Sleep Health 6 (2020) 358–365

Contents lists available at ScienceDirect

Sleep Health

Journal of the National Sleep Foundation

journal homepage: sleephealthjournal.org

Fighting fatigue: A conceptual model of driver sleep in the gig economy

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ARTICLE INFO

Article history:
Received 24 May 2019
Received in revised form 23 January 2020
Accepted 3 February 2020

Keywords:
On-Demand Driver
Gig Economy
Sleep
Fatigue
Safety
Health

ABSTRACT

The purpose of this paper was to integrate the sleep science, occupational health, and organizational psychology literature to develop a conceptual model of driver sleep and fatigue in the gig economy. We develop an integrative framework, which proposes that aspects of the on-demand driving context influence driver sleep health and fatigue. Driver outcomes include safety incidents, injuries, health, job attitudes, interpersonal behavior, and performance. In addition, moderators, such as driver demographics and health conditions, can interact with aspects of the driver context. A number of practical implications are provided, addressing the ways in which occupational health researchers, online labor platform companies, and drivers can improve sleep health. This is the first paper to provide a broad understanding of how scientists, through both research and practice, can help improve sleep, a primary issue in the ridesharing industry.
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The gig economy has experienced recent dramatic growth,[1] with approximately 16% of American adults reporting they have offered independent services as contractors for companies such as Uber, Lyft, and TaskRabbit in the past month.[2] Although many gig workers find benefits in the flexibility of this work,[3] scholars, the media, and policy experts have raised concerns that gig work poses serious health and safety risks for contractors.[4,5] In particular, sleep and fatigue have been identified as major issues for gig economy workers.[6] Notably, the American Academy of Sleep Medicine (AASM) recently put forward a position statement focusing on the sleep and fatigue of on-demand drivers in the gig economy:

> *It is the position of the AASM that fatigue and sleepiness are inherent safety risks in the ridesharing industry. The AASM calls on ridesharing companies, government officials, medical professionals, and law enforcement officers to work together to address this public safety risk. A collaborative effort is necessary to understand and track the scope of the problem, provide relevant education, and mitigate the risk through regulations and fatigue risk management systems.*[7]

On-demand drivers represent a vulnerable population that is particularly susceptible to poor sleep health and, in turn, safety incidents and injuries, decreased health, and negative workplace outcomes. Although a large literature has evaluated driver sleep and fatigue in relation to safety outcomes with both professional and nonprofessional driving samples,[8,9] on-demand driver sleep and fatigue remain unexplored. This paper integrates the sleep science, occupational health, and organizational psychology literature. We develop an integrative model to drive future research, proposing that aspects of the on-demand driving context influence driver sleep health, which, in turn, results in fatigue.

The gig economy and online labor platforms

The gig economy has been defined as "contingent work which is transacted on a digital marketplace."[10] It is characterized by a variety of nonstandard work arrangements; workers in such positions do not hold contracts for long-term employment.[11] In addition, Kuhn and Maleki[12] have defined online labor platforms as "for profit firms that use technology to facilitate the filling of immediate short-term service labor needs, either remotely or in-person, with workers who are officially considered independent contractors" (p. 184). As such, this paper is focused solely on on-demand drivers from online labor platform companies such as Uber or Lyft, primarily within the United States. It is important to note that although the majority of research that has been conducted on the gig economy has been done with US samples,[13] Lyft operates only within US cities, whereas Uber has drivers across the globe.

The defining characteristic of gig economy businesses is that they consider themselves technology companies, not service providers. From this perspective, drivers are end users who are free to use an

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https://doi.org/10.1016/j.sleh.2020.02.004
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application (i.e., smartphone application) to find people who want rides.[14] Although a patchwork of local and state regulations have addressed the employment relationship between the labor platforms and drivers, labor platforms typically consider drivers independent contractors rather than employees. This means that workers for gig platforms within the United States do not have access to work protections under the National Labor Relations Act or other labor laws, nor are they provided insurance, job training, or workers' compensation.

However, unlike traditional independent contractors, on-demand drivers cannot negotiate their rates or scope of work but must electronically accept the labor platform's terms to access assignments. Because these workers have no contract, they can easily be "deactivated" by the platform and cut off from the ability to access work.[15] In addition, a recent survey found that nearly one-third of gig workers had experienced wage theft (i.e., not being paid by one's employer for work that was completed) in the prior year, which is notable, given that approximately one-third of gig workers also say that they depend on the money earned from gig work to meet their basic needs.[16]

Sleep and fatigue of on-demand drivers

We adopt Buysse's[17] multidimensional conceptualization of *sleep health*, which was proposed as an alternative to sleep definitions focusing on sleep disorders and deficiency. This positive sleep construct is aligned with well-being and represents *sleep duration* (i.e., the total amount of sleep in a 24-hour period), *sleep satisfaction* (i.e., the subjective assessment of sleep quality), *sleep efficiency* (i.e., the ability to fall asleep or return to sleep easily), and *sleep timing* (i.e., where sleep falls within the 24-hour day). Although clear guidelines are not available for all components of sleep health, large reviews of the literature indicate that a minimum of 7 hours of sleep duration per night is necessary for human performance and health.[18]

In addition, the sleep health definition also includes a fifth *alertness/sleepiness* dimension, which is defined by Buysse as "the ability to maintain attentive wakefulness" (p. 11).[17] However, we believe it is important for the purposes of this paper to differentiate the alertness/sleepiness dimension from other components of sleep health, given that this dimension results from the other dimensions. We instead use the parallel term, *fatigue*, which can be characterized as an outcome of other components of sleep health and has a more specific definition: "a physiological state of reduced mental or physical performance capability" (p. 698).[19] Given our focus throughout this paper on a specific operational setting (i.e., the on-demand driving industry), in addition to our interest in understanding how sleep ultimately impacts not just health but also performance and safety outcomes, we believe that focusing on fatigue as opposed to attentiveness/sleepiness is appropriate. Thus, although the definitions of alertness/sleepiness and fatigue are somewhat overlapping and represent different ends of the same spectrum, we frame our discussion in alignment with previous occupational sleep and performance literature that has used the terminology of fatigue.[20]

As such, the two-process model of sleep regulation delineates the homeostatic and circadian factors that predict one's propensity for sleep and experiences of fatigue[21] In the homeostatic process, there is a biological drive to sleep, in which fatigue and pressure to sleep increase with greater periods of wakefulness and diminish once someone falls asleep. This process interacts with a person's circadian rhythms, which determine the levels of fatigue based on the time of day. However, contextual factors such as work schedules and work hours also interact with homeostatic and circadian processes. Irregular and nonstandard work schedules (e.g., night shifts and long work hours) produce a misalignment between workers' need to sleep and their circadian rhythms, which results in heightened experiences of fatigue that can intensify throughout a work shift.[20]

In line with propositions from the two-process model, prior research on the gig economy has suggested that sleep deprivation and fatigue are likely to result from the irregular hours and overwork that characterize this industry, both in the United States and across the globe, including in lower income countries and regions such as Sub-Saharan Africa and Southeast Asia.[22] Scholars have also found that many gig workers hold other primary jobs and supplement their income with this contract work.[23,24] This suggests that on-demand drivers are working longer hours than traditional drivers. Recent media accounts have also chronicled the increasing trend of on-demand drivers commuting significant distances during irregular work hours to urban areas where they are more likely to maintain a steady flow of rides[25,26].

Existing research evaluating driver sleep and fatigue

Research on taxi driver sleep likely has the greatest implications for future investigations with on-demand drivers, given the similarities between the two lines of work. Previous studies indicate a relationship between taxi driver poor sleep satisfaction and fatigue, with other correlates of fatigue including long work hours (i.e., more than 10 hours per day) and having a second job.[27] Some research indicates that taxi drivers experience frequent fatigue, report long work hours as the primary reason for fatigue, and are at a greater risk for crashes than other types of commercial drivers such as truck drivers.[28] This work also suggests that taxi drivers typically do not engage in effective countermeasures to combat fatigue that require them to stop driving (e.g., naps). Other work finds a negative association between taxi driver break time and crash rates,[29] highlighting the importance of reducing fatigue. This is compounded with findings from basic laboratory studies evaluating subjective sleepiness and objective performance,[30] which show that taxi drivers tend to overestimate their ability to drive safely when fatigued.[28,29] Despite the large literature indicating that sleep disorders increase one's risk of being in a car crash,[31] taxi drivers usually have little education on sleep disorders and may avoid telling their general practitioners about sleep-related issues for fear of losing their license or employment.[32] We next describe the nature of gig work and provide a model of sleep health and fatigue that is specific to the on-demand driving industry (see Figure 1).

A conceptual model of on-demand driver sleep health and fatigue

The on-demand driving context in relation to sleep and fatigue

We focus our efforts primarily on describing the linkage between the on-demand driving context and drivers' sleep, given that these are the most novel relationships in our model. These include algorithmic management, a lack of strict regulations and worker protections, and high work-related stressors.

Alternative management tactics

Although the use of algorithmic management or software algorithms used in place of human managers is growing in traditional sectors, online labor platforms rely almost exclusively on it.[14,33,34] For example, companies such as Uber and Lyft use these data-driven algorithms to assign rides to drivers. When the driver's app is turned on, they receive trip requests from nearby potential passengers and must accept within a certain time window. The companies also adjust prices within certain locations when there is a greater demand for rides (i.e., "surge pricing" with Uber and "prime time pricing" with Lyft). In addition, customers rate their driver's performance after their ride with a five-star rating system, and drivers' acceptance

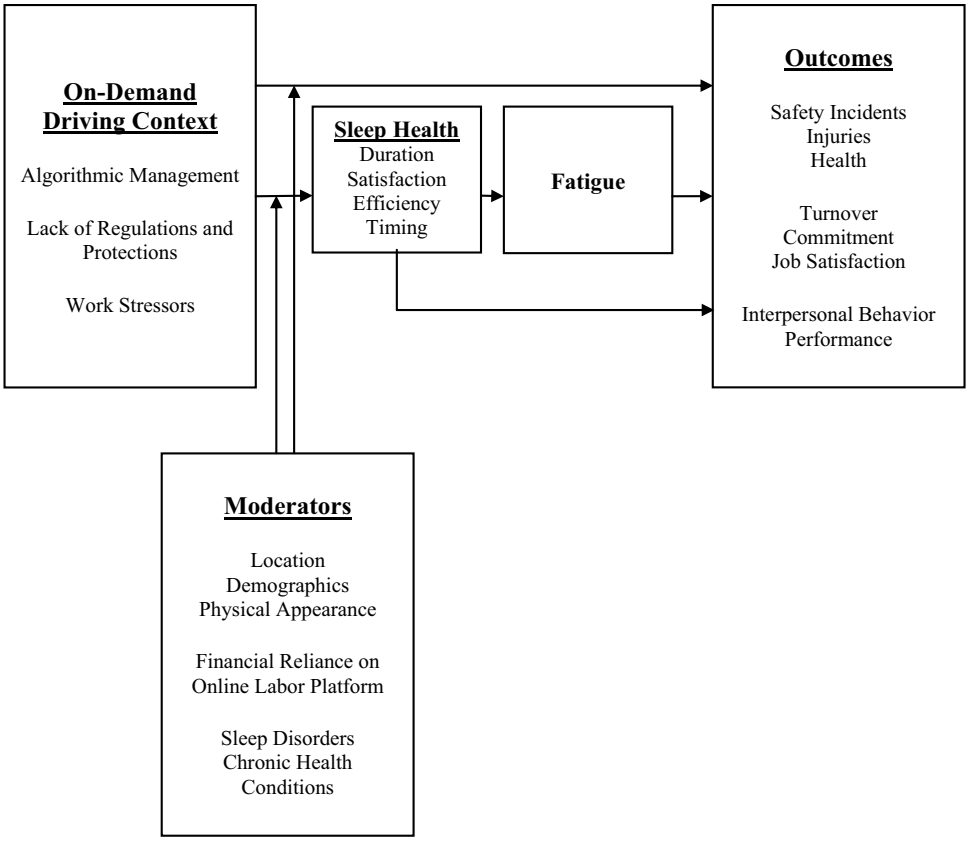

Figure 1. A model of on-demand driver sleep health and fatigue.

rates (i.e., the ratio of accepted rides to the total number of ride requests) are continuously calculated.

Recent research indicates that drivers experience perceptions of unfairness related to how these algorithms operate (e.g., surge pricing can change so unreliably and rapidly that drivers often do not reap any benefits) and a lack of transparency because it is not well understood what factors are accounted for by the algorithms.[14,34] Furthermore, accounts in both media[35] and research[14,36] have begun to highlight controversial behavioral science strategies used by online labor platform companies that "nudge" drivers into working longer hours, often for less pay. These strategies typically provide drivers with incentives for meeting certain goals and reminders via texts, emails, and application pop-up notifications. For example, drivers can receive bonuses for working during late night, peak, and weekend hours.[12] Some of these bonuses are monetary, whereas others involve gamification tactics such as receiving "badges."[35] As Scheiber documents, Uber implemented a 25-ride signing bonus to decrease new driver attrition, with drivers receiving frequent reminders and notifications to meet the goal.[35] We argue that these management strategies motivate on-demand drivers to work longer and more unsafe hours (e.g., in the middle of the night), thereby decreasing sleep time, encouraging odd timing of sleep, and increasing fatigue levels.

Lack of strict regulations and protections

The US transportation industry is largely governed by strict regulations specifying acceptable hours of service. For example, the Federal Motor Carrier Safety Administration (FMCSA) limits passenger-carrying drivers to a maximum of 10 driving hours following an 8-hour off-duty period and limits property-carrying drivers to a maximum of 11 driving hours following a 10-hour off-duty period.[37] In addition, these workers are limited to a total of 60 on-duty (driving and nondriving work tasks) hours in a 7-consecutive-day period, or, if the company operates vehicles each day of the week, a total of 70 on-duty hours in an 8-consecutive-day period.[37] Similar regulations are enforced by the Federal Railway Administration[38] and the Federal Aviation Administration.[39]

On-demand drivers are subject to some limitations in driving hours, although these regulations vary by jurisdiction and are not enforced at the federal level. In New York City, the Taxi and Limousine Commission recently implemented regulations to limit taxi drivers to no more than 10 consecutive hours of driving in a 24-hour period and limits weekly work hours to 72.[40,41] Similar regulations have been implemented in other large cities, such as Chicago, Los Angeles, and Denver. Uber's Web site notes that it notifies drivers via their app when they are approaching and meeting the duty hour limit.[42] Lyft also indicates on their Web site that drivers must take a 6-hour break for every 14 hours that the app is in driver mode, but drivers are also directed to a page with their city or region's regulations.[43]

Despite recent efforts to limit work hours and require breaks in the ridesharing industry, it is challenging to enforce these regulations because of on-demand drivers' status as independent contractors and the algorithmic management functions that actually promote long and unsafe working hours. Furthermore, unlike other passenger- and property-carrying drivers, railway workers, or aviation workers, on-demand drivers do not have access to places where they can sleep off-duty (e.g., sleeper berths; a seat that reclines to a bed in long-haul trucks). As a result of this, on-demand drivers resort to creating makeshift sleeping arrangements in their personal vehicles

and opt to sleep in local parking lots during their breaks.[25] Moreover, unlike other jobs in the transportation industry (e.g., aviation), on-demand drivers are not consistently screened and provided treatment for health conditions such as obstructive sleep apnea. However, general medical screening is required in some localities for some companies,[44] but it is unclear whether these screenings, when they do occur, capture all significant medical conditions that could affect driving.

Because on-demand drivers are considered independent contractors, online labor platform firms are exempt from being required to provide benefits such as health insurance, in contrast with companies in the transportation sector who employ drivers via standard arrangements. It is important to point out that sleep disorders are often comorbid with both psychological disorders and chronic health conditions.[45,46] Therefore, workers with untreated medical conditions or those without access to diagnostic tests, treatment, and/or preventative health services may also experience sleep disorders. Moreover, common sleep disorders (e.g., insomnia and sleep apnea) are associated with increased fatigue,[47] which translates into an increased risk for safety incidents and injuries while working. Meta-analytic evidence suggests that sleep problems are responsible for approximately 13% of all work injuries.[48] On-demand drivers also do not have access to worker's compensation insurance that would cover medical expenses for diagnosis and treatment, in addition to disability payments should a workplace illness or injury be experienced. As a result, and compounded by financial concerns characteristically experienced by gig workers,[23] on-demand drivers are more likely to be working while injured or sick.

Increased work-related stressors

A well-established link exists between stressors and individuals' ability to obtain adequate sleep satisfaction, efficiency, and duration,[49,50] and sleep disorders are more likely to occur in the presence of work-specific stressors.[51] On-demand drivers receive instant input from their passengers related to their performance via algorithmic management. Along with working overtime, working during busy hours (e.g., rush hour), and increased fatigue, on-demand drivers worry about the ratings they receive from their passengers.[27] These ratings are tied to drivers' compensation; if they fall under a certain rating for a number of rides, they can be deactivated from using the app and lose a day or more of work.[27] Scholars have described how these subjective ratings made by customers are likely based on conscious or unconscious biases related to race, ethnicity, gender, and other demographic factors, rather than actual driver performance.[34] Recent research indicates that individuals who experience discrimination are more likely to have a deficient sleep and increased fatigue.[52,53] Because of their independent contractor status, there are restricted legal options to uphold nondiscriminatory actions made against on-demand drivers. Ratings could also depend on whether driver behavior is representative of middle-class white culture. Minority on-demand drivers often have to prove to white passengers that their biases and/or stereotypes are untrue. In order for passengers to feel comfortable and give a high rating, drivers may feel they have to deliberately change their behavior to emulate white customs.[54]

In addition, similar to other organizational scholars who have expressed growing concerns that gig economy workers are subject to personal financial instability and debt, we argue that on-demand drivers likely experience stressors of financial insecurity.[55] Because of the independent contractor status of on-demand drivers, online labor platform companies are not responsible for paying drivers a minimum wage or overtime pay. Although drivers note the flexibility of when and where they work as a main motivation to join these online labor platforms,[34] gig workers typically earn less than individuals in standard work arrangements.[3] In addition, low pay and an insufficient amount of available work are commonly reported as concerns among these individuals.[23] Ethnographic evidence from a study of Montreal Uber drivers indicated that driver revenues tend to fluctuate dramatically day to day and are highly dependent on the area and time of day.[56] Moreover, drivers are responsible for maintaining, insuring, and fueling their own personal cars, although some companies, such as Lyft, have car rental programs.[57] However, these car rental programs have been criticized because they often incentivize drivers by waiving rental car charges and fees in exchange for drivers committing to a certain number of rides, sometimes resulting in drivers working longer hours.[35] A number of studies have found associations between financial strain and poor sleep.[58,59]

On-demand driver outcomes

We propose that on-demand driver sleep health and fatigue has significant implications for a number of outcomes (Figure 1). We first discuss safety incidents and injuries. A well-established literature exists indicating that fatigued individuals experience decrements in cognitive functioning, including decreased attention, vigilance, and working memory.[18,60] Therefore, fatigued workers are more likely to make errors that can lead to unsafe behavior while driving, such as crossing traffic lines and actual traffic incidents.[61,62] In a mixed methods study with gig economy drivers and their managers in Great Britain, a large number of drivers reported experiencing a collision and having near-miss incidents daily.[63] Other research indicates an association between low sleep satisfaction and duration and workplace injuries more generally,[64,65] whereas poor sleep efficiency and satisfaction are predictive of chronic musculoskeletal pain over time.[66] As stated earlier, on-demand drivers experiencing injuries are not provided benefits or worker's compensation by online labor platforms, so they are less likely to receive medical treatment and/or financial compensation. An alternative pathway through which poor sleep health may lead to safety incidents and injuries is risk-taking behavior. Reviews indicate that sleep loss is associated with decisions to engage in more dangerous behavior, despite the knowledge that this behavior could lead to negative outcomes, such as loss or harm, often because there is the possibility of a reward.[67]

Large-scale reviews also indicate that low sleep duration is associated with increased health risks, including cardiovascular disease, diabetes, obesity, cancer, and all-cause mortality.[18] Other work suggests the importance of sleep for mental health.[68] A Canadian qualitative study that included a diverse sample of on-demand drivers, taxi drivers, and other stakeholders such as taxi managers found evidence for health concerns in drivers, including weight gain and muscle pain.[69] Research with taxi drivers more specifically has shown that they have poor nutrition, lower physical activity levels, and engage in fewer preventative health care screenings than the general population, yet also report plans to engage in more health promoting behaviors, such as more fruit and vegetable consumption.[70] In addition, Burgel et al.[71] found that taxi drivers' main health and safety concerns include stress, body pain, danger, vulnerable employment status, and concerns related to unhealthy working conditions, and these drivers engage in self-care strategies to maintain health and safety (e.g., keeping a positive attitude and stress management).

In addition to safety and health outcomes, on-demand drivers are more likely to experience negative job attitudes as a result of poor sleep health and increased fatigue. Recent research indicates associations between worker sleep satisfaction and duration and job satisfaction, turnover intentions, and commitment to the organization.[72,73] These relationships are important to replicate with the on-demand driver population. As noted earlier, online labor platform companies rely on algorithmic management tactics

to increase driver retention rates, yet establishing a link between driver sleep and fatigue and these outcomes would provide the online labor platform industry with evidence suggesting that they should focus their efforts toward improving sleep and fatigue as a way to retain drivers.

Aside from attitudes, we propose that on-demand driver sleep and fatigue is likely to influence behavior on the job, including interpersonal behavior and performance. Regarding interpersonal behavior, fatigued on-demand drivers are more likely to experience negative emotions and have a more difficult time self-regulating their behavior,[74] especially when interacting with customers. As reviewed by Budnick and Barber,[75] sleepy individuals are less likely to trust others and more likely to act aggressively and assign blame to others in frustrating situations. Moreover, the authors show that both ambiguous and threatening cues in the workplace are interpreted more negatively when individuals are sleepy. In this way, on-demand drivers may be more likely to appraise interactions with customers in a negative light. These potential interpersonal issues are especially concerning in the on-demand driving industry because customers are the only individuals providing performance ratings for drivers. In addition, fatigued drivers' biased interpretations may affect mental safety calculations on the job. For example, they may interpret a rather harmless passenger as a threat, especially if passengers are intoxicated or display unusual behavior.

To this point, we also suggest that on-demand driver fatigue affects driver performance ratings. Customers are encouraged to rate driver performance at the end of the ride based on their limited interactions with the driver and ultimately a very brief sample of the driver's work. Performance ratings can be affected by a driver's demeanor, politeness, and overall customer service, all of which are likely impaired when drivers are fatigued for reasons mentioned previously. In addition, customer performance evaluation may be based on observations of the driver's on-road performance. As such, fatigue-related decrements in cognitive functioning discussed previously[18,61] can result in driving errors such as taking a wrong turn or failing to stop at a stop sign. Indeed, other research indicates a link between decreased sleep satisfaction and duration and reduced work performance.[76,77]

Moderators

In Figure 1, we list a number of moderators that may interact with the on-demand driving context to determine sleep health, fatigue, and related outcomes. First, we note that location can act as a moderator; high-density urban areas and markets with higher numbers of taxi drivers may result in greater pressure to work longer hours and/or during less than ideal biological times (e.g., late at night) as a result of fierce competition, given recent news reports that taxis and the on-demand driving industry are in competition.[78] Certain local contexts may influence driver work hours; for example, recent legislation reclassifying on-demand driver contractors as employees in California and proposed legislation in New York, Oregon, and Washington could result in additional labor protections for drivers that could limit work hours.[79] In addition, effects of algorithmic management are likely to depend on demographic characteristics, such as race, ethnicity, gender, and age of drivers, with certain minority groups more likely to be discriminated against by riders.[80] Similarly, physical appearance of drivers, including attractiveness, body weight, or dress could also play a role and result in unfair discrimination against drivers. Drivers with children, elder care, or other significant financial responsibilities may be more likely to work long and unsafe hours for extra pay in the absence of regulations and protections, given other work suggesting that these individuals benefit significantly from additional pay.[81] These same individuals may also experience a stronger relationship between financial strain and sleep. Relatedly, drivers with more financial reliance on the online labor platform, as opposed to individuals with another primary job, may be more likely to work long and unsafe hours and experience decrements to their sleep health. We also note that individuals with existing sleep disorders (e.g., sleep apnea and insomnia) or existing chronic health conditions (e.g., cardiovascular disease and chronic pain) are more likely to experience stronger relationships among the negative aspects of the on-demand driving context, sleep health, and later outcomes, given high rates of fatigue that are often present in these individuals.[47,82]

Discussion

Future research examining on-demand driver sleep and fatigue is necessary for the protection of on-demand drivers and future policy change. Researchers will likely face difficulty in accessing on-demand drivers for research as a result of research projects taking place outside of formal collaborations between online labor platform companies and the research team. We encourage researchers to thoughtfully consider their participant recruitment methods and explore unique avenues for contacting drivers that are both effective and ethical. For example, online driver forums, snowball sampling techniques, and community-based participatory research methods are all likely to be useful.

Although research methods typically used in the organizational sciences are needed to understand the sleep health and fatigue of on-demand drivers (e.g., self-report surveys and longitudinal approaches), researchers will likely experience difficulty in collecting such data, given that on-demand drivers may be challenging to access in large numbers, track over time, and likely cannot devote substantial effort to study participation. We suggest that researchers think creatively about how data can be gathered and accessed from this unique population. For example, algorithmic management techniques used by online labor platforms track objective data such as work schedules, workload, and performance ratings, which can be informative either in conjunction with self-report measures of sleep and fatigue or on their own. Content analysis could also be used with text describing sleep, fatigue, and work schedule issues from online forums. Finally, objective health monitoring techniques, such as actigraphy,[83] could be used to unobtrusively measure sleep.

Future research

Next, we provide a number of specific research questions on this topic that are less implied by our model. First, we suggest that scientists investigate why, when, and how on-demand drivers sacrifice sleep. In other words, what motivations or factors (e.g., monetary, messaging from online labor platforms, and lack of sleep knowledge) play a role in drivers' decision to work long or unideal hours. Second, we believe it is important to pinpoint which drivers are most at risk for sleep health and fatigue issues (e.g., drivers in high-density urban areas, commuters, and those with extreme financial strain), as these individuals will likely be the most important to intervene upon to prevent safety incidents and health risks.

We suggest that future investigation in this area begin to determine whether our model of driver sleep health and fatigue can be extended to other types of gig working samples. For example, online task gig workers, such as those who complete work for Mechanical Turk or TaskRabbit, have been reported to spend long hours scanning Web sites for work (i.e., work that is not paid), be frequently misled about the amount of time tasks will take resulting in unanticipated and long work hours, and wake up during the middle of the night to find more competitive tasks when fewer individuals are online.[84] Generalizing to these types of workers would be interesting, as sleep and fatigue issues are likely to have an impact on unique

outcomes, such as incidents and injuries at home, while at another job, or even during commutes.

Practical implications

Regarding interventions, federal policy reform is first and foremost needed to help protect and promote the well-being of on-demand drivers and the public; for a review, refer to the study by Tran and Sokas.[11] The International Labour Organization has recognized the global importance of protecting the rights of gig workers.[85] To have a more widespread positive impact on workers in this industry, the United States could look to other parts of the world, who have responded to the rise of the gig economy. For example, in the United Kingdom, even workers who are classified as self-employed or contactors still receive health and safety protections.[86] Beyond this, the United Kingdom has fought to change the classification of rideshare workers from self-employed to "workers," granting them greater rights (e.g., minimum wage and protection against discrimination), a decision that has been upheld despite Uber's appeals.[87] In addition, courts in the European Union and Colombia have ruled that Uber is a transportation company, rather than a technology company, which requires that workers are licensed taxi drivers and are entitled to health and safety protections.[88,89] Alternatively, countries such as Canada have created an intermediary worker classification—"dependent contractor"—that some argue can better accommodate on-demand drivers because it provides greater protections than those given to independent contractors.[90,91]

In addition, within the United States, many truck drivers are also classified as independent contractors and companies that employ truck drivers are being faced with similar legal and legislative challenges (i.e., classifying workers as employees or independent contractors) as those occurring for online labor platforms such as Uber and Lyft.[87,88] Despite this, the FMCSA has deemed that all motor carrier workers, regardless of their classification as an employee or independent contractor, must adhere to their federal safety regulations.[37] There are clear parallels between truck drivers and on-demand drivers in terms of how their work hours and sleep health can influence public safety. Therefore, it would be advantageous to consider how federal safety agencies, such as the FMCSA, have responded to worker classification issues as a framework for establishing federal safety regulations for on-demand drivers.

Occupational health scientists and practitioners can help inform this effort by conducting research and beginning to understand how online labor platforms influence the behavior, health, and well-being of drivers. We encourage readers to consider adopting the Total Worker Health® approach created by the National Institute for Occupational Safety and Health, which is defined as "policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being."[92] Thus, the TWH approach involves both health protection initiatives (i.e., providing workers with safe working conditions) in addition to health promotion initiatives (i.e., improving workers' personal health behaviors and general health status).[93] Examples of such programs could include intervening with a top-down approach by establishing and enforcing public policies, as previously described, while also intervening on an individual level with drivers. Individual-level interventions could include addressing sleep health and safety information in new driver orientation materials or application-mediated trainings. Finally, reminders about sleep and fatigue via emails, messages, and application pop-ups could also be used as frequent and unobtrusive small interventions with drivers.

Conclusion

We argue for the necessity of a new stream of research investigating on-demand driver sleep and fatigue. This work has important implications for the health and well-being of drivers, the public, and the online labor platform industry. With the growing gig economy and increased pressures on these types of workers, the need for evidence-based driver-level and management-level solutions will continue to increase in importance alongside the need for policy reform.

Acknowledgments

R.B.'s work on this research was supported by the Mountain and Plains Education and Research Center, Grant T42OH009229, funded by the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention. F.R.-S.'s work on this paper was supported by the Colorado State University College of Natural Sciences Faculty Support Grant. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the Department of Health and Human Services or Colorado State University.

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