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ORIGINAL RESEARCH

Moderating Effects of Self-Efficacy and Time Pressure on the Relationship Between Employee Aging and Work Performance

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Purpose: The relationships among employee aging, working memory capacity, and task performance in the context of information technology were studied, and these investigations in turn provide insight into improving employee task performance and mitigating the negative effects of employee aging.

Participants and Methods: Based on the limited resource theory and the inhibitory deficit theory, a total of 296 valid questionnaires were collected and the relationships among the variables were examined using cascaded linear regression via SPSS 22.0.

Results: Aging negatively affects working memory capacity and task performance. Working memory capacity partially mediates the relationship between age and task performance. Time pressure can exacerbate the negative effects of age on task performance, and self-efficacy mitigates the negative effects of age on task performance.

Discussion: Employee information system learning and training can be enhanced to ameliorate the negative impact of aging on task performance. IT-related work can be limited to a manageable level to reduce the negative effects of reduced working memory capacity. Employees' internal motivation can be gradually cultivated, and employees can be guided toward the improvement of their IT self-efficacy.

Keywords: cognitive aging, working memory capacity, time pressure, self-efficacy

Introduction

China's former one-child population control policy coupled with economic expansion following the reform and opening up of the country has led to its extremely rapid fertility rate decline, with the concomitant effects of a future labor shortage and aging demographics.[1] To address this situation, China has introduced a series of policies in recent years, including measures such as allowing families to have three children, strengthening regulations on the education and training industry, and curbing the excessive rise of housing prices.[2,3] However, these measures require time to fully ascertain their effects, and the aging of China's population shows no sign of slowing down, so the question of how to actively deal with the negative effects of aging in society is a top priority.[3] In the modern work environment, in addition to addressing the aging of employees, attention needs to be focused on the use of information technology (IT) in the workplace.[4] Recently, an increasing amount of information technology has become commonplace in the workplace, including technology such as DingTalk, WeChat, and intelligent information software related to the professional content of work at the office. Young employees tend to easily adapt to this work environment, while for older employees, the situation is not so simple.[5] As the workforce ages, technology has dramatically increased the number of distractions in the workplace;[6] irregular phone calls, sticky notes, and traffic have evolved into constant instant messaging, email notifications, meeting and task reminders, and other interruptions. These new distractions are propagated by a plethora of constantly beeping and buzzing technological devices, to the extent that technology-induced interruptions consume more

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than one-third of employees' working time.[7] This situation is more convenient for younger employees, but also hinders older employees from completing necessary tasks. Therefore, the following questions are worth considering: What are the reasons for the lower task performance of older employees in the context of information technology? How can older employees be helped to improve their task performance? What are the factors that exacerbate or moderate the negative impact of aging on task performance?

This study introduces age as a variable into the research model to investigate whether there are aggravating and moderating factors operative in the relationship between aging and task performance and whether working memory capacity can be used as a mediating variable between age and task performance. The significance of working memory capacity can be expressed in two ways: (1) from the perspective of employer sustainability, working memory capacity can reduce labor costs and improve the task performance of older employees; (2) from the perspective of individual employees, working memory capacity improves their performance and mitigates the negative effects of information technology change.

Literature Review

Age-Related Studies

The theoretical interrelationships among cognitive aging (ie, age-related changes in cognitive abilities), IT-supported task performance, and IT-related individual differences have been noted to be unclear.[4] Cognitive ability as a function of age may lead to potential job performance deficits.[8] Rietzschel suggested that employees' working memory, processing speed, attention, and ability to process new information steadily decline with age throughout individuals' lives.[9] Furthermore, theoretical and empirical studies have demonstrated that age can be used as a substantive variable (an independent variable rather than a control variable), which may set the tone for the focal relationship between perceived job demands and job outcomes,[10] such as task performance. Thus, scholars who are concerned with aging have proposed three theories to explain the correlation between cognitive decline and aging: the processing speed theory, the inhibitory deficit theory, and the limited resource theory.[11] The processing speed theory concerns the relationship between age differences and cognitive performance. Scholars have used the processing speed theory as a means of support when studying the relationship between aging and task performance, but the inhibitory deficit theory and the limited resource theory have not yet been applied to the theoretical study of the relationship between aging and task performance.[12] The main focus of the inhibitory deficit and limited resource theories is on the control of attention and the allocation of attentional resources when task-irrelevant information is present.[13] The inhibitory deficit theory assumes that task performance is somewhat affected when task-irrelevant information is present but does not directly examine task performance as an outcome variable.[14] The limited resource theory, on the other hand, suggests that distraction is more likely to reduce working memory capacity, which in turn can cause other adverse effects.[15] It is thus clear that aging can have task-related effects via other factors. Furthermore, although aging is known to have a range of negative effects on cognitive performance, the question of how to mitigate such negative effects is also a current focus of researchers interested in aging and human resources.

Relevant Studies of Working Memory Capacity

The working memory capacity view holds that the processing and storage capacities of individuals in cognitive activities are limited by their working memory capacity. When the demand for working memory capacity in cognitive activities exceeds an individual's capacity limit, the processing and storage capacities will be reduced to the allowable range of working memory capacity; thus, individuals with different working memory capacities will exhibit differences in the speed and accuracy of information processing and storage.[16,17]

Working memory refers to a system responsible for the temporary storage and processing of information during complex cognitive activities. The capacity of this system is limited and can be theoretically distinguished into four major components: the phonological loop, the visual-spatial template, the central executive, and the contextual buffer.[18] The storage system of working memory includes subsystems that retain verbal, spatial, and visual information.[19] The storage system plays a crucial in job completion, which is why many scholars have studied working memory in conjunction with

task performance. Although much research in this area has simply assessed the correlation between working memory and cognitive task performance, there is growing interest in understanding the processes underlying relatively complex working memory tasks.[20] As humans age, the speed at which they process information and their working memory capacity decrease, both of which are important mediators of the relationship between aging and cognitive decline.[21–23] In addition, according to the limited resource theory, which explains how finite attention resources are allocated, deeper encoding processes consume more attentional resources and performing encoding with distraction can be very difficult.[12] Therefore, this theory can be applied to study the negative effects of aging; after all, older people are relatively less efficient at the encoding process and thus more easily distracted, which also reduces their working memory capacity.[12] Information needs to be processed and stored in working memory; depending on how the information is perceived, eg, if a person is familiar with certain aspects of the environment (extensive experience), fewer working memory resources are needed.[24,25] Thus, it is the interaction between environmental stimuli and perceptual processes that generate working memory demands and, ultimately, responses such as stress.[25] However, stress selection is not a simple function of information processing, which depends on the way the information is interpreted. In the context of information processing and stress, self-efficacy can be one of the factors affecting interpretation, which determines whether the processed information is interpreted as a threat.[26] In previous studies, many researchers have used working memory capacity to examine the negative effects of aging. Thus, the present study proposes to use working memory capacity as a mediating variable to measure the relationship between aging and task performance.

A Study Related to Task Performance Supported by Information Technology

Task performance supported by information technology refers to work performance that relies on information technology,[27] as task performance is the main result of system use and has a direct impact on organizational productivity. In studies related to information management, many scholars have explored the factors that affect task performance, but there is a lack of literature regarding the relationship between aging and task performance. Few scholars have conducted studies that focus on information processing speed as the age contact point;[12] however, these scholars have developed an abstract model of age and IT-supported task performance that is independent of any specific technology or software. From a practitioner's perspective, abstract models may appear to be less realistic.[28] Therefore, a scenario-specific version of the model would like be more utile, the development of which would be fruitful for further in-depth research.

In summary, the integration of information technology into the work environment is inevitable, and decreasing cognitive level and ability caused by aging make it difficult for older employees to adapt to this environment. Although scholars have started to focus on the relationship between age and work environment,[29,30] they have only explored the negative effects of aging in a one-sided manner, thus ignoring the impact of marginal conditions, such as the factors that can mitigate or exacerbate the negative effects of aging.

Research Hypotheses and Model

The Direct Effect of Employee Aging on Task Performance

The present study was conducted using the inhibitory deficit theory of cognitive aging,[31] to advance the effects of age in the context of information technology phenomena. This theory suggests that older adults store for more information in their working memory than do younger adults, thereby disrupting the inhibitory mechanisms consisting of access and deletion functions; thus, older adults are more susceptible to the disruptive effects of technological mediators at work, which in turn can lead to poorer performance.[6] It is clear from the inhibitory deficit theory how and why age affects working memory content;[21,32] employees' cognition gradually deteriorates with age, with a consequent decline in working memory and selective attention. Recent studies have shown that older adults' working memory capacity tends to be more negatively affected by the salience of sensitivities than that of younger adults due to attentional amplification of sensitivities.[33] Thus, the salience of interference is one of the factors by which age may affect technical adaptation, as it relies on attentional amplification (with age) and attentional amplification's impact on resource availability, potentially leading to more adverse effects on perceived stress of mental workload and performance.[6]

Therefore, older employees may require more working memory resources to perform IT-based work tasks than younger employees, which may lead to greater stress and lower performance.[6] Thus, the following hypothesis can be formulated.

H1: Employee age has a negative impact on task performance in the context of information technology.

The Mediating Role of Working Memory Capacity

The processing resource theory of cognitive aging suggests that human cognitive function is gradually weakened by increasing age, which is caused by the gradual decline in mental resources that can be extracted quickly, mainly working memory.[21,32] In an IT-filled office, older employees are less productive in terms of coding because their limited mental resources make it easier for them to be distracted. It can also be expected that the older an employee is, the lower working memory capacity related to information technology he or she possesses[12,34] —ie, the older an employee is, the greater the negative impact on his or her working memory capacity. In addition, based on the concept of working memory capacity, in a working environment surrounded by information technology, the greater an employee's working memory capacity, the more information he or she can store, which is more conducive to the completion of work tasks.[34,35] In summary, increasing age in employees leads to gradual cognitive aging, which in turn affects working memory capacity and eventually reduces performance at work. Based on the above analysis, the following hypotheses can be formulated.

H2a: Employee age has a negative impact on working memory capacity in the context of information technology.

H2b: Working memory capacity has a positive effect on task performance in the context of information technology.

H2c: Working memory capacity mediates between employee age and task performance in the context of information technology.

The Moderating Effects of Time Pressure and Self-Efficacy

Time pressure is psychological stress experienced by team members who are required to complete corresponding tasks or goals assigned by their leaders within a limited time frame.[36] The relationship between time pressure and performance is usually recognized as an inverted U-shaped relationship, ie, both excessive and insufficient pressure can only lead to lower performance.[37] In a work environment that is inundated with new and increasingly complex information technologies, individuals constantly need to adapt to new information and transactions. Thus, they experience time pressure because slower learning of new technologies means that they may be faced with increasingly complex information technologies.[12,38] When individuals feel a sense of urgency from work pressure, they are required to devote a great deal of their limited energy to cope with this negative emotion, and their performance at work naturally decreases. Moreover, in the context of iterative information technology updates, a vicious cycle can emerge with people growing tired of processing additional information, leading to reduced employee performance. This analysis is supported by researchers,[39] who have found that stress and performance on computer-based tasks may be negatively related. In addition, time pressure due to factors such as the urgency and complexity of the work can cause individuals to experience positive emotions such as concentration,[40] and these positive emotions in turn require higher working memory capacity to undertake the next relevant work task.

Self-efficacy is the belief in one's ability to accomplish a specific task or achieve success in a given situation.[41] People with high self-efficacy always believe that they can complete more complex tasks, and this trait can increase the accuracy of task completion.[42] In contrast, people with low self-efficacy are more likely to imagine themselves failing and to fear the negative consequences of failure.[43] It has been suggested that people with higher self-efficacy experience less stress in the context of high task demands,[42] and therefore, the higher self-efficacy is, the lower the working memory capacity required. If older employees have a high sense of self-efficacy, they will be more confident and make greater efforts when engaging in IT-based work tasks, and this effort and confidence can compensate for their decreased working memory capacity.[12] Therefore, the following hypotheses can be formulated.

H3a: Time pressure moderates the relationship between working memory capacity and task performance, and when time pressure is higher, the effect of working memory capacity on task performance is stronger.

H3b: Self-efficacy moderates the relationship between working memory capacity and task performance, and when self-efficacy is higher, the effect of working memory capacity on task performance is weaker.

H3c: Time pressure positively moderates the mediating effect of age on task performance through working memory capacity.

H3d: Self-efficacy negatively moderates the mediating effect of age on task performance through working memory capacity.

The theoretical framework is shown in Figure 1.

Research Methodology

Measurement of Variables

To ensure the reliability and validity of the instrument, the scales were selected from international journals published by authoritative organizations and validated in the Chinese context. Since the scales were developed in English, we used a "translation-back translation" process: first, we invited two PhD holders from Australia and the UK to translate the English scales into Chinese; then, we invited two PhD holders in psychology to translate the scales back into English. Finally, professors in management were invited to compare the three versions of the scales and suggest changes to avoid linguistic ambiguities.

To further ensure the rigor of the survey procedure and the accuracy of the questionnaire, we invited 30 Master of Business Administration (MBA) holders from a university to conduct a mock survey. The simulation results showed that the valid return rate of the questionnaire was 100%, and the students provided good feedback. In addition, we used a five-point Likert scale to measure all scales ("1" for total disagreement and "5" for total agreement).

(1) Age: The scale from the study by Hong et al was used to measure cognitive age, including a total of five questions.[44] A sample item from this scale is as follows: "I feel young."

(2) Working memory capacity: The scale developed by Hurt and Gonthier and others was used to measure working memory, especially in elderly individuals.[45,46] Questions regarding interrupted memory were integrated into the scale in accordance with the purpose of the study, for a total of nine items. One of the sample questions is as follows: "It is difficult for me to go back to what I was doing after being interrupted by noise (eg, a door slamming or horn honking)."

(3) Task performance: A 3-item scale developed by Tsai et al was used, which featured the question prefix "In the past month … " to collect information concerning time as a prerequisite for obtaining recent measures.[47] An example item from this scale is as follows: "I have completed all the tasks assigned to me very effectively."

(4) Self-efficacy: The scale developed by Burton-Jones was used, including a total of three items, and a sample item is as follows: "Even if I haven't used such software before … "[48]

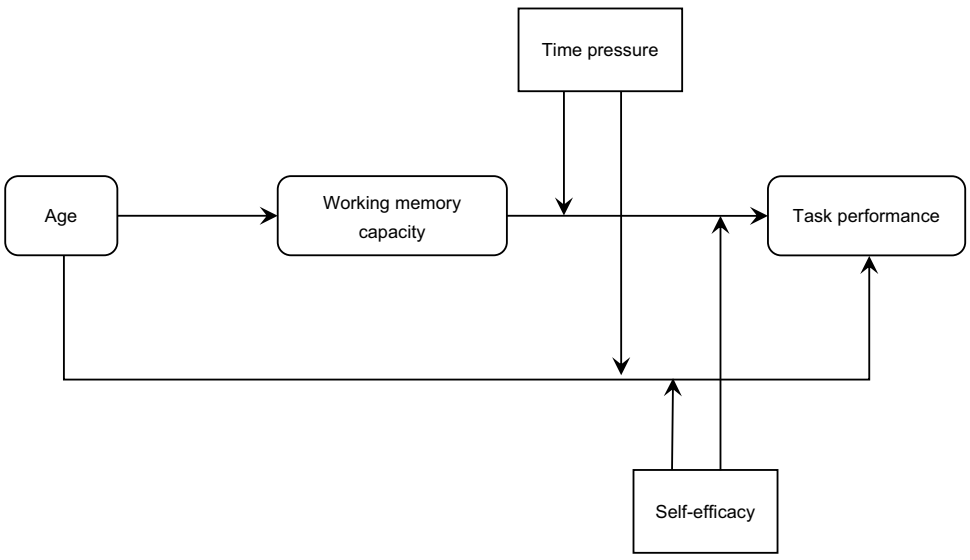

Figure 1 Conceptual model for this research.

(5) Time pressure: The scale employed by Mohammed, Emmerik, and others in their studies was used, including a total of 5 items.[49,50] An example item is as follows: "The workload is so heavy that it will result in me not having enough time off."

Sample and Collection Procedures

Based on the recommendation of Lowry, this study used a web-based questionnaire for data collection and employed the WeChat app Credamo as the data collection platform.[51] To ensure the authenticity and quality of the questionnaire, two screening questions were included in the design of the questionnaire. The first screening question was designed to ascertain whether respondents fit the target population of this paper, ie, "Do you have access to or use information technology (IT) to perform your current job?" The second screening question was an attention test designed to ensure that respondents took the survey seriously, ie, "For this particular question, please select the option 'strongly disagree'," and only those who selected "strongly disagree" were allowed to continue with the survey. Only those who met the requirements of the sample frame by correctly answering the above two screening questions were allowed to answer the remaining questionnaire items. An online form of informed consent was received from all individuals involved in the study. The subjects willingly and voluntarily took part in the research. The Institutional Review Board of the Hunan Normal University approved the study design and data collection. All procedures involving human participants were conducted in accordance with the ethical standards of the institutional research committee, the ethical standards of the APA, and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Through automatic exclusion by the platform and manual elimination by the research team of questionnaires that did not meet the screening criteria, 296 valid questionnaires were collected for the final sample. Within the valid sample, there were 182 female and 114 male employees, accounting for 61.5% and 38.5% of the total, respectively. There were 15 employees with a junior high school/ high school education or below, 240 employees with bachelor's/college degrees, and 41 employees with master's degrees or higher, accounting for 5.1%, 81.1%, and 13.8% of the total, respectively. There were 16, 24, 60, 123 and 73 employees with working experience of less than 1 year, 1–3 years (inclusive), 3–5 years (inclusive), 5–10 years (inclusive) and 10 or more years (inclusive), accounting for 5.4%, 8.1%, 20.3%, 41.6% and 24.6% of the total, respectively. There were 66 unmarried employees and 230 married employees, accounting for 22.3% and 77.7% of the total, respectively. Thirty-six people under the age of 25 accounted for 12.2% of the total, 226 people aged 25–45 accounted for 76.3% of the total, and 34 people over 45 years old accounted for 11.5% of the total.

Results

Reliability and Validity Testing

This study used SPSS 24.0 and AMOS 17.0 software to test the reliability and validity of the collected scale data.

(1) Common method bias test: The Harman single factor method was used to test for homogeneity bias. The results showed that five factors with characteristic roots greater than one were obtained by unrotated principal component factor analysis. The variance explained by the first factor was 31.99%, which was lower than the criterion of 40%, so there were no serious problems with common method bias, and a follow-up study could be conducted.

(2) Scale reliability test: Cronbach's alpha coefficient was used as an indicator to test reliability. The results showed that the alpha coefficients of age, working memory capacity, time pressure, self-efficacy, and task performance were 0.816, 0.898, 0.776, 0.768, and 0.748, respectively, all of which were greater than the criterion of 0.7. Thus, the internal consistency among the data and the scale reliability were satisfactory.

(3) Validation factor analysis: Validation factor analysis was conducted using AMOS 17.0 software to test the discriminant validity of all variables. The results are shown in Table 1. The five-factor model fit indices met the requirements and were significantly better than those of other competing models, which indicated reliable discriminant validity among all variables. It also indicated to some extent that there were no serious problems with common method bias in this study.

Table 1 Results of Validation Factor Analysis

Models	Contained Factors	χ^2	df	χ^2/df	IFI	TLI	CFI	RMSEA
Five-factor model	CA, WMC, TP, SE, PF	772.529	340	2.272	0.904	0.919	0.923	0.066
Four-factor model	CA+WMC, TP, SE, PF	1225.436	344	3.562	0.758	0.732	0.756	0.093
Three-factor model	CA+WMC, TP+SE, PF	1613.628	347	4.650	0.652	0.618	0.649	0.111
Two-factor model	CA+WMC+PF, TP+SE	1692.694	349	4.850	0.631	0.597	0.628	0.114
One-factor model	CA+WMC+PF+TP+SE	1766.268	350	5.046	0.611	0.576	0.608	0.117

Abbreviations: CA, age; WMC, working memory capacity; TP, time pressure; SE, self-efficacy; PF, task performance.

Hypotheses Testing

This study used SPSS 24.0 and the PROCESS macro program for hypotheses testing. To avoid potential effects of multicollinearity on the study results, variables involving interaction terms were standardized, and the results of the cascaded linear regressions are shown in Table 2. The dependent variable for Models 1 and 2 was working memory capacity, and the control variables were first added to Model 1, while Model 2 added age to the list of variables used for Model 1. The dependent variable of Models 3 to 8 was task performance, and the control variables were first added to Model 3. Model 4 added age to the variables in Model 3. Model 5 added working memory capacity to the list used for Model 3. Model 6 added working memory capacity to the variables in Model 4. Model 7 added time pressure and the interaction term between time pressure and working memory capacity to the list used for Model 5. Model 8 added self-efficacy and the interaction term between self-efficacy and working memory capacity to the variables in Model 5.

Table 2 Hierarchical Linear Regression Results

Variable Name	Working Memory Capacity		Task Performance					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Gender	0.033	0.012	0.081	0.061	0.067	0.058	0.060	0.041
Academic qualifications	0.152	0.052	0.133	0.023	0.070	0.008	0.071	0.004
Work experience	0.170***	0.237***	0.062	0.134***	−0.009	0.067	−0.003	−0.008
Marital status	0.243	0.243*	0.134	0.136	0.033	0.067	0.031	0.108
Age		−0.510***		−0.558***		−0.413***		
Working memory capacity					0.415***	0.283***	0.268***	0.171***
Time pressure							−0.008	
Self-efficacy								0.195***
Working memory capacity X Time pressure							0.065*	
Time pressure X Self-efficacy								−0.081***
R^2	0.129	0.271	0.053	0.328	0.296	0.423	0.306	0.491
ΔR^2	0.129	0.142	0.053	0.275	0.243	0.095	0.01	0.195
F-test	10.705***	21.389***	4.049**	28.126***	24.335***	35.095***	18.077***	39.503***

Notes: * p<0.05, ** p<0.01, *** p<0.001.

As seen in Table 2, with the inclusion of control variables, Model 4 showed a significant negative effect of age on task performance ($\beta = -0.558$, p<0.001), and Hypothesis 1 was tested. Model 2 showed that age negatively affected working memory capacity ($\beta = -0.510$, p<0.001), and Hypothesis 2a was supported. Meanwhile, Model 5 showed a significant positive effect of working memory capacity on task performance (β=0.415, p<0.001), and Hypothesis 2b was verified.

Model 6 showed that after adding working memory capacity to Model 4, working memory capacity significantly affected task performance ($\beta = 0.283$, p<0.001), while the effect of age on task performance was still significant but less so ($\beta = -0.413$, p<0.001), indicating that working memory capacity partially mediated the effect between age and task performance. Furthermore, we used the SPSS-PROCESS macro program for bootstrapping analysis with 5000 resamples. The results showed that the mediating effect of age through working memory capacity on task performance was −0.145 with a 95% confidence interval of [−0.239, −0.065], not containing 0, indicating a significant mediating effect of working memory capacity. Hypothesis 2c was supported by the above analysis.

As shown in Table 2, Models 7 and 8—after the inclusion of control variables, mediating variables, moderating variables, and interaction terms—the interaction term of working memory capacity and time pressure had a significant positive effect on task performance (β=0.065, p<0.05), while the interaction term of working memory capacity and self-efficacy had a significant negative effect on task performance (β=−0.081, p<0.001). Based on the suggestion by Aiken et al, the relationship between working memory capacity and task performance was plotted in two cases: one in which the moderating variable was set at a high value (one standard deviation above the mean), as shown in Figure 2, and one in which the moderating variable was set at a low value (one standard deviation below the mean), as shown in Figure 3. As seen from the graphs, the effect curve of working memory capacity on task performance is steeper, ie, the degree of influence is greater, when high time pressure or low self-efficacy are involved, and thus H3a and H3b were validated.

In this study, the conditional indirect effects of the moderating variables at high and low values were obtained directly by PROCESS operations, as shown in Tables 3 and 4. As seen from Table 3, the indirect effects of age on task performance via working memory capacity varied at different high and low time pressures, but the index of the moderated mediating effect was −0.035 with a confidence interval of [−0.092, 0.024], containing 0, indicating that the moderated mediating effect did not hold. As seen in Table 4, the indirect effect of age on task performance through working memory capacity varied at different levels of self-efficacy, with a moderated mediating effect index of 0.048 and a confidence interval of [0.013, 0.082], not containing 0, indicating that the moderated mediating effect did hold. Thus, H3c was not supported, while H3d was supported.

Discussion

Based on the theory of limited resources and the theory of restraining defects, this study collected 296 effective questionnaires, and proposed and verified the theoretical model of whether employee age growth will affect task performance in the context of it.

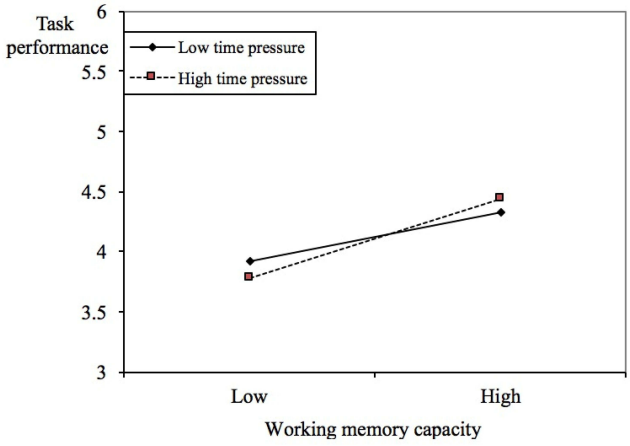

Figure 2 The moderating effect of time pressure on the relationship between working memory capacity and task performance.

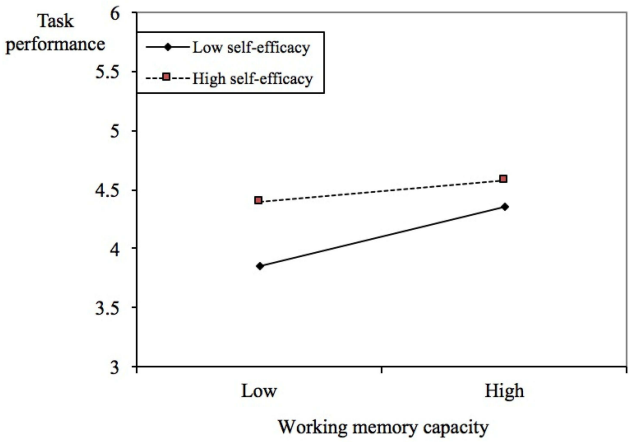

Figure 3 The moderating effect of self-efficacy on the relationship between working memory capacity and task performance.

Theoretical Implications

The main content of this paper focuses on three tasks: first, to empirically analyze the relationship between aging and task performance; second, to investigate the mediating role of working memory capacity between aging and task performance; and third, to discuss the moderating role of time pressure and self-efficacy in the relationship between working memory capacity and task performance. In this paper, the proposed hypotheses were investigated and tested, and the following conclusions were obtained.

First, we open the "black box" of the relationship between age and task performance. In an IT-focused work environment, employee aging negatively affects working memory capacity and task performance. That is, older employees have a lower working memory capacity, which lowers their task performance. These findings extend the conclusions of the study by Tams et al about the relationship between working memory capacity and age and task performance.[12]

Second, our research contributes to a more detailed understanding of the time pressure. The higher the time pressure is, the higher the moderating effect on employees' working memory capacity and task performance, meaning high work time pressure causes employees to require more working memory capacity to cope with related work tasks. Besides, the hypothesis that time pressure positively moderates the mediating effect of age on task performance through working memory capacity was not supported, suggesting that older employees do not experience a decrease in task performance as a result of greater time pressure. This result may be because this study did not segment time pressure. According to

Table 3 Tests for Mediating Effects Moderated by Time Pressure

	Indirect Effects	Standard Error	95% Confidence Interval
Low time pressure	−0.089	0.053	[−0.206, 0.006]
High time pressure	−0.164	0.050	[−0.264, −0.070]
Moderated intermediary index	−0.035	0.029	[−0.092, 0.024]

Table 4 Tests for Mediating Effects Moderated by Self-Efficacy

	Indirect Effects	Standard Error	95% Confidence Interval
Low self-efficacy	−0.144	0.039	[−0.225, −0.070]
High self-efficacy	−0.067	0.033	[−0.153, −0.027]
Moderated intermediary index	0.048	0.018	[0.013, 0.082]

existing studies, time pressure can be divided into hindering time pressure and challenging time pressure: challenging time pressure is generally considered to be a positive factor that can stimulate employees while hindering pressure functions in the opposite way.[40]

Third, Our research links self-efficacy with employees' individual characteristics, which promotes their research in the field of it and aging. Despite a growing interest in the research on self-efficacy and working memory capacity in the field of psychology, the existing literature fails to unveil the internal mechanism.[12,41] To make up for the limitations of the existing research, We examined their role in the relationship between age and task performance, and our findings showed, self-efficacy moderates the relationship between working memory capacity and task performance, and when employees' self-efficacy is higher, the effect of working memory capacity on task performance is weaker, which indicates that working memory capacity is more important when self-efficacy is lower. Besides, the negative indirect effect of age on task performance is weaker when employees' self-efficacy is stronger, suggesting that increasing employees' self-efficacy can significantly mitigate the negative effects of aging on task performance.

Practical Implications

The results of this study have implications for governments and businesses with respect to their responses to the aging of the working population.

(1) Employee information system learning and training can be enhanced to ameliorate the negative impact of aging on task performance. The findings of this study proved that employee aging in the context of information technology has a negative impact on task performance; thus, we can take advantage of the effects caused by individual differences in age. For example, since younger employees are more likely to learn how to use information technology, an approach in which the "new" lead the "old" can be implemented, such that older employees can engage with younger employees on a one-on-one basis for the purposes of information technology education and adapting to the endless array of information technology in the modern workplace.

(2) IT-related work can be limited to a manageable level to reduce the negative effects of reduced working memory capacity. This study demonstrated that employee aging leads to a decrease in working memory capacity and that limited working memory capacity leads to a decrease in task performance. Therefore, the intensity and completion time of IT-related tasks should be rationalized, and managers should ensure that older employees perform less intermittent IT-related work as much as possible.

(3) Employees' internal motivation can be gradually cultivated, and employees can be guided toward improvement of their IT self-efficacy. According to the findings of the study, employees' high self-efficacy can significantly mitigate the negative impact of aging on task performance; therefore, employees' internal drive should be gradually cultivated in the context of work. Specifically, this suggestion can be implemented in two ways. First, managers should provide employees with substantive support as much as possible, such as regular information technology lectures and training, to help them add to their reserves of relevant knowledge and improve their determination to overcome difficulties. Second, a fault-tolerance mechanism can be established to reduce the psychological burden caused by the belief that "more work will lead to more mistakes; less work will lead to make fewer mistakes," which is conducive to enhancing the courage of employees with respect to exploration and learning.

Limitations and Future Research

Although this paper has reported important findings regarding the relationship between age and task performance, there are still some limitations that should be noted. First, we have discussed the relationship between age and task performance only from a linear perspective, and there is already research that shows that the relationship between age and task performance is not always linear. Therefore, adding multiple survey time points may lead to further understanding of this subject. Second, a questionnaire-based measure makes common method bias a potential concern in our study. A multi-source, multi-wave approach of data collection should be used in the future to reduce common method bias. Third, the survey respondents were only from companies with a Chinese cultural background, which may limit the generalizability of our findings. Future research may conduct cross-cultural studies to further confirm the findings in other regions and countries.

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Disclosure

The authors report no conflicts of interest in this work.

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