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Examining demographic, work, and sleep characteristics among older South Asian American yellow taxi drivers in New York City: A brief report

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ABSTRACT

Objectives: This exploratory study examines workplace factors, sleep, sleep disorders, and safety among older (age 50 years and above) yellow taxi drivers in New York City (NYC) of South Asian descent.
Methods: Using street intercept methods, quantitative data was collected among yellow taxi drivers in NYC (n = 27) from January–March 2020.
Results: Among drivers, higher than normal sleepiness was identified in 33%, sleeping fewer than 7 hours on worknights work nights was reported by 52%, and 37% were at high risk for obstructive sleep apnea (OSA). Among drivers, 11% (n = 3) reported a motor vehicle accident in the past year and all drivers who reported an accident were at high risk for OSA.
Conclusions: Findings from this hard-to-reach and understudied population revealed that most drivers did not report sufficient sleep on work nights. Results found over one-third of drivers had high OSA risk and drivers at high risk for OSA contributed to all reports of motor vehicle crashes.

1. Introduction

Taxi driving, due to extended periods of time in a seated position, long work hours, high stress and uncertain conditions, is an occupation that is associated with depression [1] and cardiovascular disease (CVD) [2]. Further, many taxi drivers are foreign born and from racial/ethnic minorities. A 2004 report showed that the majority of yellow taxi drivers (taxis that feature a 'medallion,' which is a city-issued permit to pick up street-hailing customers) in New York City (NYC) were immigrants (84%), low income earners (average income was $29,048), and typically older (average age 46 years old) [3]. Particularly concerning, research found that more than 40% of NYC yellow taxi drivers did not have a usual source of healthcare and 25% had never received a health checkup [4]. Due to the increase in popularity of low-cost, ride-sharing services, demand for yellow taxis has fallen [5], threatening financial well-being and introducing significant barriers to mental and sleep health among this already vulnerable population. Although research has documented insufficient sleep and sleep disorders in other transportation workers [6], there has been little research on sleep among taxi drivers, and there is a lack of comprehensive assessments of sleep among taxi drivers. Although not yet widely examined, obstructive sleep apnea (OSA) may increase safety concerns. According to a study of Australian taxi drivers, 18% of drivers were identified as high risk for OSA [7]. Further, average age of NYC taxi drivers is 46 years of age, and age is a risk factor for sleep disorders [8]. Finally, according to the NYC Taxi and Limousine Commission, Bangladesh is the number once country of origin of yellow taxi drivers in NYC [3], yet no research has examined sleep, health, and safety in this population. In this exploratory study, we examine sleep, health, and safety among older (age 50 and above) NYC yellow taxi drivers of South Asian descent, the most common ethnicity of drivers.

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1.1. Participants and methods

Twenty-seven drivers of yellow medallion taxicabs were recruited in NYC using the street intercept method. Study team members were stationed at a popular rest area where yellow taxi drivers can park for free and get out of their car to take a break and/or have a meal. Drivers were recruited from this rest area in NYC between January and March 2020. Study team members were tasked with approaching all yellow taxi drivers who stopped and got out of their vehicle at this rest area. Taxi drivers were informed about the study, provided a consent form, and then screened for eligibility. Study team members were stationed at the rest area across several days at different times to reach drivers on different types of shifts. The study team approached approximately 85 drivers, the majority of whom declined stating they were too busy working. Eligible drivers were those ≥50 years of age, English-speaking, and of South Asian descent. Due to literacy challenges and time pressures on taxi drivers, surveys were read aloud to eligible and interested participants by the study team members and responses were transcribed onto the surveys. The survey data was subsequently entered into data management software for analysis. Participants were compensated with a gift card for their time. The Institutional Review Board at the NYU School of Medicine approved the study.

1.2. Measures

This study asked drivers to respond to demographic questions. Participants also self-reported their health conditions, height and weight, and overall health. Additionally, work-related questions were asked. These included years as a driver, shifts, and commute times. Job control was measured with the question "The pacing of the job I do is." on a scale from "Entirely outside my control" (1) to "Entirely under my control" (5). Professional fulfilment was measured by the 16-item Professional Fulfilment Index (PFI) [9]. Burnout was measured on a scale from "I enjoy my work. I have no symptoms of burnout" (1) to "I feel completely burned out and often wonder if I can go on." (5) [10]. Participants were asked to report the number of motor vehicle accidents and speeding tickets in the past year.

Sleepiness was measured according to the Epworth Sleepiness Index (ESS) [11]. Insomnia symptoms were measured using the Athens Insomnia Scale (AIS) [12] and risk for obstructive sleep apnea was measured using the Berlin Questionnaire [13].

Analysis. Responses to each question were scored and tabulated using descriptive statistics. All variables were analyzed by OSA risk as scored by the Berlin Questionnaire using the appropriate test (Pearson chi-square or ANOVA), depending upon variable type (i.e., continuous or categorical).

2. Results

Survey results are provided in the Table 1. Participants were all male and most were married. Self-reported medical conditions were common, notably high cholesterol (59%), diabetes (33%), hypertension (37%), and depression (15%). OSA was reported by 7% and insomnia by 4%. Only 26% had excellent/very good overall health. Among the sample, 48% reported long work hours (>56 hours in a typical week). Participants reported high job control (81%), but also high work-related exhaustion (44%) and interpersonal disengagement (52%). Among the participants, 19% were at risk for burnout. Mild or moderate sleepiness was identified in 33% of drivers. Less than 7 hours sleep was reported by 52% on workdays but by 26% on non-work days. Overall, high insomnia risk, according to the AIS, was identified in 26% of drivers and OSA risk according to the Berlin Questionnaire was identified in 37% drivers.

OSA Sub Analysis. Drivers who scored at risk for OSA according to the Berlin Questionnaire were compared to those who did not score at risk for OSA. No statistically significant differences were found between the groups. Several qualitative differences, however, were identified. Specifically, those at risk for OSA were more likely to have elevated cholesterol (high OSA risk: 70%; total sample: 59%), diabetes (high OSA risk: 50%; total sample: 33%), and hypertension (high OSA risk: 60%; total sample: 37%). Sleepiness among those at risk for OSA was 40%, while that among those not at risk for OSA was 33%. While not significant, all drivers who reported involvement in an accident in the past year were also at high risk for OSA.

3. Discussion

In this exploratory study we use a novel method (street intercepts) to recruit older yellow taxi drivers in NYC of South Asian descent, the most common ethnicity of NYC yellow taxi drivers, yet a group that has been understudied from the standpoint of sleep and sleep disorders. In our sample, we found that most drivers reported an unhealthy amount of sleep on workdays, but sufficient sleep on non-workdays. We also found that 37% of drivers were at high risk for OSA, which is markedly higher than previous studies, including a survey of taxi drivers in Australia, which found 18% at risk for OSA [7], and a survey of taxi drivers in Turkey, which found only 6% at risk for OSA [14]. The proportion at risk for OSA in our study is also higher than that observed in community-dwelling older adults, which has been shown to be approximately 11% [8]. Research on OSA among those of South Asian descent has shown mixed results. According to a survey that included participants who reported a wide range of Asian ethnicities, 30% scored high risk for OSA [15], yet data collected among another multi-ethnic South and Southeast Asian sample found OSA risk was 8% among Malay and 11% among Indian individuals [16]. In a survey of community-dwelling individuals in India, researchers found 20% were at risk for OSA [17], but another study of individuals in Pakistan found 10% were at risk for OSA [18].

We also found most drivers reported long work weeks (56 hours per week or longer), which is consistent with prior research documenting long work days (63% reporting 12 hours work days) [19]. According to previous research, longer work days and work weeks were also associated with fatigue and increased risk of motor vehicle accidents [19].

In our study we found that most drivers demonstrated work-related exhaustion and interpersonal disengagement, however, very few drivers reported burnout. Burnout is a complex phenomenon among immigrants. Nevertheless, it is surprising that burnout was not reported to be high among this sample, that was comprised largely of immigrants, who are at risk for health concerns, such as burnout, compared to native born individuals [20]. As English was not the primary language for the majority of the sample, it is possible that the burnout item was not culturally tailored to the population in our study, and therefore was ineffective at measuring burnout effectively in this study. We also observed relatively high job control among the sample (80%). It is therefore possible that high job control served as a buffer to burnout in our population. Future research on workplace characteristics, such as burnout, with a larger sample of taxi drivers is warranted.

In a sub-group analysis of those participants who scored at risk for OSA, we found higher rates of diabetes and high blood pressure than those who scored at low risk for OSA, although these differences were not statistically significant. We did not, however, find those with OSA to also score higher on measures of work-related exhaustion or interpersonal disengagement. We did observe that

Table 1
Demographic, sleep, burnout, and work characteristics among yellow taxi drivers in New York City.

		Total Sample n = 27		High OSA Risk n = 10		Statistic	P-Value
Age		56 (sd = 6)		58 (sd = 8)		0.8	0.371
BMI		28 (sd = 3)		28 (sd = 3)		1.6	0.221
Sex	Male	27	100%	10	100%	–	–
Marital Status	Married	24	89%	10	100%	1.4	0.508
	Divorced or widowed	2	7%	0	0%		
	Single	0	0%	0	0%		
Health Conditions	High Cholesterol	16	59%	7	70%	1.6	0.668
	Diabetes	9	33%	5	50%	4.1	0.244
	Hypertension	10	37%	6	60%	5.3	0.070
	Anxiety	4	15%	2	20%	5.3	0.070
	Depression	4	15%	1	10%	0.6	0.723
	CVD	4	15%	1	10%	0.2	0.660
	Gastrointestinal disorders	6	22%	3	30%	0.2	0.593
	OSA	2	7%	2	20%	2.0	0.373
	Insomnia	1	4%	1	10%	1.6	0.296
Cigarette Smoking	(cigarettes or e-cigarettes)	5	19%	1	10%	0.9	0.613
Self-Reported health	Excellent/very good	7	26%	4	40%	2.5	0.648
	Fair	12	44%	4	40%		
	Poor/very poor	7	26%	2	20%		
Work hours	45 hrs or less	3	11%	2	20%	12.2	0.426
	46–55 hrs	9	33%	2	20%		
	56–65 hrs	9	33%	2	20%		
	>65 hrs	4	15%	3	30%		
Years Driving		20 (sd = 9)		23 (sd = 10)		1.7	0.204
Commute		33 (sd = 31)		37 (sd = 42)		0.2	0.597
Job Control	None/little	4	15%	1	10%	2.2	0.695
	Neither	1	4%	0	0%		
	Some/total	22	81%	9	90%		
Workplace Exhaustion	High risk (score >27)	12	44%	4	40%	0.1	0.722
Interpersonal Disengagement	High risk (score >10)	14	52%	3	30%	3.0	0.081
Burnout	High risk (score >2)	5	19%	2	20%	0.1	0.879
Epworth Sleepiness Scale	Normal sleepiness	18	67%	6	60%	6.3	0.043
	Mild sleepiness	3	11%	3	30%		
	Moderate sleepiness	6	22%	1	10%		
Sleep (Work nights)	<6 hrs	5	19%	1	10%	10.7	0.218
	6–6.99	9	33%	2	20%		
	7–8 hrs	10	37%	2	20%		
	>8 hrs	3	11%	5	50%		
Sleep (Free nights)	<6 hrs	3	11%	1	10%	0.1	0.624
	6–6.9	4	15%	1	10%		
	7–8 hrs	10	37%	6	60%		
	>8 hrs	9	33%	2	20%		
Sleep Latency (AIS)	No problem, slightly/markedly delayed	25	93%	7	70%	1.5	0.687
	Very delayed or did no sleep at all	1	4%	2	20%		
Nighttime awakenings (AIS)	None/minor/considerable problem	25	93%	9	90%	3.3	0.347
	Serious problem or did not sleep at all	1	4%	0	0%		
Waking early (AIS)	None/a little/markedly earlier	25	93%	8	80%	2.3	0.321
	Much earlier or did not sleep at all	2	7%	1	10%		
Total sleep duration (AIS)	Sufficient, slightly/markedly insufficient	25	93%	10	100%	3/7	0.296
	Very insufficient or did not sleep at all	2	7%	0	0%		
Sleep quality (AIS)	Satisfactory, slightly/markedly unsatisfactory	24	89%	8	80%	5.6	0.133
	Very unsatisfactory or did not sleep at all	2	7%	1	10%		
Well-being after waking (AIS)	Normal, or slightly/markedly decreased	25	93%	9	90%	5.8	0.117
	Very decreased	1	4%	0	0%		
Functioning after waking (AIS)	Normal, or slightly/markedly decreased	25	93%	9	90%	4.5	0.203
	Very decreased	1	4%	0	0%		
Overall Insomnia Risk (AIS)	Low	10	37%	6	60%	10.3	0.309
	High	7	26%	4	40%		
OSA Risk (Berlin)	Low	17	63%	0	0%	–	–
	High	10	37%	10	100%		
Motor Vehicle Crash	(>1 in the past year)	3	11%	3	30%	6.0	0.109
Speeding Ticket	(>1 in the past year)	2	7%	0	0%	1.2	0.269

Notes.

- Statistic refers to chi-square or ANOVA, depending on the variable level (continuous versus categorical).
- Male was the only sex, so no statistics are computed for OSA risk by sex.
- Epworth sleepiness scores of 0-5 indicate normal daytime sleepiness, scores 6-10 indicate higher than normal sleepiness, scores of 11-12 indicate mild excessive daytime sleepiness, scores of 13-15 indicate moderate excessive daytime sleepiness.
- Berlin OSA risk scores are computed in 3 categories. Participants who score positive in 1 or fewer categories are at low risk and those with score positive in 2 or more categories are at high risk for OSA.
- Athens Insomnia Scale (AIS) collects responses to 4-point scales (ranging 0, “No problem,” in the case of nighttime awakenings, to 3, “Serious problem,” in the case of nighttime awakenings). Responses to each item are summed and a score of 6 or higher indicates risk for insomnia.
- Professional fulfillment Index (PFI) includes 16 questions assessing sub-domains including work exhaustion and interpersonal disengagement. All measures include 5-point scales (0 to 4). Responses are averaged, then multiplied by 25 for a score from 0 to 100. Scores greater than 10 indicate interpersonal disengagement and scores greater than 27 indicate workplace exhaustion.
- Burnout was measured with a single item. Scores above 2 indicate burnout ("I am definitely burning out and have one or more symptoms of burnout," “The symptoms of burnout that I'm experiencing won't go away. I think about frustrations at work a lot,” and "I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to see some sort of help”).

all the motor vehicle accidents reported in our sample were contributed by those at high risk for OSA. Future research may aim to identify methods to mitigate accidents and raise awareness of the disorder among these groups.

3.1. Limitations

Although our exploratory study employed a novel method to recruit a hard-to-reach population of taxi drivers in NYC, our study has several important limitations. First, due to COVID-19 our study recruitment was stopped prematurely due to the New York State stay-at-home order in March 2020. Therefore, although our study planned to recruit >50 drivers, we only recruited and interviewed 27. Thus, the statistical results of our analysis of taxi drivers at risk for OSA compared to not at risk should be interpreted with caution due to the very small sample size. Second, our study included only South Asian drivers. Future research may aim to recruit a more diverse sample to facilitate comparison of OSA prevalence by race/ethnicity. Finally, our study did not include objective measures of sleep or sleep disorders symptoms. Future research may consider evaluating sleep using gold standard measures, such as actigraphy.

4. Conclusions

This exploratory study found that more than one-third of our sample of older South Asian yellow taxi drivers in NYC were at risk for OSA, yet only 7% reported a diagnosis. Future research may aim to replicate our findings in a larger sample. Future research may also aim to design interventions to promote awareness about OSA among taxi drivers.

Author statement

RR and SK conceptualized the study and obtained funding for the project. RR, NC, and SC collected the data. All authors collaborated on data curation and formal analysis. RR drafted the manuscript. All authors provided substantial intellectual contribution to the first draft and approved the final draft.

Declaration of competing interest

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