

Research on the Mechanism of the Role of Employees' Commuting Satisfaction on Their Career Calling in the Context of Human-Computer Collaboration

Weijiong Wu^{1*}, Liushaowei Wang¹, Yi Tian¹, Rongrong Zhang¹

¹*Guangdong University of Technology, Guangzhou, China*

**Corresponding Author. Email: wuweiiiong@gdut.edu.cn*

Abstract: In recent years, with the continuous changes in the working environment and social culture, the mechanism of employees' commuting satisfaction on their career calling has attracted the attention of academics and enterprises, especially in the fields of enterprise management and public management. However, there is a lack of research in China on the factors that change the dynamics of commuting satisfaction and the mechanism of the role of sense of career calling in the work environment of human-computer collaborative. In order to fill this gap, the paper pays special attention to the moderating role of human-computer collaborative environments in commuting satisfaction. Based on the questionnaire data of 204 Chinese employees, regression analysis and mediation effect analysis were used to explore in depth the relationship between human-computer collaborative environment, commuting well-being, career calling, and work satisfaction, which provides new theoretical perspectives for public sector and corporate human resource management, and is of great significance in promoting the healthy development of human-computer collaborative environment.

Keywords: Human-computer collaborative environment, commuting well-being, career calling, work satisfaction

1. Introduction

In the context of human-computer collaboration, commuting is not just a physical movement from home to workplace, but is seen as a process that can be optimised and enhanced[1]. Due to differences in individual socio-economic attributes, commuting characteristics, travelling attitudes, built environment and life events, the components of employee commuting well-being and their interactions present a more complex and dynamic picture, which together contribute to the employee's commuting experience, and consequently, to his/her perceptions and attitudes towards work. Research has shown that the recovery experience has an important role in the commuting process and can modulate the relationship between commuting time and employee well-being[2]. By improving the commuting experience, the overall satisfaction and work engagement of employees can be effectively enhanced, while the improvement of urban residential location can also improve commuting satisfaction.

Employees' moods are usually lower during commuting than during other daily activities, and the congestion, crowding, and unpredictability of the commute is a major cause of stress. According to the Conservation of Resources Theory and the Job Demands-Resources model, longer commute times

lead to lower commitment and well-being, and long commute times deplete employees' energy and time, further affecting their career calling. Despite the growing interest in the relationship between commuting well-being and career calling, this area remains under-researched in the specific context of human-computer collaboration. The concept of human-computer collaboration emphasises the interaction and cooperation between humans and machines and systems, and the psychological experiences and emotional responses to this process have yet to be fully explored. There are even fewer theoretical studies outlining the relationship between the human-computer collaboration perspective on commuting well-being and career calling. Therefore, our study considers the important role of commuting factors in enhancing employees' work satisfaction and well-being when designing and implementing the research path of human-computer collaboration[3].

Based on the above background, this study takes employee commuting well-being as the independent variable, career calling as the dependent variable, work satisfaction as the mediator variable, and human-computer collaboration context as the moderator variable. As shown in Figure 1, an integrative theoretical framework was constructed by combining Self-Determination Theory and Situational Strength Theory. Self-determination theory states that employees' intrinsic motivation is fuelled when their sense of autonomy, belongingness and competence is satisfied. Positive perceptions during the commuting experience enhance the fulfilment of psychological needs, which in turn promotes employees' sense of belonging and identification with their profession[4]. Therefore, we propose Hypothesis 1: There is a significant positive effect of commuting well-being on career calling with employees. In China, career calling, as employees' emotional identity and sense of responsibility for their work, has gradually become a key factor influencing their work behaviour and career development[5]. Under the fast-paced urban life and high-intensity work pressure, how to effectively enhance employees' commuting well-being has become one of the key factors to improve employees' work attitude and reduce the turnover rate. Based on self-determination theory, in the pathway of commuting well-being, employees' perceived comfort and positive experience during the commuting process can improve their overall evaluation of their jobs by relieving psychological pressure and stimulating positive emotions. Further, when employees perceive higher work satisfaction, they develop a higher sense of identification with the occupation itself, which enhances their career calling[6]. Therefore, we propose Hypothesis 2: Work satisfaction plays a partial mediating role in the effect of commuting well-being on career calling. Du, Hui et al. showed that in scenarios with a high degree of human-computer collaboration, employees' sense of meaning and accomplishment of their work is significantly enhanced and can promote their occupational behaviours and emotional responses through positive psychological experiences[7]. In addition, Wang, Zhenyuan et al. found that human-computer collaborative environments can act on employees' psychological state through contextual factors and significantly affect their work behaviour performance by collating existing literature. Situational Strength Theory states that strong situations significantly affect the variability of individual behaviour. Therefore, we propose Hypothesis 3: Human-computer collaborative environment plays a moderating role in the effect of commuting well-being on work satisfaction.

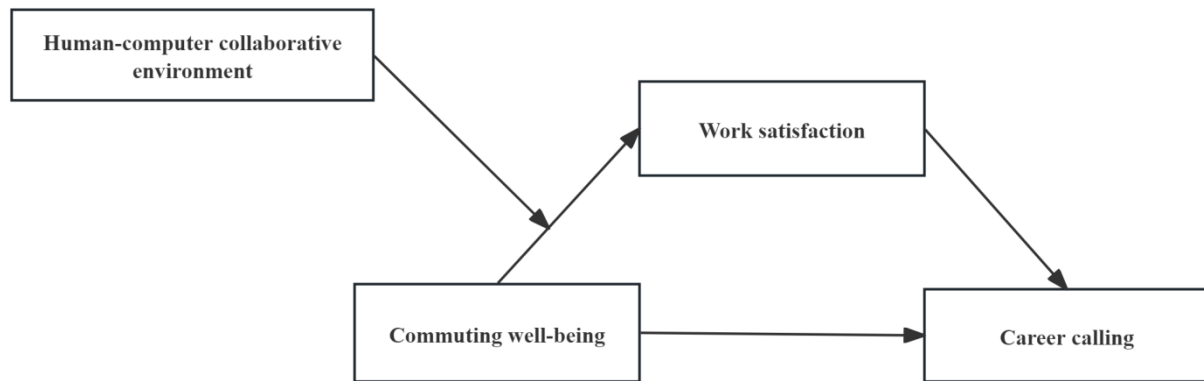


Figure 1: Hypothetical theoretical model

2. Methods

The questionnaire is based on various scales, using questionnaire star as a tool for questionnaire design, through online WeChat communication to employees with work experience and some of the internship student groups. Before the survey, the subjects participated voluntarily and understood the purpose and content of the survey, the researcher promised that the questionnaire is anonymous and only involves academic research, the subjects fill out the questionnaire in accordance with their own true ideas, a total of 204 questionnaires were collected, and the statistical analysis of the sample individual characteristics of the respondents of the study is shown in Table 1.

Table 1: The situation of the sample of this survey

Designation	Options	Frequency	Percentage (%)
Gender	male	100	49.02
	female	104	50.98
Age	18-24 years old	44	21.57
	25-34 years	80	39.22
	35-44 years	34	16.67
	Over 45 years	46	22.55
Participation time	Under 6 months	44	21.57
	6 months to 1 year	40	19.61
	1-3 years	37	18.14
	3-5 years	45	22.06
	Over 5 years	38	18.63
Average total daily commuting time	Under 10 minutes	23	11.27
	10-30 minutes	63	30.89
	30-50 minutes	59	28.93
	Over 50 minutes	59	28.92
Main commuting modes	walking	61	29.90
	Self-drive (private car, bicycle, electric car, etc.)	82	40.20
	Public transport (metro, bus, etc.)	61	29.90
Total		204	100.0

3. Results

3.1. Reliability analysis

In this study, internal consistency reliability test was used and Cronbach alpha coefficient was used to carry out the assessment of the reliability and stability of the questionnaire. According to the generally recognized standards in the academic world, the criterion for a high quality of scale reliability is a Cronbach alpha coefficient > 0.9 . As can be seen in Table 2, the Cronbach alpha coefficient value is 0.981, thus indicating that the reliability of the study data is of high quality. In addition, the CITC values of the analyzed items are all greater than 0.4, which indicates that there is a good correlation between the analyzed items. The data reliability level is of high quality and can be used for further analysis. The table of the reliability test can be seen in Table 2.

Table 2: Cronbach's reliability analysis

Designation	CITC	Cronbach's alpha coefficient
Work satisfaction	0.920	0.981
Human-computer collaborative environment	0.969	
Commuting well-being	0.959	
Career calling	0.963	

Note: Standardised Cronbach's alpha coefficient = 0.982

3.2. Validity analysis

First, in terms of content validity test, since the measures of commuting well-being, job satisfaction, sense of professional mission and human-computer collaborative environment in this study use mature scales that have been validated by a large number of domestic and international studies, and have been used and validated in a large number of domestic studies, and thus have good content validity, this study will not be analysed for content validity test. For example, to investigate the moderativeness of the human-computer collaboration environment, the Human-Computer Interaction Trust Scale by Ferreira and Candeias was used.

Secondly, in terms of construct validity, this study used KMO index and Bartlett's test to assess the applicability of the sample data in factor analysis. According to Table 3; the KMO value is 0.881, which side by side reflects that the validity of the data is good. Also, the corresponding p-value needs to be less than 0.05, the validity of the study data is good.

Table 3: KMO and Bartlett's test

KMO values		0.881
Bartlett Sphericity Check	Approximate cardinality	1413.588
	df	6
	p values	0.000

3.3. Linear regression analysis

Linear regression analyses were conducted using commuter happiness as the independent variable and career mission as the dependent variable. According to Table 4, the unstandardised coefficient of commuting well-being is 0.941, indicating that for every unit increase in commuting well-being, occupational mission increases by 0.941 units on average. The standardised coefficient is 0.898, indicating that commuting happiness has a strong positive effect on career mission. Hypothesis 1 was proven.

Table 4: Regression coefficient (intermediate process) (n=204)

	Unstandardised coefficient		Standardised coefficient	<i>t</i>	<i>p</i>	95% CI	VIF
	<i>B</i>	standard error	<i>Beta</i>				
Constant	0.235	0.126	-	1.860	0.064	-0.013 ~ 0.483	-
Commuting well-being	0.941	0.033	0.898	28.943	0.000**	0.877 ~ 1.004	1.000

3.4. Mediation effects analysis

In order to test the mediating effect of job satisfaction between commuting happiness and sense of professional mission, this paper conducts the bias-corrected Bootstrapping test, and the specific data are shown in Table 5. The test results proved that the mediating effect exists and is obvious, so employees' job satisfaction plays a partial mediating role between the effects of commuting happiness and sense of professional mission. Hypothesis 2 was proven.

Table 5: 95 % confidence interval for the effect value

Designation	^c Total effect	a	b	a*b intermediary effect	^{c'} direct effect
commuting well-being =>work satisfaction =>career calling	0.889 ~ 0.970	0.877 ~ 1.004	0.154 0.318 ~	0.155 ~ 0.308	0.621 ~ 0.793

Note: a*b is 95 per cent bootstrap ci, bootstrap type = percentile bootstrap method.

3.5. Moderated effects analysis

The blue solid line indicates the effect of the mean value of commuting happiness on job satisfaction, which tends to increase as commuting happiness increases; the cyan dotted line indicates the effect of high levels of commuting happiness (+1SD) on job satisfaction, which is more significant compared to the mean; the green dotted line indicates the effect of low levels of commuting happiness (- 1SD) on job satisfaction, which is less significant compared to the mean; the green dotted line indicates the effect of low levels of commuting happiness (-1SD) on job satisfaction, which is less significant compared to the mean. 1SD), where low levels of commuting well-being are associated with a smaller increase in job satisfaction than the average. All three lines show a positive correlation between commuting well-being and job satisfaction, i.e., the higher the level of commuting well-being, the higher the level of work satisfaction in the context of human-computer collaboration. Hypothesis 3 was proven.

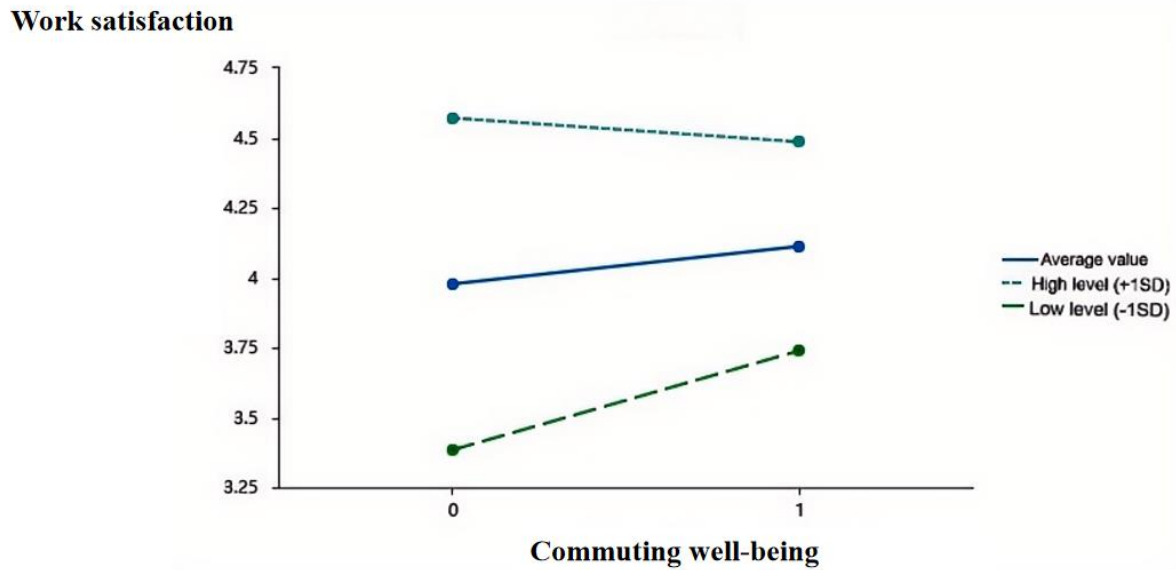


Figure 2: Simple slope diagram

3.6. Moderated mediated effects analyses

From Table 6, Boot LLCI and Boot ULCI do not include the number 0, then it means that it is significant, i.e., it means that there is a moderating intermediary effect.

Table 6: 95 % confidence interval for the effect value

Moderator variable	Intermediary variable	Index	BootSE	BootLLCI	BootULCI
human-computer collaborative environment	work satisfaction	-0.047	0.026	-0.105	-0.001

4. Discussion

This paper takes a new perspective on time to better understand employees' career acquisition, well-being behaviours and psychological responses in the context of human-computer collaboration, including how to improve employees' commuting conditions, provide flexible working arrangements, and enhance human-computer collaboration training. To provide new perspectives on the theoretical connotations of occupational sense of mission in the context of human-computer collaboration, and to expand the application and understanding of existing career calling of mission theories in the domestic cultural context. In the domestic cultural context, career calling, as an employee's emotional identity and sense of responsibility for his or her work, has gradually become a key factor influencing his or her work behaviour and career development. Through an in-depth analysis of this influencing mechanism, the application of existing theories of career calling in the domestic cultural context is expanded, as well as how employees' work attitudes and behaviours are profoundly affected by the emerging work paradigm. In particular, factors such as family and social responsibility may exacerbate employees' work stress in China's unique cultural context. While the enhancement of human-computer collaboration training helps employees better adapt to technological change,

reduces anxiety due to technological pressure, and further enhances employees' sense of career acquisition and stability, companies can effectively reshape the criteria of employees' propensity to leave, shifting them from a single pay orientation to a more multidimensional assessment of career satisfaction, which in turn enhances employees' sense of belonging and long-term stability.

5. Conclusion

This paper reveals the role of employees' daily commuting experience in the formation of career calling by verifying the positive effect of commuting well-being on career calling; investigates how work satisfaction builds a bridge between employees' daily commuting experience and occupational attitudes, and explores its intrinsic psychological mechanism; and validate how human-computer collaborative context moderates commuter well-being on employees' psychological state and career attitudes by introducing Situational Strength Theory.

While this study provided valuable insights, there were some limitations, such as, the receipt collection section was oversimplified. The questionnaire survey did not implement semi-structured interviews set for company executives, did not complete in-depth interviews with a number of senior company staff, and lacked the opportunity for in-depth communication with the company's grassroots staff. At the same time, due to limited resources, some people were not randomly selected for the follow-up survey, but only relied on the group members' personal social networks to distribute the questionnaires and collect data. It is hoped that in the future, we will seek cooperation with the public sector and enterprises to obtain more resources in the data collection section and improve the sample data.

Acknowledgments

During the course of this research, the generous guidance from Professor Wu Weijiong has been deeply engraved in my mind. Professor Wu first provided me with a constructive direction for my topic selection, enabling me to conduct research on the relationship between commuting happiness and professional mission from an emerging perspective. Moreover, in the part of data analysis where I was not familiar, Professor Wu also gave me direct guidance, allowing me to extract valuable information from the complex data and laying a crucial foundation for the conclusion of the research. Once again, I sincerely thank my supervisor Professor Wu Weijiong for his full support in the research process and for illuminating the path for me to conduct in-depth research on this topic.

References

- [1] DU Hui, MAO Jiye. *Human-computer collaboration and employee work sense of meaning reshaping during digital transformation*[J]. *Enterprise Economy*, 2022, 41(11): 1527. DOI: 10.13529/j.cnki.enterprise.economy.2022.11.002.
- [2] Wu Weijiong. *Breaking the 'commuting paradox': How commuting time affects happiness*[J]. *Psychological Journal*, 2017, 49(11): 1449-1459. DOI: 10.3724/SP.J.1041.2017.01449.
- [3] Tao Yinhua, van Ham Maarten, and Petrović Ana. "Changes in commuting mode and the relationship with psychological stress: A quasi-longitudinal analysis in urbanizing China." *Travel Behaviour and Society* 34. (2024):
- [4] Emre, O., & De Spiegeleare, S. (2019). The role of work-life balance and autonomy in the relationship between commuting, employee commitment and well-being. *The International Journal of Human Resource Management*, 32(11), 2443-2467.
- [5] Ma Yan. *An empirical analysis of the impact of spiritual leadership on employees' sense of professional mission in the public sector - the mediating role of job satisfaction as a perspective*[J]. *Journal of Party School of CPC Leshan Municipal Committee*, 2021, 23(4): 88-97. DOI: 10.3969/j.issn.1009-6922.2021.04.012.
- [6] Liu Guanqiu, and Ma Liang. "Dynamic Relationship between Commuting Time and Job Satisfaction: A Bivariate Latent Change Score Approach." *Annals of the American Association of Geographers* 114.4(2024): 808-825.
- [7] Tao Tao, and Sean Qian. "Do Smart Loading Zones help reduce traffic congestion? A causal analysis in Pittsburgh." *Transportation Research Part E* 192. (2024): 103796-103796.