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
- 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?

Methodology

<table>
<thead>
<tr>
<th>Identification</th>
<th>1 Records identified through database searching (n = 6506)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening</td>
<td>2 Records after duplicates were removed (n = 3086)</td>
</tr>
<tr>
<td>Title and Abstract Sift</td>
<td>No human interaction Automated vehicle/system only: 363 No full text articles excluded (n = 3109*)</td>
</tr>
<tr>
<td>Eligibility</td>
<td>4 Full-text articles excluded for eligibility (n = 880)</td>
</tr>
<tr>
<td>Included</td>
<td>5 Papers included (n = 174) Studies included (n = 185)</td>
</tr>
</tbody>
</table>

Screening: Full Text Review

- Full-text articles screened, excluded (n = 706)
- 402 No human interaction
- Automated vehicle/system only: 363 No full text
- 140 Not a journal paper
- 106 Not a test
- 69 Reviews and Commentary
- 50 Non-driving platform
- 5 Non-English
- 4 Other (e.g. magazine articles)

* A single review approach by two raters reached an interrater reliability of >.80 on a base set (n=796)

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