- What specific behaviours change as humans adapt to AS?
- What are the main ways that Behavioural Adaptation (BA) to AS has been measured?
- What are the environmental and social factors that influence the development of negative BA in response to AS?
- How does BA to warning systems influence AS security?





Results: Driving Scenarios

Methodology



Identification Records identified through database searching (n = 6506)

Screening Records after duplicates were removed (n = 3988)

Title and Abstract Sift Records screened via title and abstract sift (TAS) (n = 3988)

Eligibility Full-text articles screen for eligibility (n = 880)

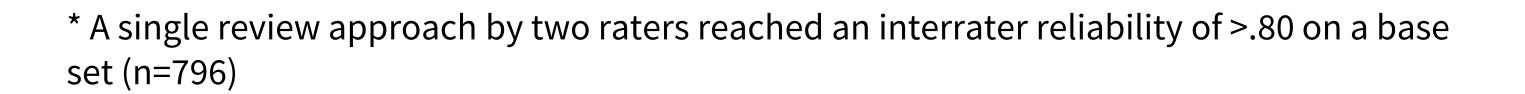
Included

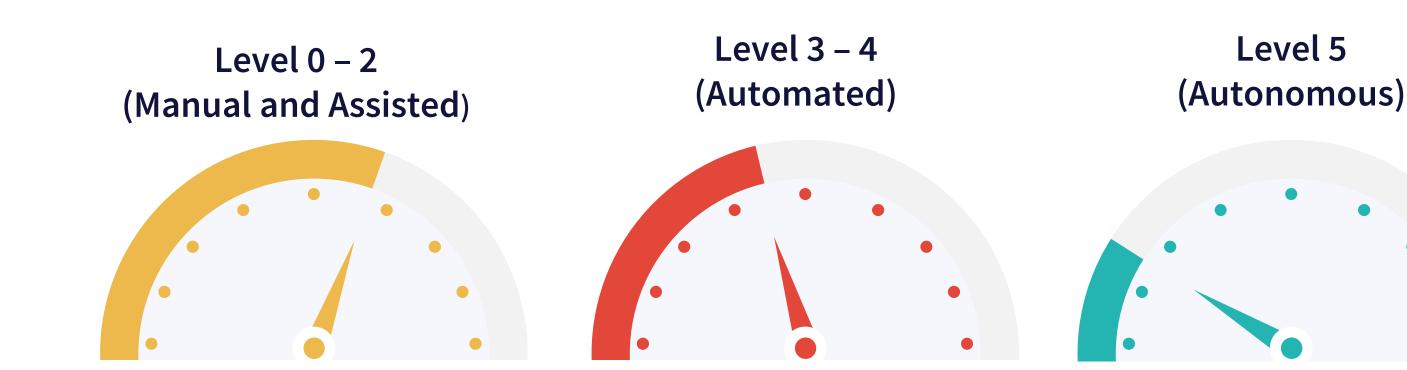
Papers included (n = 174) Studies included (n = 185) **No. of Exclusions** Records excluded (n = 3108*)

Screening: Full Text Review

Full-text articles screened, excluded (n = 706)

363 No human interaction Automated vehicle/system only
140 Not a journal paper
106 No full text
69 Reviews and Commentary
19 Non-driving platform
5 Non-English
4 Other (e.g. magazine articles)

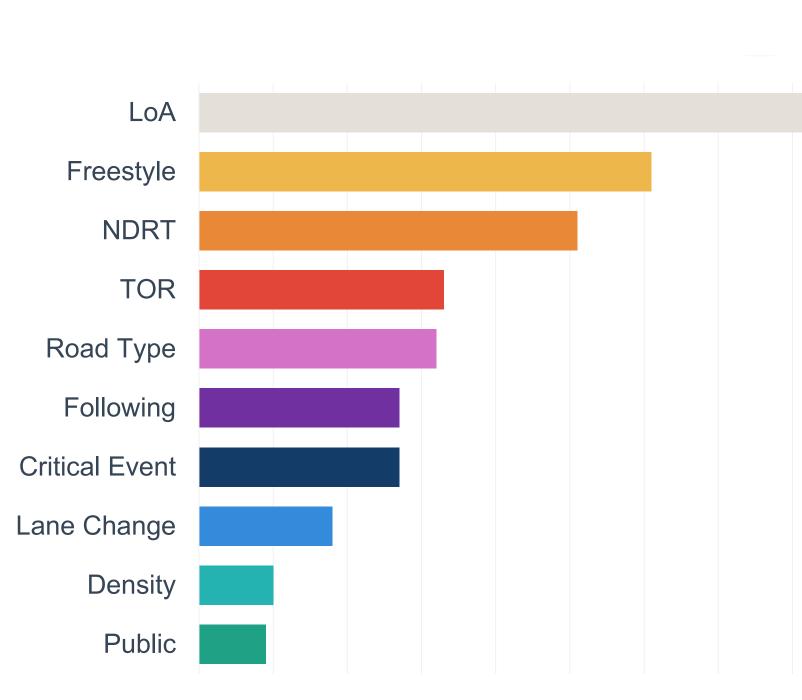




109 Studies



22 Studies



Driving Scenario	Number of Studies
Automation Level Comparison	82
Freestyle Driving	61
NDRT/Secondary Tasks	51
Take Over	33
Road Type	32
Following	27
Critical Event	27
Lane Change	18
Traffic Density	10
Public Interaction	9

Conclusions: Research Gaps

- Narrow studies employing self report or low/medium simulator-based methods with small younger male samples
- Handful of studies investigate human behaviour for non-AV platforms
- Most studies compare responses to different levels of vehicle automation
- Relatively few studies investigate human behaviour in fully autonomous vehicles
- Limited number of studies on behavioural adaptation in response to automation
- No studies on how human behaviour can compromise security at any level of automation or platform



