

# Fatigue among bus drivers in Ghana and Norway: Examining the influence of working conditions and National road safety culture



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# Presentation outline

- Background
- Aim
- Previous research and hypotheses
- Methods
- Results
- Conclusion

# Background

- Fatigue contributes significantly to many accidents involving professional drivers (Naevestad et al., 2021; Philips et al., 2015)
- Fatigue poses a risk factor in approximately 10-25% of all crashes
- International research indicates between 36 and 64% of professional drivers admit to having fallen asleep behind the wheel at some point (Sagberg & Bjornskau, 2004)
  - higher among professional drivers than private drivers (23-52%) due to the former's longer driving distances
- Fatigue results from exertion (Philips et al., 2015)
  - Its degree and nature depend on the type, dynamics, and context of exertion

# Background cont'd

- Previous research has shown that several factors affect the risk of professional driver fatigue:
  - Individual level: e.g., **age** (Moe, 2006, Nordbakke, 2004), **sleep history** (Kronholm et al., 2006; Ursin et al., 2009)
  - Working conditions: e.g., **type of transport and road environment, driver pressure and stress**
  - National level: e.g., **national road safety culture** (Naevestad et al., 2019)

# Aim

- Examine the factors influencing fatigue among professional drivers in Norway and Ghana, focusing on:
  - the role of national road safety culture (RSC)
  - work pressure
- Norway and Ghana have different road safety records (17 fatalities per million pop. vs. 77 fatalities per million pop.)

# Previous research and study hypotheses

- RSC= **shared norms** prescribing certain road safety behaviours and **shared expectations** regarding others' behaviours and shared values and attitudes (Naevestad & Bjornskau, 2012)
- Based on previous research on professional drivers in countries with different RSCs (Naevestad et al., 2021), **we expect a relationship between national RSC and fatigue** (hypothesis 1)
- Previous research (Jackson et al., 2011; Nordbakke, 2004) has also found that work-related variables such as **work pressure, working hours or commission pay** contribute to bus driver fatigue
- **We therefore expect such factors to influence fatigue** (hypothesis 2)
- **We also expect individual factors like driver age and years of experience to influence fatigue** (hypothesis 3)

# Methods

- Data collection
  - web surveys in bus companies in Ghana (n=281) and Norway (n=285)
  - semi-structured interviews with bus drivers (Norway= 10; Ghana= 19)
- Survey themes/indexes
  - Aggressive driving culture (8 items)- national RSC as descriptive norms (Cialdini et al., 1990); e.g., *When driving in my country, I expect the following behaviour from other drivers, "That they sound their horn to indicate their annoyance to another road user"*; Cronbach's alpha= 0.85
  - Stress and pressure (4 items)- e.g., *I often have to brake suddenly to avoid dangerous situations with pedestrians, cyclists, motorists and others"*; Cronbach's alpha= 0.71
  - Company safety ladder (10 items)- (Naevestad et al., 2020); e.g., *The management emphasises that all drivers should wear seat belts*; Cronbach's alpha=0.87
  - Company safety culture (10 items) - e.g., *"Management often praises drivers who drive safely"*; Cronbach's alpha=0.85
  - Fatigue- *"Have you in the past three months experienced falling asleep (or drowsed for a short moment) driving a bus"*?

# Survey sample

	Ghana n = 281	Norway n = 285
Dozed off or fallen asleep	47%	10%
Age over 46	53%	80%
Weekly 1000 km driven	1.79 (1.26)	1.36 (1.34)
Experience over 15 years	54%	58%
Daily working hours	11.00 (2.94)	7.96 (2.05)
Has fixed pay	49%	89%
Aggressive driving culture	2.11 (0.94)	1.54 (0.60)
Self-employed	28%	0%
Stress and pressure	3.90 (0.83)	2.87 (1.03)
Company safety ladder	4.06 (0.90)	3.47 (0.90)
Company safety culture	3.88 (0.74)	3.31 (0.82)



# Analyses

- We employed a hierarchical logistic regression analyses
  - Independent variables are included in successive steps, with the most basic ones added first, followed by other IDV
- We control for several key variables such as age, mileage, and experience and test the connection with national RSC, work hours, commission pay, and nationality
- Because we hypothesise that organisational factors are important for fatigue, we estimated two different models (with and without self-employed)
  - Reason: most Ghanaian drivers were self-employed (n=82)

# Results (with the self-employed)

Variable	Range	Mod. 1	Mod. 2	Mod. 3	Mod. 4	Mod. 5	Mod. 6	Mod. 7
Model pseudo R2		.003	.004	.007	.02	.03	.07	.16
Age over 46	0-1	0.77	0.78	0.67	0.76	0.82	0.84	1.27
Weekly 1000km driven	-		1.06	1.05	1.02	0.97	0.98	0.95
Experience over 15 years	0-1			1.36	1.31	1.31	1.36	1.19
Aggressive driving culture	1-5				<b>1.36*</b>	<b>1.28*</b>	1.23	1.01
Daily working hours	-					<b>1.11*</b>	<b>1.10*</b>	0.97
Has fixed pay	0-1						<b>0.38*</b>	0.77
Country - Norway	0-1							<b>0.11*</b>
Constant		0.46	0.42	0.39	0.22	0.09	0.19	10.87

# Results cont'd (without the self-employed)

Variable	Range	Mod. 1	Mod. 2	Mod. 3	Mod. 4	Mod. 5	Mod. 6	Mod. 7
Model pseudo R2		0.01	0.01	0.01	0.09	0.09	0.09	0.21
Age over 46	0-1	0.70	0.70	0.65	0.76	0.76	0.75	1.51
Weekly 1000km driven	-		1.01	1.00	0.97	0.97	0.98	0.91
Experience over 15 years	0-1			1.16	1.25	1.25	1.25	0.98
Stress and pressure	1-5				<b>2.12*</b>	<b>2.14*</b>	<b>2.12*</b>	<b>1.38*</b>
Safety ladder	1-5					0.97	1.03	0.89
Company Safety culture	1-5						0.91	<b>0.57*</b>
Norway	0-1							<b>0.08*</b>
Constant		0.43	0.42	0.41	0.03	0.02	0.03	43.06

# Interview results

- Bus driving in Norway and Ghana are substantially different things.
- The qualitative data indicates crucial differences in national framework conditions influencing fatigue bus drivers' work situation
- We found that the most important framework condition for bus drivers in Ghana is type of employer (commercial or institutional)

# Conclusion

- There are notable differences between Ghanaian and Norwegian bus drivers
  - Higher incidence of dozing off or falling asleep among Ghanaian bus drivers
  - More older bus drivers in Norway
  - Longer weekly driving distances and longer working hours for Ghanaian bus drivers
- The analysis revealed that an aggressive driving culture, longer working hours, and having fixed pay were associated with increased fatigue
  - these associations weakened when accounting for the country of residence
- Country of residence had the most significant influence on the likelihood of drivers falling asleep or dozing off (less likely for Norwegian drivers)
- Among drivers not self-employed, stress and pressure also played a considerable role in fatigue; a higher company safety culture was associated with reduced fatigue.

# Discussion

- Country variable is a proxy for the relatively unregulated nature of bus transport in Ghana, compared with Norway
- Buss companies' responsibility to change org. safety culture and work with safety management
- Authorities' responsibility to change these framework conditions

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# Survey sample

	Ghana	Norway
City bus (intra city)	29%	27%
Regional bus (inter city)	46%	27%
School bus	14%	13%
Long distance bus (inter city)	10%	5%
Express bus	1%	6%
Air port express bus	0%	2%
Tour bus	0%	3%
I drive several different types	1%	15%
Other type than mentioned	0%	2%