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Supplementary file 3. The characteristics of the included studies

study	year	country	no. participants	participant description	male/female	age	no. of channels (sampling or down-sampled rate)	task	Task duration (time of task)	type of induction of fatigue and drowsiness
Ahn et al. ²³	2016	South Korea	11	healthy subjects, with driver's licenses	10/1	26.6+-1.4	64(512 Hz)	simulated driving (maximum speed: 100 KM/h, custom-built virtual driving single monitor)	minimum of 30'(before 9AM.)	one night of sleep deprivation, determination by subjective questionnaire, and one night well rested
Akbar et al. ²⁴	2017	Japan	8	healthy males/with driver's license	8/0	21-35	19(500Hz)	simulated driving (speed:100km/h, single monitor)	50' in each trial (8-10 and 13-15 in two separate tasks)	without sleep deprivation, after sleeping enough (at least 5h), the experiment was done in two separate trials. 8 trials for each subject (KSS)
Akbar et al. ²⁵	2019	Japan	16	healthy male drivers	16/0	23.06 ± 3.88	19 (500 Hz)	simulated driving (simulator-based driving environment, speed:100KM/h)	50' in each trial (8-10 a.m. and 13-15 in two separate tasks)	after asking to sleep at least 7.5, two trials each day, for four days (KSS)
Awais et al. ²⁶	2017	Malaysia	22(university students)	university students, with at least two years of driving	NM	18-35	20(500 Hz)	simulated driving (simulator-based driving environment, speed:80KM/h, single monitor)	80' (time of driving NM)	drowsiness induced by monotonous driving (KSS)
Bose et al. ²⁷	2019	China	19(3out of 22 excluded)	healthy, recruited through advertising,	12/10	23+-2.7	24(250 Hz)	simulated driving (simulator-based driving environment, driving wheel, pedals and gearbox, speed: NM)	90' (time of experiments NM)	fatigue induced by monotonous driving. In two separate sessions with one-week intervals. (NM)
Brown et al. ²⁸	2013	USA	72	healthy, drive at least 10,000 miles per year, normal nighttime sleep patterns,	NM	21-34 38-51 55-68	9 (NM)	simulated driving (simulator-based driving environment, speed: maximum 70mph)	three nighttime driving segments,45' in sum (9 am-10 pm, 10 pm-2 am, and 2 am-6 am)	Participants drove three times of day to induce different levels of drowsiness. SSS, PVT, and retrospective sleepiness scale (RSS). (sleep-deprived in nighttime)
Chai et al. ²⁹	2023	Australia	48	healthy	NM	32.6+-12.6	32(256Hz)	simulated driving (divided attention steering simulator, speed: NM)	maximum time 2 hours for each driving (9 AM – 12 PM or 2 PM- 5 PM)	Fatigue induced by monotonous driving. (SSS)
Chuang et al. ³⁰	2018	Taiwan	16(students)	right-handed, normal or corrected-to-normal vision, No history of psychiatric disorders, neurological disease, or drug use disorders,	NM	22-28	30(250Hz)	simulated driving (360° surrounded scene, six screens, speed:100km/h)	1hour(noon)	induced by continuous driving (NM)
Foong et al. ³¹	2019	Singapore	29	healthy	NM	NM	4(256 Hz)	simulated driving (single screen, gaming seat, and steering wheel, simulator-based driving environment, speed: NM)	1 hour (time of experiment NM)	induced by continuous driving (KSS)
Gharagozlou et al. ³²	2015	Iran	12	healthy, at least two years of driving,	12/0	20-30	13(256 Hz)	simulated driving (VR simulator, three monitor screens, speed:90km/h)	1 hour or so. (2 to 6 AM)	staying awake 18 hours before the experiment. Overnight study. (ESS and F-vas score)
Guo et al. ³³	2016	China	20	healthy, with a driver's license, and experience ranging from 3-25 years)	12/8	24-51	NM	simulated driving (simulator-based driving environment, speed:80-120km/h)	4-6 hours (10:30 AM)	fatigue induced by monotonous driving. (SSS)
Hamann et al. ³⁴	2023	Germany	31	healthy, normal vision, normal hearing, initial KSS score of 6 and less, no flying experience, no pilot's license	20/11	24.1+-3.4	28(256 Hz)	simulated flying (simulator-based flying experience, For the task, an A321 cockpit was simulated in the iSim, a flight simulator based on X-Plane 11)	approximately 1.5hr (9:30 AM started, and lasted for 3.5 hours)	Fatigue induced by continuous flying. (KSS)
Jagannath et al. ³⁵	2014	India	20	healthy, at least two years of driving	20/0	23 +-4.40	21(500 Hz)	simulated driving (game environment, steering wheel with force feedback, gear shift	1 hour (time of experiment NM)	fatigue induced by monotonous driving. (NM)

									lever, foot pedals, and a projection of the driving environment for visual feedback, speed: NM)		
Kar et al. ³⁶	2010	India	21 (12 for sleep deprivation) professional drivers	professional drivers, healthy	21/0	20-35	13(256 Hz)	real and simulated driving (computer game)	1 hour (time of experiment NM)	three experiments: 1) actual driving and driving-related psychomotor vigilance tests/2) simulated driving tasks with sleep deprivation/3) actual driving tests for validation (modified questionnaire)	
Lal et al. ³⁷	2002	Australia	35	non-professional drivers, healthy	26/9	34+-21	19(256 Hz)	simulated driving (simulator-based driving environment with steering wheel, brakes, accelerator, gears, and speedometer with a video display, speed<80km/h)	about 2hours (time of experiment NM)	similar sleep period 4+-1 hours of sleep. Experiment in 2 stages, (stage 1 with 10-15 mins of active driving, stage 2 with 2 hours of monotonous driving) (fatigue state question)	
Lee et al. ³⁸	2014	South Korea	20	healthy, from various countries, without any illnesses	NM	32+-6	34(100 Hz)	simulated driving	In two sessions (16 hours) (daytime, from 11 AM to 7 PM, and nighttime, from 11 PM to 7 AM)	induced by monotonous driving (NM)	
Nguyen et al. ³⁹	2017	South Korea	9	students, healthy with enough sleep,	8/1	24-28	64(512 Hz)	simulated driving (1.5m away from chair, single screen, speed:80-100km/h, computer game)	30'-90' depending on the subject condition (time of experiment NM)	induced by monotonous driving (NM)	
Otmani et al. ⁴⁰	2005	France	18(professional drivers, bus and coach driver)	professional, bus and coach drivers, free of simulator sickness, healthy	18/0	32.05+-2.8	4(NM)	simulated driving (simulator-based driving environment, car front cabin, three screens, 2.5m away from the driver, view: 105°, max speed:130km/h)	90' (between 2 PM-4 PM and 11 PM-1 AM)	induced by monotonous driving (KSS), two separate driving sessions	
Pal et al. ⁴¹	2008	Taiwan	13	NM	NM	20-40	28(500 Hz)	simulated driving (VR-based driving environment, 3D surrounded scenes, speed:100km/h)	1hour (early afternoon after launch)	induced by monotonous driving. (NM)	
Sivakumar et al. ⁴²	2021	India	10	healthy, students and faculty members	9/1	26.1	21(256 Hz)	simulated driving (computer game, car frame, steering wheel, accelerate, brake, and clutch pedals, with 3 LCD, speed: NM)	1.5-2hour (1.30-3.30/12AM-2AM/3AM-5AM)	fatigue induced by continuous driving. Also, the drivers were distracted by answering the messages without stopping.	
Puspasari et al. ⁴³	2023	Indonesia	30(students)	university students, healthy, normal or corrected to normal vision, normal sleep	18/12	20.6+-0.83	5(NM)	simulated driving (one single 55-inch monitor, driving simulator software, max speed:80km/h, Three-foot pedals, a force-feedback steering wheel, and a gear shift)	1 hour (13.00-15.00)	sleep deprivation (sleep less than 5 hours, assessment using objective and subjective (KSS)	
Puspasari et al. ⁴⁴	2017	Indonesia	7(commercial drivers)	prohibited from consuming caffeine and smoking, healthy	NM	25-35	6 out of 16(frontal channels) (NM)	simulated driving (speed: NM, medium-fidelity driving simulator, three pedals, and embedded Citycar Driving software)	at least 3hours (time of experiment NM)	Fatigue induced by driving. (KSS)	
Shoabit et al. ⁴⁵	2023	South Korea	31	healthy, refrained from consumption of tea or coffee, alcohol, normal vision	24/7	NM	14(500 Hz)	simulated driving (game environment (Grand Turismo), with a brake, accelerator, and comfortable chair,105m away	about 1 hour (5 separate experiments) (experiments were done in the morning for the alert	sleep deprivation for 22+-0.5hrs. 2 experiments (alert state and sleep deprived state. (KSS)	

									from the screen, speed: 60-80km/h)	state and in the midnight and early afternoon for the drowsy state)	
Sun et al. ⁴⁶	2014	USA	12(recruited from university)	healthy with no addiction	9/3	26 ± 2.12	20 (NM)	simulated driving (high fidelity driving simulator) (vehicle body, six projection surfaces, speed: NM)	15' on each session. Two experimental sessions. (One in the morning, and one in the afternoon.)	induced by the time of the task. drowsiness evaluated by Wierwille and Ellsworth criteria.	
Torsvall et al. ⁴⁷	1987	Sweden	11(drivers of electric locomotives)	NM	NM	27-58	2(68 Hz)	real train driving	4.5 hours. (nighttime:21.00-7.00AM)	1 day recording and one-night recording. Induced by time of day and activity. (NM)	
Wang et al. ⁴⁸	2021	China	10(post-graduate students)	right-handed, healthy, normal, or corrected to normal vision, normal hearing, with a driver's license.	6/4	22-24	32(200 Hz)	simulated driving (one single screen, wheel, and gas pedal, speed: NM)	2.5 hours (after launch)	all the experiments were done after the launch. Fatigue induced by monotonous driving (NM)	
Wang et al. ⁴⁹	2019	USA	16(FAA certified pilots)	Eighteen Federal Aviation Administration (FAA) certified commercially rated pilots, avoid naps, sleep, and caffeine (or similar "energy" beverages) from the time they woke up the previous day in advance of showing up for the study	14/2	21.5+-2.4	13(125 Hz)	simulated flying (Piper Seminole fixed-base aviation training simulator)	2hours(2.00AM-6.00AM)	All participants were requested to remain awake for 18-20 hours before starting the experiment. (KSS and PVT)	
Wei et al. ⁵⁰	2018	Taiwan	10	healthy, normal vision	NM	NM	32(250 Hz)	simulated driving(VR simulator, six degree of freedom platform speed: 100km/h)	1.5hour (after launch)	induced by monotonous driving. After launch. (NM)	
Wijesuriya et al. ⁵¹	2007	Australia	50(non-professional drivers)	healthy, current driver's license, For the 24 hours before the experiment, were refrain from drinking alcohol and for 12 hours before the study, from drinking caffeine-based drinks,	27/23	31.7+-12.5	32(1025 Hz)	simulated driving (divided attention steering simulation, one single screen) (game grand prix)(speed: NM)	2 hours (9.00-12.00 noon or 2.00-5.00 PM)	induced by monotonous driving. if a subject did not show signs of fatigue in the 2 h, they were eliminated from the study. (LAQ questionnaire, ESS and SSS)	
Zhang et al. ⁵²	2013	China	10(5 of 10 were professional drivers)	NM, 5 out of 10 non-professionals.	NM	NM	14(128 Hz)	simulated driving (the description NM + real driving	1 hour (time of Experiment NM)	fatigue induced by continuous driving. (NM)	
Zhang et al. ⁵³	2020	China	16	driving licenses, healthy right-handed, no mental disorders or sleep problems, refrained from using tea, alcohol, and caffeine.	8/8	20-35	19(500 Hz)	simulated driving(cockpit, wheel, a clutch, a foot brake, an accelerator pedal and a hand brake, single screen, simulator-based driving environment)(speed: NM)	1 hour (13.00-15.00 after launch)	induced by monotonous driving(NM)	
Zhang et al. ⁵⁴	2021	China	48	driving history of 1-10 years, normal vision, normal hearing, enough sleep, not allowed to drink coffee, alcohol, or tea 24 hours before the experiment	NM	24.83+-2.81	64(250 Hz)	simulated driving (viewing angle of 120°, brake, wheel, gear, simulator-based driving environment)	40' (9-11 every morning)	monotonous driving(automated and manual driving mode)(SOFI)	
Zheng et al. ⁵⁵	2017	China	23	Caffeine, tobacco, and alcohol were prohibited before participating in the experiments. normal or corrected-to-normal vision.	11/12	23.3+-1.4	18(200 HZ)	simulated driving (VR-based driving simulator, wheel, gas pedal, speed: NM)	approximately 2hour (time of experiment:13.30, early afternoon after launch)	Fatigue induced by continuous driving(NM)	

Zuraida et al. ⁵⁶	2022	Indonesia	14	healthy, right-handed, normal vision, valid driving license, at least two years of driving experience, refrain from consuming alcoholic or caffeinated beverages and in-between naps	14/0	26.36+ -4.59	14(128 Hz)	simulated driving (simulator-based driving environment, a single screen monitor, pedal, gears, wheel, 40cm away from the driver, speed:40-60 km/h)	5 hours (started at 7.00 AM)	driving in two sessions. One with mild sleep deprivation. (3-4 hours of sleep). Fatigue induced by monotonous driving. (KSS and SFR-subjective fatigue rating)
Akerstedt et al. ⁵⁷	2010	Sweden	13(one out of 14 excluded)	refrained from using tea, and coffee for three hours to test, and alcohol for 72 hours to test, at least 5000km/year of driving, no motion sickness,	7/7	37.9 years (24–57)	three bipolar derivations positioned at Fz-A1, Cz-A2, and Oz–Pz (6 channels)(256 Hz)	simulated driving(front part of Volvo, view of 120*30,three screens of front view, speed: max 90 km/h)	Driving was scheduled to start at 09:30, 13:00, 16:30, 20:00, 23:20 and 03:00 hours for half the subjects, and 70 min later for the other half. These sessions formed the factor TOD	normal sleep (8 h, with sleep between 23:00 and 07:00 hours) and PSD (4 h, with sleep between 03:00 and 07:00 hours),(KSS)
Ahlstrom et al. ⁵⁸	2017	Sweden	30	healthy, BMI<30, normal sleep pattern, avoid alcohol for 72 h, and abstain from nicotine and caffeine for 3h before driving, no simulator sickness,	30/0	23.6 ± 1.7	30(256 Hz)	simulated driving(high fidelity driving simulator)(vehicle body, six projection surfaces,speed:60-80km/h)	Each scenario lasted for 30 minutes, with 1.5 hours of rest in between each drive (day session:12.30PM-9.15 PM/ night session:22.00-6.15AM)	The experiment was set up to investigate driver sleepiness in terms of light conditions (daylight/darkness), traffic environment (rural/suburban), and consistency (three identical repetitions for each driver)(KSS)
Akbar et al. ⁵⁹	2015	Japan	16	healthy, with a driver's license, and no alcohol or caffeine before the experiment.	16/0	21–23	19(500 Hz)	simulated driving(speed: NM)(no description of simulator environment)	50 minutes (01.00 pm to 03.00 pm)	Drowsiness induced by monotonous driving. (KSS)
Zuraida et al. ⁶⁰	2019	Indonesia	28	healthy, at least two years of driver's license, no alcohol and caffeine consumption within 24 hours before the experiment,	28/0	26.36 ± 4.59	10(128 Hz)	simulated driving	2.5-hr (morning driving session:7.00AM/night:21.00)	induce fatigue from prolonged driving(SOFI,SFR,KSS)
Awais et al. ⁶¹	2014	Malaysia	9(university students)	healthy, valid driving license, normal vision, without mental disease.	NM	NM	19(500 Hz)	simulated driving (simulator-based driving environment, one single screen monitor)(speed: maximum 80 km/h)	80 min(time of experiment NM)	drowsiness induced by monotonous driving(SSQ)
Caldwell et al. ⁶²	2009	USA	10 (aviator)	avg flight experience of 1153hrs.	9/1	31.2 (range = 26–46),	32(NM)	real flying aircraft(UH-60 helicopter)	1.5-hours flight(in three sessions)(scheduled at 14.00,17.00,20.00)	sleep deprivation for 26 hours. Monotonous driving. (POMS)
Campagne et al. ¹²	2003	France	46	driving at least 5000km/year, driver's license of at least 2 years, having normal vision,	46/0	NM(3 different groups of age):20-30/40-50/60-70	4(NM)	simulated driving(simulator-based driving environment, average speed:125km/h,	2 h and 49 min ± 11 min(time of experiment NM)	drowsiness induced by monotonous driving(driving in lighted and non-lighted motorway condition)(NM)
Chen et al. ⁶³	2018	China	12(students)	healthy, normal vision, normal hearing, postgraduate students, at least 2 years of driving experience, coffee, alcohol, tea, and tobacco are prohibited before participating in the experiments, and normal sleep.	12/0	M=27.33, SD=2.81	30 (1000 Hz)	simulated driving (single monitor, a steering wheel, a horn, a clutch, a brake pedal, an accelerator, a shift, a chair, and turn signals,(Santana couple)(speed:60km/h)	60'(started at 2.00PM)	Drowsiness induced by monotonous driving. (KSS and SSS)

Zhang et al. ⁶⁴	2018	USA	22(college student)	healthy, valid license, abstain from caffeine consumption, enough sleep, abstain from using caffeine and alcohol on the test day	16/6	23.5 ± 3	4(1000 Hz)	simulated driving (five screens,200° field of view, BMW front car, VR-based driving simulator,	60'+-10mins (10.00-15.00)	drowsiness induced by monotonous driving (NM)
Craig et al. ⁶⁵	2011	Australia	48	healthy, held a current driver's license, refrained from using alcohol for 12 hours and caffeine 12hr	25/23	31.5+12.3(18-55)	32 (1025 Hz)	simulated driving (divided attention steering simulation, (60-120km/h), one single screen)	up to 120 min(9.00AM-12.00PM/2.00PM-5.00PM)	drowsiness induced by monotonous driving (CFS)
Eoh et al. ⁶⁶	2004	South Korea	8	at least 2 years of experience	8/0	26.1	8(256 Hz)	simulated driving (single monitor screen, speed:100-120 km/h) (wheel, pedal, and car seat,1.6*1.1m screen, Grand Turismo, game)	50'(8.00AM after a night of sleep deprivation)	drowsiness induced by monotonous driving (after a whole night of sleep deprivation) A1, A2, B1, B2(eyes open and close, dosage of coffee)(NM)
Filtness et al. ⁶⁷	2012	Australia	40	healthy, medication-free, ESS<10, driving more than 2 years, more than 3 hours per week. No alcoholism, low coffee consumption.	40/0	20 older men (mean 66.6/52-74) and 20 younger men (mean 22.7 / 20-26)	2(NM)	simulated driving (simulator-based driving environment, 2*1.5 screen, speed: appropriate for driving, dull monotonous dual carriageway)	2 hours (started at 2.00 PM)	drowsiness induced by monotonous driving, normal sleep, and (ii) sleep restriction to 5 h by delayed bedtime. (KSS)
Dunbar et al. ⁶⁸	2020	USA	25	valid license, healthy, sleep limited to 5 hours before the experiment	10/16	20-32	4(NM)	simulated driving (max speed:60km/h) (simulator-based driving environment, lane change test)	45' (time of experiment NM)	drowsiness induced by monotonous driving. (also, mild sleep deprivation and sleep limitation to 5 hours) (KSS)
Jap et al. ⁶⁹	2009	Australia	52	refrained from using tea, caffeine, and alcohol, non-professional, no alcoholism, drug abuse, healthy, normal BMI	36/16	(28 ± 10)	30 (1000 Hz)	simulated driving (speed:60-80km/h, grand prix game, wheel, brake, accelerator, gears)	63 min ± 12 min(noon)	drowsiness induced by monotonous driving (two driving sessions, alert driving session, and monotonous driving)(NM)
Kecklund et al. ⁷⁰	1993	Sweden	18(truck drivers)	truck drivers, the experience of more than one year, healthy, driving at night time for more than 1 year	NM	45	4 (68 Hz)	The drivers were recorded during one night or evening drive between southern Sweden and Stockholm (approximately 500 km) in the spring or the autumn.	6-9hours (evening group:18.20-4.00AM/night group:20.30-7.24)	drowsiness induced by monotonous driving with 20 min rest. (evening group and night group) (KSS)
Lees et al. ⁷¹	2018	Australia	63	healthy, without substance use	54/9	38.56 ± 9.9	32 (1000 Hz)	train simulated driving (video game, first-person train driving simulation)	10 minutes (time of experiment NM)	drowsiness induced by monotonous train driving (PSQI, KSS, CIS20, ESS)
Lowden et al. ⁷²	2009	Sweden	20 (10 young/10 elderly)	all the subjects lacked actual driving experience, had no shift work, had no alcoholism and drug abuse, abstained from using coffee and alcohol 6hrs before the experiment,	10/10	18-24 55-64	16 (256 Hz)	simulated driving (moving based-driving simulator, 120°-wide, screen 2.5 m in front of the driver, max speed:110km/h)	50mins(5.00PM-9.00PM/2.00AM-5.30AM)	drowsiness induced by monotonous driving (KSS)
Otmani et al. ⁷³	2005	France	20(young and older drivers)	driver's license:11years for young and 30 for older drivers, driving at least 10,000 km/year, healthy,	20/0	29.6±2 .62/49.	4 silver electrodes (250 Hz)	simulated driving (car cabin, 2.50 m away from driver,108°, max speed:130km/h)	90'. Every 10 minutes during the driving (2-4 PM)	afternoon post-lunch dip period (between 2 and 4 p.m.). One test day (control condition) was

						6+ 3.06				conducted after a normal night's sleep at home. The subject arrived at midday at the laboratory and took lunch with the scientific team. The other test day was conducted after a night of sleep deprivation. (KSS)
Li et al. ⁷⁴	2013	China	30(15 experienced,15 unexperienced)	experienced group, as they drive more than 50,000 km/h, refrained from using coffee and beverages, no sleep disorders.	30/0	26+ 3.2	10 to 16(8192 Hz)	road driving (speed:100km/h)	90' (8.00-10/12.00.14.00/16.00-18.00)	drowsiness induced by monotonous driving (experienced and inexperienced group) (SSS)
Ma et al. ⁷⁵	2018	China	21(experienced)	healthy, driver's license of 15.8 years, drive more than 100,000 km/year, refrain from consuming caffeine or alcohol in the morning of their visits, normal sleep.	21/0	40.1 (29-47)	63(250 Hz)	simulated driving(speed:72km/h) (fixed based driving simulator, wheel, gear,3screens, accelerator, brakes.)	60 min(9.00AM)	drowsiness induced by monotonous driving (SOFI-C)
Jap et al. ⁷⁶	2010	Australia	24(non-professional)	non-professional, healthy, no alcoholism, no drug abuse, nicotine, caffeine, tea, and food intake were restricted for approximately 4 h, while alcohol intake was restricted for 24 hours before the study	12/12	29.5± 12.4 years	30 (1000 Hz)	simulated driving (wheel, brakes, accelerator, and gears. Grand Prix 2 game, speed:60-80kh/h)	67± 11(10.00-13.30)	drowsiness induced by monotonous driving (Likert scale questionnaire)
NELSON et al. ⁷⁷	2010	Australia	12 experienced drivers)	healthy, low caffeine and low alcohol, licensed at least 3 years (mean 14.75+6.9, and at least 15000km per year, good sleep quality).	8/4	32.75 (6.93)	8(250 Hz)	simulated driving (front cabin of the car, wheel, accelerator, brakes,1.6m from the front wheel, speed:80km/h)	4 Each driving session (2 hours) (time of the experiment (9.30 PM-8.00 AM)	drowsiness induced by monotonous driving. (also sleep deprivation during sessions) (KSS & POMS)
Perrier et al. ⁷⁸	2016	France	16(eight of 24 did not complete the task.	driving experience at least for 4 years, driving at least 5000km per year, healthy, without drug or alcohol abuse, excessive caffeine use, and smoking.	NM	26.9 (± 3.4)	32 (250 Hz)	real driving condition(speed:95km/h) (standardized highway driving test)	1 hour (between 9 am.-13.00)	sleep deprivation condition in one group and drowsiness induced by monotonous driving. (KSS)
Papadelis et al. ⁷⁹	2007	Greece	21	healthy, refrained from using tea, caffeine, alcohol, and nicotine 24 hours before the experiment, driving at least 10,000 km per year. Normal vision	20/1	33.04 ± 10.7	8(200 Hz)	real driving (max speed:120km/h, performed with a 5cylinder car)	1 hour (time of experiment NM)	night driving and day driving, drowsiness induced by monotonous driving, and sleep deprivation (24-hour sleep deprivation) (MWT scale and ESS)
Kee et al. ⁸⁰	2010	Malaysia	25	driving experience of at least 2 years, healthy, refrained from using alcohol, tea, coffee, and smoking 24 hours before the experiment.	25/0	23-53	6(1024 Hz)	simulated driving (single screen,1 meter from the driver, speed:50-90km/h)	250km within 3 hours (daytime and nighttime driving)	drowsiness induced by monotonous driving (group A: daytime driving, and group B: nighttime driving)(NM)
Simon et al. ⁸¹	2011	Germany	10	drivers aborted from driving due to excessive sleep.	6/4	27.5(2 4-36)	64(500 Hz) – 128(1000 Hz)	Real driving (Mercedes Benz s class,430km, max speed:130km/h)	2:23 h, standard deviation (SD): 0:38 h (started at 12.30 pm.)	drowsiness induced by monotonous driving (KSS)
Sivakumar et al. ⁸²	2021	India	10	healthy, male drivers	10/0	Range: 19- 32	21 (256 Hz)	simulated driving (game environment (speed dreams, three screens, max speed:70km/h)	Each experiment lasted for 90-120 minutes (experiments were conducted on three timings: midnight (12.00 AM to 2.00 AM); early morning (3.00 AM to 5.00	drowsiness induced by monotonous driving (NM)

									AM) and afternoon (2.00 PM to 4.00 PM).	
Zhao et al. ⁸³	2012	China	13(students)	All the subjects lacked actual driving experience, had no shift work, were right-handed, had normal vision, no alcoholism or drug abuse	13/0	25.8 range: 22–27	32(500 Hz)	simulated driving + oddball task(speed:100km/h)	90mins(9.00-11.00/3.00PM-5.00PM)	drowsiness induced by monotonous driving (Li's score)
Han et al. ⁸⁴	2019	China (college and graduated students)	16	healthy, right-handed, ocular diseases, refrained from the use of alcohol, coffee, and tea 48hour before the experiment	12/4	23 ± 2.9	62(256 Hz)	simulated driving (simulator-based driving environment, steering wheel, speed: NM)	70'(time of experiment NM)	drowsiness induced by monotonous driving (NM)
Gibbins et al. ⁸⁵	2022	Canada	28	healthy, right-handed, no shift, non-smoker, restricted use of caffeine,	17//11	22+3	27(500 Hz)	simulated driving (simulation of rural driving experience, York computer, max speed:100km/h)	approximately 70'(12.00PM-4PM.)	the study was done in two groups, the normal sleep group with sufficient sleep and the mild sleep deprivation group. Assessment of drowsiness was done using SSS and PVT
Zheng et al. ⁸⁶	2022	China	6	healthy, valid license, abstain from caffeine consumption, enough sleep,	6/0	24	32 (200 Hz)	simulated driving (simulator-based driving environment, simulator driving equipment, wheel, brake and accelerator, a large screen) (speed: NM)	1-2 hours (time of experiment NM)	induced by simulated driving (Li's subjective fatigue scale)

KSS: Karolinska Sleepiness Scale; NM: not mentioned; SSS: Stanford Sleepiness Scale; PVT(Psychomotor Vigilance Task; VR: Virtual reality; MWT: Maintenance of Wakefulness Test; ESS: Epworth Sleepiness Scale; POMS: the profile of mood state; SOFI: Swedish Occupational Fatigue Inventory; CIS 20: Checklist Individual Strength; PSQI: Pittsburgh Sleep Quality Index; CFS: Clinical Frailty Scale