



Disadvantaged workers are not all alike in attitudes towards automation

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ABSTRACT

Automated vehicle (AV) adoption is anticipated to affect millions of motor vehicle operators, including gig drivers (platform-based ride-hailing and/or delivery drivers). The multidisciplinary body of research investigating worker attitudes towards automation suggests disadvantaged workers are more likely to fear automation status. Gig drivers may have different views about automation because of the unique aspects of their work context. To contribute to multidisciplinary research about worker acceptance of automation, we analyze focus group and online survey data from a career perspective to understand gig drivers' attitudes about job longevity with AV adoption. Study findings indicate drivers are not threatened by AV adoption because of the transitory nature of their jobs. Drivers also highlighted unique aspects of their work that cannot be replaced by AVs. This viewpoint means workers are not preparing for potential work displacement, which places them at risk for unemployment.

1. Introduction

Estimates of the employment impacts of automated vehicles (AVs) vary (Haratsis et al., 2018). One projection about AVs is that the number of jobs will decline as automation replaces existing work, but then increase as new forms of work are created (Groshen et al., 2018). However, there is more agreement about potential job displacement related to AVs (Pettigrew et al., 2018). The U.S. Department of Commerce projected that AV adoption could affect the occupations of 15.5 million U.S. workers, and of those, 3.8 million were motor vehicle operators—including gig workers, who would be most affected by AVs (Beede et al., 2017).

Gig work involves short-term, often task-based, employment arrangements and is present in a variety of industries including information technology, customer service, and consulting (Watson et al., 2021). One type of gig work is the use of digital platforms to facilitate delivery and/or ride-hailing transportation services to customers. This type of platform work requires the worker's physical presence, as well as their

own transportation (Agrawal et al., 2021; Tubaro & Casilli, 2022). We refer to this group of gig workers as *gig drivers* in this manuscript.

Research suggests gig drivers may be exceptionally vulnerable to job loss and wage reduction related to AV adoption (Ao et al., 2021; Burkhardt & Bradford, 2017; Center for Global Policy Solutions, 2017). Given the rise in gig drivers to as much as 36 % of all U.S. workers (Dua et al., 2022), a transition to AVs could impact over 50 million workers. Thus, there are concerns as to whether gig drivers will be necessary and/or how their role will change if AVs become more widely adopted (Groshen et al., 2018; Pakusch et al., 2020; Wang et al., 2020; Yankelevich et al., 2018). Much of the literature discussing how AVs will affect the gig workforce have come from an industry perspective, noting there will be a decrease in the driving workforce (Burkhardt & Bradford, 2017; Center for Global Policy Solutions, 2017; Groshen et al., 2018; Yankelevich et al., 2018); however, there is less discussion of how this change may affect the drivers, professionally and personally. Given the high number of gig drivers that could be affected by a transition to AVs, it is important to examine the perspectives of gig drivers to understand how

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they see their job longevity as a gig driver with the introduction of AVs.

Contemporary research on workers' acceptance and attitudes towards automation paints a gloomy picture for lower-skill workers' attitudes toward their roles becoming automated (Krutova et al., 2022; Vieitez et al., 2001; Zhang & Jin, 2023). One line of popular reasoning comes from labor economics. The self-interest hypothesis argues that whereas workers who hold stronger labor market positions will have positive views, workers who are more disadvantaged in the labor market (e.g., older workers, those with lower education, part-time workers, women, racial/ethnic minorities) will fear automation (Dekker et al., 2017). Indeed, such disadvantaged workers tend to hold more fears about job displacement given the introduction of automation, as predicted (Dodel & Mesch, 2020). Along with posing an instrumental threat to job security, automation may be viewed as a threat to workers' identity as it will change their work tasks and status (Mirbabaie et al., 2021).

However, gig workers are situated in a more unique and modern work arrangement. Thus, we hypothesize that their views about AV-related automation may differ from other gig workers. We add greater nuance and clarity to the self-interest hypothesis and multidisciplinary literature on worker acceptance of automation by incorporating more contextual work design and careers psychology perspectives. Specifically, we contribute by considering the influence of contextual role characteristics (e.g., Parker et al., 2017) in creating role challenges and precarity (Santilli et al., 2021; Caza et al., 2022), in order to better identify and understand factors that inform workers' attitudes about their careers given the adoption of automation.

Workers in more modern work arrangements (befitting the gig economy) already operate with low job security (Caza et al., 2022). As a result, gig workers may have less fear of changes from automation, as compared to workers in more traditional work arrangements who are accustomed to job security. Gig drivers are, in fact, more likely to view the gig driver role as transitory (Donovan et al., 2016). In this way, we put forth that the precarious circumstances defining gig work may offer an unexpected silver lining for the future of automation.

2. AVs and the future of gig driving

The commercialization of AV-based ride-hailing and delivery services in the near term seems highly plausible. Waymo is offering driverless ride-hailing services in Austin, TX, Los Angeles, CA, San Francisco, CA, and Phoenix, AZ. Several companies have also begun pilot programs offering driverless ride-hailing and food/grocery delivery services to the general public in recent years (e.g., Krafcik, 2020; Cruise, Vogt, 2022; Nuro, Domino's, 2021; GrubHub and Yuro's partnership, Hawkins, 2021; AutoX, 2018, and the Argo.ai, Ford, and Walmart partnership, Argo AI, 2021). Yet, there are reasons to believe that human workers will continue to be needed with AV adoption. Groshen et al. (2018) projected that human operators will still be needed in AVs to perform non-driving tasks such as delivering packages to the customer's door and various other customer service demands. They also argued that as AVs reduce transportation costs, the demand for transportation and the aforementioned non-driving tasks will likely increase. Research also indicates that most Americans are hesitant to use or rely on driverless ride-hailing services (Wang et al., 2020), which supports the idea of having a human operator in an AV to perform non-driving tasks.

The portended effects that AVs may have on the gig driving workforce have mainly come from the perspectives of government and industry leaders. There is a paucity of research addressing the future workforce in the era of AVs from the point of view of gig drivers. The wider literature on worker attitudes towards automation overwhelmingly highlights that disadvantaged workers (e.g., those with lower-skill and educational attainment) have more negative reactions towards automation, in large part due to increased job insecurity (Dodel & Mesch, 2020). According to the self-interest hypothesis in labor economics, workers who hold weaker positions in the labor market should

have more negative attitudes (Dekker et al., 2017; Dodel & Mesch, 2020). The basis of this argument (and other similar perspectives, e.g., Nazareno & Schiff, 2021) is that workers' attitudes are determined by their self-interest, and automation represents a more prominent threat to disadvantaged workers' job security. Studies consistently find that lower-skill workers, such as factory workers, have more negative attitudes towards automation, specifically viewing automation as a threat to their job security (Argote et al., 1983; Chao and Kozlowski, 1986; Fink et al., 1992; Vieitez et al., 2001).

Gig drivers are easily categorized as disadvantaged, given the numerous challenges of this work arrangement. However, counter to the self-interest hypothesis and the established literature on workers' attitudes towards automation, gig workers occupy an already precarious work arrangement that is absent much of the security that for workers in more stable arrangements is threatened by automation. Accordingly, we suggest that disadvantaged workers may not be all alike regarding their tendency to fear automation. Rather, we contend that the nature of work arrangements, and present job security afforded, are key contextual factors that may influence worker acceptance and distress about automation.

3. Role characteristics and challenges of gig driving as a work arrangement

There are two main types of gig drivers, ride-hailing drivers and delivery drivers. Ride-hailing drivers provide an on-demand mobility service to riders by using their personal vehicle to provide transportation upon request through an app (e.g., Uber, Lyft) (Shaheen et al., 2015). Delivery driving is a service in which customers request to have groceries, restaurant food, or other provisions delivered by a gig driver through an app (e.g., Grubhub, Instacart); these drivers also use their personal vehicles to provide this service (Shaheen et al., 2015). These gig-based services mean that gig drivers must contend with inconsistent earnings and work opportunities. Due to this inconsistency, gig drivers often work for multiple platforms, including engaging in both ride-hailing and delivery services (Anderson et al., 2021; Farrell et al., 2018; Hoang et al., 2020).

Yet, there are further challenges to gig driving. As compared to workers in more typical work arrangements, gig workers have minimal protections. For example, gig workers who are younger and those belonging to minoritized gender and racial demographic groups experience more unwanted sexual advances and felt more unsafe when performing gig work (Anderson et al., 2021). Gig drivers value the flexibility that comes with the role, but often find themselves working long hours (Prassl, 2018). Moreover, as they are not considered employees, gig drivers do not receive employee benefits (Abraham et al., 2018; Anderson et al., 2021).

Whereas disadvantaged workers in typical work arrangements may be able to draw upon social support from co-workers, this resource is less available for gig drivers. Although other platform workers (e.g., information technology crowdsourcing) may form connections through interactions with clients (Taylor & Joshi, 2019), the transitory nature of customer interactions in gig driving may preclude drivers from long-term customer relationships (Kuhn & Galloway, 2019). Moreover, unlike taxi drivers, gig drivers do not operate out of a central base where they interact with other drivers or those in managerial roles (Wood, 2021), thus limiting the opportunities for forming links with an in-person peer network.

Gig driving does not involve heavy investments in the form of skill development, and ceasing gig work does not result in tangible losses for most workers (e.g., basic employment protections such as minimum wage and sick pay) compared to traditional work arrangements. However, gig drivers must still invest in their jobs by using their personal vehicles, a substantial capital expenditure, and paying for ongoing operating expenditures such as insurance, fuel, and vehicle maintenance, in addition to the typical costs associated with personal vehicle

use (Henao & Marshall, 2019). Research on platform work has found that gig drivers rely on their driving income more than other types of platform work (Anderson et al., 2021; Farrell et al., 2018; Hoang et al., 2020).

As compared to more traditional work arrangements, such as administrative work, gig drivers may have lower amounts of task identity, task significance, and skill variety (Kost et al., 2018) because they do not see the whole product and do not feel connected to their products in the organization. Finally, for additional career challenges defining the gig work arrangement, gig drivers have fewer opportunities to develop professional social networks. These connections can be essential for career development because they help workers access others' knowledge and resources, which fosters the development of new skills and competencies (Eby et al., 2003). Unfortunately, gig workers lack the available references and network of more standard employment roles, which can be seen as a lack of "social insurance" (Graham et al., 2017; Irwin, 2016). These defining qualities of gig work highlight that this type of role is precarious and replete with challenges to job security. The gig work arrangement thus represents a unique, distinct model of work, which involves more pronounced challenges as compared to more typical and stable contracted employee models.

By focusing on gig drivers and forecasted AV adoption, we contribute to the literature on workforce attitudes towards automation and provide a career-based perspective on workers' acceptance of and preparedness to adjust to automation. Specifically, we answer three research questions: 1) How do gig drivers view the longevity of gig driving jobs with the future of AVs?, 2) How do gig drivers anticipate that AVs will change their work role, and finally 3) To what extent are gig drivers concerned about AVs replacing them?

4. Methods

This study investigated the potential impact of AVs on the gig driving workforce. Gig drivers were defined as on-demand, gig workers whose main job tasks use a personal vehicle to provide delivery and/or transportation services to customers connected by a platform, in the form of an app or website (Agrawal et al., 2021; Tubaro & Casilli, 2022). Data were collected between March 2021 and July 2021 through a pre-focus group online survey and virtual focus groups with gig drivers (N = 53). We used a semi-structured protocol to guide the focus groups to achieve an in-depth understanding of gig drivers' attitudes about their jobs, with an emphasis on understanding the potential changes that AVs may have on the gig driving workforce. Pre-focus group online survey data was compared for consistency in findings (Patton, 1999).

4.1. Participant recruitment

To obtain a diverse sample of gig drivers, participants were recruited in multiple ways. Information about the study and focus groups was advertised on social media websites and groups, including Reddit, Facebook, LinkedIn, and Twitter. We also used a snowball sampling strategy based on recommendations from study participants. A recruitment email was also sent out to members of a platform drivers' group. Additionally, members of the team put up printed recruitment fliers at local restaurants. Potential participants were directed to a website to complete a two-minute screening survey. If they met the inclusion criteria (i.e., currently working as a platform-based ride-hailing and/or delivery service driver and residing in the U.S.), a member of the research team scheduled a virtual focus group with them. Prior to the focus group drivers were asked to complete a consent form, as approved by the Institutional Review Board, and complete a 15-minute online survey. Recruitment of gig drivers stopped once we achieved data saturation (Sandelowski, 1995).

4.2. Data collection

4.2.1. Pre-focus group online survey

The online survey consisted of demographic questions (age, gender, ethnicity/race, annual household income) and questions about the future of gig driving with AVs. Occupation was assessed through the following question: *how many years have you worked as a ride-hailing driver (or a delivery service driver)?* (two separate questions). Responses were in year intervals, ranging from < 1 year to > 10 years. For participants who worked as both ride-hailing and delivery drivers, and therefore responded to both occupation questions, we used the response with the longest amount of time to measure length of time as a gig driver. Three questions measured anticipated changes in the gig work driving industry due to AVs: *do you expect the size of the workforce for your company or the platform organization that you drive with (e.g., Uber, DoorDash) to increase, stay the same, or decrease in the next 2 (5 and 10) years as a result of automated vehicles?* Response options included decrease, stay the same, or increase. Nine of the 53 participants did not complete the pre-focus group online survey. Age was assessed through one question: *what is your age in years?* Responses were in 5-year intervals ranging from 18 to 22 to 73+. Gender was measured with one question: *what is your gender?* Response options included male, female, and other. Ethnicity/Race was assessed by asking: *which of the following categories describes you?* Please select all that apply. Response options included White or Caucasian, African American, Asian, Hispanic or Latino, American Indian or Alaska Native, and other. Annual household income was assessed through one-item: *please select the answer that includes your entire household income (in the previous year) before taxes.* Response options ranged from less than \$10,000 to \$150,000 or more.

4.2.2. Focus groups

Seventeen focus groups were conducted virtually using the Zoom web conferencing tool. Each focus group had an interviewer, two note takers, and between 1–6 participants.¹ Informed consent was provided at the beginning of the focus group. An interview protocol was used to guide each focus group, consisting of closed and open-ended questions on gig driving and occupational embeddedness. Participants' gig work status (ride-hailing only, delivery driving only, or both ride-hailing and delivery driving), along with which gig work platforms they used was determined based on their response to the question, *what is your life like as a driver?* Participants were asked, *how do you think AVs will impact your job in 2, 5, and 10 years?* Follow-up questions to this initial query included: *what are your thoughts about whether your job will change or go away?* And, *what might be the impacts of AVs on your quality of life?* Each focus group was audio recorded and transcribed. All participants received a \$50 Amazon e-gift certificate.

4.3. Data analysis

The pre-focus group online survey data were analyzed descriptively. Data from the focus groups were analyzed thematically (Braun & Clarke, 2006, 2012). To become familiar with the data, two coders completed a critical line-by-line review of the focus group transcripts. Initial codes were developed, and the data were categorized for each code. The codes were thematically categorized according to frequency, meaning, and relationship. Themes were evaluated in relation to the coded data and revised as needed. As a final step in the analysis process, themes were defined and named. Inter-coder reliability was established among two team members for each focus group transcript with a kappa ≥ 0.80 . NVivo software was used for coding.

¹ We attempted to have multiple participants in each focus group. Given participant no-shows, however, there were a few groups with only one participant.

5. Results

5.1. Gig driver characteristics

Participants were mainly male (68.89 %), Caucasian (55.56 %), less than 48 years old (72.72 %), and had an annual household income of less than \$60,000 (72.72 %). See Table 1 for demographic information. Participants worked as a gig driver, on average, 2.74 years (SD = 1.45). On average, participants worked for more than one gig driving platform ($M = 1.80$; $SD = 1.41$); Lyft (50.94 %) and DoorDash (45.28 %) were the top gig driving platforms. See Table 2 for additional driver characteristics.

5.2. How do gig drivers see their jobs continuing with AVs? (RQ1)

Most of the participants (69 %) responded in the online survey that they expected the size of the gig driving workforce would stay the same over the next two years. However, in ten years, the majority of the participants (82 %) thought that the gig driving workforce would decrease as a result of AVs (see Table 3). Consistent with the survey results, most participants shared in the focus groups that over the next ten years they believed they would still have a job. P19 shared, “I think in two to five years it won’t have much impact, but ten years or more as it gets more developed, then it [AVs] will start, I guess, taking over.”

However, past ten years, as AVs are pilot tested and become more common, there is a dichotomy among the views of the participants. Half of the participants believe that AVs will completely eliminate the driving position. P6 said, “I think it’s going to basically... There won’t be many DoorDash drivers if we go this route. It’ll be free calls to DoorDash for minimal costs. You won’t have any employees complaining.” The other half of the participants believe that AVs will just decrease the number of

Table 2

Gig Driver Characteristics.

	M (SD)
Years worked as a gig driver ^a	2.74 (1.45)
Number of platforms working on ^a	1.80 (1.41)
	N (%)
Gig driving platforms used ^b	
Lyft	27 (50.94)
DoorDash	24 (45.28)
Uber	16 (30.19)
UberEats	6 (11.32)
Amazon Flex	2 (3.77)
Instacart	1 (1.89)
Grubhub	1 (1.89)
SkipTheDishes	1 (1.89)
Roadie	1 (1.89)

Notes. Gig driving platforms used are not mutually exclusive. ^aMissing 9 responses. ^bMissing 4 responses.

Table 3

Change in the Size of the Gig Workforce as a Result of AVs.

	Increase	Stay the Same N (%)	Decrease
2 years ^a	9 (20)	31 (69)	5 (11)
5 years ^a	5 (11)	18 (40)	22 (49)
10 years ^b	2 (5)	6 (13)	37 (82)

Notes. ^aMissing 8 responses. ^bMissing 7 responses.

drivers needed. P51 shared, “I don’t think I’ll go away; I just think it’ll be less delivery or less Lyft drivers because of this [AVs].”

5.3. How AVs are anticipated to change gig driving roles (RQ2)

Three themes arose from our focus group analysis related to gig driving roles in an era of AVs: 1) the human element, 2) the role of AVs, and 3) the driving environment.

5.3.1. The human element

Most participants believe there is a *human element* that will still be needed in gig driving, even with AVs. There will need to be a human to handle unforeseen issues that may arise, such as: changes in destination mid-trip, passengers assistance with the app, intoxicated passengers, stopping too many passengers from trying to get into the car, cleaning the vehicle in between passengers, maintaining vehicle security, finding temporary parking spots, or navigating with inaccurate Global Positioning System (GPS). P26 shared:

I don’t think that they’re going to be able to [do away with drivers] logistically because if someone’s in the car and they mess something up, someone’s going to have to be there to clean it up or if there’s not a human in the car, people are going to feel more able to get away with maybe stealing something or scratching something into the car or something like that, defacing the car

Some participants thought passengers would still want in-person customer service for communication, assistance when disabled, and some passengers wouldn’t want only a computer driving. P28 explained, “It’s going to take a long period till people get used to [AVs]. Maybe some people like it, they’re going to take one of these, but a lot of people maybe they prefer the human interaction.”

In the context of delivery driving, participants believed that a human would still be needed to deliver food to the door, which may include entering an apartment building, walking up steps, or using an elevator. P46 noted, “I don’t think that would ever make sense for home delivery because what automated car is going to go up a flight of stairs? To a gate

Table 1

Participant Characteristics.

	N (%)
Gender^a	
Male	31 (68.89)
Female	12 (26.67)
Other	2 (4.44)
Age^b	
18–27	9 (20.45)
28–37	14 (31.82)
38–47	9 (20.45)
48–57	9 (20.45)
58 and older	3 (6.82)
Race/Ethnicity^a	
Caucasian	25 (55.56)
African American	14 (31.11)
Asian	3 (6.67)
Hispanic	3 (6.67)
American Indian or Alaska Native	1 (2.22)
Other	3 (6.67)
Annual Household Income^b	
Less than \$10,000	1 (2.27)
\$10,000 to \$19,999	6 (13.64)
\$20,000 to \$29,999	5 (11.36)
\$30,000 to \$39,999	4 (9.09)
\$40,000 to \$49,999	7 (15.91)
\$50,000 to \$59,999	9 (20.45)
\$60,000 to \$69,999	0 (0)
\$70,000 to \$79,999	2 (4.55)
\$80,000 to \$89,999	4 (9.09)
\$90,000 to \$99,999	2 (4.55)
\$100,000 to \$149,999	4 (9.09)

Notes. Race/ethnicity are not mutually exclusive. ^aMissing 8 responses.

^bMissing 9 responses.

code? To an apartment door? To deliver the food.” Whereas, participants noted that a human may not be needed with ride-hailing.

5.3.2. Role of AVs

The second theme was the *role of AVs*. Participants acknowledged that one of the benefits of AVs was an increase in safety related to reduced road accidents caused by human error and a decreased incidence of drunk driving. P12 stated, “From a safety standpoint, I think that driverless vehicles would make sense maybe in reducing the number of accidents.” Participants also believed that AVs could make the gig driving job easier and less stressful for the driver, and the driver could perform other non-driving tasks (e.g., interacting with the customer) while the car was moving. P5 explained:

Sometimes when you’re driving, the customer texts and you need to respond or be helpful, if the car can just take control for a few seconds... I think more focus would probably be on actual food delivery, maybe hospitality aspect of it instead of getting there on time. So, I think that would maybe take some stress out of it and maybe add to the personality of your Dashing [driving for DoorDash] experience.

Study participants also acknowledged several downsides to AVs. They explained that system errors in GPS and other wireless infrastructure could affect the functionality of AVs. P40 described:

However, when they go into the parking garages, that’s a wrap. It [AVs] doesn’t work as well. A lot of our parking garages are so large. I mean, they’re extreme. And when you go into there, you can’t even get a phone signal. You’ll be glad to get a mobile signal. So, you’re looking at more technology being evolved to see like, ‘okay, what’s going to happen if we go through the tunnel?’ And a lot of the vehicles cut out during the tunnel.

Additionally, there is a current lack of legal and logistical parameters for AVs. P27 explained:

Who’s really at fault when an autonomous vehicle is late to picking someone up or drops them off at the wrong location? Or, heaven forbid, there be a car accident between two autonomous vehicles. Who’s really at fault? And the liability where that is, is it the passenger’s fault? Is it the car’s fault? And not to mention the cost that’s going to be on these ride-hailing companies to provide the autonomous vehicles.

5.3.3. Driving environment

The *driving environment* was the third theme, particularly in relation to location and weather. Participants believed that a transition to AVs would be more easily accomplished in a city than in the suburbs or rural areas. P10 shared:

I’ve already seen it implemented in some larger cities that they have some fully automated vehicles. And I think that’s where it would make the most sense. I don’t see a fully automated ride share service would be useful in places even like [a small college town]. It’s just not big enough a city with regular enough driving patterns between picking up and dropping off passengers like it would be in a gridlock city.

Environmental conditions could also be a potential barrier to AV deployment. P39 shared, “I think these vehicles [AVs], they worked great in perfect conditions where it’s sunny and there’s very little extreme weather. In the city of winter and construction season... they do very poorly in those conditions.”

5.4. Unconcerned about AVs replacing drivers (RQ3)

Most participants were not concerned about the possibility that AVs would replace their role as drivers since they viewed work as temporary and assumed they would no longer be driving by the time AVs were

adopted. Participants also had difficulty imagining the future of gig driving with AVs but recognized that AVs could affect their driving jobs. P9 explained, “I can’t really wrap my head around any way that they [AVs] could eliminate the human presence... but I can see it definitely changing the game and the experience.” Interestingly, when participants were discussing the transition to AVs during the focus groups, they could conceptually describe changes that may occur, which included not needing a driver. Yet, at the same time they also spoke about their role inside the AV, implying that they would still be present and working as a gig driver. P11 shared, “I can be doing other things while going from one place to another one whether it’s for DoorDash or it’s for personal even.”

A small number of participants ($n = 10$; 18.87 %), however, voiced concern in the focus groups about the possibility that AVs would eventually replace their role as drivers. P23 said, “Maybe at first when they’re just testing it out, it still requires a human that ...but then there’s nothing left for me to do..... phased out.” Not having a job was of particular concern to P3 who explained, “...before DoorDash, I had been unemployed since 2006 [due to medical issues that prevented them from working in a traditional type of employment]. So, if I did not have this job, it would go right back to where I was.”

6. Discussion

This study focused on gig drivers’ perceptions of job longevity and changing work roles with the future of AVs. As gig workers comprise as much as 36 % of the U.S. workforce (Dua et al., 2022), it is critical to get the opinions of workers who may be affected by AVs. Our research questions asked gig drivers about their perceptions regarding the impact of AVs on the longevity of driving jobs, changes to driving roles, and concerns about job displacement. Drivers anticipated that their roles would not be affected in the short-term, yet their roles may eventually decrease in the next 10 years. They also expected positive changes including enhanced safety, ease, and time to devote to other tasks rather than driving. Drivers also simultaneously anticipated risks related to security and liability.

Gig drivers were unsure if human gig drivers will be needed after the next decade. If humans are needed, it will only be for specific purposes like handling unforeseen issues or delivering food from the vehicle to the customer. This finding is consistent with the literature on vehicle automation (Groshen et al., 2018). Our findings also allow for greater understanding of the lived experience in the gig work role. Gig drivers emphasized the importance of their interactions with customers, which contrasts with the literature suggesting these interactions are too fleeting to contribute to workers’ networks of support (Jabagi et al., 2020; Kuhn & Galloway, 2019). Instead, drivers suggested a variety of customer needs that AVs are not able to fulfill and that AV technology may create issues for customers on platforms.

Gig drivers’ positive and negative expectations largely align with those raised by truck drivers (Kishore Bhoopalam et al., 2021; Richardson et al., 2017; Van Fossen et al., 2023). One point of departure is a greater concern among truck drivers perceiving that AVs may have the potential to reduce autonomy (Balkmar & Mellström, 2018; Van Fossen et al., 2023). There may be differences in the populations of drivers in some roles in the transportation industry that may inform how accepting of AVs drivers may be. If truck drivers are drawn to this role to meet their preference for independent work (Levy, 2015), they may be more threatened by AVs because of the potential for lost vehicle control. Gig drivers are younger compared to the trucking population (Statista, 2023a, 2023b), which may explain their relative openness to AVs since studies have found that younger people tend to be more accepting of AVs generally (Hulse et al., 2018; Hudson et al., 2019).

Overall, the finding that drivers in our sample were relatively unthreatened by potential automation, and not solely because they perceived AV adoption as something in the distant future, is a novel insight that differs from prior theoretical (Dekker et al., 2017) and

empirical work (Dodel & Mesch, 2020; Krutova et al., 2022). Previous studies of lower-skill workers in manufacturing (Chao and Kozlowski, 1986; Fink et al., 1992; Herold et al., 1995; Olson & White, 1979) and workers who are at a comparative disadvantage in the labor market (e.g., lower education, wealth, or social group privilege) find that the greater fear about automation is explained by concerns about job security (Dodel & Mesch, 2020; Gnams & Appel, 2019; Krutova et al., 2022). Research on drivers' responses to AVs in the trucking industry has likewise found that, though truck drivers anticipate a continued need for human drivers, truck drivers remain concerned about job security (Kishore Bhoopalam et al., 2021; Orii et al., 2021; Othman, 2021; Richardson et al., 2017; Van Fossen et al., 2023).

The contrasting findings of our study are particularly interesting because gig workers could be classified as a comparatively less advantaged work group, particularly in the United States, where these workers tend to be younger, have lower incomes and are more likely to identify as Hispanic (Anderson et al., 2021). This contrast in findings may be explained in part by differences in worker demographics and differences between traditional employment positions and gig work, which is characterized by less stability and predictability. Gig drivers may be accustomed to dealing with and managing uncertainty in their day-to-day roles, and as our participants noted, they view their role as impermanent. In this way, gig workers must uniquely manage day-to-day job insecurity with no expectation (or even necessarily strong desire) for future security.

An additional factor for future research to evaluate may be workers' perceptions of their investments in their current career and perceived employment alternatives (Taing et al., 2011). As noted, gig workers do not have the same preparation and skill investments (e.g., certifications, trainings, skills learned that are not transferable) as compared to truck drivers. Although gig workers must invest in a personal vehicle and maintenance costs, these investments may be perceived as being more readily transferred without being lost. Along with the fact that they work without expectations of job security, gig workers may be less bothered by automation compared to other workers if they are already considering alternative roles and are less subject to a sense of sunk costs (Arkes & Blumer, 1985).

Overall, the precarious and transitory nature of gig work may mean that gig drivers are less threatened by automation as compared to other disadvantaged workers. Compared to workers in more traditional work arrangements, gig workers have less to lose, and thus may be able to feel more calm given workforce automation. We do not mean to suggest that gig workers' struggles in precarious work should be accepted; however, our results do point to a silver lining of the gig work arrangement specifically related to the ability to adjust to workforce automation.

We do not mean to suggest that gig workers' struggles in precarious work should be accepted. However, our results do point to a silver lining of the gig work arrangement related to the ability to adjust to workforce automation. Along with adding greater insight into career psychology implications of the gig work model, our findings also contribute insights about heterogeneities within groups of disadvantaged workers and their attitudes towards automation.

We focused on gig drivers as a lower-skill occupation in this study. There is also a continued trend that new technologies (e.g., generative AI) may also replace human workers in performing tasks in high-skill occupations (e.g., accountants, designers, Autor & Dorn, 2013). Future research may also evaluate and contrast the attitudes of workers in high-skill occupations set to experience automation to those held by gig workers. This can result in greater understanding of factors that may inform workers' fear versus self-efficacy to adapt to changes from automation. We expect that highly skilled workers may feel more capable of effectively adapting to changes. Yet we also expect that highly skilled workers may still be more upset about the prospect of their roles changing or going away as compared to gig workers, who view their role as transient.

Our results also have implications for effectively preparing the

workforce for the adoption of automation (Lent, 2018). Though gig drivers saw broad benefits to AVs in terms of safety and convenience, they recognized that the current lack of infrastructure and policies supporting AVs could affect their overall functioning. These findings can be helpful for designing effective procedures for introducing automation into the transportation industry. Gig driving and trucking organizations can emphasize the safety and comfort benefits provided by AVs to encourage driver acceptance and the retention of key personnel. Organizations must also be prepared to address driver concerns about potential security issues and liability risks to ensure driver acceptance of AVs. Yet, the messaging and preparation of gig drivers may be more minimal compared to other driving occupations (e.g. truck driving), since drivers expressed more acceptance of job insecurity. Gig drivers also did not share the same pronounced concerns about reduced autonomy as documented in truck drivers. Our findings also suggest that workforce retraining initiatives and policies may need to devote less effort to helping gig drivers prepare for AV-related job changes compared to truck drivers.

6.1. Limitations

There are some limitations to note about this study. Much of the data collection occurred during the COVID-19 pandemic, which could have affected views about the future of AVs and gig driving jobs. A majority of the participants were employed by Lyft and DoorDash, which limits our findings to the perceptions of drivers employed by these companies. Future research could examine perceptions of drivers from other platforms to analyze the extent that the perceptions of Lyft and DoorDash workers are similar to or different from workers employed by other companies. Future research may also investigate the extent to which workers are aware of ongoing developments in their industry's plans to adopt automation, and how their awareness informs their attitudes. Lastly, AVs are not the only technology that will affect the workforce of gig drivers. Other emerging technologies including drones and grocery shopping robots may also change the nature of and demand for gig driving jobs. Future research could investigate the impact of these technologies on workers as well.

7. Conclusion

Understanding the perspective of gig drivers who may be displaced by AVs is important for developing comprehensive workforce planning to aid career transition for these workers. The temporary nature of gig driving work makes it difficult for most drivers to imagine the changes AVs will generate. Gig drivers did not believe AVs would affect them and were thus less likely to be preparing for changes or replacement work due to the advent of AVs. This leaves these workers more vulnerable to negative outcomes of displacement, such as temporary unemployment and wage losses. Future research should focus on how platform providers and policymakers can help workers avoid these negative outcomes to adequately prepare them for AV-related job changes or displacement.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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