Research on the Influence of Perceived Algorithmic Control on Gig Workers Well-being

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Abstract. Advocating the humanized management of the platform, improving the satisfaction and well-being of gig works, and increasing their stability and platform stickiness are key issues for the healthy development of the gig economy. Based on the Job Demands-Resources Model, this paper discusses how perceived algorithmic control affects gig workers well-being. We found that, perceived algorithmic control can stimulate the work engagement of gig workers, and then show higher well-being; Work engagement plays a mediating role between perceived algorithmic control and gig workers well-being; Gig worker' work type (full-time/part-time) plays a moderating effect in the relationship between perceived algorithmic control and work engagement. The research conclusion provides suggestions for online labor platforms to improve the gig workers well-being.

Keywords: Perceived Algorithmic Control, Work Engagement, Employee Well-being, Job Demands-Resources Model

1 Introduction

With the rapid development of network technology, various new industries are rapidly emerging. There have been great changes in the way enterprises employ workers and in the concept of employment of workers, with an increasing number of flexibly employed people, whose existence has supported the "gig economy"[1] [5]. The "selling points" of low threshold, high degree of autonomy, and more pay for more work have attracted a large number of gig workers, which has led to the expansion of the market size of the new employment pattern that relies on the gig economy to realize flexible employment[8].

Compared to traditional economic, gig economy relies particularly on intelligent algorithmic platforms that use algorithms to manage and control the labor process as a means of transacting goods and services[4]. In order to be able to effectively improve the efficiency and service quality of casual workers, AI algorithms are virtualized by the platform to supervise the labor service process of casual workers, a process known as Algorithmic Control (AC)[7].

In this paper, we will introduce the variable of work engagement based on the Job Demands-Resources Model (JD-R) to study the influence path of perceived algorithmic control on the gig workers well-being.

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2 Analytical framework

2.1 Perceived algorithmic control and work engagement

Online labor platforms use algorithmic systems to assign and evaluate the work of casual workers[7] [6] . Algorithmic technology pushes information, such as task allocation, optimal routes, and service demands, in real time for casual laborers with its powerful computational capability, and provides feedback on the results to help them meet the work demands. The instant feedback provided by the algorithm can increase the effective information resources acquired by the gig worker in their work, which will be further transformed into the gig worker' experience of controlling their own work[11] . In the process of providing services and achieving work goals accordingly, the digital technology empowers workers to increase their sense of efficacy in accomplishing their tasks, making the work demands more meaningful[3] [8] [10] .

Based on the above analysis, this paper proposes the following hypothesis:

H1: Perceived algorithmic control has a positive effect on gig workers' work engagement.

2.2 The mediating role of work engagement

Studies have shown that employees who are more engaged in their work are more energetic, have a stronger sense of participation in the activities they are engaged in, have a higher level of job satisfaction, consider themselves to be an important part of the work task, and then have positive psychological emotions and less anxiety caused by stressors[2] . Employees who are dedicated to their work can achieve or even exceed their work goals in the short term, improve their personal performance and organizational benefits, and in the long term, they can accumulate knowledge and experience to achieve individual growth, and realize their own value, obtain the satisfaction and happiness brought by their hard work[9] .

Based on the above analysis, this paper proposes the following hypothesis:

H2: Work engagement has a positive effect on gig workers well-being.

The algorithm's guidance, as a source of information for gig workers to perform tasks, will convey a large amount of work-related information to gig workers. A large amount of work resources reduces the threshold and difficulty for gig workers to carry out their business, which is more conducive for gig workers to devote themselves to their work and gain a sense of work accomplishment[6]. The platform puts forward work demands for gig workers through the evaluation mechanism and the reward and punishment mechanism, and generates pressure on their performance, so that they can devote themselves to their work, thus increasing the positive resources and evaluations that gig workers get from their labor services, and experiencing the pleasure brought by their work, and enhancing their sense of well-being.

Based on the above analysis, this paper proposes the following hypotheses:

H3: Work engagement mediates the relationship between perceived algorithmic control and gig workers well-being.

2.3 The moderating effects of gig Workers' Work types

This study argues that, platforms have differentiated settings for full-time and part-time workers in terms of their dispatching methods, assessment mechanisms and other management contents. Gig workers themselves have different identity perceptions about the work type (full-time/part-time), and this can lead to different work attitudes and motivations[13] . Gig workers have different identity perceptions of their work type, which leads to large differences in their work attitudes, motivations and evaluations[7] .

Based on the above analysis, this paper proposes the following hypotheses:

H4: The indirect relationship between gig workers' perceived algorithmic control affecting well-being through work engagement will be moderated by the moderating effect of the type of gig worker's job (full-time/part-time). Specifically, the effect of this indirect relationship is stronger for full-time workers.

To summarize, the research model is shown in Figure 1 below.

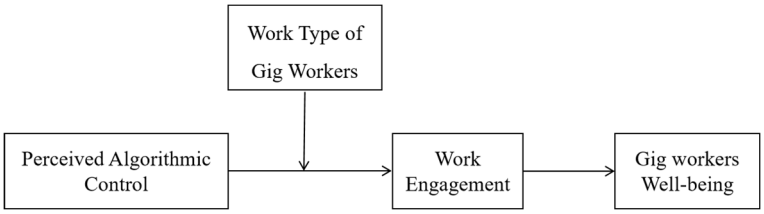

Fig. 1. Research Model.

3 Methods

3.1 Sample and data collection

A total of 510 questionnaires were collected in this study, and after screening and eliminating invalid questionnaires, 435 valid questionnaires were finally retained, with a questionnaire recovery rate of 85.29%. Among them, 333 were male (76.6%), the group of 21-30 years old accounted for most of the samples in this research, totaling 224 (51.5%), and the higher the age group the lower the number of people, and 302 (69.4%) were full-time.

3.2 Variable measurement

In this study, more mature scales at home and abroad were selected for measurement, and the foreign scales were strictly in accordance with the "translation-back-translation" procedure to ensure accuracy.

Perceived algorithmic control. This study is similar to the object and work situation researched by Pei Jialiang et al. (2021) when they developed the scale, and it is reliable. It contains three dimensions of standardized guidance, tracking evaluation, and behavioral constraint, with a total of 11 items. In this study, the Cronbach's α coefficient for this scale is 0.736.

Work Engagement. Considering the conceptual definition of work engagement and the characteristics of the correlates involved in this study, the scale constructed by Rich et al.

(2010) was used in this study to measure employee work engagement. The scale contains three dimensions, physical, emotional and cognitive, with six entries for each dimension, totaling 18 items. In this study, the Cronbach's α coefficient for this scale was 0.856.

Employee Well-Being. Including three dimensions of life well-being, workplace well-being, and psychological well-being, totaling 18 items. In this study, the Cronbach's α coefficient was 0.932.

4 Results

4.1 Descriptive and correlation statistics

Descriptive statistics and correlation analyses of the main variables are shown in Table 1, which shows that there is a positive correlation between perceived algorithmic control, work engagement and gig workers well-being ($r=0.464$, $p<0.01$), and that the type of gig worker shows a significant negative correlation with work engagement ($r=-0.260$, $p<0.01$), and also with gig workers well-being ($r=-0.265$, $p< 0.01$). The above correlation analysis preliminarily verified the correlation between the variables, indicating that further regression analysis and hypothesis testing can be conducted.

Table 1. Correlation analysis between variables.

	M	SD	1	2	3	4	5	6	7	8	9
1.Age	2.49	0.784	1								
2.Education	3.06	0.902	-0.033	1							
3.Platform Type	1.31	0.490	0.085*	0.040	1						
4.Work Period	3.34	1.243	0.383***	-0.099**	0.013	1					
5.Work Type	1.31	0.461	-0.094**	0.176***	0.054	-0.469***	1				
6.Salary	3.06	1.045	0.209***	0.091*	-0.016	0.380***	-0.414***	1			
7.Perceived Algorithmic Control	4.24	0.394	0.094*	-0.072	-0.110**	0.216***	-0.209***	0.185***	1		
8.Work Engagement	4.24	0.424	0.145***	-0.113**	0.001	0.211***	-0.260***	0.207***	0.464***	1	
9.Employee Well-being	3.98	0.644	0.181***	-0.072	0.025	0.296***	-0.265***	0.272***	0.391***	0.807***	1

Notes: ***, **, * represent 1%, 5%, and 10% significance levels.

4.2 hypothesis testing

In this study, the relationship between the variables was analyzed through hierarchical regression, and the summary results are shown in Table 2. Model 3 in Table 2 shows that perceived algorithmic control has a positive effect on work engagement after controlling for control variables, and hypothesis 1 is supported. Model 7 shows that work engagement has a significant positive effect on gig workers well-being and hypothesis 2 is supported. According to the results of model 7, the effect of perceived algorithmic control on gig workers well-being changed from 0.330 ($p<0.01$) to 0.000 with the addition of the mediating variable work engagement compared to model 6. Meanwhile, the mediating effect of work engagement showed that Perceived algorithmic control through the indirect effect of work engagement on

the gig workers well-being does not contain 0 in Table 3, and hypothesis 3 is supported.

Table 2. Hierarchical regression analysis results.

Variants	Work Engagement				Gig Worker Well-being		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model7
Age	0.064	0.058	0.073	0.071	0.063	0.058	0.014
Education	-0.115**	-0.088**	-0.067	-0.052	-0.069	-0.049	0.019
Platform Type	0.001	0.048	0.051	0.075*	0.023	0.059	0.022
Salary	0.161***	0.107**	0.068	0.061	0.193***	0.151***	0.069**
Work Period	0.114**	0.046	-0.002	0.007	0.191***	0.139***	0.104***
Perceived Algorithmic Control		0.428***	0.419***	0.781***		0.330***	0.000
Work Engagement							0.772***
Work Type of Gig Worker			-0.130**	1.051**			
Perceived Algorithmic Control * Work Type of Gig Worker				-1.168***			
R2	0.079	0.238	0.260	0.273	0.126	0.227	0.674
△R2		0.169	0.011	0.013		0.101	0.447
F	7.408***	23.631***	21.440***	20.001***	12.362***	20.916***	126.090***

Notes: N=435; ***, **, and * represent 1%, 5%, and 10% significance levels.

Table 3. Bootstrap mediation effect test results.

	Effect	BootSE	BootLLCI	BootULCI
Total Effect	0.5399	0.0725	0.3973	0.6825
Direct Effect	-0.0026	0.0522	-0.1052	0.1000
Indirect Effect	0.5425	0.0718	0.4141	0.6948

Table 4. Mediating effects of different types of gig workers.

	Norm	Effect	BootSE	BootLLCI	BootULCI
Moderated intermediary	Full-time	0.6831	0.0995	0.4994	0.8892
	Part-time	0.3802	0.0902	0.2171	0.5699
Moderated intermediary comparisons	Full-time vs Part-time	-0.3029	0.1321	-0.5547	-0.0394

As can be seen from Model 4 in Table 2, the interaction term between perceived algorithmic control and gig worker's work type had a significant negative effect on work engagement. A

simple slope test found that the positive effect of perceived algorithmic control on gig workers well-being through work engagement was significant when the gig worker's work type was full-time, with an indirect effect value of 0.6831 in Table 4, and that the positive effect of perceived algorithmic control on gig workers well-being through work engagement was equally significant when the gig worker's work type was full-time, but the effect was weaker, with an indirect effect value of 0.3802, and Hypothesis 4 was supported.

5 Conclusions

Based on the JD-R Model, this paper constructs the mechanism of the influence of perceived algorithmic control on the gig workers well-being, with perceived algorithmic control as the independent variable, work engagement as the mediator variable, gig workers well-being as the dependent variable, and gig workers' work type (full-time/part-time) as the moderating variable between the perceived algorithmic control and work engagement. The following research conclusions were obtained from this study. (1) Perceived algorithmic control significantly predicts work engagement, work engagement significantly and positively affects gig workers well-being, and work engagement plays a mediating role in the effect of perceived algorithmic control on gig workers well-being. (2) Gig worker work type (full-time/part-time) plays a moderating role in perceived algorithmic control and work engagement, and when gig workers are full-time, their perceived algorithmic control is more likely to influence gig workers' high level of work engagement, which in turn triggers higher levels of well-being.

With the development of Internet technology, the gig worker economy, a new employment model is increasingly favored by managers, especially in the travel industry, takeaway delivery delivery service industry, a new service industry, gig workers as the core resources of the gig worker economy, the platform enterprise to stimulate and enhance the well-being of the gig worker workers in a variety of ways, thereby increasing the gig worker's work performance and the platform viscosity.

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