

REVIEW ARTICLE

Risk behind the wheel: A scientometric and scoping review of sensation seeking and driving behaviour among military personnel

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Abstract - Sensation seeking is strongly linked to risky driving, a pressing issue in military populations where stress and operational demands heighten risk-taking. This study consolidates fragmented research across psychology, military health, traffic safety, and behavioural sciences through a dual-method approach combining scientometric analysis and a scoping review. Using data from Scopus and Web of Science, the scientometric analysis mapped publication trends, influential institutions, key concepts, and dominant theoretical frameworks, while the scoping review synthesised empirical evidence to identify major themes, methodological trends, and research gaps. The findings reveal growing academic interest over the past two decades, with risk-taking, risk perception, and psychological traits as central themes. Theories such as the Theory of Planned Behaviour, Terror Management Theory, and Deterrence Theory, were most frequently applied. Research output remains geographically concentrated, highlighting the need for broader global participation. The review further confirms that sensation seeking, impulsivity, and risk perception significantly shape driving behaviour under stress or fatigue and are influenced by factors such as gender, age, and self-confidence. This integrated synthesis clarifies the current state of knowledge and guides evidence-based interventions to enhance road safety and occupational well-being among military personnel, aligning with Sustainable Development Goals 3 and 8.

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1. Introduction

Sensation seeking is a personality trait characterised by a tendency towards novel, intense, and diverse experiences, often involving a willingness to take physical and social risks to achieve such experiences (Zuckerman, 1979). This trait is linked to a higher likelihood of engaging in risky behaviours, as demonstrated by its correlation with hazardous activities and mental health disorders among adolescents (Padrós Blázquez et al., 2021). Research shows that sensation seeking is positively correlated with risk-taking behaviour, with peer influence identified as a significant predictor; however, no interaction effect between sensation seeking and peer influence has been found (Siraj et al., 2021). In the sports domain, sensation seeking has been associated with an increased risk of sport-related concussions, especially among athletes in contact sports, indicating that higher sensation-seeking scores may be linked to a greater likelihood of sustaining concussions (Liebel et al., 2020). During the COVID-19 pandemic, sensation seeking was reported to drive both positive and negative risk-taking behaviours, highlighting its influence on socially accepted and unaccepted risks (Brinke et al., 2022). Furthermore, sensation seeking affects risk adjustment through reward sensitivity, thus influencing how individuals respond to rewards and make decisions in high-risk contexts (Yin et al., 2023). Overall, sensation seeking is a complex trait that significantly influences various aspects of risk-taking behaviour and is shaped by both individual and contextual factors.

Sensation seeking is closely linked to risk-taking behaviours through various psychological and neural mechanisms that differ across populations. High sensation seekers (HSS) display behavioural and neural insensitivity to negative outcomes when making decisions under uncertainty. This is evidenced by their stable feedback-related negativity (FRN) regardless of the magnitude of potential losses, in contrast to low sensation seekers (LSS), who show increased sensitivity to such outcomes (Xu et al., 2019). This insensitivity may predispose HSS individuals to engage in riskier behaviours. Dopamine plays a crucial role in modulating risk-taking, with its effects depending on baseline sensation-seeking traits. The administration of the D2/D3 agonist cabergoline revealed that individuals with lower sensation-seeking scores were more sensitive to winning probabilities and less able to discriminate between loss magnitudes, thereby highlighting dopamine's influence on risk-related decision-making (Norbury et al., 2013). Furthermore, the neurobiological foundations of sensation seeking indicate that HSS individuals show more pronounced neural responses to high-arousal stimuli in brain regions associated with arousal and reinforcement. In contrast, LSS individuals exhibit greater activation in areas linked to emotional regulation (Joseph et al., 2009). Additionally, the processing of intense sensory experiences, such as mild electric shocks, is similarly encoded as economic rewards in the ventromedial prefrontal cortex of stimulation-seeking individuals, suggesting a shared neural mechanism for both sensory and economic rewards (Norbury et al., 2016). These findings highlight the complexity of sensation seeking and its implications for risk-taking, as variations in neural and psychological responses across different populations contribute to diverse behavioural outcomes.

In a military context, personnel represent a high-risk group for dangerous driving, particularly after deployment or active duty, due to several interrelated factors. Training in high-stress, high-speed environments can normalise risky

driving behaviours; military personnel are often conditioned to operate under pressure, which may carry over into civilian driving situations (Whipple et al., 2016). Additionally, exposure to combat and psychological stressors, such as post-traumatic stress disorder (PTSD) and depression, significantly contribute to risky driving behaviours. Veterans diagnosed with PTSD or traumatic brain injury (TBI) report higher levels of driving-related anxiety and engage in more high-risk driving compared to their nondisabled counterparts (Lew et al., 2011; Whipple et al., 2016). Substance use, particularly alcohol, plays a critical role, as alcohol consumption is notably higher among certain military ranks and during specific periods, such as the invasions of Iraq and Afghanistan (Kesisiklis, 2011). This increased substance use correlates with heightened crash severity and fatalities (Kesisiklis, 2011). Moreover, military culture, which emphasises toughness and resilience, may discourage help-seeking behaviour and further exacerbate issues such as emotional dysregulation and risky driving (MacManus et al., 2015). Young male service members, especially those aged 17-25, are disproportionately represented in military motor vehicle fatalities, with risky driving being a significant contributing factor (Kesisiklis, 2011; Sheriff et al., 2015). Despite these challenges, efforts have been made to mitigate risky driving, as exemplified by the UK military's road safety campaign, which has resulted in a reduction of dangerous driving behaviours over time (Sheriff et al., 2015). Therefore, understanding these factors is essential for developing targeted interventions aimed at improving road safety among military personnel.

Personality traits, particularly sensation seeking, significantly interact with military-specific stressors to influence driving behaviour, as demonstrated by various studies. Sensation seeking, defined by a desire for novel and intense experiences, is associated with risky driving behaviours that are common among military personnel due to the high-stress environments encountered during deployments (Li et al., 2021). A study by the UK Defence Science and Technology Laboratory on army personnel deployed to Iraq found that impulsive sensation seeking was linked to risky health behaviours, including driving, throughout various phases of deployment (Verrall, 2019). This finding is consistent with results from a contextual mediated model study, which identified sensation seeking as a predictor of dangerous driving and traffic accidents and mediated by risky driving behaviours (Monteiro et al., 2018). Moreover, a literature review on risk-taking in military contexts highlights that sensation seeking is a common trait among military personnel, often leading to increased risk-taking behaviours, particularly in driving situations (Breivik et al., 2019). Additionally, sensation seeking, along with impulsivity and boredom proneness, has been shown to contribute to speeding behaviour, a specific type of risky driving (Putranto et al., 2022). These findings suggest that the high-stress military environment may amplify the effects of sensation seeking on driving behaviour, making it crucial to consider personality traits when addressing risky driving among military personnel. Understanding these interactions can help inform targeted interventions aimed at improving road safety in military contexts.

The relationship between sensation seeking and driving behaviour in military populations is critically important; however, existing research remains fragmented across disciplines, including psychology, military health, traffic safety, and behavioural science. While several studies have explored how psychological traits influence driving behaviour among military personnel (Lee & Blais, 2014; Whipple et al., 2016), a unified synthesis that systematically integrates this body of knowledge is still lacking. This absence of comprehensive analysis impedes the field's ability to identify overarching patterns, theoretical foundations, and practical applications pertinent to military driving safety. To address this gap, a dual-method strategy combining a scoping review and scientometric analysis offers a rigorous and effective approach. Scoping reviews facilitate a structured mapping of key themes, conceptual frameworks, and gaps in the literature, thereby providing a broad qualitative overview of the research landscape. Conversely, scientometric analysis quantitatively assesses the structure and dynamics of scholarly output to highlight trends, collaborations, influential publications, and knowledge clusters. By integrating these methodologies, the current review aims to provide a holistic understanding of existing research, guide future investigations, and inform targeted interventions that consider both individual psychological predispositions and the unique demands of military driving contexts.

2. Methodology

2.1 Scientometric Analysis

Scientometric analysis is a recognised method for analysing and understanding large scientific datasets to enable a detailed understanding of developmental pathways within particular domains (Donthu et al., 2021). It has been widely utilised for several objectives, including evaluating the quality of research output and journal performance (Struck et al., 2021), examining collaboration patterns and research elements (Wachsmann et al., 2019), assessing publication trends within specific fields (Abdullah, 2021), and investigating the intellectual framework of particular domains through published literature (Simao et al., 2021). This study used scientometric analysis to identify patterns in research publications on sensation seeking in driving behaviour, identify countries actively contributing to this domain, and examine the themes and sub-themes represented in authors' keywords.

2.2 Scoping Analysis

The primary objective of scoping reviews is to systematically collect and document a wide range of available evidence (Munn et al., 2018). Therefore, this study aims to conduct a thorough analysis of the key factors related to sensation seeking in driving behaviour among military personnel, while also synthesising the existing research in this field. This scoping review was conducted to identify areas that require further exploration and to highlight gaps in the current body of knowledge. The study followed the established five-step scoping review framework developed by Arksey and O'Malley (2025).

- i. Establish the research question.

- ii. Identify relevant studies.
- iii. Select studies.
- iv. Chart the data.
- v. Report the results.

2.3 Establishing the Research Question

The research question underlying this investigation is driven by the need to systematically synthesise fragmented evidence on the relationship between sensation seeking and driving behaviour among military personnel. Previous studies across psychology, behavioural science, and military health have addressed this topic in isolation, leading to inconsistent findings and limited theoretical integration. By employing the SPIDER framework (Sample, Phenomenon of Interest, Design, Evaluation, Research Type) developed by Cooke et al. (2012), the research seeks to establish a structured, transparent, and replicable approach to reviewing the literature.

This framework enables the study to:

- i. Define the sample (military personnel) and phenomenon of interest (sensation seeking and driving behaviour) precisely.
- ii. Clarify the designs and evaluation methods utilised in existing research.
- iii. Identify the types of evidence available to highlight methodological gaps and areas requiring further study.

Ultimately, the question is grounded in the goal of integrating interdisciplinary insights and informing evidence-based interventions to mitigate risky driving behaviours in high-stress military contexts.

2.4 Identifying Relevant Studies

2.4.1 Database

Accessing scientific journal publications, institutional repositories, archives, and other collections requires the use of databases and search engines (Abdullah et al., 2020). This work employed the Scopus and Web of Science (WoS) databases to examine scientometric and scoping indicators. These databases were chosen for their superior focus on document citations relative to other resources (Vieira & Gomes, 2009). To strengthen the validity of the coverage analysis, this study implemented several improvements, including enhanced metadata precision, document-type categorisation, and the assignment of relevant disciplines. Both Scopus and WoS emphasise these elements (Stahlschmidt & Stephen, 2022).

2.5 Search Strategy

After selecting keywords, an encyclopaedia was consulted to identify synonymous terms. Table 1 delineates the search phrases utilised to generate publication listings from the Scopus and WoS databases. The search was performed in June 2025 and included titles, abstracts, and keywords from both databases. No limitations were applied to the acquired data by date, publication type, or language.

Table 1

Search strategy for data extraction from the Web of Science and Scopus databases

Database	Search Strategy	Records
Web of Science	Topic: ("Sensation seeking" OR "risk taking" OR "novelty seeking" OR "impulsivity" OR "Arousal Seeking" OR "Excitement Seeking" OR "Thrill and Adventure Seeking" OR "Experience Seeking" OR "Disinhibition" OR "Boredom Susceptibility" OR "Adventure seeking" OR "Exploratory behavior" OR "Stimulus seeking" OR "Risk-oriented behavior") AND ("driving behavior" OR "driving performance" OR "driving" OR "vehicle operation" OR "road safety" OR "Driving habits" OR "Driving violations" OR "Driving practices" OR "Driving decision-making behavior" OR "Driving Style") AND ("military" OR "armed forces" OR "defense" OR "combat" OR "soldiers" OR "army" OR "navy" OR "airforces" OR "cadet" OR "private" OR "special forces" OR "Service members")	66
Scopus	Article Title, Abstract, Keywords: ("Sensation seeking" OR "risk taking" OR "novelty seeking" OR "impulsivity" OR "Arousal Seeking" OR "Excitement Seeking" OR "Thrill and Adventure Seeking" OR "Experience Seeking" OR "Disinhibition" OR "Boredom Susceptibility" OR "Adventure seeking" OR "Exploratory behavior" OR "Stimulus seeking" OR "Risk-oriented behavior") AND ("driving behavior" OR "driving performance" OR "driving" OR "vehicle operation" OR "road safety" OR "Driving habits" OR "Driving violations" OR "Driving practices" OR "Driving decision-making behavior" OR "Driving Style") AND ("military" OR "armed forces" OR "defense" OR "combat" OR "soldiers" OR "army" OR "navy" OR "airforces" OR "cadet" OR "private" OR "special forces" OR "Service members")	122

2.6 Software

ScientoPy and VOSviewer are two widely used research tools in academic settings. ScientoPy, run as a Python script, retrieves key information from research papers, including main topics, authors, countries, and related documents. It uses keywords supplied by authors to generate insights and reduce biases that may arise from isolated studies (Ruiz-Rosero et al., 2017). Nonetheless, it is crucial to acknowledge that evaluating papers by author names may still introduce bias, especially when names are similar (Ruiz-Rosero et al., 2017). Moreover, ScienPy's analysis is confined to theories openly

referenced in abstracts, keywords, and titles, meaning theories not acknowledged by prior writers may remain unrecognised (Radzi et al., 2025). Identifying these ideas can provide fresh insights into topics and underscore pertinent areas for further investigation. VOSviewer is a software tool created by Van Eck and Waltman in 2010 for co-occurrence studies of terms, specifically related to sensation seeking in driving behaviour. It utilises sophisticated mapping methodologies to transform CSV data into visually meaningful graphs or clusters (Abdullah, 2022). These mapping methodologies offer considerable benefits for researchers studying specific data points, such as authors' keywords (Abdullah & Othman, 2022; Radzi et al., 2024).

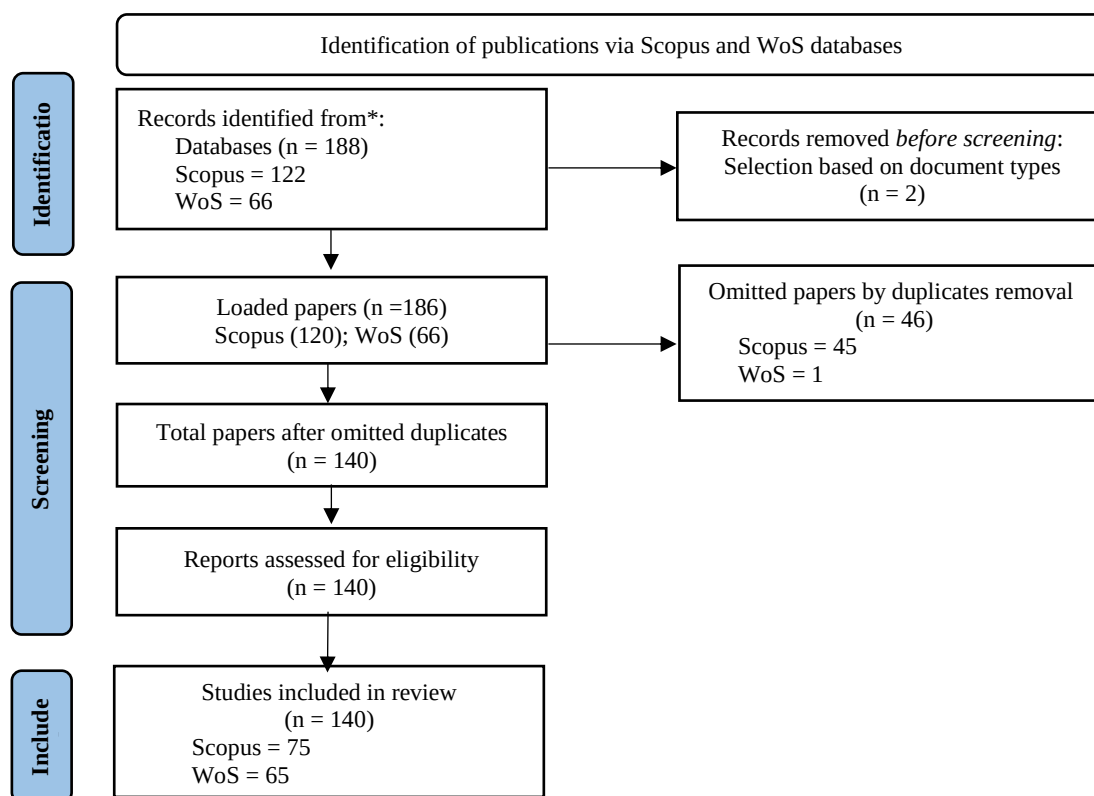
2.7 Selecting Studies

2.7.1 Merging publications and removing duplicates

Data from both databases were aggregated and analysed via ScientoPy. All data were standardised by replacing commas in authors' names with semicolons, removing periods and inconsistent formatting, and deleting duplicate entries with identical titles and authors. This scientific technique improves the precision and dependability of the datasets. Figure 1 illustrates the outcomes of the pre-processed data.

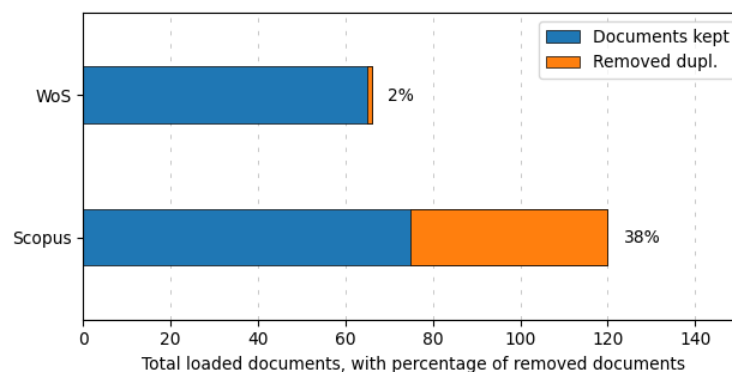
Figure 1

Flow diagram of research on databases and registers



The pre-processing script used in ScientoPy emphasises documents obtained from WoS compared with those from Scopus. Figure 2 visually represents the document screening and deduplication process from these two prominent databases within the framework of research examining sensation seeking and driving behaviour among military personnel. The data indicate that a substantially larger quantity of documents was retrieved from Scopus than WoS. However, 38% of documents from Scopus were classified as duplicates and removed, suggesting significant overlap within the database or across sources. In contrast, WoS showed a much lower redundancy rate, with only 2% of its records removed for duplication. These findings underscore the importance of using multiple databases for comprehensive literature retrieval and highlight the need for rigorous deduplication procedures to ensure data accuracy and prevent inflated publication counts. The high retention rate in WoS suggests a cleaner dataset, whereas Scopus, despite its broader coverage, requires more meticulous filtering because of its higher rate of document overlap.

Figure 1 illustrates that the source dataset comprises 188 papers obtained from the WoS and Scopus databases. ScientoPy categorises these publications into many classifications, including conference papers, essays, reviews, proceedings papers, and press releases. Consequently, two documents, comprising books, letters, and errata, were omitted from the analysis. This study used 140 items from both databases, consisting of 65 papers from WoS and 75 from Scopus, following data reconciliation. Furthermore, 45 duplicate entries from Scopus and one from WoS were eliminated.

Figure 2*Data combination and duplicate removal*

2.7.2 Data charting

The publication growth graph shows the development of publishing within the Scopus and WoS databases, which is crucial for understanding overall publication trends. Further analysis of the articles entailed examining the evolution graph of the top ten authors' keywords and the co-occurrence of these keywords.

2.7.3 Reporting results

In line with the study's objectives, the authors prepared a concise summary and report of the findings. ScientoPy was used to analyse publication growth, identify active countries, and examine keywords. VOSviewer served as a descriptive tool to assess the co-occurrence of authors' keywords, noting that at least two keywords are required to generate co-occurrence results. Additionally, thesaurus files were carefully reviewed and modified according to the recommendations of Abdullah et al. (2022) to prevent duplication of authors' keywords. This study employed the scoping review, a methodology designed to provide a comprehensive overview of existing research within a specific field. A primary objective of conducting a scoping study is to identify gaps or deficiencies in the current body of literature. This investigation aimed to systematically examine and characterise existing research on sensation seeking in driving behaviour among military personnel and identify gaps in the literature. To facilitate this analysis, articles sourced from Scopus and WoS were pre-processed using ScientoPy. Table 2 details the specific inclusion criteria for this scoping review.

- i. Composed in the English language.
- ii. Publications from 2010 onwards.
- iii. Discuss original research.
- iv. Include the term 'risk perception' in the authors' keywords.

3. Results and Discussion

3.1 Scientometric Outcome

3.1.1 Publication growth

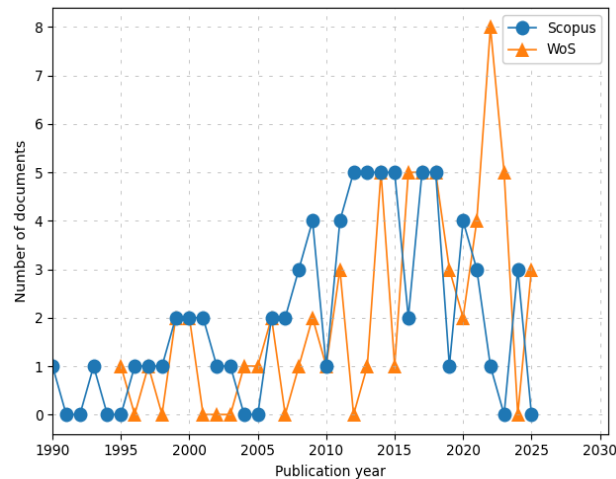
Figure 3 illustrates the annual publication trends from the Scopus and WoS databases regarding sensation seeking and driving behaviour among military personnel from 1990 to 2025. The data show a gradual increase in research output beginning in the early 2000s, with significant growth from 2008 onwards. Between 2010 and 2018, both databases show a steady upward trend, with Scopus consistently publishing more articles per year than WoS. WoS peaks around 2021, reporting its highest number of publications (eight documents), suggesting a surge in interest or research activity that year—potentially linked to post-deployment risk research or an intensified focus on military health outcomes. In contrast, Scopus exhibits a more stable output throughout the 2010s, averaging five publications per year over several consecutive years. Although both databases exhibit a slight decline in recent years (2023–2025), the overall trend indicates an increasing scholarly interest in the relationship between psychological traits and driving risk in military populations, particularly over the past two decades. This upward trend underscores the significance of this topic for military safety, behavioural sciences, and applied psychology.

The increasing volume of research on sensation seeking and driving behaviour in military personnel reflects a growing awareness of the significant impact of psychological traits on operational safety, the high incidence of traffic-related fatalities among service members, and the necessity for evidence-based interventions to enhance military readiness, post-deployment reintegration, and overall personnel well-being. Studies have demonstrated that impulsive sensation seeking is a critical factor influencing health behaviours, including risky driving, among military personnel during various phases of deployment (Verrall, 2019). A comprehensive literature review spanning three decades underscores the prevalence of risk-taking and sensation seeking in military contexts, emphasising the need for targeted interventions (Breivik et al., 2019). Risky driving behaviours (RDBs), which are strongly linked to personality characteristics such as sensation seeking, significantly increase the likelihood of traffic-related injuries and fatalities, with personality traits accounting for a substantial portion of the variance in RDBs (Akbari et al., 2019). Research involving Marines has revealed that those recently returned from combat zones report higher levels of risk-taking and aggressive driving behaviours, indicating a

need for further examination and intervention (Sarkar, 2006). Furthermore, driving-related anxiety, often associated with PTSD and depression, exacerbates risky driving practices among recently deployed service members, highlighting the importance of addressing mental health issues and improving access to formal care to enhance post-deployment reintegration and overall well-being (Zinzow et al., 2013). These findings collectively underscore the necessity for evidence-based interventions to mitigate risky driving behaviours and enhance military readiness and safety.

Figure 3

The evolution of publication growth (Source: Author, using ScientoPy 2.1.3)

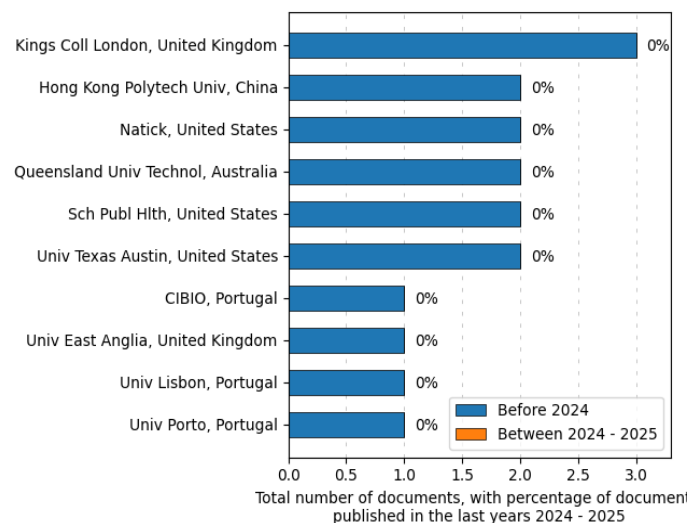


3.1.2 Most influential academic works

Figure 4 presents the foremost academic institutions that have made significant contributions to research on sensation seeking and driving behaviour among military personnel, based on the volume of documents published up to 2025. All documents were published before 2024, as shown by the absence of orange segments in the bars. It indicates that these institutions did not produce new documents between 2024 and 2025. King's College London (UK) occupies the leading position with the highest number of publications (three documents), followed by Hong Kong Polytechnic University, Natick (U.S.), and the University of Texas at Austin, each contributing one to two publications. These institutions reflect a diverse geographical representation, encompassing contributors from the United States, the United Kingdom, China, Australia, and Portugal. Nonetheless, the overall number of publications per institution is relatively modest, suggesting that no single university or research centre currently dominates this field. Furthermore, the absence of recent publications from these prominent institutions may indicate a plateau in their research output or a shift in focus, thereby highlighting an opportunity for emerging centres and interdisciplinary teams to advance the field in the forthcoming years.

Figure 4

Institution bar trends graph



3.1.3 Author's keywords

Figure 5 illustrates the most frequently used author keywords in publications on sensation seeking and driving behaviour among military personnel, highlighting key thematic priorities in the literature. "Risk taking" and "driving" emerge as the

predominant keywords, with "risk taking" appearing in 13 documents and accounting for 8% of contributions between 2024 and 2025. This statistic indicates a sustained scholarly interest in the behavioural implications of sensation seeking. Although "driving" ranks second in total frequency, it has no publications in the current period, suggesting either a decline in explicit focus or a shift toward more nuanced subtopics. Notably, "risk perception" is the only other keyword with activity between 2024 and 2025, representing 25% of its total usage during this timeframe. This reflects a growing emphasis on how individuals subjectively assess and manage driving-related risks—potentially influenced by psychological traits such as sensation seeking. Additional significant keywords, including "driving simulator," "veterans," "college students," "personality," and "adolescents," underscore the multidimensional nature of the research, addressing population-specific analyses and methodological tools. However, the absence of recent publications associated with many of these terms highlights an opportunity for future studies to revisit or expand upon these areas, particularly as emerging technologies and trends in military mental health continue to evolve.

Figure 5

The bar-trend graph of research themes and topics emerging (Source: Author, using ScientoPy 2.1.3).

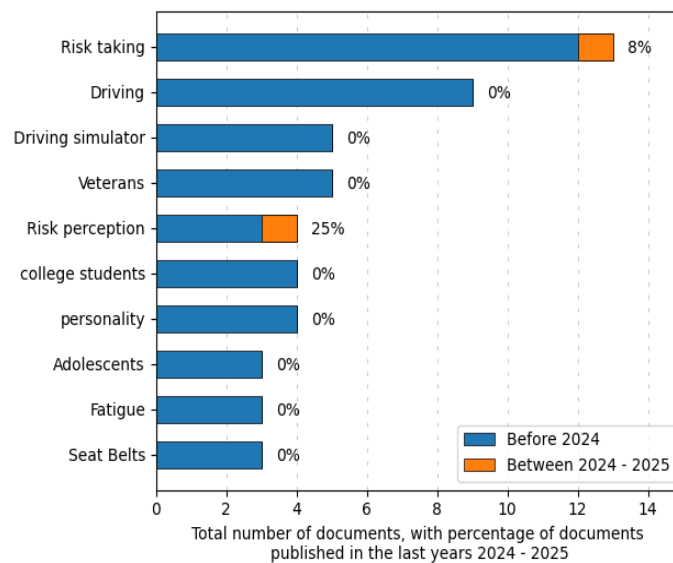
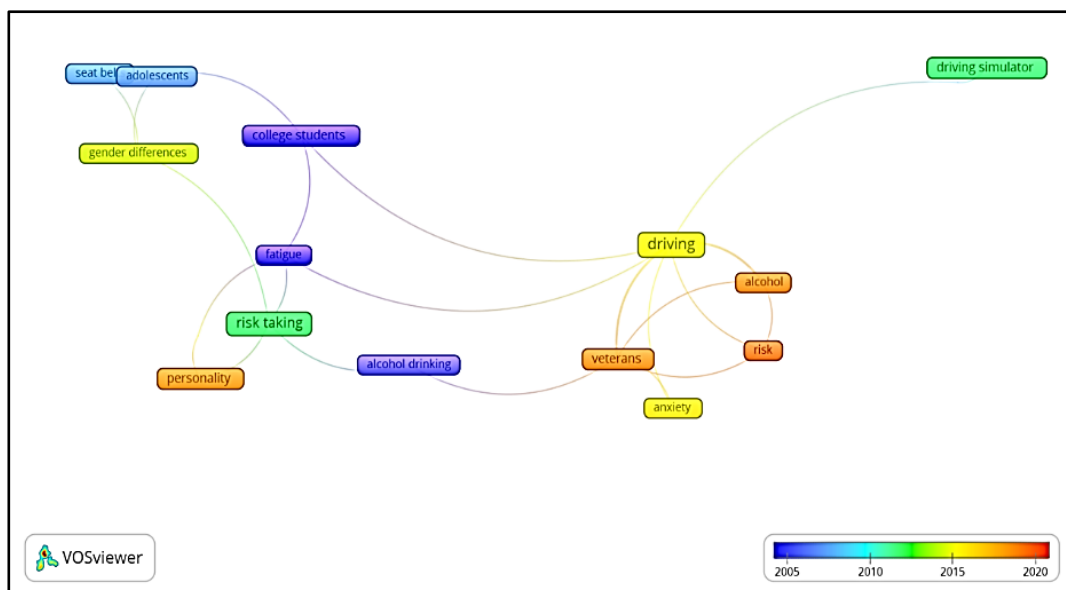


Figure 6 presents an overlay visualisation of keyword co-occurrence, providing a temporal and thematic overview of the evolution of research on sensation seeking and driving behaviour among military personnel from 2005 to 2020. The central node, "driving," depicted in bright yellow, signifies the primary focus of this research and exhibits strong connections to keywords such as "veterans," "alcohol," "risk," and "anxiety," all shaded in orange to indicate heightened scholarly interest in recent years (post-2015).

Figure 6

Co-occurrence of authors' keywords



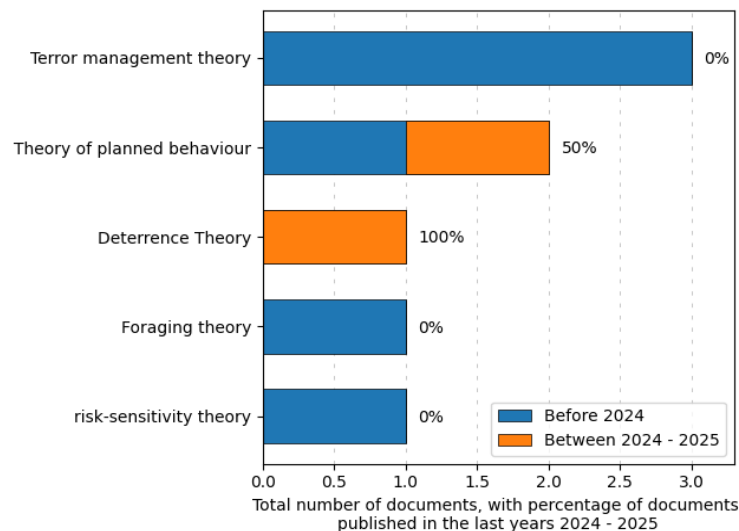
This clustering suggests that more recent studies increasingly examine psychological risk factors such as anxiety and alcohol use and their impact on driving behaviour within veteran populations. In contrast, keywords like "college students," "adolescents," and "seat belts," illustrated in cooler blue and green tones, were more prevalent in earlier studies, reflecting an initial emphasis on younger, civilian populations and general safety practices prior to the shift towards military-specific research. Themes such as "risk taking" and "personality" also emerge as significant and serve as links between demographic groups and psychological constructs, thereby underscoring the importance of sensation seeking as a key personality trait. Furthermore, the inclusion of "fatigue" and "driving simulator" indicates that experimental and physiological aspects are also being considered in the evaluation of risky driving behaviour. Consequently, the map illustrates a clear chronological and thematic transition—from broad foundational studies on general risk and safety behaviours to more nuanced, military-specific research that focuses on veterans, mental health, and the psychological factors influencing high-risk behaviour in driving.

3.1.4 Foundational theories

Figure 7 illustrates the foundational theories that inform research on sensation-seeking and driving behaviour among military personnel, highlighting both historical emphasis and emerging theoretical trends. The Terror Management Theory is the most frequently cited framework overall, with all its contributions published prior to 2024. This suggests its significant historical influence in explaining behaviour under existential threat, particularly relevant for military populations. The Theory of Planned Behaviour remains crucial, accounting for 50% of its usage during the 2024–2025 period. This underscores a contemporary shift towards understanding how attitudes, perceived behavioural control, and social norms influence risky driving decisions in structured environments, such as the military. Notably, the Deterrence Theory experienced 100% of its citations in the last two years, indicating a recent focus on compliance, enforcement, and the effects of perceived punishment on modifying high-risk behaviour, which may signal a research orientation driven by policy or intervention needs. In contrast, theories such as the Foraging Theory and Risk-Sensitivity Theory have seen limited application and no recent use, suggesting they are either niche or losing relevance in the current research landscape. Collectively, these findings indicate a trend towards integrating behavioural intention models and legal-psychological frameworks to more effectively address and mitigate sensation-driven driving risks in military contexts.

Figure 7

The bar-trend graph of foundational theories (Source: Author, using ScientoPy 2.1.3)



3.2 Scoping Outcomes

This section provides a comprehensive examination of how risk perception is addressed in the literature concerning sensation-seeking behaviour in driving among military personnel. It constitutes a crucial initial step in identifying knowledge gaps and guiding future research, ultimately enhancing the existing body of knowledge and best practices. To conduct this scoping analysis, qualitative research questions were formulated, and the SPIDER tool was utilised as the search strategy. Table 2 presents the scoping analysis of four publications that were retrieved based on extended author keywords sourced from ScientoPy. It is important to note that this study focuses specifically on research articles and excludes four records that were not classified as research papers at this stage.

4. Discussion

Keyword analysis reveals that risk-taking is closely linked to notational analysis, multivariate analysis, and kinetics. This suggests that research on risk-taking associated with sensation-seeking driving behaviour among military personnel increasingly employs advanced analytical and biomechanical methodologies to clarify behavioural patterns and performance in high-risk situations. Individuals with HSS exhibit behavioural and neural insensitivity to negative

outcomes during decision-making under uncertainty, which may lead to increased risk-taking in contexts involving potential losses (Xu et al., 2019). This insensitivity is further influenced by dopamine; for instance, the D2/D3 agonist cabergoline modifies risk-taking behaviour based on baseline sensation-seeking traits (Norbury et al., 2013). The complexity of risk-taking behaviour is illustrated by the variability in brain-behaviour associations, which depend on the measures used to capture individual differences. This indicates that methodological considerations are essential for developing effective intervention and prevention strategies (Tisdall et al., 2020). Additionally, external factors, such as video racing games, can amplify risk-taking tendencies by altering self-perceptions and fostering risk-affirming thoughts and emotions, thereby affecting attitudes towards reckless driving (Fischer et al., 2009). Moreover, risk sensitivity in decision-making is evident in sensorimotor control, where individuals demonstrate a mean-variance trade-off by selecting actions based on the variability of effort, consistent with economic theories of decision-making (Nagengast et al., 2011). Collectively, these findings underscore the importance of integrating notational analysis, multivariate analysis, and kinetics to deepen our understanding of and mitigate risk-taking behaviours in high-risk environments.

In addition, the topic of driving commands significant academic attention and warrants further exploration, particularly concerning sensation seeking among military personnel. This focus is crucial due to its implications for occupational safety, the disproportionately high rates of traffic-related incidents within military populations, and the necessity for tailored interventions that address the psychological traits and contextual factors specific to military environments. Sensation seeking, a personality trait characterised by the pursuit of novel and intense experiences, is particularly prevalent in military contexts where risk-taking behaviours are often encouraged or necessitated by the demands of military operations (Breivik et al., 2019). Research indicates that military personnel exhibit elevated levels of impulsive sensation seeking, which correlates with risky health behaviours, including driving, particularly during deployment phases (Verrall, 2019). Risky driving behaviours (RDBs) significantly contribute to traffic accidents, which are a leading cause of death worldwide. These behaviours are strongly influenced by personality traits such as sensation seeking, impulsivity, and driving anger (Bıçaksız, 2021; Akbari et al., 2019).

In military settings, factors such as age, relationship status, and alcohol use further exacerbate these behaviours. Younger, single personnel and those exhibiting harmful alcohol consumption patterns are more likely to engage in risky driving (Sheriff et al., 2015). Although there was a reduction in the prevalence of risky driving among UK military personnel from 2004 to 2009, the emergence of new risky drivers remains a concern. This underscores the necessity for ongoing road safety campaigns and interventions specifically tailored to the unique psychological and contextual aspects of military life (Sheriff et al., 2015). Understanding these dynamics is essential for developing effective strategies to mitigate the risks associated with sensation seeking and enhance occupational safety within military populations.

To gain a deeper understanding of how driving behaviour impacts sensation-seeking among military personnel, it is essential to examine psychological predispositions (such as impulsivity and risk perception), situational factors (including operational stress and deployment conditions), and contextual influences (such as military culture and organisational practices). Individuals exhibiting HSS traits frequently demonstrate behavioural and neural insensitivity to negative outcomes during decision-making processes, resulting in an increased propensity for risk-taking behaviour—a tendency that may be exacerbated in military environments where risk-taking is often valorised (Xu et al., 2019). Among veterans, risky driving behaviours, including drinking and driving, carrying firearms, and aggressive driving, are prevalent. Research indicates a significant response bias in self-reported data attributable to mental health stigma, suggesting that these behaviours are likely underreported (Sheppard et al., 2013). The stress associated with military operations, including deployment, can influence driving behaviour by affecting hazard anticipation and stress responses. Predictable hazards may elicit anticipatory responses that mitigate stress; however, driving experience and situational stressors encountered during deployment may alter these responses (Kerautret et al., 2023). Despite the psychological adaptation to stress observed in soldier's post-deployment, no significant changes in physiological stress markers have been noted, indicating a complex relationship between perceived stress and actual stress responses (Maier et al., 2022). Moreover, dopamine function, which is linked to sensation-seeking traits, may modulate risk-taking behaviour, suggesting that individual differences in sensation-seeking could influence how military personnel respond in risky driving situations (Norbury et al., 2013). These findings underscore the necessity for tailored interventions that consider individual psychological traits, the effects of military culture, and the unique stressors faced by military personnel to effectively address risky driving behaviours.

The clustering in co-occurrence analysis of research pertaining to sensation seeking and driving behaviour reveals distinct thematic groupings that have developed into specialised subfields over time. Initially, studies concentrated on psychological and behavioural risk factors, such as the relationship between sensation seeking and psychoactive substance use among drivers. This body of research highlighted that high sensation seeking is linked to the utilisation of stimulants and engagement in risky driving behaviours (Jamt et al., 2020). The theme extends into the military context, where poor sleep quality and duration are associated with high-risk behaviours, including reckless driving, suggesting that sleep interventions could mitigate such risks (Mantua et al., 2021).

Table 2*List of inclusive publications*

Sources	Sample	Phenomenon of Interest	Design	Evaluation	Research Type
Xie et al. (2025)	520 commercial airline pilots from China Southern Airlines Ltd	Investigate the relationships among impulsivity, risk perception, situation awareness, and incident involvement in Chinese airline pilots.	Utilised a cross-sectional design	Impulsivity significantly predicts incident involvement through independent and serial mediation by risk perception and situation awareness, offering both theoretical insight and practical strategies for enhancing flight safety through targeted training and pilot selection.	Quantitative
Salameh et al. (2014)	3,384 Lebanese university students using on-campus convenience sampling due to administrative constraints, achieving a 69.1% response rate from 4,900 distributed questionnaires	Assess how risk perception, attractiveness, and motives influence risk-taking behaviours—such as smoking, alcohol use, and mental distress—among university students in Lebanon.	Utilised a cross-sectional design	Validated three risk-related scales among Lebanese university students, revealing that higher risk perception deters risky behaviours, while attractiveness and certain motives (e.g., irresponsibility, novelty seeking) increase them, with gender differences observed and waterpipe smoking perceived as less harmful—though limitations include non-random sampling and reliance on self-reports.	Quantitative
Obst et al. (2011)	305 Queensland drivers who returned surveys out of 1000 randomly selected Royal Automobile Club of Queensland (RACQ) members	"Driving while sleepy," specifically focusing on the behaviours associated with it and the risk perceptions drivers have regarding this state.	Utilised a survey design	Despite high perceived risks, especially among younger and male drivers, fatigued driving is widespread—with 80% having driven while sleepy, 30% experiencing near-misses, and notable discrepancies in risk perception during high-fatigue times like 4:00 AM.	Quantitative
Drinkwater & Molesworth (2010)	Included 56 participants recruited from the Bachelor of Aviation Flying degree program at the University of New South Wales (UNSW) and other flying institutions located at Bankstown aerodrome, Sydney	Pilots' risk management behaviour, specifically examining whether known markers (e.g., attitude, risk perception) and personal characteristics (e.g., flight experience, age) predict the acquisition and utilisation of this skill.	A simulated flight task to examine how attitudes towards safety, risk perception, age, and flight experience relate to risky flight behaviour, measured by flight time and descent altitude during a fuel-limited search scenario	Pilots who chose to avoid risk rated immediate danger higher than those who proceeded, with no significant differences in attitude or demographics, while among risk-taking pilots, higher self-confidence led to shorter flight times and older age correlated with more conservative altitude decisions.	Quantitative

Furthermore, research on personality traits, including sensation seeking, has demonstrated both direct and indirect effects on dangerous driving and accident involvement, thereby emphasising the importance of psychological evaluations in the context of driver safety (Monteiro et al., 2018). The stability of sensation seeking as a trait has been a subject of debate, with evidence indicating that it can fluctuate over time, particularly during adolescence, thereby influencing problem behaviours such as aggression and substance use (Lynne-Landsman et al., 2011). Within military populations, post-traumatic stress disorder (PTSD) and traumatic brain injury (TBI) have been associated with aggressive driving, with PTSD identified as a significant predictor of road rage, thereby highlighting the necessity for targeted interventions (Van Voorhees et al., 2018). Collectively, these studies illustrate the transition of research from broad psychological assessments to more nuanced investigations of specific populations and conditions, reflecting an evolution into interrelated subfields that address both civilian and military contexts.

The Theory of Planned Behaviour (TPB) provides a comprehensive framework for understanding the influence of sensation seeking on reckless driving behaviour among military personnel by elucidating the roles of attitudes, subjective norms, and perceived behavioural control. Sensation seeking is defined as a personality trait characterised by the pursuit of novel and intense experiences. It is associated with risk-taking behaviours, including reckless driving, particularly in military contexts where personnel frequently engage in high-risk activities (Breivik et al., 2019; Verrall, 2019). According to TPB, sensation seeking primarily influences reckless driving through its impact on attitudes towards this behaviour. Individuals exhibiting heightened sensation-seeking tendencies may develop positive attitudes towards reckless driving and perceive it as thrilling or exciting, thereby increasing the likelihood of engaging in such behaviour (Rahardjo & Kusumawardhani, 2020). Furthermore, TPB posits that subjective norms, defined as the perceived social pressures to either engage in or abstain from a behaviour, can also affect reckless driving (Guggenheim et al., 2020). In military environments, where group dynamics and peer influences are pronounced, sensation seekers may feel compelled to drive recklessly if they perceive such behaviour as accepted or normative within their peer group (Verrall, 2019). Additionally, perceived behavioural control, which pertains to the perceived ease or difficulty of executing the behaviour, may mediate the relationship between sensation seeking and reckless driving. Military personnel who are confident in their driving abilities may believe they can effectively manage the risks associated with reckless driving, consequently increasing the likelihood of engaging in such behaviour (Son & Huh, 2014). In summary, TPB elucidates the interplay between sensation seeking and various psychological and social factors that influence reckless driving among military personnel, underscoring the importance of addressing these factors in interventions aimed at mitigating such behaviours.

A scoping analysis reveals that four studies examining risk perception in driving behaviour have been published in journals indexed by Scopus and WoS from 2010 to 2025. The results denote several critical insights. Impulsivity serves as a significant predictor of incidents among pilots, with risk perception and situational awareness acting as mediating factors. Elevated risk perception tends to diminish risky behaviours in university students, whereas factors such as attractiveness and specific motivations may exacerbate these behaviours. Notably, despite possessing heightened awareness of risks, younger male drivers frequently engage in fatigued driving. The decision-making processes of pilots regarding risk avoidance or acceptance are influenced by their risk perception, confidence levels, and age-related conservatism in flight-related decisions. Sensation seeking, a trait associated with the pursuit of novel and intense experiences, is often correlated with impulsivity and risky behaviours, particularly within military contexts where the stakes are considerable. The research conducted by McKewen et al. (2019) establishes a connection between impulsivity, reward-seeking behaviours, and maladaptive outcomes, suggesting that military personnel exhibiting lower cognitive control may be more vulnerable to engaging in risky driving behaviours as a result of sensation seeking. Furthermore, Tanglai et al. (2022) found that personality traits such as normlessness and anger can predict risky driving behaviours, which may be exacerbated in military environments characterised by stress and high-pressure situations. Brookland et al. (2010) underscore the influence of parental guidance on the risk perception and behaviours of young drivers, a dynamic that may also pertain to military personnel operating within hierarchical structures, where the attitudes of senior members can significantly shape the driving behaviours of their juniors. Additionally, Jomnonkwao et al. (2022) highlight that personal characteristics, including previous violations and accidents, substantially impact risky behaviours, suggesting that military personnel with such histories may exhibit heightened sensation-seeking driving behaviours. Smith (2016) further supports the notion that despite a pronounced awareness of risks, younger male drivers—a demographic notably represented in the military—are more inclined to engage in risky driving practices. These studies elucidate the complex interplay between sensation seeking, impulsivity, and risk perception in driving behaviours by indicating that military personnel could benefit from targeted interventions designed to enhance cognitive control and risk awareness, thereby mitigating the influence of sensation seeking on driving safety.

The phenomena of interest include examining how impulsivity and risk perception influence incident involvement among pilots, factors affecting risk-taking behaviours in university students, behaviours and perceptions related to fatigued driving, and predictors of pilots' risk management behaviour during simulated flights. Impulsivity and risk perception are critical in aviation, where high-stakes decisions are prevalent. For instance, a study on risk perception among Chinese aviators indicates that traits such as narcissism and a promotion focus can lead to optimism bias, resulting in pilots underestimating personal risks. This is particularly concerning in military aviation, where effective risk management is essential (Ju et al., 2017). Similarly, the neuroergonomic approach to aviation safety reveals that emotional stress can impair decision-making, leading to plan continuation errors (PCE), which occur when pilots fail to revise unsafe flight plans. This issue may be exacerbated in high-pressure military operations (Causse et al., 2013). Furthermore, assessments of stress and workload in aviation highlight the importance of managing mental workload and stress to prevent human error, a prevalent issue in both civil and military aviation (Masi et al., 2023). Risk identification and

assessment methods, such as the HHM-RFRM model, provide a framework for pinpointing critical risk factors in flight training, which is vital for military pilots who often operate in complex and dynamic environments (Sun et al., 2023). Moreover, insights from university students' risk behaviours suggest that risk perception and motives significantly influence risk-taking, a finding that can be extrapolated to military settings. Understanding the personal, environmental, and psychological predictors of risk can enhance risk management strategies (Salameh et al., 2014). Collectively, these studies underscore the multifaceted nature of risk perception and management in aviation, emphasising the necessity for comprehensive training and assessment protocols to mitigate risks among military personnel.

Investigating sensation-seeking driving behaviour among military personnel can significantly enhance strategies for promoting road safety and reducing accidents, ultimately contributing to the achievement of Sustainable Development Goal 8, which emphasises decent work and economic growth. Sensation seeking, a personality trait associated with higher driving speeds, has been identified as a predictor of risky driving behaviours, including increased average and maximum speeds—critical factors in accident prevalence (Ju et al., 2022). Understanding these behaviours through psychological metrics and virtual reality simulations can aid in the development of targeted interventions. For instance, promoting mastery-approach goals, which have been shown to negatively predict risky behaviours such as hard braking, could serve as an effective protective strategy (Nicolleau et al., 2022). Moreover, multilevel analyses of unsafe actions indicate that personal characteristics, including past violations and accidents, significantly influence risky behaviours. This finding suggests that tailored interventions focusing on these individual factors could help mitigate unsafe driving (Jomnonkwao et al., 2022). However, caution is warranted when implementing behavioural interventions, as overly salient safety messages may unintentionally increase crash rates. This underscores the necessity for carefully designed communication strategies (Hall & Madsen, 2022). Furthermore, addressing the broader social costs of road traffic injuries, which contribute to significant global mortality and economic losses, aligns with the goals of providing safe and sustainable transport systems (Loo & Tsoi, 2022). By integrating these insights, road safety strategies can be more effectively tailored to reduce accidents among military personnel, thereby supporting economic growth and social sustainability.

5. Conclusions

This study employed a combined scientometric and scoping review methodology to conduct a comprehensive analysis of the research landscape pertaining to sensation seeking and driving behaviour among military personnel. It focused on publications indexed in the WoS and Scopus databases from 2010 onwards, with particular emphasis on the role of risk perception. Scientometric techniques, utilising ScientoPy and VOSviewer, facilitated the identification of publication trends, influential institutions, frequently used keywords, and foundational theories within the field. Key findings indicate a gradual and consistent increase in scholarly output over the past two decades, signifying a growing acknowledgement of the psychological factors influencing risky driving behaviours in military contexts. Prominent research themes include risk-taking, driving, and risk perception. Recent studies demonstrate an increasing analytical focus on risk perception and psychological variables, such as anxiety and alcohol use. Foundational theories, including the Terror Management Theory, Theory of Planned Behaviour, and Deterrence Theory, reflect an integration of behavioural intention and compliance frameworks to address driving risks. The scoping analysis highlighted that impulsivity significantly predicts incident involvement mediated by risk perception and situational awareness. Furthermore, risk perception is inversely related to risky behaviours, as evidenced in various contexts, including aviation, university environments, and fatigued driving scenarios. These insights underscore the importance of tailored interventions designed to enhance cognitive control and increase risk awareness among military personnel. Effectively addressing sensation-seeking and risky driving behaviours within military populations also aligns with the Sustainable Development Goals (SDGs), particularly SDG 8 concerning decent work and economic growth, by significantly improving road safety, reducing accidents, and elevating occupational safety standards, ultimately supporting broader social and economic sustainability objectives.

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The authors declare no conflicts of interest.

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Elias Md Radzi: Methodology; Data Collection; Analysis; Writing - original draft
 Zuraida Hassan: Conceptualisation; Data Validation; Supervision; Writing - review & revise
 Mohd Azril Ismail: Methodology; Visualisation, Conceptualisation, Proofreading
 Mohd Abidzar Zainol Abidin: Methodology; Analysis; Writing - review & revise
 Mohd Aman Armawai: Methodology; Data curation, Software; Writing - review & revise

Availability of Data and Materials

The data supporting this study's findings are available on request from the corresponding author.

Ethics Declarations

This research was conducted in accordance with ethical standards.

Generative Artificial Intelligence Declarations

The authors claim that artificially intelligent-assisted technologies in the form of generative AI were not used to generate content, ideas, or theories. AI was only used to enhance readability and refine the language. This was used with extreme human control and oversight. The authors take full responsibility for reviewing and approving the content.

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