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A Study on the Double-Edged Sword Effect of STARA Awareness on Task Performance

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Abstract. In the era of digital economy, intelligent technologies are transforming the internal operation methods of enterprises. Informed by the theory of stress cognitive appraisal and analyzing the survey data of 400 employees, this study explores how STARA awareness affects employees' task performance at the psychological level. The finding indicate: STARA awareness has a double-edged effect. The positively influencing task performance through thriving at work while negatively impacting it via AI dependency. The problem rumination ability has a different regulatory effect. On one hand, high rumination ability will enhance the positive effect of STARA awareness on thriving at work and positively moderate its influence on task performance. On other hand, high levels of rumination ability will weaken the positive effect of STARA awareness on AI dependency, at the same time negatively moderate its influence.

Keywords: STARA Awareness, Task Performance, Thriving at Work, AI Dependency, Problem Rumination Ability

1. Introduction

In the context of the digital landscape, the application of intelligent technologies has significantly changed behavior patterns of employees. It has evolved from an auxiliary tool into either a partner or a competitor, and the relationship between the two becoming increasingly complex [1]. Intelligent technologies can enhance work efficiency, eliminating many unnecessary and repetitive tasks, thereby simplifying employees' workloads. On other hand, they also introduce new pressures, making employees more concerned about the stability of their jobs. This concern has changed their work attitude and triggered the STARA awareness (SA), this refers to the perception and worry of being replaced by AI [2].

Research shows that SA has a double-edged effect.Take the positive side, it can enhance employees' engagement in job design, encouraging them to engage in active learning and creative actions.Take the negative side, it may cause anxiety related to AI, leading to job insecurity and some abnormal behaviors [3,4]. The increasingly evident double-edged effect indicates that SA has predictive power over employees' psychological cognition and work behaviors. The research on the relationship between SA and employees has practical application value. It helps employees adapt to technological changes and improve their task performance.Consistent with cognitive appraisal theory of stress, an individual's perception of the stressor will have different effects on them.

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Through challenge based assessment, employees view intelligent applications as tools for solving work-related problems and acquiring new knowledge, thereby enhancing their Thriving at Work(TAW) [3]. Obstacles in the assessment process may cause employees to have intense dissatisfaction with job replacement. Employees may give up their efforts to solve problems and more likely to accept the suggestions and decisions made by AI, eventually lead to AI dependence(AID) [5]. People's understanding and assessment of their own resources will directly affect the outcome of their stress perception. Problem Rumination ability(PRA) is a personal internal resource. It is a goal-oriented ability to seek solutions. PRA can adjust the continuous thinking mode of employees towards work goals. It will influence their perception of stress levels. This research is based on the pressure cognitive evaluation theory, explores the double-edged sword effect of SA and the psychological changes of employees. It provides theoretical support and guidance for organizational development and managers.

2. Theoretical analysis and research hypotheses

2.1. STARA awareness

Intelligent technology is a highly advanced and complex technology that can simulate human cognitive functions, learn from data, and perform tasks [6]. In recent years, organizations have increasingly adopted intelligent technologies to optimize resources and enhance efficiency [7]. But the psychological impact on employees has not yet been fully studied.Scholars predict that robots will replace 47% of low-skilled jobs, and this trend will also extend to high-skilled occupations [8]. Brougham refers to the notion that intelligent technologies might replace his job as the concept known as SA [2]. In light of theory of stress cognitive appraisal, SA consists of two distinct components, challenging stress and obstructive stress. The challenging assessment means that employees believe that intelligent technology brings opportunities and is used for personal learning and growth, which can improve their TAW [9]. The obstructive assessment makes people feel threatened, leading to a decline in one's work skills and a reduction in proactive behavior [3]. Both of these assessments will affect employees' service performance. Some studies have found that generative AI may cause people to hand over problem solving abilities to external resources, which will reduce their own independence and ultimately maintain work efficiency by AI dependency [10]. The development of this cognitive inertia also reinforces AID behavior [11]. Hence, Hypothesis H1 states: SA positively influences TAW. Hypothesis H2: SA positively influences AID.

2.2. The mediating role of thriving at work and AI dependency

TAW is a positive psychological state, which is the subjective perception of mental fullness and the continuous optimization of psychological perception [12]. When SA is recognized as a catalyst for individual growth, it fosters employees' professional flourishing, strengthens organizational belonging and loyalty, which are key factors influencing employee TP. TAW shows a significant positive correlation with employees' innovative behaviors and job engagement [13]. When employees perceive benefits from technological changes, they receive substantial resource rewards and experience vitality in their work tasks which provides strong support for work performance.Therefore, this study indicates that TAW exerts an indirect effect in both the SA and TP aspects. The hypothesis H3 was proposed: TAW positively influence TP. Hypothesis H4: TAW mediates the relationship between SA and TP.

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AID is a negative condition that hinders personal growth and organizational development. SA makes employees feel insecure, reduces their work enthusiasm, and less willing to perform well at work. Research shows that AID hinders the development of core capabilities, including creative behavior and critical thinking skills, and this harm is direct. It causes employees to lack initiative and enthusiasm when completing tasks, hindering the improvement of efficiency. However, AI can quickly solve problems in work and reduces the stress caused by work anxiety. Even so, employees' psychological resources and professional abilities are gradually being depleted, which also erodes the core competitiveness of the organization. Eventually, task performance will decline. Thus, Hypothesis H5 states: AID negatively affects employees' TP. H6: AID plays a mediating role in the influence between SA and TP.

2.3. The regulatory role of problem rumination capacity

PRA constitutes a cognitive approach to work reflection, an active method centred on problem-solving to identify appropriate solutions. As an internal resource, PRA mitigates the adverse effects arising from SA. Employees with high PRA transform SA into learning motivation, thereby strengthening TAW. This converts positive psychology into concrete actions for efficiently completing organizational tasks, making TAW's promotion of TP more pronounced. Thus, Hypothesis H7a was advanced: PRA modulates the relationship between SA and TAW. The higher the PRA, the stronger the beneficial impact of SA on TAW. Hypothesis H7b: PRA modulates the indirect effect of TAW on TP in SA. The higher the PRA, the stronger this indirect effect becomes. Employees with higher PRA regard AI technology as an auxiliary tool instead of mindless assistant. By actively thinking and making independent decisions, they enhance work quality, mitigate the negative effects of AID, and thus reduce its impact on TP.Thus, Hypothesis H8a was suggested: PRA modulates the relationship between SA and AID. The higher the PRA, the weaker the beneficial impact of SA on AID. H8b: PRA moderates the indirect effect of AID on employee TP in SA. The higher the PRA, the weaker this indirect effect becomes.In summary, Fig 1 presents the established hypothesis model.

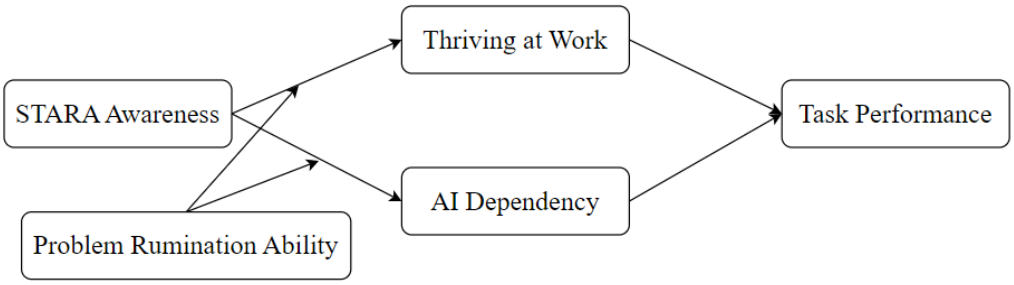


Figure 1. Hypothesis model

3. Research methods and hypothesis testing

In Credamo, 453 questionnaires were distributed, and after excluding invalid data, 400 valid samples were retained, with a recovery rate of 88.3%. The 5-point Likert scale was used, ranging from 1 (strongly disagree) to 5 (strongly agree). Control variables are selected from traditional demographic variables. 4 items of SA were assessed using the Brougham developed scale (Cronbach's α 0.904) [2]. 10 items TAW scale was adapted from Porath's version (Cronbach's α 0.929) [13]. AID 3-item multiple-choice Tang scale (Cronbach's α 0.833) [14]. 5-item PRA was

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derived from Cropley (Cronbach's α 0.861) [15]. The TP comprises 7 items from Williams' scale (Cronbach's α 0.835) [16].

The five-factor model with the best fit was obtained by using Mplus, with the fit indices of x^2 =840.432, df =367, x^2/df =2.290,CFI=0.929,TLI=0.921,RMSEA=0.057,SRMR=0.050. It shows that the test has excellent discriminant validity. The homology method bias was tested by Harman test. The first common factor explained 28.176% of the variance, which was lower than 40%, and the common method bias was not serious.

The entire model was tested using SPSS, with the results presented in Tab 1. SA was a positive predictor for both TAW (β =0.581, P<0.01) and AID (β =0.527, P<0.01).. TAW showed a significantly positive correlation with TP (β =0.232, P<0.01), while AID exhibited a significantly negative correlation with TP (β =-0.217, P<0.01). Based on these findings, the proposed research hypothesis was preliminarily validated.

Table 1. Descriptive statistics and correlation analysis of variables

	M	SD	1	2	3	4	5	6	7	8	9
Gender	1.610	0.488	1								
Age	2.170	0.962	-0.012	1							
Background	2.020	0.594	0.101*	-0.106*	1						
Seniority	2.440	1.012	-0.016	0.690**	0.008	1					
SA	2.839	1.041	0.049	-0.066	-0.057	-0.125*	1				
TAW	3.848	0.514	-0.017	0.120*	0.028	0.049	0.581**	1			
AID	2.368	1.002	0.009	-0.161**	-0.029	-0.186**	0.527**	0.157**	1		
TP	4.352	0.386	-0.002	0.074	-0.018	0.136**	-0.105*	0.232**	-0.217**	1	
PRA	3.868	0.687	-0.095	0.141**	0.113*	0.180**	-0.214**	0.278**	-0.382**	0.409**	1

Note: N=400, *- P<0.05, **- P<0.01.

A mediation test was conducted through multiple linear regression, the results presented in Tab 2. Model 1 indicates that SA has a positive predictive effect on TAW($\beta = 0.600$, $P < 0.001$), which supports Hypothesis H1. Model 3 indicates that SA is also significantly correlated with AID($\beta = 0.514$, $P < 0.001$), supports Hypothesis H2. Model 5 indicates that TAW has a positive and statistically significant effect on the TP coefficient($\beta = 0.279$, $P < 0.001$), which confirms H3. Besides, AID was negatively correlated with TP ($\beta =$ -0.252, $P < 0.001$), thereby verifying Hypothesis H5. To verify the indirect influence relationship between TAW and AID, the Bootstrap method was employed for the test. The results are as follows: 0.094 is the indirect effect value of SA<TAW<TP, CI is [0.064,0.130], the hypothesis H4 is true. The indirect effect of SA<AID<TP is 0.026, with a CI of [-0.053, -0.004], confirming the validity of Hypothesis H6.

Tab 2 presents the data for the adjustment test using stratified regression. Model 2 indicates that SA × PRA positively affects TAW($\beta = 0.174$, $P < 0.001$), confirming Hypothesis H7a. Model 4 demonstrated that SA × PRA exerted a negatively effects AID($\beta =$ -0.306, $P < 0.001$), confirming Hypothesis H8a. The PROCESS plug-in is used to test the adjustment variables again. Fig 2 shows that SA demonstrates a stronger positive effect on TAW at high PRA($\beta = 0.396$, $p < 0.001$), confirming Hypothesis H7a. Conversely, the positive effect on AID is weaker at high PRA ($\beta = 0.047$, $p < 0.001$), supporting H8a.

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Table 2. Results of the mediation and moderation effect tests

Variable	TAW		AID		TP	
	M1	M2	M3	M4	M5	M6
Gender	-0.053	-0.022	-0.017	-0.03	0.010	0.027
Age	0.159**	0.117*	-0.084	-0.038	-0.108	-0.118
Background	0.084*	0.042	-0.006	0.017	-0.046	-0.065
Seniority	0.013	-0.014	-0.064	-0.065	0.15*	0.138*
SA	0.600***	0.626***	0.514***	0.549***		-0.275***
TAW					0.279***	0.423***
AID					-0.252***	-0.134*
PRA		0.362***		-0.200***		
SA × PRA		0.174***		-0.306***		
R2	0.372***	0.547***	0.296***	0.447***	0.133***	0.167***
△R2	0.353***	0.027***	0.258***	0.082***	0.113***	0.020***
F	46.654***	67.525***	33.211***	45.284***	10.030***	11.252***

Note: N=400, *- P<0.05,**- P<0.01, ***- P<0.001.

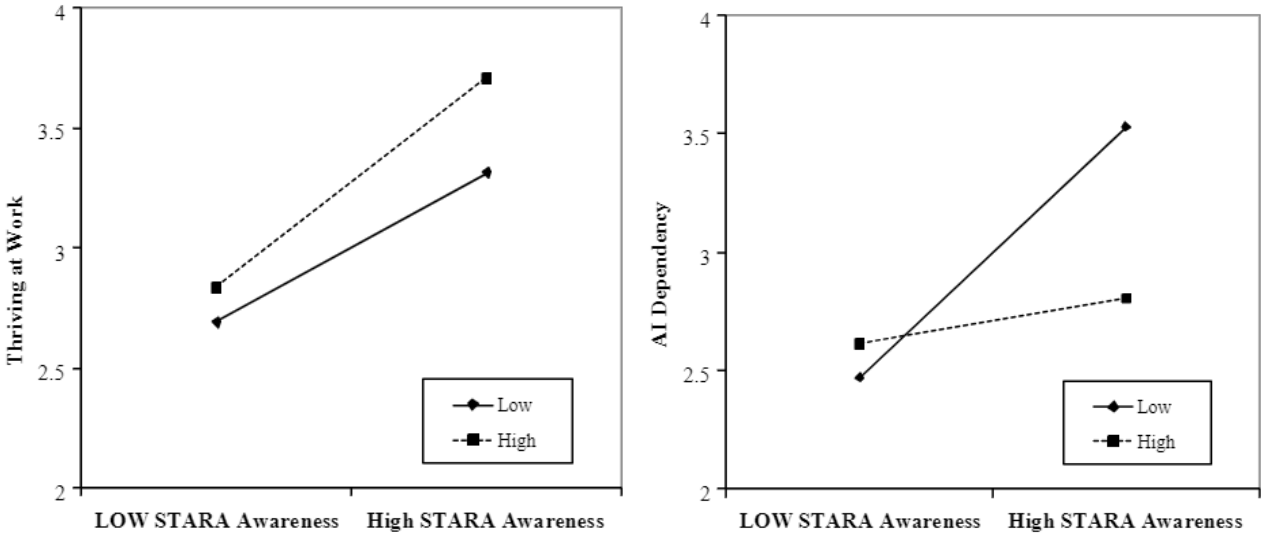


Figure 2. The moderating role of problem rumination ability

Bootstrap method is utilized to analyze the relationship between SA and TAW, AID at different PRA levels. When the PRA was high, the 95% CI of TP by SA through TAW path was [0.090, 0.164], the indirect effect was significant. The differences between the groups were significant, with a significance level of 0.055 and a CI of [0.026, 0.083]. The mediating effect of TAW is positively moderated by PRA, confirming the Hypothesis H7b. When the PRA was high, the 95% CI of SA via AID for TP path was [-0.026, -0.002], the indirect effect was significant. The significance level of the differences between the groups was 0.031, and the CI was [0.005, 0.060]. The mediating effect of PRA on AID produced a negative regulatory effect, which proved Hypothesis H8b.

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4. Conclusion

Based on the theory of stress cognitive appraisal, establishes the moderated mediation model. The two influence paths of SA on TP and the boundary effect of PRA were discussed, the following conclusion is drawn: 1. SA has two different ways of influencing TP. It can either promote the increase of TP or inhibit its growth. SA enhances TP through TAW and reduces TP through AID. 2. PRA adopts different regulatory methods on these two paths. It strengthens the connection between SA and TAW, and weakens the connection between SA and AID. 3.PRA significantly alters the mediating role of TAW and AID. This forms a regulatory mediating effect. PRA strengthens the mediating role of TAW and weakens the mediating role of AID. Finally, different industries face intelligent technology at different levels. The research results will vary. We can later study the spillover effect of STARA awareness and focus on organizations or families.

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