

RESEARCH ARTICLE

The influence mechanism of psychological contract on primary medical staff's turnover intention in the context of COVID-19 pandemic in China

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Abstract

Objective: This research aims to study the influence mechanism of psychological contract on the turnover intention of primary medical staff in the context of Corona Virus Disease 2019 (COVID-19) fighting.

Methods: Six hundred and fifteen primary medical staff from 13 primary health care institutions in Jiangnan District, Wuhan City, Hubei Province, China were selected by random sampling. Psychological contract, emotional exhaustion and turnover intention questionnaires were adjusted appropriately according to research needs, and 5-point Likert scale was used to measure.

Results: Normal, interpersonal, and developmental contracts were negatively associated with turnover intention. Emotional exhaustion mediated the effects of interpersonal and developmental contracts on turnover intention.

Conclusion: The government should establish a long-term incentive mechanism for primary medical staff, fully recognise the work of them in fighting against COVID-19, pay close attention to the psychological state of them, and carry out timely and effective psychological intervention to alleviate their emotional exhaustion and reduce their turnover intention.

KEYWORDS

COVID-19, emotional exhaustion, primary medical staff, psychological contract, turnover intention

Highlights

- The purpose of this research is to explore the influence mechanism of psychological contract on the turnover intention of primary medical staff under the work of fighting against COVID-19.
- The three dimensions of psychological contract (normal, interpersonal, and developmental contracts) had a significant negative effect on turnover intention and emotional exhaustion.
- Normal contract had no effect on emotional exhaustion.
- Emotional exhaustion partially mediated the effects of interpersonal and developmental contracts on turnover intention.

1 | INTRODUCTION

1.1 | Background

Human resources are the key core of the health system and the source of achieving a healthy and sustainable development of health care.¹ The medical staff of primary health care institutions play an important role as the 'gatekeeper' of residents' health and an important force in the construction of the medical service system. They undertake important medical and public health service functions such as diagnosis and treatment of common diseases, management of chronic diseases, and health education. The quality of the staff and the stability of the team in primary health care institutions are directly related to the quality and effectiveness of primary healthcare services, and are closely related to the success or failure of the reform of the healthcare service system.²

However, the healthcare work environment has become more tense and severe, and gradually primary medical staff have resigned or transferred.³ The shortage of primary medical staff not only disrupts the order of diagnosis and treatment, hinders the normal operation of the healthcare system, but also affects the lives and health of the people.⁴ Many countries are paying more and more attention to the training of primary medical staff in order to have a stable team of them. For example, the United Kingdom endows the primary health care institutions-general practitioners (GPs)-residents with a statutory health care relationship, provides continuing education opportunities and material rewards for GPs.⁵ The American Board of Family Medicine issues GP qualification certificates to qualified GPs, so that GPs enjoy a high reputation in the society.⁶ France implements the Contract for Improving Individual Practice (CAPI) for GPs and adopts a mixed salary system, with service charges accounting for more than 70% and performance salary accounting for 0%–8%.^{7,8} The report of the 19th National Congress of the Communist Party of China clearly pointed out the implementation of a Healthy China Strategy (Healthy China Strategy is a comprehensive national strategy to comprehensively improve the health of Chinese citizens and improve people's well-being), strengthening the construction of the primary healthcare service system and the team of GPs. This requires local governments to take measures from various aspects such as policy and economy, and strive to improve the stability of the primary medical staff.⁹ For example, China's Anhui Province implements the system of county management for township use for talents in primary health care institutions. And new recruits for grassroots positions will be transferred back to county-level hospitals based on merit after they have worked in township health centres for 5 years. In addition, various localities of China have continuously established and improved the incentive system for primary medical staff to raise their salaries, so that the salaries of GPs are in line with county and district public hospital clinicians.¹⁰

Previous studies on the influencing factors of primary medical staff's turnover intention mostly focussed on demographic characteristics (such as age, gender, and marital status),¹¹ organisational factors (such as organisational support, leadership relationships),¹² job-related factors (such as job satisfaction, work characteristics).⁴ Psychological contract is based on the interrelationship between organisations and individuals, and the study found that its elements have an impact on turnover intention,¹³ which provides a new research idea for analysing the turnover intention of primary medical staff.

The primary medical staff on the front line of the prevention and control of Corona Virus Disease 2019 (COVID-19) are facing tremendous work pressure, while enduring different degrees of social isolation, and if the pressure from all aspects is not alleviated in time, it will lead to different degrees of emotional exhaustion.¹⁴ Emotional exhaustion is characterised by feeling exhausted and over-stressed. Compared with the other two dimensions of job burnout (depersonalisation and personal accomplishment), as the core dimension of job burnout, emotional exhaustion has a more significant effect on important outcome variables.¹⁵ Based on the background of COVID-19 prevention and control, this research empirically studied the turnover intention of primary medical staff with the theoretical model of 'psychological contract—emotional exhaustion—turnover intention', in order to provide reference for reducing the turnover of primary medical staff and stabilising the team of them.

1.2 | Theory framework and hypotheses

After March and Simon first proposed the employee turnover motivation model in 1958, scholars have constructed different theoretical models around turnover intention.¹⁶ In 1960, Argyris introduced the concept of 'psychological contract' into the field of management. Psychological contract refers to the perceived responsibility provided by each other in the relationship between organisations and individuals, which is measured and compared based on social norms and values.¹⁷ In 2006, on the basis of domestic and foreign scholars' researches on the structure of psychological contract, Li et al. divided the psychological contract into three dimensions (normal, interpersonal and developmental contracts) in combination with China's cultural and social background.¹⁸ Normal contract refers to the organisation providing employees with clear, specific conditions related to the working environment and material benefits, such as salary, welfare, and stable job security. Interpersonal contract means that the organisation provides a good interpersonal environment for employees, cares about their personal life, and solves difficulties in their life for them, such as respecting employees and caring for their personal growth and life. Developmental contract is an organisation that provides employees with professional development space that enables them to realise their full strengths and potential, such as challenges at work, training and learning opportunities. In business management research, it has been confirmed that psychological contract breach is negatively related to turnover intention. Research by Jamil et al. show that normal and interpersonal contracts mediate the perceived breach-burnout relationship. Interpersonal contract, which is more subjective and relationship-oriented, and is beneficial to organisations because it helps to buffer the organisational consequences that are harmful to individuals, such as job burnout.¹⁹ COVID-19 may coexist with humans for a long time, and fighting against it will become an important part of the daily work of primary medical staff. Therefore, it is of positive significance to explore the influence of psychological contract between primary medical staff and primary health care institutions on turnover intention under the pressure of normalisation of fighting against the COVID-19.

Social exchange theory states that employees form relationships at work. Peter M. Blau believes that reward is what individuals get in the exchange process, including both external (money, etc.) rewards, and internal emotional (respect, gratitude, etc.) rewards.²⁰ Therefore, exchange is not only an economic behaviour, but also a social behaviour. Evidence presented by social exchange theorists suggests that a lack of social exchange relationships leads to higher turnover intention, lower job performance, and less organisational citizenship behaviour.^{21,22} Research shows that individuals form social exchange relationships to the extent that they receive valuable benefits and those benefits are distributed in an equitable manner.²³ And jobs that lead to emotional exhaustion are likely to violate both

conditions.²⁴ Emotional exhaustion is one of the three parts of the burnout model proposed by Maslach,²⁵ and it is a chronic state of emotional and physical exhaustion. Shirom et al. argue that emotional exhaustion best captures the core meaning of burnout.²⁶ And studies have also shown that the dimension of emotional exhaustion in job burnout is closely related to employees' perception of self-work value and control of work initiative.^{27,28} Therefore, emotional exhaustion is likely to play a mediating role in the influence of psychological contract on turnover intention. This research proposes the following research hypotheses (see Table 1 and Figure 1).

2 | MATERIALS AND METHODS

2.1 | Sample

The research design used a cross-sectional survey. This quantitative research was conducted in Jiangnan District, Wuhan, China. Jiangnan District is the earliest outbreak site of COVID-19 pandemic in China. Primary medical staff

TABLE 1 The theoretical Hypotheses

Hypotheses
H1: Normal contract has a direct negative effect on emotional exhaustion
H2: Interpersonal contract has a direct negative effect on emotional exhaustion
H3: Developmental contract has a direct negative effect on emotional exhaustion
H4: Normal contract has a direct negative effect on turnover intention
H5: Interpersonal contract has a direct negative effect on turnover intention.
H6: Developmental contract has a direct negative effect on turnover intention
H7: Emotional exhaustion has a direct positive effect on turnover intention
H8: Normal contract has an indirect negative effect on turnover intention through the mediating effect of emotional exhaustion
H9: Interpersonal contract has an indirect negative effect on turnover intention through the mediating effect of emotional exhaustion
H10: Developmental contract has an indirect negative effect on turnover intention through the mediating effect of emotional exhaustion

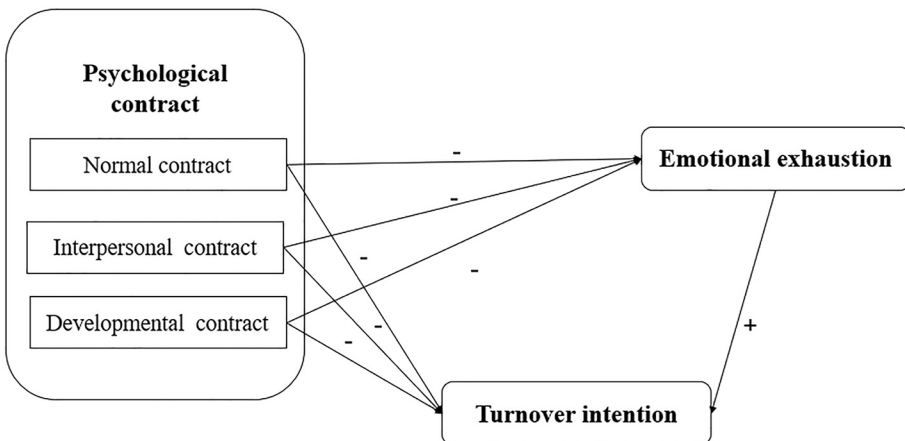


FIGURE 1 The theoretical model and hypotheses

in the region are facing unprecedented challenges, and there is no experience in the fight against the pandemic from other places to learn from. Therefore, this research included all 13 primary health care institutions in Jiangnan District into the scope of the questionnaire survey. Firstly, we contacted the managers of 13 community health service centres (CHCs), introduced the purpose of the research, and obtained the support of all CHCs. Then, each CHCs provided us with a list of primary medical staff to identify those suitable for the survey.

The inclusion criteria for primary medical staff are: (a) participating in the fight against COVID-19 (b) voluntarily participating in the research. The exclusion criteria are: (a) primary medical staff still on probation (b) primary medical staff on leave during the survey period. The investigators issued electronic questionnaires through WeChat (WeChat is a software where users can chat with each other in real time and send related information such as links and files, and it's one of the most popular social media in China), and the participants' WeChats were provided by the managers of the CHCs. In this research, participants participated anonymously. A total of 634 primary medical staff were included as survey subjects. The questionnaires were stored in Wenjuanxing (a secure online database) where the results were automatically uploaded. A total of 615 valid questionnaires were collected, and the questionnaire response rate was 95%.

2.2 | Measuring instruments

The psychological contract, emotional exhaustion, and turnover intention questionnaires used in this research were all from internationally widely used scales. At the same time, the scales used in this research were all scored using the Likert 5-point scale, ranging from 1 ('totally disagree') to 5 ('totally agree').

2.2.1 | General conditions

A questionnaire was designed according to the research needs, and the general information included basic demographic characteristics: gender, length of service, education level, and job type.

2.2.2 | Psychological contract

With reference to the psychological contract research questionnaire compiled by Li et al. in 2006 based on Chinese cultural background,¹⁸ combined with the actual situation of COVID-19, a total of 16 measurement items were included, consisting of three dimensions: normal contract (5 items), interpersonal contract (5 items) and developmental contract (6 items). An example of normal contract was: 'The reward and punishment system of the CHCs during the COVID-19 is very reasonable'. An example of interpersonal contract was: 'My work is supported by the team (medical staff or the COVID-19 prevention and control coordination team)'. An example of developmental contract was: 'The CHCs provides me with good work and social resources during the COVID-19 prevention and control work'. The Cronbach's alpha coefficient of the scale was 0.960.

2.2.3 | Emotional exhaustion

Learning from the Maslach Burnout Inventory General Survey (MBI-GS), a total of three items were involved: 'I feel I'm working too hard on my job,' 'I feel burned out from my work during the pandemic,' 'I feel emotionally drained from my work.' The Cronbach's alpha coefficient of the scale was 0.926.

2.2.4 | Turnover intention

It mainly drew on the research of Kelloway,²⁹ with a total of 4 measurement items: 'I plan to quit my current job after the COVID-19,' 'I will consider looking for a job of a different nature in the future,' 'I don't think I have a future in this CHCs,' 'I don't plan to stay in this CHCs for longer.' The Cronbach's alpha coefficient of the scale was 0.972.

2.3 | Statistical analysis

Use Excel 2019 to complete data entry and conversion. Relevant statistical data were analysed using SPSS26.0. Measurement data were expressed by Mean \pm SD. Pearson correlation analysis was used to clarify the correlation between the psychological contract, emotional exhaustion, and turnover intention of primary medical staff.

To examine our hypotheses, we constructed a structural equation model (SEM) using AMOS17.0 software with psychological contract as the predictor variable, emotional exhaustion as the mediator variable, and turnover intention as the result variable. We provide metrics including χ^2 , GFI, RMSEA, etc. to assess the fitness of the model. The final model also reported the coefficients for each path. Mediation effects were tested using the bootstrap method to calculate bias-corrected 95% confidence intervals (CI) with $n = 2000$ resamples. $p < 0.05$ was considered statistically significant difference.

3 | RESULTS

3.1 | Demographic characteristics of participants

Table 2 showed the demographic characteristics of the respondents. 84.9% of primary medical staff were women. 34.5% of primary medical staff had 10–19 years of service. Most primary medical staff had bachelor's degree (53.7%), and only one had a doctoral degree. Regarding the job type, more than one-third of the primary medical staff were nurses (35.4%), with the least number of licensed (assistant) physician accounting for only 1.8%.

3.2 | Correlation of major variables

The total item scores of normal contract, interpersonal contract, developmental contract, emotional exhaustion and turnover intention were 16.95 ± 4.45 , 19.71 ± 5.16 , 20.88 ± 5.56 , 7.99 ± 3.41 and 7.62 ± 4.29 respectively. The Pearson's correlation for the major variables were shown in Table 3. There was a significant positive correlation between the three dimensions of the psychological contract. Specifically, normal contract was positively correlated with interpersonal contract and developmental contract, and interpersonal contract was positively correlated with developmental contract ($r = 0.286, p < 0.01$; $r = 0.524, p < 0.01$; $r = 0.241, p < 0.01$). Normal, interpersonal and developmental contracts were significantly negatively correlated with emotional exhaustion and turnover intention respectively ($r = -0.220, p < 0.01$; $r = -0.306, p < 0.01$; $r = -0.270, p < 0.01$; $r = -0.305, p < 0.01$; $r = -0.340, p < 0.01$; $r = -0.342, p < 0.01$), while emotional exhaustion and turnover intention were significantly positively correlated ($r = 0.368, p < 0.01$). This indicated that the latent variables were suitable to be included in the SEM for further analysis.

TABLE 2 Demographic characteristics of primary medical staff respondents

Variables	N (%)
Gender	
Male	93 (15.1)
Female	522 (84.9)
Length of service	
Less than 5 years	90 (14.6)
5–9 years	143 (23.3)
10–19 years	212 (34.5)
20–29 years	94 (15.3)
30 years and above	76 (12.3)
Education level	
Senior high school and below	10 (1.6)
Technical secondary school	45 (7.3)
Junior college	215 (35.0)
Bachelor degree	330 (53.7)
Master degree	14 (2.2)
Doctor degree	1 (0.2)
Job type	
Licensed (assistant) physician	165 (26.8)
Nurse	218 (35.4)
Public health staff	111 (18.0)
Apothecary	21 (3.4)
Docimaster	11 (1.8)
Management and logistics staff	38 (6.2)
Others	51 (8.4)

TABLE 3 Correlation coefficient among major variables

	Mean ± SD	Normal contract	Interpersonal contract	Developmental contract	Emotional exhaustion	Turnover intention
Normal contract	16.95 ± 4.45	1				
Interpersonal contract	19.71 ± 5.16	0.286*	1			
Developmental contract	20.88 ± 5.56	0.524*	0.241*	1		
Emotional exhaustion	7.99 ± 3.41	-0.220*	-0.306*	-0.270*	1	
Turnover intention	7.62 ± 4.29	-0.305*	-0.340*	-0.342*	0.368*	1

*At 0.01 level (two-tailed), the correlation is significant.

3.3 | Test of research model

AMOS26.0 was used to continue to test the model. The initially constructed SEM had a total of 23 measured variables and 5 latent variables. The 5 latent variables included 3 exogenous variables, namely normal contract, interpersonal contract and developmental contract, as well as 1 mediating variable, emotional exhaustion, and 1 endogenous variable, turnover intention.

The model fitting results were: $\chi^2 = 828.990, p = 0.000, DF = 223, GFI = 0.889, AGFI = 0.862, RMSEA = 0.067$. Since GFI and AGFI were lower than 0.9, the initial model's fitness indicators were not ideal. According to AMOS's revised proposal, there were common influencing factors behind the indicators 'Honor and reward' and 'Work environment' that were not potential variables of 'Normal contract', and there were common influencing factors behind 'Major decision participation right' and 'Work autonomy' that were not potential variables of 'Developmental contract'. Therefore, the correlation between e3 and e5, e15 and e16 were added to adjust the model. The model fit test results showed that $\chi^2 = 617.224, p = 0.000$, the absolute fit indexes were $GFI = 0.921, AGFI = 0.901, RMSEA = 0.054$, the incremental fit indexes were $NFI = 0.971, TLI = 0.978, CFI = 0.981, IFI = 0.981$, and the parsimonious fit indexes were $PGFI = 0.737, PNFI = 0.848$. The adjusted model covariance matrix was still significantly different from the hypothetical model, but the chi-square value was more sensitive to the sample size, so it was necessary to refer to other overall model fitting indexes to decide whether to accept the model, and considered that other indexes fitted well, so accepted the model (see Figure 2).

Bias-Corrected (Bias Corrected non-parametric percentage) Bootstrap test was used, with 2000 times repeated sampling, and the 95% CI was calculated. The results of the mediation effect analysis were shown in Table 4. Both the interpersonal and the developmental contracts had a direct negative effect on emotional exhaustion ($\beta = -0.269, p < 0.05; \beta = -0.197, p < 0.05$), but the normal contract had no effect on emotional exhaustion ($\beta = -0.010, p > 0.05$). The three dimensions of psychological contract all had a direct negative effect on turnover intention ($\beta = -0.111, p < 0.05; \beta = -0.198, p < 0.05; \beta = -0.183, p < 0.05$). Emotional exhaustion had a direct positive effect on turnover intention ($\beta = 0.238, p < 0.05$).

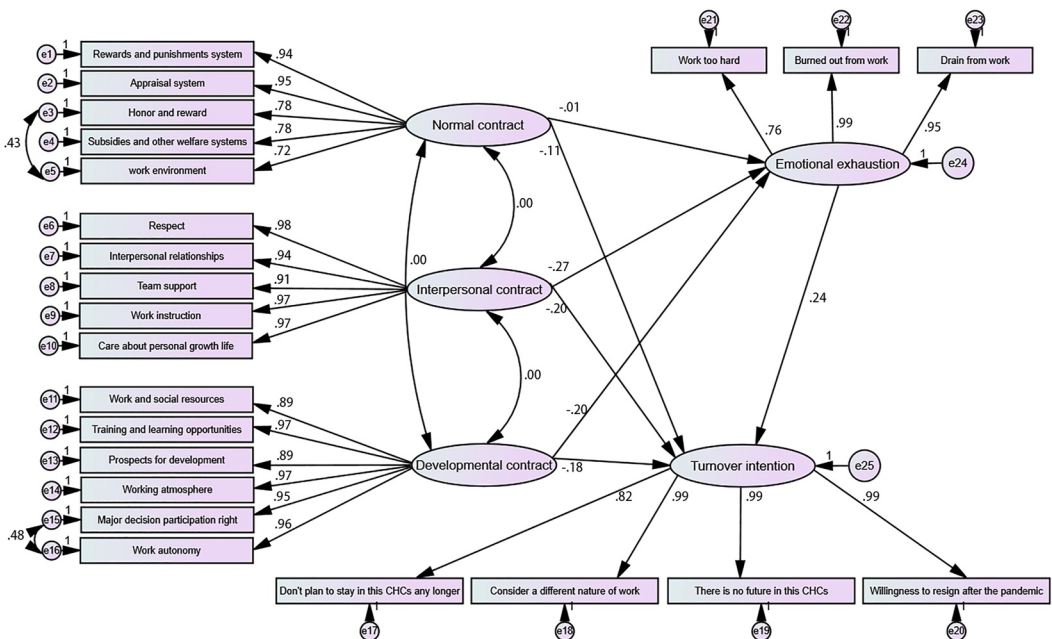


FIGURE 2 Revised measurement model [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE 4 Significance test of the mediating test

Model pathways	Estimated	95% CI	p	Hypotheses
Standardised total effects				
Emotional exhaustion←Normal contract	-0.010	-0.119, 0.087	0.821	
Emotional exhaustion←Interpersonal contract	-0.269	-0.353, -0.181	0.000	
Emotional exhaustion←Developmental contract	-0.197	-0.290, -0.104	0.000	
Turnover intention←Normal contract	-0.114	-0.211, -0.013	0.019	
Turnover intention←Interpersonal contract	-0.262	-0.357, -0.166	0.000	
Turnover intention←Developmental contract	-0.231	-0.330, -0.132	0.002	
Turnover intention←Emotional exhaustion	0.238	0.159, 0.321	0.000	
Standardised direct effects				
Emotional exhaustion←Normal contract	-0.010	-0.119, 0.087	0.821	H1
Emotional exhaustion←Interpersonal contract	-0.269	-0.353, -0.181	0.000	H2
Emotional exhaustion←Developmental contract	-0.197	-0.290, -0.104	0.000	H3
Turnover intention←Normal contract	-0.111	-0.202, -0.016	0.021	H4
Turnover intention←Interpersonal contract	-0.198	-0.292, -0.092	0.000	H5
Turnover intention←Developmental contract	-0.183	-0.284, -0.087	0.000	H6
Turnover intention←Emotional exhaustion	0.238	0.159, 0.321	0.000	H7
Standardised indirect effects				
Turnover intention←Normal contract	-0.002	-0.031, 0.019	0.879	H8
Turnover intention←Interpersonal contract	-0.064	-0.098, -0.041	0.000	H9
Turnover intention←Developmental contract	-0.047	-0.080, -0.024	0.000	H10

Significance test was performed on the mediation effect. If the 95% CI of the indirect effect did not include 0, it indicated that the mediation effect was statistically significant. If the 95% CI of the direct effect included 0, it indicated complete mediation. There was no mediating effect between normal contract and turnover intention ($\beta = -0.002$, $p > 0.05$). Interpersonal contract had an indirect negative effect on turnover intention through the mediating effect of emotional exhaustion (95% CI: -0.098 , -0.041). The developmental contract had an indirect negative effect on turnover intention through the mediating effect of emotional exhaustion (95% CI: -0.080 , -0.024). Therefore, the final results did not support the assumptions H1 and H8.

4 | DISCUSSION

Normal, interpersonal, and developmental contracts had a significant effect on the turnover intention of primary medical staff. Wen et al.³⁰ found that low salary was one of the main reasons for high turnover intention, and 74.8% of village doctors were dissatisfied with their financial compensation. Lansiquot et al.³¹ found that the vacancy rate of registered nurses in the Caribbean was 30%, and the high turnover rate was related to leadership and organisational support. Perreira et al.³² emphasised that organisational justice and emotional commitment had a negative effect on turnover intention in the study of primary nurses in Ontario, Canada. During the COVID-19 outbreak, China issued the 'Notice on Comprehensively Implementing Several Measures to Further Protect and Care for Medical Staff', which doubled the temporary work subsidy and tripled the salary of medical staff involved in the fight against COVID-19. Mental health assessments were carried out for them, and they were given priority to appointment in the evaluation of professional titles, and the titles and post promotions were not limited by the proportion of the CHCs' position structure. These measures aim to conclude a 'psychological contract' with medical staff during the pandemic.

However, we found that the average salary of CHCs in Jiangnan District, Wuhan, China is 150,000 yuan/year/person, which is lower than the average salary of 185,600 yuan/year/person of public institutions in the district. Temporary salary increases during the COVID-19 period cannot provide long-term incentives. Therefore, a long-term incentive mechanism for primary medical staff should be established, and a performance appraisal and salary system should also be formulated reasonably.

Interpersonal and developmental contracts had a significant effect on the emotional exhaustion of primary medical staff, and this finding was generally consistent with previous research.¹⁹ Relevant research shows that primary medical staff value work atmosphere and career development. Once they feel that interpersonal relationships are complicated, they cannot integrate into the team, or feel that the workload is heavy and the future development is uncertain, they are prone to psychological contract breach, reduce their sense of responsibilities and trigger emotional exhaustion.³³

In addition, there is an interesting discovery worth mentioning. In this research, normal contract had no effect on emotional exhaustion, which seems to conflict with previous research.³⁴ Rousseau believes that those with normal contract is characterised by highly competitive wages and lack of long-term commitments. Specifically, normal contract is obligations of 'economic' nature, including willingness to work overtime, providing high level of performance, etc., but employees have no loyalty to the organisation, and these obligations are related to employers offering high performance-based salaries to employees.³⁵ We believe that the reason for this result may be that during the fight against COVID-19 in 2020, the whole society's positive publicity for primary medical staff has enhanced their recognition of professional value and formed an internal driving force, thus prompting primary medical staff to regard fighting the pandemic as their social responsibility. In this context, primary medical staff's sense of mission and social identity is stronger than their concern about salary, which is of great significance for primary medical staff to overcome negative emotions under great pressure.

This research found that emotional exhaustion had a significant negative effect on turnover intention, and played a partial mediating role in the influence of interpersonal and developmental contracts on turnover intention. Previous researches have also shown that primary medical staff are the 'gatekeepers' of COVID-19 prevention and control, undertaking a large amount of basic work, and are prone to the phenomenon of rapid consumption of emotional resources during the pandemic, which develops into a high turnover intention.^{3,14} These results draw our attention to the importance of improving the emotional exhaustion among primary medical staff.

5 | LIMITATIONS

Firstly, since we used a subjective questionnaire, there may be information bias due to herd mentality, but we have reduced this bias through the anonymity of participants. Secondly, this paper only used psychological contract as the predictive variable and emotional exhaustion as the mediating variable to explore the influence on turnover intention. In subsequent studies, various antecedent variables affecting turnover intention can be discussed from different perspectives and theories. Thirdly, the questionnaire had such high Cronbach's alfa coefficients, which we believe it may be due to the fact that the first wave of COVID-19 has just ended, and primary medical staff have a strong feeling and a consistent understanding of the impact of COVID-19. There may also be a possibility that our questionnaire items are redundant. This will be confirmed in subsequent researches. Finally, relevant researches show that demographic variables (such as gender, age, education level, etc.) also have an impact on turnover intention.^{36,37} Therefore, demographic variables can be included in further researches in the future.

6 | CONCLUSION

This research measured the turnover intention and the influencing factors of primary medical staff after experiencing public health emergencies, and emotional exhaustion played a mediating role. These results not only provide new ideas for understanding the reasons for the turnover intention of primary medical staff, but also provide possible new methods for normalising the prevention and control of COVID-19 at the grassroots level and improving the emergency response capability of primary medical staff.

Based on the research results, the government should establish a reasonable performance appraisal and salary system for primary medical staff, fully recognise the work of fighting against COVID-19 carried out by primary medical staff, pay attention to the psychological status of them, so as to better establish normal, interpersonal and developmental contracts between primary medical staff and primary health care institutions.

AUTHOR CONTRIBUTIONS

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Xiaoyan Zhang, Chen Chen, Yuxuan Wang and Kenyiti Shindo. The first draft of the manuscript was written by Xin Chen and all authors commented on previous versions of the manuscript. Xiaojin Zhang has made critical revisions to important knowledge content. All authors read and approved the final manuscript.

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CONFLICT OF INTEREST

The authors have no competing interests to declare that are relevant to the content of this article.

DATA AVAILABILITY STATEMENT

Research data are not shared.

ETHICS STATEMENT

Approval was obtained from the Ethics Committee of Tongji Medical College, Huazhong University of Science and Technology. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

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