

The relationship between the feedback environment and creativity: a self-motives perspective

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Background: For companies, employee creativity is vital to gaining competitive business advantages. Research regarding creativity has focused on contextual factors such as feedback, but results of studies on the relationship between feedback and creativity are inconsistent; further, only a handful of studies have been carried out from the perspective of coworkers. In this study, we aimed to analyze the association between the coworker feedback environment and creativity, to test the mediating role of feedback monitoring in this relationship and to test the moderating role of self-motivation among employees in China.

Methods: A coworker feedback environment survey, a coworker feedback monitoring questionnaire, a self-motivation scale and a creativity scale were used. The staff submitted 264 questionnaires, of which 235 (74.6%) were completed by the participants. Among the respondents in the sample, 132 (56.2%) were men, and 103 (43.8%) were women. The mean age is 30 and age range from 24–49. Mplus 7.11 software was used to perform descriptive analysis, Spearman's correlation analysis, mediating analysis and moderation analysis.

Results: Coworker feedback environment was positively associated with creativity ($\beta=0.60$, $p<0.01$) after controlling for the demographic variable. Coworker feedback monitoring partially mediated the relationship between coworker feedback environment and creativity ($\chi^2/df=2.5$, RMSEA=0.05; CFI=0.93; GFI=0.93). When self-assessment motivation is lower, the positive relationship between coworker feedback monitoring and creativity becomes stronger ($\beta=0.19$); the same relationship becomes weaker ($\beta=0.01$) when self-assessment motivation is higher.

Conclusion: It was suggested that a coworker feedback environment could improve employee creativity by promoting coworker feedback monitoring; creativity could be improved especially among employees who have lower self-assessment motivation.

Keywords: feedback environment, creativity, feedback seeking, self-motivation

Introduction

Creativity refers to novel and viable products, processes, or methods that are valuable to organizations.¹ For companies, employee creativity is vital to gaining a competitive advantage.² For years, research regarding the antecedents of employee creativity has focused on organizational environmental factors, such as work complexity, leadership styles, rewards, time constraints, and feedback.^{2,3} Although previous literature found that feedback can improve creativity, a meta-analysis indicated that more than 38% of the feedback has a negative effect on creativity.⁴ It is essential to identify how to use feedback to improve creativity.

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Previous research on feedback and creativity compared and contrasted the effects of different types of feedback; however, this approach ignores the complexity of the feedback process.⁵ In this process, factors, such as the credibility of the feedback source, the feedback delivery, and the encouragement of feedback seeking, impact the feedback effect in a contextual sense.⁶ To fully understand the association between feedback and creativity, researchers have introduced the concept of a feedback environment, which refers to the contextual processes between a supervisor and his/her subordinates or coworkers, and this environment would exist in the coworkers' daily work environment rather than in a formal performance appraisal feedback session.⁵ Prior work has yet to deeply explore the consequences of the supervisor feedback environment;⁷ however, only a handful of studies have been carried out from the perspective of coworkers. This omission is consequential. Because coworkers are more approachable and are professionally equal relative to their supervisors, there are more opportunities to exchange feedback with coworkers in daily life.⁸ Although existing research shows that some dimensions of the coworker feedback environment, such as feedback validity and feedback seeking supporting, can influence creativity,⁹ little research has been performed on the impact of the coworker feedback environment on creativity.

As for the influence of the feedback environment on creativity, current research focuses on the internal psychological mechanism but neglects the role of feedback seeking.¹⁰ It still remains unclear how the coworker feedback environment actually influences creativity.¹¹ Sedikides and Strube's self-motives theory deals with how individuals receive, select, process, seek, and react to feedback, also focuses on the use of motivation to influence how individuals perform self-evaluations and seek information.¹² In this paper, we believe that self-motives theory is of great importance for gaining a deep understanding the impact of feedback environment on creative performance.

As a proactive behavior, feedback seeking is the behavior of individuals who involves actively seeking valuable information in the organization so that it can be adapted to the organization's and individuals' development requirement.¹³ A supportive coworker feedback environment encourages coworkers to seek feedback,¹⁴ thereby enabling employees to improve their creativity.¹⁰ Employees are capable of seeking feedback by using feedback inquiry and feedback

monitoring. According to self-motives theory, feedback often includes unfavorable information and might hurt self-esteem. Thus feedback seeking can be divided into feedback inquiry and feedback monitoring, but employees can emulate creative role models without losing the respect of their coworkers by using feedback monitoring.¹⁵ Feedback monitoring involves examining one's environment for indirect feedback cues. Employees observe the task progress of their coworkers to gain insights into aspects of their own performance.¹⁵ Especially in China, where maintaining the respect of others is a high cultural value, employees are more likely to adopt feedback monitoring from coworkers.¹ However, the role of feedback monitoring in the relationship between coworker feedback environment and creativity is not clear because of the lack of empirical research.¹⁶

Unfortunately, a meta-analysis of feedback seeking showed that feedback seeking and creativity were not significantly positively related.¹⁷ Coworker feedback monitoring had a positive impact on creativity only under certain conditions.¹⁸ Self-motives theory classifies the motivations that drive people to perform evaluations and seek feedback into four categories: self-verification, self-enhancement, self-assessment, and self-improvement.¹⁹ Self-verification refers to strengthening individuals' feelings of prediction and control, thereby helping them to form a stable self-concept, and encouraging others to have the same views that the individuals have of themselves; self-enhancement is aimed at improving one's self-image and implementing self-protection due to assumed negative information; self-improvement is aimed at improving individuals' knowledge, abilities, and skills; and individuals who are driven by self-assessment motivation prefer external feedback, since they are interested in knowing the external environment's view of their appearance, abilities, and traits.¹² Individuals who seek feedback by self-verification, self-enhancement and self-assessment motivations do not care about the accuracy of feedback, so these three motivations belong to the tactical aspect of self-concept enhancement and may weaken the impact of feedback-seeking behavior, but self-improvement motivation may not.²⁰ Self-motivation reflects feedback-seeking motivation more comprehensively and solves the past lack of classification regarding feedback-seeking motivations; however, the moderating role of self-motivation in the relationship between feedback monitoring and creativity, especially in the Chinese culture, has not been fully clarified.²¹

Coworker feedback environment and creativity

The coworker feedback environment reflects the complexity of feedback, and it simultaneously highlights the feedback recipients' perception of feedback effectiveness and focuses on encouraging feedback-seeking behavior.²² Specifically, a supportive coworker feedback environment occurs when an employee believes that the coworker is credible, gives high-quality feedback, delivers feedback clearly, delivers both positive and negative feedback accurately, is accessible, and actively promotes feedback-seeking behavior.¹¹ Most work has adopted a variable-centered approach, which calls for assessing how a composite score of seven feedback environment facets relates to outcomes.²³ The reasons that the coworker feedback environment can affect creativity are as follows:

First, current research shows that some dimensions can influence creativity. For example, a feedback environment can provide the staff with clear feedback, wherein the purpose and function of the feedback are evident, thereby enhancing the creativity of the employees. Regarding feedback validity, the feedback process can act as an information source for employees to improve their work and learning performance.²⁴ If coworkers support feedback-seeking behavior, they can provide themselves with the information required to promote the development of creative ideas.⁹

Second, a supportive environment provides reliable, accurate, and useful feedback information; delivers the information properly; and encourages employee feedback-seeking behavior.²⁵ Such a feedback environment enables employees to clarify their self-performance standards based on organizational requirements, thereby reducing uncertainty and ambiguity.²⁵ Additionally, the key to the creativity of employees is support. Both experimental and investigatory studies have consistently found that support enhances the work environment and is related to creativity.⁹ Therefore, we hypothesize the following:

Hypothesis 1: Coworker feedback environment positively impacts creativity

The mediating role of coworker feedback monitoring

A feedback environment has a multidimensional structure: a feedback environment can not only provide employees with support from supervisors and coworkers and offer

credible and accurate feedback information appropriately but also encourage coworker feedback-seeking behavior,¹⁴ thereby enabling employees to improve their creativity. Feedback-seeking behaviors clarify the roles and goals of individuals to improve performance based on relevant information provided by a feedback environment.²⁶ A feedback environment influences work behaviors, is related to high performance and rewards, and can encourage employees by providing them with expected working achievements.²⁷

Unlike traditional feedback, feedback-seeking theory argues that feedback receivers are able to self-regulate and should be proactive in their approach. Self-regulation theory states that individuals can plan their way forward through their own efforts and ultimately achieve their goals.²⁰ Individual creativity may be influenced by one's social environment in the development process, but encouragement by coworkers can promote individual creativity as well.²⁸ Previous studies have shown that creativity is significantly enhanced when individuals communicate with others frequently at work.²⁹ Moreover, frequent feedback can provide useful suggestions to improve individuals' work. These suggestions also provide individuals with different perspectives and can help them produce more interesting ideas, thereby enhancing creativity.²¹ Since individuals in China pay more attention to self-esteem and having the respect of others, this factor should be considered in creating a coworker feedback environment. When coworkers seek feedback, they can use feedback monitoring to increase their abilities without losing face.³⁰

Hypothesis 2: Coworker feedback monitoring is a mediator between the coworker feedback environment and creativity

The moderating role of self-motives

Employees can selectively seek feedback from coworkers. The motivation for seeking feedback is not limited to instrumental motivation but is also influenced by other motivations.³¹ In fact, instrumental motivation is a combination of self-improvement and self-assessment motivations, while self-protection motivation and impression management motivation are actually two aspects of self-enhancement motivation; there is limited research regarding self-verification motivation.³¹ While the theory of self-motivation explains feedback-seeking motivation more comprehensively and solves the past lack of classification regarding feedback-seeking motivations, it is necessary to introduce

self-motivation for feedback seeking to analyze the moderating mechanisms.³²

Feedback-seeking motivations can influence an individual's self-assessment and produce different forms of creativity.⁹ Most individuals verify themselves generally by creating a social environment based on their ego and subjectively distorting their reality.²⁰ Creating a self-based social environment includes choosing the friends that one is willing to associate with, purposefully revealing one's identity, and performing self-verification by associating with others. Distorting one's reality subjectively involves selecting, recognizing, and comprehending alternatives.²⁰ Self-improvement motivation is concerned with developing a self-concept in a better direction regardless of its accuracy.³³ A coworker feedback environment offers low-cost, accurate, and credible feedback; this feedback encourages employees to enhance their individual public images by seeking feedback. Self-improvement motivation is different from the other three motivations in the sense that individuals focus on their own problems and think about whether they can truly improve their abilities.¹⁹ Therefore, self-improvement motivation belongs to the strategic aspect of self-motivation and is aimed at improving creativity; thus, self-improvement motivation may reinforce the mediating role of feedback seeking.

Hypothesis 3: When self-improvement motivation is higher, the positive relationship between coworker feedback monitoring and creativity becomes stronger.

A supportive feedback environment can reduce the cost of seeking feedback, and this situation can create opportunities for individuals to improve their self-assessment. Self-assessment motivation is concerned with the accuracy of self-cognition. Only feedback-seeking that arises from honesty and not tactics can enhance positive behavior and produce real individual growth,¹⁹ while self-verification motivation involves considering whether one can agree with the self-concept or not. However, individuals with a strong self-enhancement motivation tend to prefer positive evaluations to negative ones; these individuals particularly prefer social evaluations that are good for themselves, and they invest much energy into thinking about positive feedback.⁹ Individuals with a self-assessment motivation desire an external evaluation of their appearance, abilities, character, and traits; receiving this evaluation generally involves the following: (i) reducing the number of unnecessary things, (ii) focusing on what they truly look similar

to in the eyes of others, and (iii) achieving small goals before recognizing their true self.²⁰ Individuals who seek feedback by self-verification, self-enhancement and self-assessment motivations do not care about the accuracy of feedback, so these three motivations belong to the tactical aspect of self-concept enhancement and may weaken the impact of feedback-seeking behavior, but self-improvement motivation may not.²⁰ According to the relevant feedback-related literature, individuals whose feedback-seeking motivation originates from a desire to manage their public image and the impressions of others are not interested in learning, improving their performance, or correcting potential mistakes,¹⁹ thereby likely weakening the impact of feedback-seeking behavior on creativity.

Hypothesis 4: When self-enhancement, self-verification and self-assessment motivations are lower, the positive relationship between coworker feedback monitoring and creativity becomes stronger.

The aim of this research was to analyze the association between the coworker feedback environment and creativity, to test the mediating role of feedback monitoring in this relationship and to test the moderating role of self-motivation among employees in China. Thus, we have developed our research model (Figure 1).

Methods

Participants and procedure

This study was carried out in accordance with the recommendations of the ethics committee of Liaocheng University with written informed consent from all subjects. The protocol was approved by the ethics committee of Liaocheng University (2017_7_14). All subjects have given written informed consent in accordance with the Declaration of Helsinki.

Before the survey, all participants provided written informed consent. The scope of this investigation is all the employees in 13 industrial enterprises in eastern Chinese provinces. The employees were investigated by layer cluster sampling and were stratified by group headquarters and branches. Employees provided data at three time points 3 months apart to help mitigate concerns associated with having same-time, same-source data, based on the time interval of previous studies.³⁴ In Survey 1 (end of February 2018) we collected demographic data and measured coworker feedback environment. In Survey 2 (May 2018) employees were given the

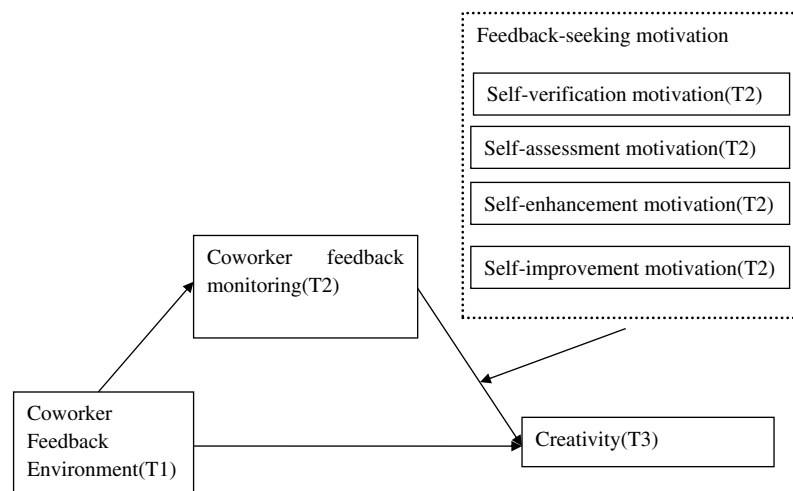


Figure 1 Hypothesis model.

feedback-seeking behavior questionnaire and the self-motivation questionnaire. In Survey 3 (mid-August 2018) the employees' direct supervisors were given the creativity questionnaire. The staff submitted 264 questionnaires, of which 235, or 74.6%, of those submitted were valid.

Among the respondents in the sample, 132 (56.2%) were men, and 103 (43.8%) were women. The sample age had a centralized distribution, with 205 respondents (87.2%) being no more than 35 years of age. The mean age is 30 and age range from 24–49. In total, 190 respondents (80.8%) had under 5 years of work experience, and 192 respondents (81.7%) had completed an undergraduate education or higher.

Measures

Coworkers feedback environment

Based on our theoretical foundation of this study, we measured the coworker feedback environment by using a shortened version of the Coworker Feedback Environment Scale, which was developed by Rosen.⁶ This scale was widely used and tested after its launch and has been proved to have good internal consistency and reliability. The scale is a 21-item questionnaire with 7 dimensions: feedback credibility, feedback quality, feedback delivery, the accuracy of positive feedback, the accuracy of negative feedback, feedback availability, and feedback-seeking promotion; in addition, each dimension consists of 3 items. A sample item reads, "My coworkers give me useful feedback about my job performance." Each item was answered by using a 7-point Likert scale (1=strongly disagree; 7=strongly agree). In this study, Cronbach's alpha coefficient for the total scale is 0.89. Confirmatory factor analysis was used to test all variables' construct validity,

and used the standard of good fit to determine whether the variable had good structural validity: χ^2/df is <3, root mean square error of approximation (RMSEA) is <0.05, Tucker-Lewis index (TLI) and comparative fit index (CFI) are over 0.90; thus all of the variables showed good convergent validity. The fit indices of this were $\chi^2/df=1.63$, $RMSEA=0.04$, $CFI=0.91$, $TLI=0.92$. Hence, this is an appropriate survey to measure feedback environment.

Feedback-seeking

According to self-motives theory research,²⁰ Callister, Kramer, and Turban's feedback-seeking scale was adopted in this questionnaire; this scale overcomes the limitations of Ashford and Ford's scale, which only distinguishes between observations and feedback seeking.³⁵ Callister et al.'s scale not only distinguishes between feedback monitoring and feedback inquiry but also further distinguishes between the different feedback sources: superiors and coworkers. Because we were focused only on coworker feedback monitoring, 3 questions were used for measuring it and only included one dimension. A sample item reads, "From their reactions, I can tell how well I am getting along with members of my work group". All items are rated on a 7-point Likert scale (1=strongly disagree; 7=strongly agree). In this study, Cronbach's alpha coefficient for the scale is 0.92. Construct validity analysis results showed that the fit indices were $\chi^2/df=1.31$, $RMSEA=0.04$, $CFI=0.94$, $TLI=0.93$.

Self-motivation

Based on self-motives theory, we used self-motivation questionnaire compiled by Gregg et al, which includes

four sub questionnaires corresponding to the four types of self-motivation: self-improvement, self-assessment, self-verification, and self-enhancement.²⁰ This scale was widely used for Chinese populations for its good reliability.³¹ According to the Gregg et al.'s requirements, this questionnaire cannot be added to the total score of self-motivation, and each dimension needs to be individually judged to determine the size of each motivation. Therefore, each motivation questionnaire comprises 2 questions arranged in a 7-point Likert-type scale for the self-assessment of employees. Cronbach's alpha for the measure of each motivation are 0.88, 0.90, 0.87 and 0.93. Construct validity analysis results showed that the fit indices were $\chi^2/df=1.64$, $RMSEA=0.05$, $CFI=0.91$, $TLI=0.91$.

Creative performance

Zhou and George developed the creativity scale,³⁶ which was the most widely used and tested creativity scale. It has been proved to have good internal consistency and reliability.³⁷ This scale has only one dimension and comprises 1 dimension which include 13 topics, the average of which is about employee creativity. Utilizing the aforementioned method of subjective evaluation of employee creativity, our questionnaire asked respondents to answer each item by using a 7-point Likert scale (1=strongly disagree; 5=strongly agree). A sample scale item reads, "Seeks out new technologies, processes, techniques and/or product ideas". The Cronbach's alpha for the measure of creativity was 0.92. Construct validity analysis results showed that the fit indices were $\chi^2/df=1.18$, $RMSEA=0.05$, $CFI=0.92$, $TLI=0.92$.

Control variables

As in prior studies, demographic variables, such as gender, age, job tenure, and education, were controlled by statistical control variables.³⁷

Results

Data analysis

Descriptive analyses were performed to describe the participants' demographic characteristics. Spearman's correlation coefficients were used to test the correlation among variables. Mplus 7.11 software was used to perform path analysis. According to the testing procedures for the comparison model, the coefficient multiplication method was utilized to verify the mediating effect. Finally, hierarchical regression was used to test the moderation effect of

feedback-seeking motives. Differences were considered statistically significant if the p -value was less than 0.05. A 95% CI (Confidence interval), excluding 0, indicated that the mediating or moderating role is significant.

Descriptive and correlation analyses

Descriptive and correlation analyses were carried out on the variables involved in this study. The mean value, standard deviation, and correlation coefficient are shown in Table 1. These values show that the coworker feedback environment is positively related to coworker feedback monitoring ($r=0.48$, $p<0.01$) and creativity ($r=0.36$, $p<0.01$). Coworker feedback monitoring is also positively related to creativity ($r=0.25$, $p<0.01$). There are significant correlations among the four types of self-motivation and creativity: self-verification ($r=0.22$, $p<0.01$), self-enhancement ($r=0.19$, $p<0.05$), self-assessment ($r=0.37$, $p<0.01$), and self-improvement ($r=0.28$, $p<0.01$). These correlations provide a good basis for the next step of verifying the intermediary role of the different forms of coworker feedback environment and the adjustment of different feedback-seeking motives. Additionally, demographic variables, such as gender, age, and education level, are controlled.

Direct effect test

The results in Table 2 show that a coworker feedback environment has a significant, direct influence on coworker feedback monitoring ($\beta=0.53$, $p<0.01$). The impact of the coworker feedback environment on creativity ($\beta=0.60$, $p<0.01$) is significant, thereby verifying hypothesis 1. When adding coworker feedback monitoring to the model, coworker feedback monitoring significantly predicted creativity ($\beta=0.18$, $p<0.05$), but the effect of the coworker feedback environment on creativity ($\beta=0.31$, $p<0.01$) declined. The results are basically supported that coworker feedback monitoring is a mediator between the coworker feedback environment and creativity.

Test of mediating effect

The structural equation model in the Mplus 7.11 software was used for testing. First, we established the non-mediating model, the partial-mediating model, and the full-mediating model through the comparison of model-fitting indexes; this comparison explores how well the model fits the actual data (Table 3). The results show that the partial-mediating model fits the data better than other nested models ($\chi^2/df=2.5$, $RMSEA=0.05$; $CFI=0.93$; $GFI=0.93$). The CFA results suggest that the

Table 1 Variable mean, standard deviation, correlation coefficient

Measure	1	2	3	4	5	6	7	8	9	10	11
1. Coworker feedback environment (T1)	–										
2. Self-enhancement motivation (T1)	0.32**	–									
3. Self-assessment motivation (T1)	0.31**	0.33**	–								
4. Self - verification motivation (T1)	0.35**	0.58**	0.32**	–							
5. Self-improvement motivation (T1)	0.29**	0.43**	0.60**	0.52**	–						
6. Coworker feedback monitoring (T2)	0.48**	0.51**	0.33**	0.28**	0.38**	–					
7. Creativity (T3)	0.36**	0.22**	0.19*	0.37**	0.28**	0.25**	–				
8. Gender	0.06	0.03	0.16*	–0.01	0.05	0.07	–0.16*	–			
9. Age	0.02	–0.08	–0.05	–0.06	–0.01	0.03	0.11*	–0.04	–		
10. Job tenure	0.08	0.01	0.04	0.01	0.08	0.09	0.05	–0.19*	0.08	–	
11. Education	0.11	0.02	0.02	0.10	0.01	–0.06	0.09	–0.12*	0.04	0.36**	–
M	4.72	5.01	5.74	5.11	5.18	5.23	4.21	–	2.21	2.49	–
SD	0.61	1.22	1.07	1.21	1.01	1.26	1.23	–	1.09	1.11	–
Potential range	1–7	1–7	1–7	1–7	1–7	1–7	1–7	1–2	1–5	1–5	1–3
Actual range	1.0–7.0	1.0–7.0	1.0–7.0	1.0–6.0	1.0–7.0	1.0–7.0	1.0–6.0	1.0–2.0	1.0–5.0	1.0–5.0	1.0–3.0

Notes: n=235. *p<0.05. **p<0.001.

Abbreviation: T, time.

Table 2 Regression results for relevant variables at different time (T) points

Independent variable	Dependent variable		
	Coworker feedback monitoring (T2)	Creativity (T3)	Creativity (T3)
Intercept	1.79**	1.57**	1.55**
Coworker feedback environment (T1)	0.53**	0.60**	0.31*
Coworker feedback monitoring (T2)			0.18*
R	0.17	0.19	0.02
F	10.38**	12.79**	8.87**

Notes: n=235. *p<0.05. **p<0.001. The numerical value in the table is a fully normalized path coefficient, indicating the variation of the endogenous latent variables being interpreted by exogenous latent variables.

Abbreviation: T, time.

Table 3 Comparison of structural equation

Path model	χ^2	df	χ^2/df	CFI	TLI	GFI	RMSEA	SRMR
Finding Inter-mediator Variables with coworker feedback monitoring								
Model 1 (Partial intermediary model)	182.63	73	2.50	0.93	0.91	0.93	0.05	0.03
Model 2 (fully mediated model)	221.75	74	3.00	0.81	0.79	0.78	0.09	0.08
Model 3 (Non-intermediary model)	269.15	72	3.74	0.75	0.76	0.72	0.13	0.09

respondents could clearly distinguish the constructs under study. Table 3 shows that the partial-mediating model fits best.

Mplus 7.11 software was used for bootstrap analysis, wherein a random sample of 5000 samples showed that the coworker feedback environment through feedback monitoring has an indirect effect on creativity at the 95% confidence interval (CI [0.02, 0.22]), which does not

include 0 (Table 4). The indirect effect and coworker feedback monitoring has a mediating effect on the impact of coworker feedback environment on creativity. Therefore, hypothesis 2 is supported.

Moderation effect test

According to the type of self-motivation, feedback seeking has a moderating relationship with creativity. The analysis

Table 4 Regression results of mediation analysis

Independent variable	Mediator variable	Dependent variable	Completely standardized indirect effect	BOOT SE	95% CI	
					LL	UL
Feedback environment (T1)	Co-worker feedback monitoring (T2)	Creativity (T3)	0.15	0.06	0.02	0.22

Abbreviations: T, time; CI, confidence interval; LL, lower limit; UL, upper limit.

results (Table 5) show that in Model 2, the coworker feedback's regression coefficient (T2) and self-assessment motivation's regression coefficient (T1) ($\beta = -0.13, p < 0.01$) have a significant interaction effect on creativity; the interaction of the other three models were not significant, indicating that the relationship between feedback monitoring and creativity is moderated by self-assessment motivation.

The relationship between the types of feedback seeking and creativity are plotted in the figures, which include the self-assessment motives of coworkers (Figure 2). It is evident that when self-assessment motives rise from a low to a high level, the relationship between coworker feedback monitoring and creativity is a straight line with a relatively steep slope that is positive ($k = 0.42, p < 0.01$) and a linear change that is relatively gentle ($k = 0.15, ns$); the steep slope and gentle linear change symbolize the higher self-assessment motives. The positive relationship between coworker feedback monitoring and creativity is weaker. The Johnson-Neyman method analysis shows that

self-assessment motivation has a value of less than 6.64. The relationship between coworker feedback monitoring and creativity is significant, wherein 78.29% subjects in this study stated that coworkers' feedback has a strong and significant positive effect on creativity. This provides the basis of the next test for evidence of a conditioning role.

According to the researchers, suggested steps, the effects of interaction on the first step, the interaction between self-assessment motivation and coworker feedback monitoring ($\beta = -0.12, p < 0.01$) and the impact of this interaction on creative feedback is significant under environmental impact test conditions. The second step is evaluating the indirect effect of this interaction (Table 6); when self-assessment motivation is low, the feedback environment has an indirect effect of 0.19 on creativity through feedback monitoring (CI [0.06, 0.36]); when the self-assessment motivation is moderate, the feedback environment influences the indirect effect of creativity by 0.10 through feedback monitoring (CI [-0.04, 0.23]). When

Table 5 Regression analysis of the adjustment effect test of self-motivation

Measure	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	3.42**	-0.50	3.68	1.96	-2.43
Coworker feedback environment (T1)					0.29**
Coworker feedback monitoring (T2)	0.09	0.17*	-0.08	0.17*	0.16*
Self-enhancement motivation (T1)	0.07				
Self-assessment motivation (T1)		0.12*			0.10*
Self-verification motivation (T1)			0.07		
Self-improvement motivation (T1)				0.04	
Co-worker feedback monitoring (T2) × self-enhancement motivation (T1)	0.02				
Co-worker feedback monitoring (T2) × self-assessment motivation (T1)		-0.13**			-0.12**
Co-worker feedback monitoring (T2) × self-verification motivation (T1)			0.06		
Co-worker feedback monitoring (T2) × self-improvement motivation (T1)				-0.01	
R ²	0.12	0.13	0.21	0.15	0.20
△R ²	0.01	0.02	0.01	0.01	0.07
F	0.11	4.44**	1.63	0.06	7.10**

Notes: $n = 235$. * $p < 0.05$. ** $p < 0.01$.

Abbreviation: T, time.

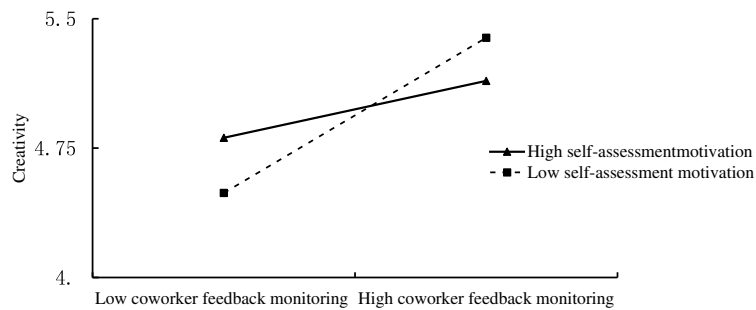


Figure 2 Simple slopes of coworker feedback environment predicting creativity at low (one SD below M) and high (one SD above M) levels of self-assessment motivation.

Table 6 Test result of condition indirect effect

Moderation variable		Indirect effect of condition				Moderated mediation effect			
		Effect	SE	Min	Max	Index	SE	LL CI	UL CI
Self assessment motivation	Low	0.19	0.08	0.06	0.36	-0.08	0.05	-0.19	-0.01
	Mid	0.10	0.07	-0.04	0.23				
	High	0.01	0.09	-0.17	0.17				

Abbreviations: CI, confidence interval; LL, lower limit; UL, upper limit.

self-assessment motivation is high, the creative environment and feedback monitoring have an indirect effect of 0.01 on creativity through coworker feedback monitoring (CI [-0.17, 0.17]). The results show that a creative feedback environment and coworker feedback monitoring have an indirect and significant effect on creativity only when self-assessment motivation is low. The index of moderated mediation effect is -0.08 (CI [-0.19, -0.01]), and because the confidence interval does not contain 0, the mediating effect is significant. Therefore, hypothesis 3 is partially supported, and hypothesis 4 is not supported.

In summary, this study validates the following model (Figure 3).

Discussion

Based on self-motives theory and the recommendations of previous researchers,⁹ the results show that the coworker feedback environment leads to creativity through coworker feedback monitoring, and when self-assessment motivation

is lower, the positive relationship between coworker feedback monitoring and creativity becomes stronger.

First, we found that the coworker feedback environment positively impacts creativity. In organizational psychology and behavior research, this finding echoes the established notion that in a supportive feedback environment, employees engage in feedback seeking and receive more supportive, high-quality feedback. Coworkers convey information to employees in a way that considers the employees' feelings, making it easier for employees to accept feedback and further increase their creativity.²⁸

Second, coworker feedback monitoring mediates the relationship between the coworker feedback environment and creativity. This impact path is similar to that described by Dahling et al, where feedback seeking has a mediator between feedback quality and performance.²⁹ The supportive feedback environment is negatively related to the perceived cost of feedback-seeking, the alleviation of which leads to frequent feedback-seeking behavior.²¹ In

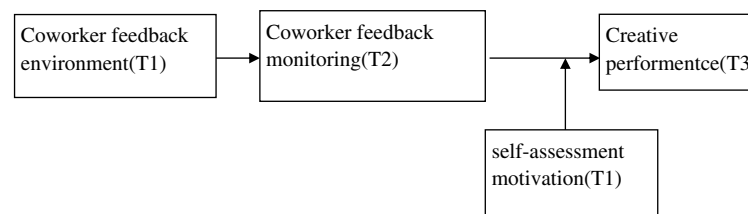


Figure 3 The validated model.

China, a society with such a high face culture, employees are more likely to adopt feedback monitoring. The fact that individuals in China pay more attention to the face or ego should be considered in peer feedback. When individuals seek feedback, they can use feedback monitoring to increase their abilities without losing face, while creativity is significantly enhanced when individuals communicate with others frequently at work.³⁸ Moreover, frequent feedback can provide useful suggestions for improving individuals' work. These suggestions also provide individuals with different perspectives and can help them produce more interesting ideas, thereby enhancing creativity.²¹

Last, feedback monitoring was positively associated with creativity only for subordinates with a low level of self-assessment motivation. Feedback monitoring that arises from honesty and not tactics can enhance positive behavior and produce real individual growth, while individuals with a self-assessment motivation can focus on how they appear in the eyes of others and reducing uncertainty.¹⁹ In agreement with much past research, when a feedback seeker asks for help with high self-assessment motivation, he/she feels great pressure to reward the feedback giver, and this pressure makes the seeker more willing to help in the future.¹² Since providing feedback takes much effort and time, the more people seek to repay others for their feedback, the more positive the relationship is between feedback-seeking behavior and creativity.²⁰ Furthermore, persons who try to use feedback to assess performance suffer from an increased affective load, and an affective load decreases creativity.³⁸ An individuals whose feedback-seeking motivation originates from a desire to manage social impressions and their public image are not interested in learning, improving their performance, or correcting potential mistakes,³⁸ thereby likely weakening the impact of feedback-seeking behavior on creativity.

Theoretical contribution

First, beyond single feedback intervention, this study explored the impact of a coworker feedback environment on creativity from a more comprehensive perspective. While previous studies have explored the impact of certain dimensions of feedback on creativity performance, it is difficult to reach a consistent conclusion due to the lack of comprehensiveness. As a more comprehensive concept, the feedback environment reflects the entire concept of feedback, and beyond feedback itself. The feedback environment has a positive effect on clarifying performance standards, improving work performance, and increasing

employees' sense of identity, and the impact of feedback seeking on creativity is consistent with that shown in the results of previous studies.³⁸

Second, this study differentiated between the different roles of the two feedback-seeking mechanisms in the measurement to overcome the limitation of previous research, which did not differentiate between the two feedback-seeking mechanisms or only emphasized the feedback inquiry. The conclusion of this study is similar to that of Dahling et al.²⁹ However, Dahling et al only considered the feedback inquiry and did not determine whether the object of the feedback seeking was a supervisor or a coworker, thereby ignoring an important form of feedback seeking and obscuring the cost of feedback seeking.²⁹ Although some studies have explored the action mechanism of seeking feedback, the focus has been only on feedback inquiry, while the role of feedback monitoring has been neglected. Perhaps for China, a society with such a high face culture, employees are more likely to adopt feedback monitoring.³⁹ Based on the above analysis, this study accurately analyzes the path of the impact of the coworker feedback environment on creativity. Since individuals in China pay more attention to the face or ego, this factor should be considered in peer feedback. When coworkers seek feedback, they can use feedback monitoring to increase their abilities without losing face.

Third, based on self-motivation, the conditions in which different feedback-seeking behaviors play an active role are supported. Regarding the feedback-seeking motivation results, although previous research has discussed the positive correlation between inquiry feedback seeking and performance evaluation, it was found that feedback leads to reduced individual creativity; in addition, too much information may be acquired in seeking feedback, thereby causing information redundancy.²⁰ Therefore, it is important not only to discuss how to improve creativity when solving the problem of employee demand but also to explore the positive role of feedback. Since motivation is the direct reason to promote people's activities, the main focus is on feedback-seeking motivation; further, it is thought that the occurrence and effect of feedback seeking is closely related to the seeking motivation.³¹

The motivation of individuals seeking feedback from coworkers through observation is derived from self-verification motivation and self-enhancement motivation. As a result, the purpose of individual information screening and analysis is different from that of the feedback sender, and the accuracy of information sought by coworkers through observational

feedback can hardly be guaranteed. Self-assessment motivation refers to the motives for self-evaluation. A self-assessment motive is the same as the term self-concept, and self-evaluation motivation is more sensitive to the original self-concept.²⁰ Individuals with self-evaluation motivation prefer accurate external feedback. If they get external evaluations of their abilities, characteristics, appearance and personality that conflict with their self-evaluations,²⁰ they will have information redundancy. The information redundancy brought by feedback information will cause individuals to focus on processing information conflicts, leading to distraction.¹¹ Thus, when self-assessment motivations are lower, the positive relationship between coworker feedback monitoring and creativity becomes stronger.

Practical contribution

Feedback environment is constructive when it offers concrete information that can be used. The intent is to help—that is, to maintain, correct, or improve behavior. Constructive coworker feedback environment takes into account the recipients' ability to comprehend and absorb the information and addresses elements of performance that contribute to task success and that are under the recipient's control.

Self-assessments are more likely to be accurate when they are based on easily measureable, objective criteria, not surprisingly. When self-perceptions agree with evaluations from others, people are more likely to accept the feedback. However, they may not learn from the feedback and change their behavior as a result. Favorable ratings suggest no change is needed. Unfavorable ratings may merely affirm the receivers' low self-perception. So the receiver may not take action to change behavior even though such action is called for.

People who underestimate their performance in the eyes of others may adjust their self-perceptions upward but not change their behavior. People who over-estimate their performance may have trouble facing facts and may look for ways to deny or rationalize the negative feedback. Specific feedback is likely to increase the likelihood that the feedback recipient will take action to change his or her behavior and improve his or her creativity. However, feedback is likely to be infrequent and subjective, and therefore easily ignored as inaccurate and not to be trusted.

Limitations and future research

This study has several limitations, which indicate the direction for future research. First, this study focuses on the impact of four kinds of self-motivation. Feedback researchers have identified various types of motivations that can

affect feedback-seeking behavior, but empirical research on the interaction between multiple motivations is still limited. Future studies should focus on how to elicit feedback-seeking motivation and avoid other theoretical motivations that prevent feedback seeking. Furthermore, future research must determine how to motivate and develop feedback-seeking and feedback-providing behavior and determine the impact of this behavior on work practices.

Second, the dynamic emotional mechanism of the impact of the feedback environment on creativity needs to be further explored. Previous studies regarding the impact of a feedback environment often discuss the motivation mechanism; however, a more direct consequence of a feedback environment is a strong emotional response from employees, which affects creativity.⁴⁰ Therefore, emotional motivation may be the link between situational factors and behavior. The interpersonal interactions involved in a feedback environment can cause an individual's emotions to change quickly during the creativity process.⁴⁰ Since the emotional changes caused by individuals' focus and mindset changes affect feedback-seeking behavior, two studies were analyzed based on the same framework, and future research must study this dynamic mechanism in further detail.

Third, although this study incorporated the cognitive processing of feedback into information into the motivation process, this study does not verify whether this motivation process was successful. It is very important to determine whether cognitive processes play a positive or a negative role in the various feedback-seeking methods. Studies have shown that when employees cannot judge a situation, the cost of a proactive personality is inversely proportional to job satisfaction. Consequently, they will face more interpersonal conflicts, and the matching of personal organizations can ensure positive proactive behavior, while antisocial behavior has a destructive effect on individuals, the society, and organizations. Researchers have also found that when individuals are under constant pressure to demonstrate proactive self-help behaviors and experience work overload and work-life balance conflicts, proactive behaviors tend to decline over time.⁴¹ Therefore, future research should examine not only the positive role of feedback seeking but also its drawbacks.

Conclusion

It was suggested that a coworker feedback environment could improve employee creativity by promoting coworker feedback monitoring; creativity could be improved especially among employees who have lower self-assessment motivation.

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Author contributions

All authors contributed to data analysis, drafting or revising the article, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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