

Influence of Algorithmic Control on Workplace Deviant Behavior of Selling Riders: Based on Self-determination Theory

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Abstract: Algorithmic control has changed the traditional way of organizational leadership and gradually become the research topic in the field of organizational behavior. At present, although some scholars have exposed the negative impact of algorithmic control on employees, few studies have discussed its mechanism on workplace deviant behavior. Taking full-time take-away riders as the research object, based on the perspective of self-determination theory, this paper discusses how algorithm control affects the rider's workplace deviant behavior, especially the mediating role of employees' self-demand, ability demand and relationship demand and the moderating role of service-oriented leaders. The survey results of 206 riders show that the satisfaction of three basic psychological needs has an intermediary role between algorithm control and workplace deviant behavior; Service-oriented leadership plays a moderating role between algorithmic control and the satisfaction of independent needs and relational needs: the lower the level of service leadership, the stronger the negative impact of algorithmic control on the satisfaction of the three needs; Service-oriented leadership also moderates the mediating effect between autonomous demand satisfaction and relational demand satisfaction on algorithmic control and workplace deviant behavior: the lower the level of service leadership, the stronger the mediating effect.

Keywords: Algorithm Control; Satisfaction of Psychological Needs; Service-oriented Leadership; Deviation Behavior in Workplace.

1. Introduction

The existing literature has discussed the influence of algorithmic control on odd jobs' engagement, increase or decrease of working hours, turnover and other work behaviors (for example, Yu Shengxian et al., 2024; Pei Jialiang et al. 2024; Liu Shanshi et al., 2023), however, there is little concern about the research of algorithmic control on workplace deviant behavior of direct subordinates. This study will take full-time takeaway riders as an example, take algorithmic control as the antecedent variable of workplace deviant behavior, and explore the mechanism between them. Based on the theory of self-determination, this paper intends to explore the influence of algorithmic control on the workplace deviant behavior of selling riders, reveal the intermediary role of psychological needs to meet the above relationship, and demonstrate the regulatory role of service-oriented leaders in this process, with a view to enriching the research on algorithmic control and workplace deviant behavior, and providing data reference for the optimization direction of the algorithm of odd jobs platform, and enriching management experience for managers.

2. Hypothesis

2.1. Self-determination theory

Self-determination theory holds that "the fluctuation of demand satisfaction will directly predict the fluctuation of happiness", because it defines basic psychological needs as "universal necessities", and the satisfaction of these needs is considered to be the necessary nutrition for individuals to obtain development and is very important for sustained psychological growth, integrity and happiness (Ryan et al., 1996; Deci et al., 2000). Satisfaction of needs can promote

mental health, while frustration of satisfaction will damage mental health (Gagné et al., 2005). According to the theory of self-determination, three basic psychological needs include autonomy, ability and relationship. Independent demand represents the subjective experience of individual psychological freedom and choice when carrying out activities; Ability demand is defined as the tendency of individuals to influence the environment and obtain valuable results in their interaction with the environment; Relationship demand is that people are eager to experience a sense of belonging and feel the connection and mutual respect with others (e.g. Ryan et al., 1971; Deci et al., 2000).

2.2. Algorithm Control and the Basic Psychological Needs of Riders

Different from the characteristics of task and independence endowed by organizational psychology, self-determination theory expounds the satisfaction of independent needs from two aspects: the sense of choice and psychological freedom experienced in the process of completing tasks. This paper holds that algorithmic control limits the satisfaction of the independent needs of take-away riders. Specifically, firstly, algorithmic control dispatches orders for take-away riders through AI order scheduling and AI-driven methods, and monitors and restricts the working methods and work contents of the take-away riders, such as route planning and delivery time, so as to maximize the use of labor force and ensure the maximum benefits of the platform. The riders work like "muppets" (Huang, 2023), and lose their attention to the working methods and work contents. Secondly, under the control of the algorithm, information monopoly is caused, and the takeaway rider knows little about customer information and order information. Because of the "blind single acceptance" rule set by the platform, the rider will not get the

detailed order information before accepting the order (Huang, 2023), thus losing the right to choose the order and customers. Under the action of various rules, it has a negative impact on the psychological freedom of riders at work. Thirdly, under the control of the algorithm, the rider in the digital management system is at the bottom of the food chain, and the rider's working process depends on the algorithm technology. If the algorithm determines that the rider violates the regulations, it can freeze or disable the rider's account at any time during the work. The high substitutability of takeaway riders makes it difficult for them to bargain with the platform (Sun, 2019). Finally, the rider is managed by multi-stakeholders, receiving feedback information from customers, businesses, sites, government and the rider's work system, and converting it into system data, and evaluating the rider's work performance through algorithm operation. Riders must avoid mistakes, or take remedial measures as soon as possible after mistakes, and maintain correct and compliant work behavior, so as not to affect the "algorithm score" and lead to greater algorithm punishment. To sum up, this study thinks that algorithmic control makes odd jobs lose the power of independent choice and action, and thus puts forward the hypothesis:

Hypothesis 1a: Algorithm control has a negative impact on the satisfaction of odd jobs' independent demand.

The satisfaction of ability demand mainly comes from the sense of control and competence in task completion, and good job performance also conveys positive information about ability and competence to individuals (Deci et al., 2000). The negative effects of algorithm control on the satisfaction of the ability requirements of the selling riders are mainly manifested in the following two aspects: First, the "timeliness" of the work tasks of the takeaway riders makes it difficult for the riders to easily control the whole work process, thus hitting the riders' sense of job competence. With the optimization of the algorithm system, the platform will continuously shorten the order limit time to extract more labor resources and gain additional labor value for workers and riders. A study by Wood et al. (2018) shows that among the selected respondents, 54% said that they had to work at a very high speed, 60% worked within a tight deadline, and 22% felt pain due to work. When driving at high speed, there will still be cases such as overtime orders and damaged meals, which will lead to negative customer evaluation and punishment by algorithm system, thus making the rider lose his ability and self-confidence and produce self-doubt. Secondly, the takeaway platform manages the "gamification" rider's labor through the fuzzy performance management system, and it is difficult for the rider to obtain satisfactory ranking and performance through easy work. The algorithm sets up a hierarchical and gamified evaluation system to encourage competition between riders and groups (Sun, 2019). Riders expect to "upgrade" by exceeding their production targets to gain greater "privileges" (such as more efficient orders, more effective system complaints, etc.), so they continue to extend their working hours in order to maintain a high ranking. However, it is very difficult to upgrade the rank, and there is a "black box of punishment" in the system, and riders may be punished inexplicably, which will lead to a decline in the ranking (Huang, 2023), which will directly affect the work income of riders. To sum up, this study believes that algorithmic control will affect the satisfaction of odd jobs' ability requirements through various exploitation means, and thus puts forward the hypothesis:

Hypothesis 1b: Algorithm control has a negative impact on the satisfaction of odd jobs.

Self-determination theory holds that the satisfaction of relationship needs depends on the sense of connection with others, and the respect, recognition and support of others are important factors to meet the needs (Deci et al., 2000). This study believes that algorithmic control will have a negative impact on the satisfaction of the rider's relationship needs: First, the identity inequality in the algorithmic system makes it difficult for riders to gain the attention and respect of customers. Food delivery is a "customer-centered" social behavior (Sun, 2019), and algorithmic management gives customers the supreme power, taking customer orientation as the "agent in the management loop", while takeaway riders play the role of service industry. Riders must obey customers' orders and satisfy their whimsy and desires (Linda et al., 2016; ; Wood et al., 2018) . The algorithm platform designs the rider as a slave worker, and the rider as a server provides emotional value (such as explanation, coordination, communication, etc.) to satisfy the customer and marginalize himself (Sun, 2019). Secondly, algorithmic control has changed the traditional management mode, managers no longer provide emotional value for riders, and there is no close relationship between riders and superiors. The actual manager of the rider becomes a virtual algorithm, and the labor organization on the platform is virtualized. Compared with the traditional management method, virtual algorithm no longer has emotional interaction with subordinates, but only transmits the instructions of superiors, which makes it difficult to meet the emotional needs of subordinates. At the same time, the rider's "bottom position" makes the algorithm often ignore the rider's feedback, and the information interaction becomes one-way transmission. Thirdly, the outsourcing mode adopted under the algorithmic control platform has also changed the workers' working methods and legal responsibilities (Huang, 2023), and it is difficult for riders to get their support by shirking responsibilities among higher authorities. Labor outsourcing, riders working alone, it is difficult to feel the support of the team and colleagues, further exacerbating their sense of loneliness and social alienation. At the same time, the legal and economic responsibilities of the rider's work are transferred, and the indifference and inaction of the platform after the rider's work accident also make it difficult for the rider to feel a sense of belonging to the platform and the team. To sum up, this study believes that algorithmic control leads to the rider's detachment from the crowd, and the inequality with the platform and customer status also makes it difficult for the rider to gain respect and attention, thus putting forward the hypothesis:

Hypothesis 1c: algorithmic control has a negative impact on the satisfaction of odd jobs.

2.3. Psychological needs meet the intermediary role between algorithm control and workplace deviant behavior.

Employee workplace deviant behavior refers to the voluntary behavior of employees in the workplace that violates organizational norms (Robinson et al., 1995). Research shows that employees are more likely to violate organizational norms when they have unfavorable views on their situation at work (Colbert et al., 2004). Self-determination theory puts forward that the satisfaction of basic psychological needs (independent needs, ability needs

and relationship needs) is a necessary condition for individual growth and development (for example, DECI et al., 2000; GAGNÉ et al., 2005), demand satisfaction is often related to happiness, good attitude and positive behavior (for example (DECI et al., 2000; GAGNÉ et al., 2005), while satisfaction with frustration often leads to pain and depression, which in turn leads to suboptimal performance (DECI et al., 2000). Therefore, this paper holds that the satisfaction of basic psychological needs will inhibit the rider's workplace deviant behavior, while the frustration of satisfaction will promote the rider's workplace deviant behavior. Specifically:

First of all, the satisfaction of independent demand will inhibit deviant behavior in the workplace: on the one hand, according to the theory of self-determination, individuals are inherently inclined to acquire autonomy (DECI et al., 2000), and when the independent demand is satisfied, individuals think that their behavior is self-consistent and voluntary (AL-JUBARI et al., 2019). Therefore, riders who meet their autonomous needs will gain their own will, that is, when the work is flexible and autonomous, riders will tend to take more proactive work behaviors (Deci et al., 1989) to obtain higher job satisfaction. At this time, the rider's expectation of autonomous work is satisfied, and the possibility of breaking the rules and jumping out of the "comfort zone" of work is reduced. In addition, riders who meet their independent needs tend to avoid negative behaviors that will affect their personal happiness and work performance, and deliberately maintain such favorable working conditions. On the other hand, the theory of self-determination holds that when the satisfaction of individual needs is frustrated, the ability of individual self-regulation will be weakened (DECI et al., 2000). When the rider enters the "digital cage" created by the algorithm, the seemingly free work actually breaks the rider's expectation of autonomous work, and the possibility of the rider's "revenge" and violation of the rules increases, resulting in an enhanced behavioral motivation. Therefore, it is less likely that riders who meet their own needs will take workplace deviant behavior.

Secondly, the satisfaction of ability demand will inhibit workplace deviant behavior: on the one hand, research shows that individuals may maintain this behavior when they think they have the ability to achieve their goals (ROSS et al., 2018). Takeaway riders who meet their ability requirements will feel a sense of control over the environment and tasks, and their work confidence and self-efficacy will be enhanced during the work process, thus making it easier to obtain higher work performance, and good work performance will also produce positive work feedback to the riders (DECI et al., 2000), forming a virtuous circle. In other words, when the rider's ability needs are met, he will be more willing to actively follow the current rules and continue to work. Secondly, the satisfaction of ability demand means that the rider can perfectly complete the tasks assigned by the algorithm, so he will get some algorithm preferential treatment and algorithm rewards at the same time of obtaining high performance, such as higher quality orders, more reasonable routes and order arrangements, etc. Under the background of algorithm preferential treatment, the rider can meet the expectations of personal work goals, so the rider is more likely to choose to abide by rather than violate the existing rules. On the other hand, when the algorithm prevents the rider from being promoted by "punishing the black box" or unfairly and transparently punishes the rider, it may hit the rider's morale. When riders think that they have been treated unfairly, they

will be dissatisfied with their work and promote the occurrence of deviant behaviors in the workplace. Furthermore, the satisfaction of ability demand will inhibit the occurrence of rider's workplace deviation behavior. Therefore, the satisfaction of ability demand will inhibit the occurrence of workplace deviant behavior.

Finally, the satisfaction of relationship needs will inhibit workplace deviant behaviors: First, SDT assumes that when people experience that relationship needs related to behaviors are satisfied, they tend to internalize their values and rules (GAGNÉ et al., 2005). In other words, when the relationship needs are met, people tend to accept the values and practices of their surroundings (PETROS et al., 2019; AL-JUBARI et al., 2019). The satisfaction of the relationship requirements under the algorithm management is closely related to the algorithm rules. When the rider's relationship requirements are satisfied, the rider is more likely to agree with and accept the operation rules brought by the algorithm, thus reducing the possibility of violating the rules. Secondly, riders who meet the relationship needs can form a good interactive relationship with customers and colleagues, which is easy to be based on positive emotions such as cooperation, tolerance and understanding between the two sides, thus promoting riders to further maintain interaction with the environment with a positive attitude. At this time, out of a good working atmosphere and working environment, riders tend to maintain the current working environment and working conditions, and the chances of arguments, retaliation and non-cooperation decrease. In contrast, when the satisfaction of the rider's relationship needs is frustrated, it shows that it is difficult for the rider to integrate into the work team and establish a healthy cooperative relationship with the customer. Studies have found that unsociable employees often show the characteristics of antagonism, annoyance and distrust, and have low self-esteem (Chirasha et al., 2012). Therefore, riders who are frustrated in meeting their relationship needs are likely to have antagonistic feelings with colleagues and customers during their work, and then make behaviors that violate the rules. From the analysis, it can be seen that riders who meet the relationship needs are less likely to take workplace deviant behavior.

To sum up, individuals whose basic psychological needs are met can gain independent will, feel a sense of control over environmental work, experience respect and be cared for. Under this condition, the organism is in the best environment suitable for individual growth and development, meeting all the "expectations" of the rider for work. In other words, when the rider's basic psychological needs are met, the rider no longer has the motivation to make workplace deviation behavior. Therefore, this paper thinks that the satisfaction of basic psychological needs will inhibit workplace deviant behavior, so it puts forward the hypothesis:

Hypothesis 2a: Self-demand satisfaction has a negative impact on workplace deviant behavior.

Hypothesis 2b: The satisfaction of ability requirements has a negative impact on workplace deviant behavior.

Hypothesis 2c: Satisfaction of relational needs has a negative impact on workplace deviant behavior.

Self-determination theory holds that external environmental factors have an indirect impact on individual behavior by affecting individual psychological needs (DECI et al., 2000). According to the theory of self-determination and the above assumptions 1 and 2, this paper holds that three types of psychological needs meet the relationship between

intermediary algorithm control and rider's workplace deviant behavior. Specifically, the self-determination theory holds that the satisfaction of an individual's basic needs is the necessary nutrition for his development, and the frustration of satisfaction will weaken the individual's self-regulation ability and produce certain negative results (Ryan et al., 1996; Deci et al., 2000). Algorithm control creates a seemingly free "digital cage" for the takeaway rider, and the rider's every move is monitored by the algorithm. The algorithm regards the rider as an "electronic worker", expecting the rider to complete the tasks distributed by the system according to the prescribed itinerary, and at the same time cutting off the opportunity for the rider to communicate with others. In this harsh working environment, the satisfaction of the rider's basic psychological needs is blocked. DECI et al. (2000) hold that "individuals will take defensive measures to protect themselves to some extent when they are hindered by unfavorable conditions". Therefore, riders are dissatisfied with the current working methods and rules, and their motivation to choose to break the rules and change the situation is increased. To sum up, this paper speculates that algorithmic control may affect the rider's workplace deviant behavior, and this influence is mediated by three basic psychological needs. Then put forward the hypothesis:

Hypothesis 3a: Self-satisfied demand has a mediating effect between algorithmic control and workplace deviant behavior.

Hypothesis 3b: Capability requirement satisfaction has a mediating effect between algorithmic control and workplace deviant behavior.

Hypothesis 3c: Relational demand satisfaction has a mediating effect between algorithmic control and workplace deviant behavior.

2.4. The regulatory role of service-oriented leadership

Self-determination theory holds that the satisfaction of individual's basic psychological needs is often influenced by multiple environmental factors (DECI et al., 2000). For example, Yang Chen and others [19] found that the work unit structure can adjust the positive influence of humble leadership on employees' psychological needs satisfaction. This paper holds that the function of algorithmic control may be influenced by other factors. In the practice of algorithmic control, most of them implement the mode of coexistence of dual control of algorithmic managers and general managers. In other words, in practice, algorithm managers and general managers often manage their subordinates' work together to make up for the shortcomings of algorithm control in management and arrangement (Sun Ping, 2019). For take-away riders, the role of stationmaster perfects the management practice of the algorithm and is the superior manager directly contacted by take-away riders. Service-oriented leadership is a kind of democratic leadership style, which believes that employees' interests are higher than their own interests and is committed to helping subordinates grow up and tap employees' potential (Greenleaf, 1977). This study holds that the service-oriented leadership behavior of stationmaster will adjust the influence of algorithm control on the satisfaction of the basic psychological needs of selling riders, specifically:

On the one hand, high-level service-oriented leaders will pay attention to the work needs of subordinates, take subordinates as the center, and fully support and help their

growth (Greenleaf, 1977). When the service-oriented leadership level is high, the stationmaster will authorize his subordinates to help deal with the illegal records in the algorithm system and give the rider the space to arrange his work independently; Help take-away riders coordinate work arrangements, deal with unexpected situations and unreasonable algorithm commands, so that take-away riders can finish their work tasks more easily and gain a sense of accomplishment; Respecting the dignity and values of takeaway riders makes it easier for takeaway riders to perceive the atmosphere of psychological safety, equality, fairness and trust when they get along with webmasters and colleagues (Ehrhart, 2004). Therefore, when the service-oriented leader of the stationmaster is high, the takeaway rider will experience more care and guidance from the stationmaster, so as to better cope with unexpected situations and unreasonable algorithm commands, thus reducing the negative impact of algorithm control on the satisfaction of the basic psychological needs of the selling rider.

On the other hand, when the service-oriented leadership level of the stationmaster is low, it is not only difficult for the takeaway rider to get the support and assistance from the stationmaster, but also rarely feel the respect and care of the stationmaster. First, low-level service-oriented leaders tend to regard subordinates as a part of the workflow, and only focus on "production efficiency and production results". At this time, the webmaster will not pay too much attention to the personal development and work task arrangement of the riders, and rarely provide work coordination support for take-away riders. The riders rely more on algorithms to work. Second, the webmaster with low service-oriented leadership level doesn't care about the working status and personal values of the takeaway riders. The takeaway riders work alone under the control and management of the algorithm, which aggravates the loneliness of the takeaway riders. Therefore, under the management of low-level service-oriented leaders, take-away riders rely more on algorithms to work, and strengthen the negative impact of algorithm control on the satisfaction of basic psychological needs of sell-out riders.

To sum up, put forward the hypothesis:

Hypothesis 4a: The service-oriented leadership adjustment algorithm controls the negative effect on the self-demand satisfaction of the selling riders: The higher the service-oriented leadership level, the weaker the negative effect of the algorithm control on the self-demand satisfaction, and vice versa.

Hypothesis 4b: The service-oriented leadership adjustment algorithm controls the negative effect of the ability demand satisfaction of the selling riders: The higher the service-oriented leadership level, the weaker the negative effect of the algorithm control on the ability demand satisfaction, and vice versa.

Hypothesis 4c: The service-oriented leadership adjustment algorithm controls the negative effect on the satisfaction of the relationship demand of the selling riders: The higher the service-oriented leadership level, the more negative the influence of the algorithm control on the satisfaction of the relationship demand, and vice versa.

2.5. Integration model:

Because the satisfaction of basic psychological needs has an intermediary role between algorithm control and workplace deviant behavior, the analysis shows that service-oriented leaders also have a mediating effect on this

intermediary role, that is, the mediated role. Specifically, when the level of service-oriented leadership behavior is high, the webmaster will pay more attention to the personal development and team growth of employees than the work results. At this time, the stationmaster will be willing to provide all kinds of working resources and support for subordinates, accept all kinds of information fed back by subordinates, help take-away riders solve their work problems and establish good working relationships with each other, strengthen interpersonal interaction, reduce the work pressure of algorithm control on the satisfaction of basic psychological needs, which will lead to the willingness of take-away riders to abide by the algorithm rules and obey the algorithm instructions to a greater extent, and reduce the deviation behavior in the workplace. On the other hand, when the service-oriented leadership level is low, the webmaster only pays attention to the work results of subordinates, and it is difficult for take-away riders to get additional work support from the webmaster, and they rely more on algorithms to work, thus strengthening the control of algorithms has a negative impact on the satisfaction of psychological needs, so that take-away riders show more workplace deviation behaviors. So put forward the hypothesis:

Suppose 5a: The mediating effect of autonomous demand satisfaction on algorithm control and workplace deviant behavior is regulated by service-oriented leadership: the higher the level of service-oriented leadership, the weaker the mediating effect.

Suppose 5b: The mediating effect of ability requirement satisfaction on algorithm control and workplace deviant behavior is regulated by service-oriented leadership: the higher the level of service-oriented leadership, the weaker the mediating effect.

Hypothesis 5c: The mediating effect of relational demand satisfaction on algorithm control and workplace deviant behavior is regulated by service-oriented leadership: the higher the level of service-oriented leadership, the weaker the mediating effect.

3. Hypothesis Test

3.1. Research tools

On the basis of combing the literature, the measurement

items are determined, and two masters and one doctor of enterprise management are invited to translate and translate the items back. All questionnaires use a five-point scale, where 1 means "very different" and 5 means "very agree".

Algorithm control. The scale developed by Pei Jialiang et al. (2021) has 11 items, with a confidence of 0.917.

Psychological needs are satisfied. The scale of La Guardia et al. (2000) was used to measure the satisfaction of employees' ability needs, relationship needs and independent needs. Each type of demand satisfaction includes three measurement items, in which the confidence of independent demand is 0.819, the confidence of ability demand is 0.777, and the confidence of relationship demand is 0.860.

Deviation behavior in the workplace. Using the scale of Bennett and Robinson(2000), the workplace deviant behavior is divided into interpersonal deviant and organizational deviant, with 6 items, and the reliability in this paper is 0.905. .

Service-oriented leadership Using the measurement scale of Liden et al. (2015), it was measured from seven dimensions, with one item in each dimension and a confidence of 0.900.

Control variables. In order to ensure the reliability and validity of the research results, the research needs to exclude the interference of other potential influencing factors on the relationship between the research subjects. Scholars have found that gender, age, education level, working years and self-attrition will have an impact on workplace deviant behavior (Ambrose et al., 1999 Gonzalez et al., 2013; (Loe et al, 2000). Therefore, this paper chooses the above variables as control variables. Among them, the measurement of self-loss adopts the measurement items of Twenge et al. (2004), with a total of 5 items and a confidence of 0.832.

3.2. Empirical analysis and results

(1) Variable discrimination validity test

Discriminatory validity refers to the degree of irrelevance between a concept and other different concepts. Good discriminative validity indicates that different constructions must be effectively separated. This chapter tests the discrimination validity by confirmatory factor analysis. By Table1, It can be seen that the variables of algorithm control, ability demand, relationship demand, autonomy demand, workplace deviant behavior, service-oriented leadership and self-loss in the seven-factor model have good discrimination validity.

Table 1. Measurement model test

| model | χ^2 | df | $\Delta\chi^2$ | Δdf | AIC | TLI | CFI | RMR | RMSEA |
|-------------------------|----------|-----|----------------|-------------|----------|-------|-------|-------|-------|
| M0: Seven-factor model | 844.269 | 644 | | | 1038.269 | 0.944 | 0.949 | 0.061 | 0.039 |
| M1: Six-factor model | 1110.833 | 650 | 266.564*** | 6 | 1292.833 | 0.873 | 0.882 | 0.108 | 0.059 |
| M2: Five-factor model | 1284.969 | 655 | 440.700*** | 11 | 1456.969 | 0.827 | 0.839 | 0.115 | 0.068 |
| M3: Four-factor model | 1653.013 | 659 | 808.744*** | 15 | 1817.013 | 0.729 | 0.746 | 0.13 | 0.086 |
| M4: Three-factor model | 1919.216 | 662 | 1074.947*** | 18 | 2077.216 | 0.659 | 0.679 | 0.138 | 0.096 |
| M5: Two-factor model | 2537.144 | 664 | 1692.875*** | 20 | 2691.144 | 0.493 | 0.512 | 0.16 | 0.117 |
| M6: single factor model | 3114.437 | 665 | 2270.168*** | 21 | 3266.437 | 0.338 | 0.374 | 0.175 | 0.134 |

Note: * means $p < 0.05$, ** means $p < 0.01$ and *** means $p < 0.001$.

(2) common method deviation test

Common method deviation refers to covariation between variables due to the same data source (for example, independent variables and dependent variables are answered by the same subject) or the same measuring tools. Harman single factor test is used in theoretical circles to test the deviation of common methods.(Zhou et al., 2004). In this study, Harman single factor is used to test the common method deviation of the theoretical model. The results show

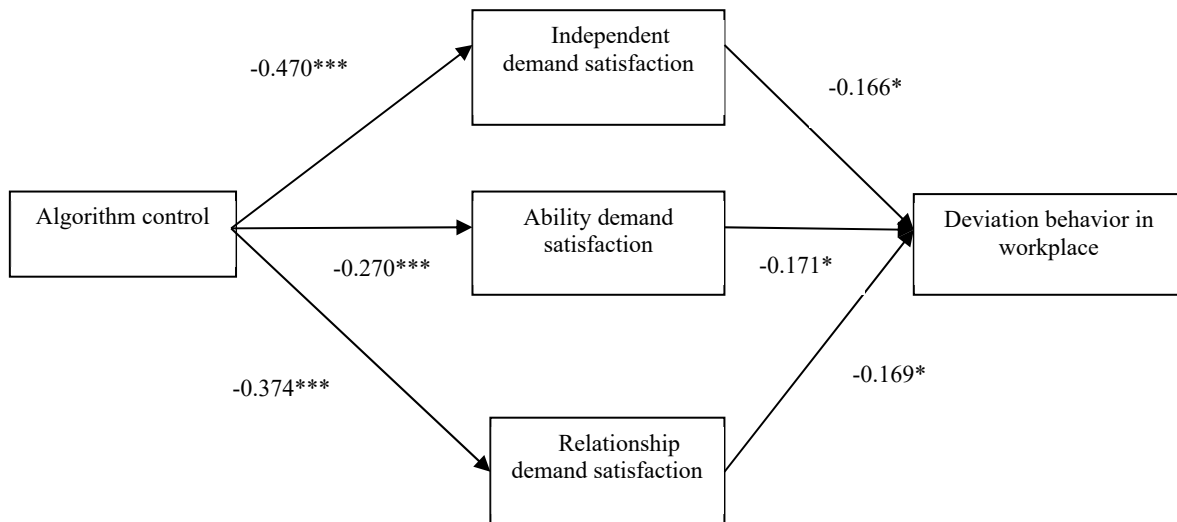
that the variance interpretation rate of the first factor is 22.948%, which is lower than the critical value of 40%, indicating that the common method deviation in this study is within the acceptable range, and the following data analysis can be carried out.

3.3. Hypothesis test

For H1a-H1c, this paper uses the PROCESS plug-in to check, and the result is shown in Figure 1. As can be seen from Figure 1, algorithmic control has a significant negative

predictive effect on autonomous demand satisfaction ($b = -0.470, p < 0.001$), ability demand satisfaction ($b = -0.270, p < 0.001$) and relationship demand satisfaction ($b = -0.374, p < 0.001$). Therefore, H1a-H1c are supported. In order to verify the mediating effect of hypothesis H2a-2c, that is, the satisfaction of psychological needs, on algorithm control and workplace deviant behavior, we followed the suggestion of

Preacher and Hayes(2008) and used Bootstrap method to analyze the mediating effect. According to the results, the satisfaction of independent demand ($b = -0.166, p < 0.05$), ability demand ($b = -0.171, p < 0.05$) and relationship demand ($b = -0.169, p < 0.05$) negatively predicted workplace deviant behavior. Assume that H2a-H2c are supported.



Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Figure 1. Path analysis of algorithm control affecting workplace deviation behavior

In addition, in order to improve the statistical efficacy of mediation effect, we further use the mediation effect program of Preacher et al. (2008) to test H3a-H3c (Table 2). From Table 2, it can be seen that 95% of the CI of the indirect effect path does not include 0, so it is further verified that there is a

mediating effect between algorithm control and workplace deviation behavior among autonomous demand satisfaction, ability demand satisfaction and relationship demand satisfaction, which strengthens the hypothesis H3a-H3c.

Table 2. Bootstrap analysis of intermediary effect

| path | Non-standardized indirect effect estimation | Standard error | 95% CI | |
|---------------|---|----------------|-------------|-------------|
| | | | lower limit | upper limit |
| AC---ANS---WD | 0.078* | 0.038 | 0.001 | 0.150 |
| AC---CNS---WD | 0.046** | 0.025 | 0.001 | 0.101 |
| AC---RNS---WD | 0.063* | 0.033 | 0.008 | 0.137 |

Note: AC stands for algorithmic control, ANS stands for autonomous demand satisfaction, CNS stands for capability demand satisfaction, RNS stands for relational demand satisfaction, and WD stands for workplace deviation behavior; * $p < 0.05$, ** $p < 0.01$.

In order to verify H4a-H4c, this paper takes ability demand satisfaction, independent demand satisfaction and relationship demand satisfaction as dependent variables, and then incorporates control variables such as age and gender into the model to get M1, M4 and M7 respectively. Algorithm control and service-oriented leadership are introduced into the regression model, and M2, M5 and M8 are obtained respectively. Finally, the algorithmic control and service-oriented leadership are centralized, and the interactive items of algorithmic control and service-oriented leadership are constructed, which are included in the regression model, and M3, M6 and M9 are obtained respectively. From the results of M3 and M9 (see Table 3), it can be seen that the interaction between algorithmic control and service-oriented leadership has a significant positive impact on the satisfaction of independent needs ($\beta = 0.168, p < 0.05$) and relational needs ($\beta = 0.267, p < 0.01$), assuming that H4a and H4c pass the test; From M6, it can be seen that the interaction between

algorithmic control and service-oriented leadership has no significant influence on the satisfaction of ability requirements ($\beta = 0.038, p > 0.05$), assuming that 4b fails the test.

Finally, combined with the adjusted mediation model testing program proposed by Preacher et al. (2007), this paper uses PROCESS to test Hypothesis 5. Table 4 lists the indirect effects of service-oriented leaders at different levels and their significance, the difference between the two groups and the CI value at 95% level. The results show that the indirect effect of algorithmic control on employees' workplace deviant behavior through independent demand satisfaction is less under high-level service-oriented leadership (Indirect effect = $-0.325, SE = 0.098$) than under low-level service-oriented leadership (Indirect Effect = $-0.615, SE = 0.095$). At the same time, the 95% CI of the indirect effect difference between the two types of work unit structures does not contain zero, so it is assumed that H5a passes the test. Similarly, suppose H5c is

also supported.

Table 3. Hierarchical regression result

| | Independent demand satisfaction | | | Ability demand satisfaction | | | Relationship demand satisfaction | | |
|---|---------------------------------|-----------|-----------|-----------------------------|-----------|----------|----------------------------------|-----------|-----------|
| | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 |
| gender | 0.202 | 0.000 | 0.016 | 0.019 | -0.091 | -0.088 | 0.063 | -0.132 | -0.108 |
| age | 0.028 | 0.012 | 0.007 | 0.010 | 0.002 | 0.001 | 0.029 | 0.009 | 0.001 |
| level of education | 0.028 | -0.001 | -0.006 | -0.013 | -0.029 | -0.030 | 0.074 | 0.045 | 0.037 |
| working life | -0.044 | 0.013 | 0.006 | 0.153* | 0.182** | 0.181** | 0.029 | 0.090 | 0.080 |
| wastage | -0.179* | -0.092 | -0.079 | -0.147* | -0.097 | -0.094 | -0.073 | -0.006 | 0.016 |
| Algorithm control | | -0.475*** | -1.069*** | | -0.272*** | -0.408 | | -0.380*** | -1.324*** |
| Service leadership | | 0.136* | -0.361 | | 0.067 | -0.046 | | 0.173* | -0.616* |
| Algorithm Control * Service-oriented Leadership | | | 0.168* | | | 0.038 | | | 0.267** |
| R ² | 0.044 | 0.234 | 0.251 | 0.049 | 0.127 | 0.128 | 0.013 | 0.140 | 0.181 |
| ΔR ² | | 0.19 | 0.017 | | 0.078 | 0.001 | | 0.127 | 0.041 |
| F | 1.821 | 8.637*** | 8.272*** | 2.045 | 4.124*** | 3.628*** | 0.510 | 4.592*** | 5.444*** |

Note: All listed in the table are non-standardized coefficients; *p < 0.05, **p < 0.01, ***p < 0.001.

Table 4. Adjusted mediation effect analysis table

| Dependent Variable | Mediator Variable | Regulated Variable | Indirect effect | SE | 95% CI | |
|---------------------------------|--------------------|--|-----------------|-------|--------|--------|
| | | | | | low | tall |
| Deviation Behavior in Workplace | Independent Demand | High level service-oriented leadership | -0.325 | 0.098 | -0.519 | -0.131 |
| | | Low level service-oriented leadership | -0.615 | 0.095 | -0.802 | -0.427 |
| Deviation Behavior in Workplace | Relational Demand | High level service-oriented leadership | -0.142 | 0.106 | -0.352 | 0.063 |
| | | Low level service-oriented leadership | -0.603 | 0.103 | -0.805 | -0.400 |

The study confirmed the mediating effect of employees' psychological needs satisfaction (H2 and H3) and the mediating effect of psychological needs satisfaction and service-oriented leadership between algorithm control and workplace deviant behavior (H5), which improved the explanation of the theoretical model of this study.

4. Conclusion

Based on the theory of self-determination, this paper systematically investigates the influence mechanism of algorithmic control on the workplace deviant behavior of selling riders. Based on the survey data of 206 take-away riders, the theoretical model of the article is tested by data analysis, and the following conclusions are drawn. Firstly, the algorithmic control has a negative effect on the satisfaction of self-demand, ability demand and relationship demand of selling riders. Secondly, the satisfaction of independent demand, ability demand and relationship demand all have negative effects on the workplace deviation behavior of foreign riders; Thirdly, autonomous demand, ability demand and relationship demand have an intermediary role in algorithm control and workplace deviation behavior of takeaway riders; Fourthly, service-oriented leadership not only regulates the relationship between algorithm control and autonomous demand and relational demand, but also mediates the relationship between autonomous demand and relational demand between algorithm control and workplace deviant behavior of takeaway riders. It is worth noting that the data does not support the service-oriented leaders' adjustment between algorithm control and ability requirements. The possible reasons are as follows: On the one hand, the work content of take-away riders is relatively simple, and the requirements for work ability are not high. Most take-away riders improve the order completion through "practice makes

perfect", and the webmaster's role in improving their work ability is not obvious. On the other hand, self-determination theory holds that good job performance can convey positive information about ability and competence to individuals (Deci et al., 2000). However, the calculation rules of take-away riders' work performance are mainly determined by algorithms, and service-oriented leaders have no authority to change the performance of take-away riders, so it is difficult to influence the work results of sell-away riders.

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