



## Basic psychological needs satisfaction mediation of the relationship between kindergarten error management climate and creative teaching

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**Abstract:** The present study aimed to examine the association between kindergarten error management climate and creative teaching and the mediating role of basic psychological needs satisfaction. A sample of 561 Chinese kindergarten teachers (females = 98%,  $M_{\text{age}} = 34.32$ ,  $SD = 1.25$ ) completed self-reported questionnaires on their work error management atmosphere, basic psychological needs satisfaction, and innovative teaching. The results structural equation modelling path analysis showed that high kindergarten error management climate was associated with higher innovative teaching. Moreover, the need for competence, but not the need for relatedness accounted for kindergarten error management atmosphere related to the teachers' innovative teaching. These results clarify the role of self-perceived competencies in the relationship between kindergarten teacher error management climate and creative teaching prospects important for teacher development and supervision.

**Keywords:** error management climate; creative teaching; basic psychological needs satisfaction; kindergarten teachers

### Introduction

Strategic error management plays a critical role in enhancing organizational competitiveness and fostering continuous improvement (Guchait et al., 2015). Among educators, the workplace climate significantly influences how errors are managed, which in turn is closely linked to the adoption of novel, original, and creative teaching approaches (Gunawan & Shieh, 2016). In kindergarten settings, teachers who effectively manage errors are more likely to engage in innovative, child-centered teaching practices. However, research specifically examining the relationship between the error management climate in kindergartens and creative teaching—particularly considering the mediating role of basic psychological needs satisfaction—is still scarce. Therefore, the present study seeks to investigate how the kindergarten error management climate impacts creative teaching and the extent to which this relationship is mediated by teachers' fulfillment of their basic psychological needs.

### Error management climate and teacher creativity

Error management climate refers to an organizational environment that promotes the sharing of knowledge about errors and fosters collective efforts to identify, discuss, and learn from mistakes (Guchait et al., 2015). Innovative teaching involves creatively achieving instructional goals through a variety of strategies, including interactive discussions, open-mindedness, problem-solving activities, diversified teaching methods, and fostering self-directed learning (Gunawan & Shieh, 2016; Huang et al., 2019). Prior studies suggest that the organizational climate in which teachers operate plays a critical role in shaping their innovative behaviors (Chen & Hu, 2008; Hou, 2018).

A supportive and positive work climate encourages the adoption of innovative teaching practices (Hou,

2018; McGeown, 1980; Ucus & Acar, 2018). In particular, a positive error management climate has been found to facilitate creative teaching behaviors, whereas a negative climate inhibits such innovation. Empirical evidence indicates a significant positive correlation between error management climate and teachers' innovative behaviors, with specific elements such as error handling, error anticipation, error-related stress, and overall error management demonstrating predictive effects on innovation (Qian & Wei, 2017; Zhang et al., 2010). Based on these findings, it is reasonable to propose that the error management climate in kindergartens is closely associated with kindergarten teachers' engagement in creative teaching practices.

Innovation inherently involves uncertainty and the possibility of making mistakes—an idea famously described as “feeling one's way across a river by touching the stones” (Zhao et al., 2013). An individual's work environment, especially the organizational climate, has been consistently shown to influence innovative work behaviors (Chen & Hu, 2008; Hou, 2018; Messmann & Mulder, R. H. 2011). Within this context, the role of error management climate is particularly noteworthy. Characterized by open communication and mutual support in addressing mistakes, error management climate is typically conceptualized along dimensions such as error learning, error thinking, error communication, and error handling (Cigularov et al., 2010). Studies consistently report a positive relationship between a strong error management climate and increased innovative behavior (Qian & Wei, 2017).

### The mediating role of basic psychological needs satisfaction

Basic psychological needs encompass three core elements: autonomy (the desire to act according to one's own volition), competence (the motivation to meet challenges and



achieve mastery using one's abilities), and relatedness (the desire to feel connected and supported within positive relationships) (Deci & Ryan, 2000). The satisfaction of these needs may serve as an important mediator between the error management climate and innovative teaching. In supportive organizational environments, basic psychological needs are more likely to be fulfilled (Zhao & Xu, 2018), which, in turn, facilitates greater creativity, adaptability, and effectiveness in completing complex work tasks (Gagné & Deci, 2005; Biennewies & Gromer, 2012).

### *The present study*

Drawing upon self-determination theory and existing empirical research, the present study examines the mediating role of basic psychological needs satisfaction in the relationship between kindergarten error management climate and teachers' creative teaching behaviors within the Chinese kindergarten context. Specifically, we propose the following hypotheses:

H1: A supportive kindergarten error management climate is positively associated with higher levels of creative teaching among kindergarten teachers.

H2: Satisfaction of basic psychological needs mediates the relationship between kindergarten error management climate and creative teaching, strengthening the positive association.

## **Methods**

### *Participants and setting*

The participants were 586 kindergarten teachers (98% female;  $M_{\text{age}} = 34.32$  years,  $SD = 1.25$ ) recruited from seven provinces in China: Beijing, Jiangsu, Guangdong, Jilin, Gansu, Sichuan, and Henan. Regarding the geographical location of their kindergartens, 503 teachers worked in urban areas, while 58 teachers worked in township areas. In terms of educational attainment, 201 participants held an associate degree or lower, 336 held a bachelor's degree, and 24 held a postgraduate degree or higher. With respect to teaching experience, 243 participants had between 6 and 15 years of teaching experience, and 80 participants had 16 or more years of teaching experience.

### *Measures*

**Creative Teaching Behavior.** Kindergarten teachers' creative teaching behavior was assessed using the Creative Teaching Behavior of Kindergarten Teachers scale (CTBKT; Gunawan & Shieh, 2016). The CTBKT consists of 20 items across five subscales: (1) interactive discussion (3 items; e.g., "I often use group discussions and brainstorming to stimulate novel ideas in young children"); (2) open-mindedness (3 items; e.g., "I always encourage young children to be open-minded to different ideas"); (3) problem-solving (5 items; e.g., "I often design problem-based scenarios to develop problem-solving skills in young children"); (4) pluralistic education (3 items; e.g., "I usually provide multiple answers to children's questions, guiding them to see things from different perspectives"); and (5) self-directed learning (6 items; e.g., "I often encourage children to self-evaluate in order to promote

their autonomy"). Participants rated each item on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater levels of creative teaching behavior. The CTBKT has demonstrated good validity among Chinese populations (Huang & Ye, 2008). In the present study, the Cronbach's alpha coefficient for the total scale was 0.98.

**Error Management Climate.** The error management climate in kindergartens was measured using the Error Management Climate scale (EMCK; Cigularov et al., 2010), adapted for the kindergarten context. The EMCK comprises 16 items across four dimensions: (1) learning from errors (4 items; e.g., "For us, errors in our work help to improve the process of work"); (2) thinking about errors (5 items; e.g., "If something goes wrong at work, we take the time to think about it"); (3) error competence (3 items; e.g., "After making a mistake at work, we ask our colleagues in the kindergarten for advice on how to follow up"); and (4) error communication (4 items; e.g., "We usually know how to react and deal with errors at work"). Items were rated on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree), with higher scores reflecting a more supportive error management climate.

Previous studies have supported the scale's reliability and validity in Chinese samples (Chen & Hu, 2008). In the current study, the Cronbach's alpha for the EMCK was 0.95.

**Basic Psychological Needs Satisfaction.** Basic psychological needs satisfaction was measured using the Chinese version of the Basic Psychological Needs Satisfaction Scale (BPNSS; Zhao & Fu, 2018; originally developed by Van den Broeck et al. (2010)). The scale assesses three dimensions: (1) autonomy (4 items; e.g., "I'm free to do my job the way I think best"); (2) competence (4 items; e.g., "I think I can do my job well"); and (3) relatedness (4 items; e.g., "At work, I feel like I'm part of the team"). Each item was rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher average scores indicate greater satisfaction of the corresponding basic psychological need. In this study, the Cronbach's alpha coefficients for the autonomy, competence, and relatedness subscales were 0.75, 0.91, and 0.83, respectively.

### *Procedure*

The study was approved by the Research Ethics Committee of Jiangxi Science and Technology Normal University. Permission to conduct the research was obtained from school administrators. All participating teachers provided informed consent prior to participation.

The survey was administered online via Wenjuanxing ([www.wjx.cn](http://www.wjx.cn)), a widely used data collection platform in China. Participants completed the questionnaires anonymously.

### *Data analysis*

Descriptive statistics and correlation analyses were conducted using SPSS 26.0. Structural equation modeling (SEM) was performed using Mplus 8.3 to test the hypothesized mediation model. The three key variables included in the SEM were error management climate, basic

**Table 1.** Means, standard deviations, and correlations of main variables

	<i>M</i> ± <i>SD</i>	1	2	3	4
1. Error management climate	4.40 ± 0.55	–			
2. Autonomy	3.67 ± 0.66	0.47**	–		
3. Relatedness	4.31 ± 0.64	0.62**	0.68**	–	
4. Competence	4.26 ± 0.65	0.55**	0.64**	0.70**	–
5. Creative teaching	4.38 ± 0.58	0.67**	0.53**	0.67**	0.70**

Note. \*\* $p < 0.01$ .

psychological needs satisfaction, and creative teaching behavior. Model fit was evaluated using several indices: chi-square ( $\chi^2$ ), Tucker–Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). A good model fit is typically indicated by a non-significant chi-square value; acceptable model fit criteria were set as TLI and CFI  $> 0.90$ , RMSEA  $< 0.05$ , and SRMR  $< 0.10$  (Preacher & Hayes, 2008). The direct, indirect, and total effects of error management climate on creative teaching behavior were estimated, controlling for teachers' age, gender, years of teaching experience, and school location (urban vs. rural). An effect was considered statistically significant if the 95% bootstrap confidence interval (CI), based on 1000 bootstrap samples, did not include zero (Wen & Ye, 2018).

## Results

Table 1 presents the descriptive statistics for the study variables. The correlations among error management climate, creative teaching, and three dimensions of basic psychological needs (i.e., autonomy, relatedness, and competence) were statistically significant, and in the expected directions.

### Direct effects of error management climate on creative teaching

Prior to the analysis of the indirect model, we analysed the direct effects of error management climate on creative teaching. The model revealed an acceptable fit to the data as follows:  $\chi^2/df = 23.92$ , CFI = 0.97, TLI = 0.96,

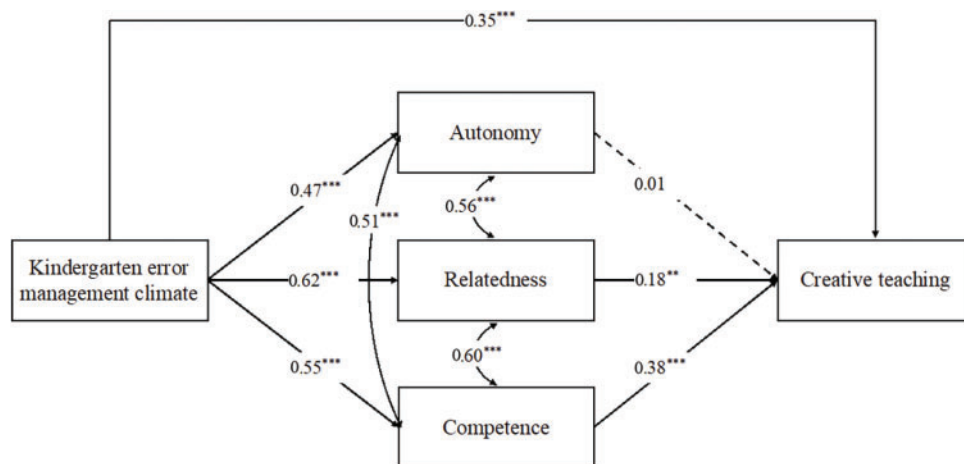
RMSEA = 0.02, SRMR = 0.01. The results revealed that error management climate had a positive, significant effect on creative teaching ( $\beta = 0.35$ ,  $p < 0.05$ ), which supported Hypothesis 1.

### Basic psychological needs mediation

A mediation model was tested with error management climate as the independent variable, three dimensions of basic psychological needs (i.e., autonomy, relatedness, and competence) as the mediating variables, and creative teaching as the dependent variable. The results showed that the model fit the data well,  $\chi^2/df = 26.21$ , CFI = 0.99, TLI = 0.94, RMSEA = 0.01, 95% CI = [0.079, 0.161], SRMR = 0.04. Standardized coefficients for the structural paths are presented in Figure 1. An examination of the specific indirect effect indicated that two dimensions of basic psychological needs (i.e., relatedness and competence) were significant mediators of the relationship between error management climate and creative teaching. (Table 2). Specifically, the indirect effects of error management climate on creative teaching via relatedness ( $\beta = 0.11$ , 95% CI [0.03, 0.18]) and competence ( $\beta = 0.21$ , 95% CI [0.13, 0.27]) were significant. The total indirect effect of error management climate on creative teaching was 0.32, which accounted for 48.48% of the total effect. These results supported Hypothesis 2.

## Discussion

The findings of this study indicate that a positive error management climate in kindergartens is associated with higher levels of creative teaching, supporting



**Figure 1.** Multiple mediating effects model after controlling gender and grade. The numbers in the model are standardized predictive coefficients. \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

**Table 2.** Bootstrap analyses of the magnitude and statistical significance of indirect effects

Model pathways	Estimate	SE	95% CI
Error management climate → Creative teaching (total effect)	0.66	0.04	[0.59, 0.73]
Error management climate → Creative teaching (direct effect)	0.35	0.06	[0.24, 0.50]
Error management climate → Creative teaching (total indirect effect)	0.32	0.04	[0.25, 0.42]
Error management climate → Autonomy → Creative teaching	0.00	0.02	[−0.04, 0.04]
Error management climate → Relatedness → Creative teaching	0.11	0.04	[0.03, 0.18]
Error management climate → Competence → Creative teaching	0.21	0.04	[0.13, 0.27]

*Note.* Indirect pathways are significant based on the bias-corrected bootstrapped 95% CI.

Hypothesis 1 and aligning with previous research (Bell & Kozlowski, 2008; Bledow et al., 2009). Specifically, when kindergartens foster a supportive error management climate, teachers are more likely to engage in creative teaching behaviors (Frese et al., 2007). In the Chinese context, a positive error management climate appears to be crucial for promoting teachers' creative practices, allowing for more effective error correction and innovation. Conversely, a negative climate may foster fear of errors, thereby hindering innovation in teaching.

Moreover, this study reveals that the relationship between error management climate and creative teaching is mediated by the satisfaction of relatedness needs. Kindergartens that encourage open communication and collaboration among teachers enhance feelings of being understood and cared for, thus satisfying teachers' relatedness needs (Zheng & Cai, 2020). In turn, this sense of relatedness fosters greater innovation in teaching. These findings are consistent with prior research (Zhao & Xu, 2018).

In addition, competence needs satisfaction also mediated the relationship between error management climate and creative teaching, consistent with previous findings (Zhao & Xu, 2018). A supportive error management climate can alleviate the frustration associated with mistakes, enhance teachers' self-efficacy (Guchait et al., 2014), and promote the fulfillment of competence needs, ultimately facilitating higher levels of creative teaching behaviors.

However, autonomy needs satisfaction did not significantly mediate the relationship. This result may reflect the traditional hierarchical structure in Chinese kindergartens, where teachers are expected to closely follow institutional guidelines with limited autonomy (Zhang, 2018). In such environments, teachers' need for autonomy is less pronounced, and opportunities for independent decision-making in teaching practices are relatively scarce, thus limiting the mediating role of autonomy in creative teaching.

### **Implications for research and practice**

This study is the first to use structural equation modeling to examine the mediating role of basic psychological needs satisfaction in the relationship between error management climate and teachers' creative teaching behavior in kindergartens. By distinguishing the dimensions of basic psychological needs, this research offers a more nuanced understanding of how different needs influence

creative teaching, providing valuable insights for theory development.

Practically, the findings highlight the importance of fostering a positive error management climate in kindergartens. Given that errors are inevitable in educational practice, creating an environment that views mistakes as opportunities for learning and innovation can facilitate creative teaching. Furthermore, satisfying teachers' basic psychological needs, particularly relatedness and competence, is critical for promoting intrinsic motivation and innovative behaviors (Gagné & Deci, 2005; Zhao & Xu, 2018). Educational leaders should thus prioritize strategies that enhance interpersonal support and teachers' perceived competence in their professional development programs.

### **Limitations and future directions**

Despite its contributions, this study has several limitations. First, the cross-sectional design precludes causal inferences. Future research should employ longitudinal or experimental designs to better examine the causal relationships among error management climate, psychological needs satisfaction, and creative teaching. Second, the reliance on self-report measures may introduce biases. Future studies could incorporate observational methods or multi-informant assessments to improve the objectivity and validity of the findings.

### **Conclusion**

This study demonstrates that a positive error management climate in kindergartens is positively associated with creative teaching among Chinese kindergarten teachers. Furthermore, relatedness and competence need satisfaction mediate this relationship, whereas autonomy needs satisfaction does not play a significant mediating role. By differentiating the three subdimensions of basic psychological needs satisfaction, this study deepens the understanding of how distinct psychological needs influence creative teaching behavior. These findings contribute to existing literature by clarifying the mechanisms through which error management climate impacts creative teaching, and they provide valuable guidance for fostering more innovative educational environments.

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**Availability of Data and Materials:** Data available on request from the authors. The data that support the findings of this study are available from the corresponding author, Ping Li, upon reasonable request.

**Ethics Approval:** This study was approved by the Research Ethics Committee of Jiangxi Science & Technology Normal University and the principals of the participating schools.

**Conflicts of Interest:** The authors declare no conflicts of interest to report regarding the present study.

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