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Behind the wheel: A bus driver's literature review and future research directions.

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Abstract

Despite being the backbone of public mobility, bus drivers often escape academic attention in management research. This study addresses the persistent neglect of bus drivers' working conditions, focusing on their occupational environment, well-being, safety, and quality of life. Methodologically, a systematic comparative literature review was conducted using six international databases (Cairn.info, ScienceDirect, Web of Science, Academic Source Premier, Business Source Premier, and PubMed), applying inclusion criteria specific to bus and metro drivers and excluding unrelated professional categories. The final sample comprised 37 studies (36 peer-reviewed articles and 1 report) that investigated drivers' working conditions, health outcomes, and occupational safety. Findings reveal that bus drivers endure irregular schedules, limited autonomy, and frequent passenger hostility. These stressors correlate with high turnover intentions, driven by work-related stress, low social support, and diminished professional fulfillment. Burnout symptoms emotional exhaustion, depersonalization, and reduced accomplishment are prevalent, alongside physical ailments such as musculoskeletal disorders and fatigue due to prolonged sedentary work and poor ergonomics. The main conclusion is that these working conditions heighten accident risks and compromise service quality, underscoring the urgent need for targeted interventions to improve workplace safety, enhance work-life balance, and reinforce social and professional support systems. Future research will delve deeper into this underexplored occupational group by adopting an ethnographic lens to closely observe the lived work trajectories of bus drivers, thereby generating grounded insights to inform sustainable policy and participatory management innovations.

Keywords: bus driver, working conditions, occupational health and safety, job quality, ethnographic observation

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Introduction

In today's rapidly evolving professional landscape, the occupation of bus driving remains a foundational yet underappreciated pillar of public life. Bus drivers play a critical role in urban and interurban transport systems, ensuring the daily mobility of millions worldwide. Far beyond simply transporting passengers from point A to point B, they serve as vital connectors within public infrastructure. However, behind the routine nature of their routes lies a complex and often overlooked work environment. Bus drivers face a range of professional and personal challenges, including irregular schedules, stressful working conditions, exposure to physical and mental health risks, and the demands of navigating unpredictable urban traffic while interacting with a wide spectrum passenger base. Although interest in the occupational health of professional drivers emerged in the mid-20th century, most notably with foundational work by Morris et al. (1953) focused research on bus drivers has gained momentum only since the early 2000s. Studies such as Bigelow et al. (2014) highlight the demanding nature of this profession, marked by prolonged sitting, excessive noise and vibration, and generally unhealthy lifestyles. This paper undertakes a critical review and synthesis of existing international studies, drawing on both qualitative and quantitative data to explore the occupational environment of bus drivers. The article consolidates prior research to uncover the multiple dimensions of bus drivers' work environments, with particular attention to working conditions, health, safety, and well-being.

1. Research Methodology

This review focuses on studies concerning bus drivers. A search was conducted using a combination of keywords such as "bus driver," "working conditions," "health," "well-being," and "safety" across several electronic databases, including Cairn.info, ScienceDirect, Web of Science, Academic Source Premier, Business Source Premier, and PubMed. Articles were included based on the following criteria: (1) they specifically addressed bus or metro drivers; and (2) they reported findings related to the drivers' work environment, including working conditions, health, well-being, and occupational safety (e.g., accident risk). Studies focusing on taxi drivers, delivery drivers, or other driving-related occupations were excluded, with two exceptions: one study on occupational stress among taxi drivers in Fez, Morocco, and another on the prevalence and risk factors of vigilance disorders among professional truck drivers in Morocco. These were retained due to their relevance in contextualizing the Moroccan setting of our future research, a context that remains underexplored. All citations were imported into

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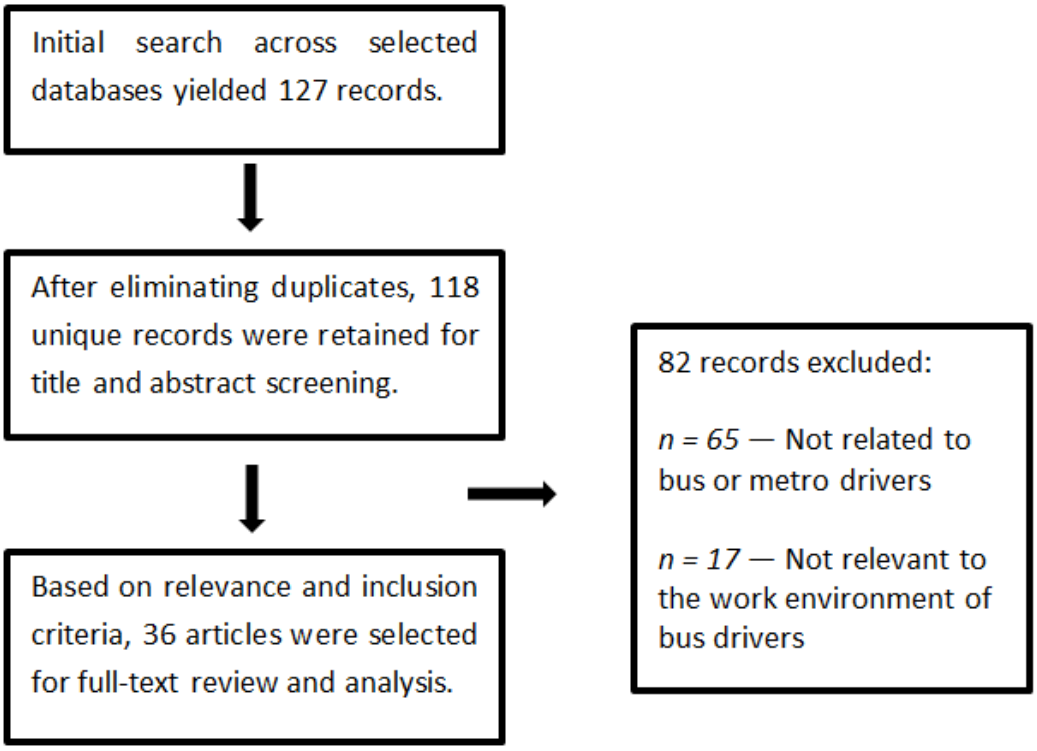
Zotero, a reference management software, where duplicates were removed. Titles and abstracts of 118 articles were screened for relevance. Full-text articles meeting the inclusion criteria were retrieved and reviewed, resulting in a final selection of 36 peer-reviewed articles and 1 report (see Fig. 1). These 37 studies are summarized in Table 1 (Appendix A), which includes author(s), year of publication, study title, country of origin, and key findings. The selected literature primarily addresses working conditions, health, and safety among bus drivers, with particular attention to accident risk, job quality, professional fulfillment, burnout, and workplace well-being. This paper synthesizes the main findings, beginning with an overview of bus drivers' working conditions.

Figure N°1: Flowchart of the Literature Selection Process



Source: Compiled by the authors.

2. Results

The analysis of existing studies provides a deeper understanding of the risk factors to which bus drivers are exposed and offers avenues for improving their work environment. Key issues addressed include irregular work schedules, physical and mental strain, working conditions, and existing safety measures. By identifying the primary determinants of burnout and their

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impact on health, this review contributes to a more comprehensive understanding of bus drivers' occupational environment beyond their daily routes. In this context, the scientific findings presented below highlight recommendations put forth by researchers in the field. These results underscore the importance of an integrated approach to addressing the challenges related to working conditions, health, and safety among bus drivers.

2.1 Working Conditions

The conversation on bus drivers' working conditions opens with Evans (1994), who sets the tone by emphasizing that this occupational group is exposed to significant health risks due to the nature of their work. He draws particular attention to job tenure, noting that drivers with more than ten years of experience tend to perceive their work environment far more negatively than their less experienced counterparts. This insight suggests a cumulative toll of the profession over time, one that is both psychological and physical. Adding a regional perspective, Laraqui et al. (2011) shift the focus to Morocco, where they conducted a large-scale study involving 5,566 professional road drivers. Their findings reveal a troubling prevalence of vigilance disorders, closely linked to poor sleep hygiene, strenuous work conditions, and limited access to occupational health services. They highlight a systemic issue: in Morocco, road safety regulations are weakly enforced, and few drivers benefit from medical coverage or preventive care. This lack of institutional support leaves drivers vulnerable to chronic fatigue and cognitive impairment factors that directly compromise road safety. Building on this, Araújo et al. (2018) introduce an ergonomic lens, arguing that the physical configuration of the driver's workstation plays a critical role in shaping health outcomes. Their study, conducted in the private collective transport sector, used ergonomic work analysis to assess the psychophysiological demands placed on drivers. Participants frequently reported discomfort caused by screen glare, noise, and poorly positioned passenger identification devices. Knee and lower back pain were among the most common complaints, pointing to the urgent need for ergonomic redesigns. Chen and Hsu (2020) expand the discussion by portraying urban bus driving as one of the most demanding and unhealthy occupations. They report elevated rates of morbidity and mortality, frequent absenteeism, and high turnover symptoms of a profession under chronic strain. Their work underscores the intersection of physical, emotional, and organizational stressors that define the daily reality of bus drivers. Finally, Zhang et al. (2022) bring attention to a critical yet often overlooked dimension: the interpersonal conflicts between drivers and passengers. In their study of 779 bus drivers in Changsha, China, verbal abuse and physical aggression were alarmingly common. Drivers

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reported being spat on, struck with objects, or verbally assaulted often in response to fare disputes, unauthorized stop requests, or passenger intoxication. While some bus companies have installed protective barriers and alarm systems, others have yet to implement even basic safety measures. Notably, only 46.6% of companies offered safety training, and a mere 39.1% provided psychological counseling services. Taken together, these studies paint a sobering picture: bus drivers operate under harsh and often hazardous conditions that jeopardize both their physical and mental well-being. Chronic pain, sleep disorders, and psychological stress are widespread, exacerbated by inadequate institutional protections and frequent confrontations with the public. In many contexts, particularly in the Global South, occupational health coverage and psychosocial support remain insufficiently developed, leaving drivers to navigate these challenges largely on their own.

2.2 Occupational Health

The health of professional bus drivers is shaped by a complex interplay of physiological, psychological, and organizational factors. Schjøtt et al. (2002) open the discussion by identifying key determinants such as age, body mass index, depression, daily working hours, perceptions of safety culture, and pre-existing health conditions that significantly influence drivers' well-being. Their findings underscore that health outcomes are not merely personal but are deeply embedded in the structural and cultural fabric of the workplace. Echoing this, Evans (1994) highlights the pervasive impact of occupational stress, arguing that the chronic pressures faced by bus drivers contribute to serious health complications and elevated absenteeism. He draws attention to the cumulative nature of these stressors, which range from time constraints and traffic congestion to the emotional toll of passenger interactions. Building on this foundation, Tse et al. (2006) offer a comprehensive synthesis of 27 international studies, mapping the specific stressors encountered by bus drivers and their associated health risks. Their review reveals a wide spectrum of adverse outcomes: cardiovascular disease, gastrointestinal issues, musculoskeletal disorders, and fatigue on the physical front; depression, anxiety, and post-traumatic stress on the psychological side; and substance use as a behavioral response. These conditions, they argue, not only compromise individual health but also undermine organizational performance through increased absenteeism, staff turnover, and accident rates. From a regional lens, Berraho et al. (2006) explore occupational stress among taxi drivers in Fez, Morocco. Using a standardized stress scale developed by France's National Institute for Research and Safety (INRS), they found that 46.3% of drivers exhibited high stress levels. The most prominent symptoms included mood disturbances, muscular tension, cognitive

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impairments, and sleep disorders—symptoms that resonate with those reported among bus drivers and highlight the broader vulnerability of professional drivers in underregulated contexts. Milosievica (2010) introduces a physiological perspective through a study of 24 urban bus drivers in Belgrade. Using biochemical and psychophysiological assessments before and after seven-hour driving shifts, the study revealed significant changes in heart rate, vocal acoustics, and middle ear function interpreted as physiological markers of fatigue. Continuous electrocardiographic monitoring further confirmed a decline in heart rate during prolonged urban driving, suggesting a state of sustained cognitive and physical depletion. Meanwhile, Crizzle et al. (2017) and Hakim et al. (2018) converge on the issue of musculoskeletal strain, particularly lower back pain, which they link to extended working hours and suboptimal driving conditions. Their conclusions are reinforced by Hanumegowda and Gnanasekaran (2022), who report that 66.75% of bus drivers in their study suffered from work-related musculoskeletal disorders (WMSDs). These disorders were significantly associated with occupational factors such as exposure to vibrations, frequent posture changes, inadequate seat ergonomics, limited physical activity, and insufficient rest breaks. Altogether, this body of research reveals a profession under considerable strain. The convergence of chronic stress, physical fatigue, and psychological vulnerability places bus drivers at heightened risk for a range of health complications. These conditions ripple beyond the individual, affecting organizational outcomes such as absenteeism, accident rates, and workforce retention. Addressing these challenges demands a holistic strategy, one that integrates ergonomic innovation, mental health support, and systemic improvements in working conditions.

2.3 Road accidents and occupational risk

The relationship between working conditions and accident risk among bus drivers has been the subject of growing scholarly attention. Berrones Sanz (2014), in his study of microbus drivers in Mexico, draws a direct link between extended working hours both daily and weekly, and the incidence of road accidents. He argues that reducing average work hours and limiting the number of working days per week could significantly lower accident rates. Beyond structural changes, he advocates for the implementation of meaningful driver training programs, not only as a prerequisite for licensing but also as a motivational tool. Such programs, he suggests, could foster a sense of professional responsibility and enhance drivers' awareness of the societal value of their role, ultimately contributing to improved service quality and reduced accident rates. Shifting the lens to France, Passalacqua (2018) offers a historical and human-centered perspective by analyzing the aftermath of the infamous "175 accident" in 1947. The case

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involved a machinist (bus driver) and a conductor, both of whom were deeply affected by the tragedy. The driver, in particular, suffered severe psychological consequences, including a nervous breakdown and eventual medical unfitness for duty. Although he was initially sanctioned, receiving a suspended prison sentence and a fine he was later promoted, raising questions about whether this was a gesture of institutional reparation. Passalacqua's analysis extends beyond the individual case to examine how the Parisian transport authority (STCRP) developed an internal alert and data collection system to manage accident-related risks. He emphasizes the potential of statistical processing to support more nuanced interpretations of incident data and to inform proactive prevention policies. In a more contemporary context, Anders and Dorn (2018) explore the predictive relationship between accident involvement and employee turnover in a major UK bus company. Their findings are striking: drivers who voluntarily resign tend to have a higher frequency of accidents than those who remain employed, even surpassing the accident rates of those who are dismissed. This suggests that accident involvement may serve as an early indicator of disengagement or dissatisfaction, potentially linked to job content, stress, compensation, or morale. The authors propose that transport companies could reduce future accident costs by identifying and addressing these risk factors early. Interestingly, they argue that voluntary turnover though costly in terms of recruitment may sometimes yield net savings by preventing further incidents. They call for improved driver selection methods that account for accident history, absenteeism, and turnover risk, noting that these three factors are often interrelated and financially burdensome. Collectively, these studies illuminate the multifaceted nature of accident risk in the public transport sector. From excessive workloads and insufficient training to psychological trauma and organizational disengagement, the causes of accidents are as diverse as they are consequential. Addressing them requires a dual strategy: one that combines systemic reforms such as improved scheduling, safety protocols, and data-driven risk management with individualized support, including psychological care and professional development. Only through such an integrated approach can transport systems hope to reduce accident rates while safeguarding the well-being of their drivers.

2.4 Safety and Risk Prevention

The question of safety in the professional driving sector has increasingly been approached through the lens of behavioral science, organizational culture, and psychosocial risk management. Useche, Ortiz, and Cendales (2017) initiate this discussion by emphasizing the role of fatigue management interventions. They argue that modifying specific working

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conditions such as shift length, rest breaks, and workload can significantly reduce risky driving behaviors and enhance both occupational and road safety for professional drivers. Building on this, Nævestad et al. (2019) conducted a comparative study involving 215 local bus drivers in Norway and Greece. Their research explored how national safety culture, sectoral emphasis on safety, and organizational safety culture influence drivers' safety-related behaviors. Interestingly, they found that Greek drivers reported higher levels of aggressive driving behaviors such as honking, expressing hostility, or reacting angrily to other road users compared to their Norwegian counterparts. These aggressive behaviors were predictive of accident involvement, although work-related stressors, such as perceived workload pressure, were even more strongly associated with crash risk. What stands out in their findings is the moderating role of organizational safety culture. A strong internal safety culture appeared to buffer the negative influence of national road safety norms, suggesting that companies can play a pivotal role in shaping safer driving behaviors even in contexts where broader cultural attitudes toward road safety may be less favorable. While previous studies (e.g., Charbotel et al., 2010; Salminen, 2000) have highlighted the role of demographic factors like age in accident risk, Nævestad and colleagues found age to be statistically insignificant in their sample. This shifts the focus toward organizational and cultural determinants as more actionable levers for intervention. Chen et al. (2019) further enrich this dialogue with a large-scale study involving 1,140 participants across 30 bus companies in Taiwan. Their research developed a hierarchical linear model to examine the relationship between aberrant driving behaviors and three key predictors: safety climate, stress, and inattention. Their findings were unequivocal: the perceived safety climate within a company had the strongest influence on reducing risky driving behaviors, followed by stress and then inattention. This hierarchy of influence underscores the importance of cultivating a robust safety culture at the organizational level. The authors argue that bus companies must assume greater responsibility in implementing safety-enhancing measures. Since the safety climate exerts a more substantial impact than individual psychological factors like stress or distraction, systemic interventions such as safety training, leadership engagement, and clear communication of safety protocols are likely to yield the most sustainable improvements. In their view, reducing aberrant driving behaviors is not solely a matter of individual discipline but a collective organizational commitment. Together, these studies converge on a critical insight: safety in the public transport sector is not merely a function of individual driver behavior but is deeply shaped by organizational culture, national norms, and structural working conditions. By investing in fatigue management, fostering a

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positive safety climate, and addressing psychosocial stressors, transport companies can play a transformative role in reducing accident risks and promoting a culture of safety from the inside out.

2.5 Job Quality and Professional Fulfillment

The question of job quality among bus drivers is increasingly recognized as central to understanding both occupational well-being and workforce sustainability. Jones, Haslam, and Haslam (2013) open the discussion by highlighting the structural challenges of the profession: unsociable working hours, limited autonomy, relatively low wages in some contexts, and exposure to passenger hostility or violence. They argue that while bus driving may never be considered a "good" job in the conventional sense, it can be rendered "good enough" under certain organizational conditions particularly when ergonomic interventions are used to identify and improve key areas of strain. In a follow-up study, Jones et al. (2014) employed a job quality index to compare bus drivers with other employees within the same companies. Their findings were unequivocal: bus drivers consistently reported lower job quality scores, underscoring the need for targeted organizational reforms. Cunha, Nogueira, and Lacomblez (2014) add a gendered perspective, focusing on the work-life balance challenges faced by female bus drivers. Their study reveals that atypical schedules and long working hours make it particularly difficult for women to reconcile professional and domestic responsibilities. Women in their sample reported spending over three hours per day on household tasks significantly more than their male counterparts. For those juggling more than 15 hours of combined work and domestic duties daily, the "time squeeze" became a critical source of stress, reflecting broader gender inequalities in the division of labor. The role of subjective job characteristics in shaping turnover intentions is further explored by Lannoo and Verhofstadt (2016). They argue that drivers' decisions to leave their employer or the profession altogether are influenced not only by objective working conditions but also by perceived job satisfaction, work-life balance, and social support. Among the most decisive factors was the sense of gratification derived from the job the feeling of doing meaningful work. This was followed by the experience of a demanding work environment, characterized by physical strain and time pressure. The authors emphasize that fostering a sense of personal fulfillment is essential, and they call on transport companies and sectoral stakeholders to implement initiatives that promote professional recognition and well-being. Chen and Hsu (2020) reinforce this point by demonstrating that emotional exhaustion negatively impacts both job satisfaction and organizational commitment. While job satisfaction contributes positively to overall life satisfaction, organizational commitment when

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coupled with burnout can paradoxically increase the desire to leave the job. This suggests that emotional well-being must be addressed not only to retain staff but also to ensure their holistic quality of life. Domínguez, Febres, and Cuadra (2022) provide a broader regional perspective through a meta-analysis of burnout prevalence among public transport drivers in Latin America and the Caribbean. They identify multiple diagnostic approaches, including the Maslach Burnout Inventory (MBI), and converge on a common conclusion: public transport drivers are a high-risk group in urgent need of mental health support. Whether defined by high emotional exhaustion, depersonalization, or low personal accomplishment, burnout is a pervasive threat to this workforce. Finally, Huang et al. (2022) explore predictive factors of burnout, identifying daily physical activity, symptoms of depression and anxiety, and insomnia as key indicators. Notably, drivers who engaged in more than 30 minutes of daily exercise were less likely to fall into high-burnout categories. The authors argue that public transport companies can play a pivotal role in mitigating burnout by enhancing drivers' sense of accomplishment an intervention that could yield both psychological and organizational benefits. Taken together, these studies reveal that job quality in the bus driving profession is shaped by a constellation of structural, psychological, and social factors. From gendered time constraints and emotional exhaustion to the need for recognition and ergonomic reform, improving job quality requires a multidimensional strategy. At its core, such a strategy must prioritize not only the physical safety of drivers but also their dignity, fulfillment, and mental well-being.

3. Discussion

Bus drivers operate at the intersection of demanding, stressful, and often hazardous working conditions (Chen & Hsu, 2020). As Evans (1994) noted decades ago, this occupational group faces disproportionate health risks and elevated rates of absenteeism and medical incapacity, largely driven by chronic work-related stress. In this light, addressing the health of bus drivers is not merely a matter of ethical responsibility; it is a strategic imperative with direct implications for public safety, organizational performance, and economic sustainability. To meet this challenge, a holistic approach is essential, one that reimagines work organization, vehicle ergonomics, psychological support systems, and safety culture (Schjøtt et al., 2002; Chung et al., 2011; Tse et al., 2006; Berraho et al., 2006; Milosievica, 2010; Crizzle et al., 2017; Hege et al., 2016; Hakim et al., 2018; Hanumegowda & Gnanasekaran, 2022). This comprehensive perspective is particularly important given the multifaceted nature of occupational stress in this profession. Indeed, as Tse et al. (2006) emphasize, stressors such as

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intense traffic, irregular schedules, and emotionally charged passenger interactions are central to the daily experience of bus drivers. These psychosocial pressures are further compounded by biomechanical strain: prolonged sitting and whole-body vibrations contribute to musculoskeletal disorders, particularly in the lower back, neck, and shoulders (Krause et al., 1998). Moreover, long and irregular working hours exacerbate fatigue and disrupt sleep patterns, which in turn elevate accident risk and erode overall well-being (Tse et al., 2007; Gertler et al., 2002). Adding to this burden, environmental exposures, such as air pollution and traffic noise pose additional threats. These factors not only compromise respiratory and auditory health but also intensify psychological stress (Kayne et al., 2005; Burgess et al., 1992). Taken together, these findings underscore that managing occupational stress in public transportation is not a peripheral concern, it is central to both driver welfare and public safety (Useche et al., 2018). Furthermore, road safety outcomes are shaped by a complex interplay of factors: working conditions, training quality, psychological support, and human resource practices. As Berrones Sanz (2014), Passalacqua (2018), and Anders & Dorn (2018) collectively argue, only a systemic, integrated approach can meaningfully reduce accident rates and enhance driver resilience. This reinforces the need to move beyond isolated interventions and toward coordinated strategies that address root causes. Equally important is the recognition that well-being in this profession is inherently multidimensional. It is shaped not only by physical conditions but also by organizational structures, gender equity, social support, mental health, and recognition. Improving these dimensions is not only vital for retention and performance, it is foundational to a safer, more humane transport system (Jones et al., 2013, 2014; Cunha et al., 2014; Lannoo & Verhofstadt, 2016; Chen & Hsu, 2020; Domínguez et al., 2022; Huang et al., 2022). In support of this, Rydstedt, Johansson, and Evans (1998) demonstrate that even technical interventions, such as redesigning urban bus routes can significantly enhance driver well-being. Similarly, Chen et al. (2019) emphasize that cultivating a strong safety climate within companies is one of the most effective levers for reducing aberrant driving behaviors. These findings suggest that organizational culture is not a peripheral variable but a central determinant of safety and satisfaction. Moreover, reducing work–family conflict and increasing access to adequate resources could mitigate burnout, improve health outcomes, and curb unsafe behaviors. As Ya-Ling Kao (2023) insightfully notes, while job satisfaction contributes to workplace morale, it does not directly influence health or behavioral outcomes suggesting the presence of deeper, structural moderators. These may include organizational justice, autonomy, and the perceived meaningfulness of work, all of which warrant greater attention in future

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interventions. In sum, the evidence is unequivocal: improving the working lives of bus drivers is not a marginal concern, it is a linchpin for sustainable urban mobility. It demands a paradigm shift from reactive risk management to proactive, human-centered design. Only by addressing the full spectrum of physical, psychological, and organizational determinants can we hope to build a transport system that is not only efficient, but also equitable, dignified, and safe for those who keep it running.

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Conclusion and research directions

This literature review was not intended to identify a gap in existing scientific knowledge per se, but rather to serve as a conceptual compass for our own empirical inquiry. Anchored in an inductive methodological stance, our objective was to gain a deep, contextualized understanding of the bus driving profession, an understanding that would inform and refine the design of our forthcoming fieldwork. The evidence reviewed paints a sobering picture: bus drivers frequently endure long, irregular shifts often exceeding 8 to 10 hours per day, with fragmented schedules and weekend work that disrupts circadian rhythms and erodes work-life balance. These temporal constraints, coupled with the stress of navigating congested urban environments and managing passenger interactions, create a high-pressure occupational ecosystem. Sedentary routines and irregular eating habits further compound health risks, increasing the likelihood of obesity, cardiovascular disease, and other chronic conditions. Moreover, safety concerns are omnipresent. Drivers face not only the risk of traffic accidents but also verbal abuse, theft, and physical aggression from unruly passengers. The psychological burden of transporting large numbers of people daily, under strict procedural constraints and with limited autonomy, adds another layer of strain. The lack of access to clean rest areas or adequate break facilities, especially on long routes or in remote areas only exacerbates the sense of occupational neglect. Despite the weight of their responsibilities, many drivers remain underpaid, with compensation that fails to reflect the intensity and complexity of their role. These findings converge on a critical insight: bus drivers are exposed to a constellation of physical, ergonomic, chemical, biological, and psychosocial hazards that collectively undermine their health, safety, and job satisfaction. Improving their working conditions, remuneration, safety protocols, and infrastructure is not a luxury, it is a necessity. As Tse, Flin, and Mearns (2006) argue, addressing these issues requires longitudinal research, evidence-based interventions, and interdisciplinary collaboration to holistically support the well-being of this essential workforce. Strikingly, despite the global relevance of this profession, the African context and particularly Morocco, remains glaringly underrepresented in the literature. Our review revealed no peer-reviewed studies specifically focused on Moroccan bus drivers, even though the profession is widespread due to the limited availability of private transport options. This absence underscores a critical gap in the scientific discourse and signals an urgent need for context-sensitive research that captures the lived realities of drivers in North Africa. The insights gleaned from this review will serve as foundational stepping stones for our own empirical investigation. Future research must continue to explore the challenges faced by bus

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drivers and develop effective strategies for health promotion and risk prevention. Qualitative methods such as in-depth interviews and focus groups are particularly well-suited to uncovering the nuanced dynamics of shift distribution, time pressure, extended driving hours, rest periods, and stressors specific to professional drivers (Useche et al., 2017). In this spirit, our own research adopts an exploratory, inductive, and qualitative case study approach to examine the work trajectories of bus drivers in Morocco. By immersing ourselves in their daily routines, we aim to uncover underexplored phenomena, generate grounded insights, and reveal new explanatory pathways. Our goal is to analyze the intentions, narratives, actions, and interactions of bus drivers, both from their own perspective and through the interpretive lens of the researcher (Dumez, 2013). This approach is detailed in our recent publication: NAINIA, Hoda; CHRAIBI, Hassan; and CHRAIBI, Soufiane (2025). Presentation of a research design based on ethnographic observation of bus drivers' working journey and design thinking as a method for managing managerial innovation. Revue Internationale du Chercheur, 6(1), February 2025. Ultimately, we believe that centering the voices and experiences of bus drivers is not only methodologically sound, it is ethically imperative. By grounding our inquiry in their lived realities, we hope to contribute to a more inclusive, responsive, and human-centered vision of public transport management in Morocco and beyond.

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APPENDIX A

Table 1

Author(s)/Year of publication	Title of the Article	Country	Key Findings
Morris et al. (1953)	Coronary heart-disease and physical activity of work	United Kingdom	- Incidence rate of first clinical episodes of coronary heart disease was 2.7 per 1000 among bus drivers. - Earlier onset of coronary disease suggested among bus drivers. - Immediate mortality from coronary thrombosis was twice as high for bus drivers, with a 50% death rate within the first 3 months.
Burgess, Swain & Harris (1992)	Road Transport Noise: An Analysis of the Health Effects of Occupational Exposure to Noise	Australia	- Prolonged exposure to road transport noise among truck and bus drivers significantly increases the risk of noise-induced hearing loss and other auditory issues. - Emphasis on improving noise regulation, hearing protection, and employee monitoring.

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Evans (1994)	Working on the hot seat: urban bus operators	India Sweden USA	- High health risks, absenteeism, and medical issues likely linked to occupational stress. - Excessive morbidity and mortality, particularly from cardiovascular, gastrointestinal, musculoskeletal, and nervous disorders. - Occupational stress contributes to early disability retirement and elevated disease rates.
Rydstedt, Johansson & Evans (1998)	The human side of the road: improving the working conditions of urban bus drivers	USA	- Intervention reduced initially high occupational stress to levels comparable with control group. - Improvements observed in perceived workload, observer-rated job difficulties, systolic blood pressure, heart rate, and post-work distress.
Krause et al. (1998)	Psychosocial job factors associated with back and neck pain in public transit operators	USA	- Adverse psychosocial work conditions (high demands, low control) are major risk factors for musculoskeletal disorders in the back and neck.
Gertler, DiFrancesco & Lieu (2002)	Work schedule and job factors in sleep disruption among Los Angeles bus operators	USA	- Sleep disturbances are prevalent and linked to work schedules. - Work schedule adjustments are essential to mitigate fatigue-related risks.

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Schjøtt et al. (2002)	Working environment and job adjustment among bus drivers	Norway	- Negative perception of working conditions increases with job tenure, especially after 10 years. - Job redesign may be necessary to prevent health deterioration.
Kayne et al. (2005)	Respiratory symptoms and ventilatory function in bus drivers exposed to exhaust fumes	United Kingdom	- Long-term exposure to exhaust fumes and particulate pollution impairs respiratory health and lung function. - Recommendations include improved ventilation and emission control systems.
Tsé, Flin & Mearns (2006)	Bus driver well-being review: 50 years of research	Multiple countries	- High occupational stress due to irregular schedules, passenger interactions, and traffic conditions. - Mental health issues such as stress, depression, and burnout are prevalent. - Interventions should target work conditions, social/emotional support, and healthy lifestyles.
Berraho et al. (2006)	Occupational stress among taxi drivers in Fès, Morocco	Morocco	- High levels of occupational stress among taxi drivers. - Emphasis on three-tiered prevention programs to improve health and reduce accidents.
Tse, Flin & Mearns (2007)	Fatigue and its impact on bus drivers'	USA UK Australia Europe	- Fatigue, often caused by irregular and exhausting work hours, poses a major safety risk.

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	performance and safety		- Fatigue management strategies (e.g., schedule adjustments, technology, education) are essential.
Milosievica (2010)	Drivers' fatigue studies	Serbia	- Synthesizes findings from various studies on fatigue in bus and truck drivers. - Symptoms during prolonged driving interpreted as indicators of driver fatigue.
Laraqui et al. (2011)	Prevalence and risk factors of vigilance disorders among professional drivers in Morocco	Morocco	- Professional drivers in safety-sensitive roles require enhanced occupational health surveillance. - Advocates for awareness campaigns and regulatory compliance to improve road safety.
Chung et al. (2011)	Developing effective professional bus driver health programs	Taiwan	- Self-rated health is significantly influenced by age, BMI, depression, daily work hours, perceived company safety, and health issues. - These factors differentially affect drivers' health assessments across various levels.
Jones, Haslam & Haslam (2013)	Bus driving – can it be a good job?	United Kingdom	- Identified disparities in job quality across three bus companies. - Improvement opportunities include scheduling, health and safety, and vehicle maintenance.

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Berrones Sanz (2014)	Working Conditions of Microbus Drivers in Mexico City as a Risk Factor in Road Safety	Mexico	- Strong correlations between long work hours and road accidents (e.g., r = 0.77 for >8 hours/day). - Excessive work schedules contribute significantly to traffic accidents.
Cunha, Nogueira & Lacomblez (2014)	Beyond a man's world: gender in bus driver work activity	Portugal	- Both male and female drivers report career and health challenges, with gendered differences in experiences. - Highlights the importance of incorporating gender analysis in occupational studies.
Jones, Haslam & Haslam (2014)	Measuring job quality: a study with bus drivers	United Kingdom	- UK bus drivers had lower job quality than other employees in the same organization, but higher than German drivers. - Creativity, control, and income/security scored particularly low.
Lannoo & Verhofstadt (2016)	What drives the drivers? Predicting turnover intentions in the Belgian bus and coach industry	Belgium	- Turnover intentions linked to poor work-life balance, low social support, and temporary contracts. - Job dissatisfaction and demanding work environments drive exits from the profession.
Crizzle et al. (2017)	Health and wellness of long-haul truck and bus drivers: A	Canada, USA	- Occupational stress, effort-reward imbalance, and low social support predict risky driving behaviors.

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	systematic literature review		- Fatigue management interventions can enhance safety and reduce risk behaviors.
Useche, Ortiz & Cendales (2017)	Stress-related psychosocial factors, fatigue, and risky driving in BRT drivers	Colombia	- Work stress, effort-reward imbalance, and low social support predict risky driving. - Fatigue management and work condition improvements are recommended.
Passalacqua, A. (2018)	« Le 175 tombe sur la berge de la Seine – 3 morts » : circulation d'informations, gestion du risque et prévention sur le réseau d'autobus parisien (1920-1980).	France	- This article emphasizes the theme of accidents and private life, particularly the devastating impact accidents can suddenly have on the lives of public transport workers. - The Paris region public transport company (STCRP) implemented a fairly advanced system to collect data on accidents.
Anders E., Dorn, L. (2018)	Bus drivers who leave; were they more crash-involved?	United Kingdom	- According to this study, there may be benefits in employee turnover. - The authors argue that fleet-operating companies would benefit more from improving driver selection methods than from attempting to retain drivers with high accident rates.
Araújo, A.V. et al. (2018)	Ergonomic work analysis: Study of bus drivers in the	Brazil	- Noise, screen light, and passenger identification device location were the most frequently reported issues.

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	private collective transportation sector.		Drivers reported knee and lower back pain. - Suggestions were made to improve the workspace and change work routines to reduce discomfort and ergonomic risks.
S Hakim et al. (2018)	Work-related and ergonomic risk factors associated with low back pain among bus drivers.	Egypt	- Low back pain prevalence was high (73.9%) and significantly associated with more than 10 years of service. - The high rate of low back pain among public bus drivers in this study is linked to prolonged employment, over 8 hours of daily driving, and uncomfortable seats and steering wheels.
Useche, Sergio & Gómez, Viviola & Cendales, Boris & Alonso, Francisco. (2018)	Working Conditions, Job Strain, and Traffic Safety among Three Groups of Public Transport Drivers.	Colombia	- Job strain significantly impacts professional driver safety, with considerable influence on performance outcomes. - Work-related stress levels differ between three driver groups (taxis, urban buses, intercity buses), implying the need for tailored safety interventions.
Nævestad, T., Phillips, R., Laiou, A., Bjørnskau, T., George Yannis, G. (2019)	Safety culture among bus drivers in Norway and Greece	Norway Greece	- This study highlights a correlation between national road safety culture, safety behavior, and accident involvement, which could help explain national differences in road safety outcomes.

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Chen, H., Chou, H., Su, J., Wen, F. (2019)	Structural interrelationships of safety climate, stress, inattention and aberrant driving behavior for bus drivers in Taiwan.	Taiwan	- The study shows that safety climate, stress, and inattention directly affect abnormal driving behaviors. Cognitive and emotional safety engagement are essential for better safety performance. - A follow-up study is recommended to assess the economic and social impacts of potential regulatory amendments.
Chen, C. F., Hsu, Y. C. (2020)	Taking a Closer Look at Bus Driver Emotional Exhaustion and Well-Being: Evidence from Taiwanese Urban Bus Drivers.	Taiwan	- Urban bus drivers face demanding and stressful working conditions. Excessive workloads and family conflicts contribute to emotional exhaustion and poor work outcomes.
Wang, X., Jiao, Y., Huo, J., Li, R., Zhou, C., Pan, H., Chai, C. (2021)	Analysis of safety climate and individual factors affecting bus drivers' crash involvement using a two-level logit model.	China	- The study identifies key risk behaviors (aggressive violations, lapses, and ordinary violations) as major contributors to accidents in a specific bus company. - The authors recommend incorporating fleet safety climate into future research.
Domínguez, C. & Febres, J. & Cuadra, S. (2022)	Síndrome de Burnout en conductores de transporte	Latin America / Caribbean	- This meta-analysis shows that 4 in 10 public transport drivers in Latin America and the Caribbean have experienced professional burnout.

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	colectivo en Latinoamérica.		- The results confirm public transport drivers are a high-risk group needing mental health support and protection.
Hanumegowda, P. K., Gnanasekaran, S. (2022)	Prediction of Work-Related Risk Factors among Bus Drivers Using Machine Learning.	India	- Key risk factors such as physical inactivity, frequent posture changes, vibration exposure, inadequate seating, and insufficient breaks significantly affect musculoskeletal pain frequency among bus drivers. - Drivers should engage in physical activity, maintain healthy lifestyles, and adopt good posture to reduce work-related musculoskeletal disorders.
Huang, A., Liu, L., Wang, X., Li, X., Li, J., Luo, C., Chen, J., Zhao, J. (2022)	Trajectories of Job Burnout among Bus Drivers in China: A Three-Year Follow-Up Study.	China	- The study aimed to describe burnout trajectories and examine the impact of related factors over time. - Enhancing drivers' sense of accomplishment could play a vital role in reducing professional burnout.
Zhang, N. et al. (2022)	Conflicts between Bus Drivers and Passengers in Changsha, China.	China	- A cross-sectional survey analyzed the characteristics of conflicts between drivers and passengers. - These conflicts significantly threaten driver and passenger safety.

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			- The authors propose several preventive measures to reduce tensions and improve bus safety.
Bigelow, P. L. et al. (2023)	Workplace Stressors for Bus Operators.	Canada	- Major stressors include passenger tensions, schedule difficulties, traffic congestion, infrastructure issues, and safety concerns. - Recommendations include workplace policy reforms, improved training, better facilities, and stronger administrative support.
Ya-Ling Kao (2023)	Reducing Aberrant Behavior in Bus Drivers through the Job Demands-Resources Model.	Taiwan	- Addressing professional burnout is crucial to improving driver well-being and reducing risky behavior. - Further research is needed to explore the complex interactions among job demands, resources, satisfaction, health, and driving behavior.