



WEINA LEI
WENBODENG
RONGJUAN ZHU
MARK A. RUNCO
DAVID YUNDAI
WEIPING HU

Does Cognitive Style Moderate Expected Evaluation and Adolescents' Creative Performance: An Empirical Study

ABSTRACT

Two studies investigated the effects of cognitive and school environmental factors on adolescents' creative performance. The first study tested the effects of expected evaluation and cognitive style on creativity among 89 high school students. The second study tested the effects of evaluation type and cognitive style on creativity among 92 high school students. Study 1 found main effects of expected evaluation and cognitive style on creativity. The interaction between expected evaluation and cognitive style was statistically significant. Under an experimental condition of expected evaluation, field-dependent adolescents performed more creatively (i.e., higher originality) than those without expected evaluation. Study 2 uncovered main effects of expected evaluation type and cognitive style on creativity but no interactions between expected evaluation type and cognitive style. Adolescents performed better on the dimension of flexibility in a controlling evaluation condition, compared with adolescents in informational evaluation condition, and field-independent adolescents showed more fluency and originality than field-dependent adolescents. Together, this research provides a better understanding of the effects of expected evaluation and cognitive style on adolescents' creative performance. Implications for further research are discussed.

Keywords: expected evaluation, evaluation type, cognitive style, creative performance.

INTRODUCTION

The cultivation of adolescents' creative talents has gained increasing worldwide attention, especially in China. Creativity is often defined as the ability to produce novel and appropriate ideas and products (Amabile, 1988; Sternberg & Lubart, 1999). Most researchers in creativity education consider that adolescents' creativity ability could be nurtured in school, who have been devoting themselves to find effective ways to cultivate adolescents' creativity from both theoretical and practical perspective (Hu et al., 2013; Niu & Liu, 2009; Yi et al., 2013). One of the findings is that inspiring students' intrinsic motivation is beneficial for creative performance. However, there are always disputes regarding the relationship between extrinsic motivation and creativity (Vallerand, 1997). One possible reason maybe the culture differences; some researchers have suggested that extrinsic motivation could facilitate creative performance in eastern cultures (Liu, Niu & Day, 2010; Niu & Kaufman, 2013; Pang & Plucker, 2012; Xue, et al., 2018). The other reason maybe the interaction between extrinsic motivation and individual differences is complicated. Researchers have explored the common effects of individual variables such as gender, personality, and extrinsic motivation on creativity (Baer, 1998; Sung & Choi, 2009). Cognitive style is also an important individual factor influence creativity thinking (Miller, 2007; Qu & Shi, 2005), as does the factors in school environment, which are important extrinsic motivators (Besancon, Fenouillet & Shankland, 2015; Mellou, 1996; Niu & Liu, 2009; Niu & Sternberg, 2003). However, the common effect of individual cognitive style and extrinsic motivation on adolescents' creativity and the interaction between them is still unclear.

Researchers have been looking closely at which factors in the school environment are most important for creativity (Hu, 2010; Hu & Han, 2015; Ogletree, 2000). One of the external factors is teachers' evaluations, which is thought as a very important extrinsic motivator inspired intrinsic motivation (Kong & Liu, 2018; Xue et al., 2018).

Expected evaluation refers to individual expectation of being assessed when performing (Amabile, 1993; Wang et al., 2016). There are substantial studies demonstrating that expected evaluation could influence individual creative performance. However, there is no consensus whether expected evaluation could facilitate or inhibit creative performance. Rather, researchers have presented different views about the effect of expected evaluation on creativity. Some researchers believed that expected evaluation impaired creativity (Amabile, 1979; Amabile, Goldfarb, & Brackfield, 1990; Bartis et al., 1988; Heyman & Dweck, 1992; Hu et al., 2018). Some research findings are at variance with this point of view in that expected evaluation sometimes can facilitate creativity (e.g., Qu & Shi, 2005; Shalley, 1995; Xue et al., 2018; Yuan & Zhou, 2008). For instance, Shalley (1995) found individuals showed higher creativity with expected evaluation when they worked individually. Xue et al. (2018) found that expected evaluation had significant positive effects on artistic creativity.

The main reason for the inconsistency of the above results seems to be that these studies only examined the effect of expected evaluation and rarely tested individual difference variables and the interaction between them. Recently, researchers have begun to take individual difference variables into consideration (Hu et al., 2018; Miller, 2007; Qu & Shi, 2005; Wang et al., 2016).

Field dependence–independence cognitive style was an important cognitive factor and individual difference variable influencing creativity (Hu et al., 2017; Miller, 2007; Qu & Shi, 2005). Cognitive style refers to the preferred way individuals (e.g., adolescents) process information or the different ways in which they think and learn (Mefoh et al., 2017; Witkin, 1976). According to the theory of cognitive style theory, field-dependence cognitive style means that individuals rely more on the external reference of their surroundings to define knowledge and information in the stimulation of the environment; field-independence cognitive style means that individuals are accustomed to making independent judgments, not easily affected by external factors and rely more on their own internal reference (Mefoh & Ezech, 2016; Messick, 1976; Warpner, 1986). Field-independent adolescents are generally described as having higher creativity, flexible thinking, and as more capable of breaking the routine, and generating novel ideas; field-dependent adolescents are generally described as having lower creativity, fossilized thinking, and as more inclined to complying with the rules, and generating ordinary ideas (Onyekuru, 2015).

Although both expected evaluation and cognitive style appear to be important for creativity, empirical research on the interaction of these two factors is limited. Qu and Shi (2005), for example, examined the effects of the expected evaluation on children's linguistic creativity and looked at cognitive factors such as field dependence–independence. The results indicated that in expected evaluation condition, field-dependent children showed greater creativity than field-independent children. The participants were children, however, so the relevance of these two factors on adolescents' creativity is still unclear.

Miller (2007) tested expected evaluation and cognitive style but the interaction was not significant. One reason may be related to domain-specific creativity. In Miller's study, a collage-making task was used to test the artistic creativity. Domain-general creative performance may be different from the domain-specific (Plucker, 1998). The other reason maybe that the task the participants took part in was the course requirement; they might have neglected the role of the expected evaluation. Considering the importance of teachers' evaluation on students in China, it seems worthwhile to look more closely for possible interactions. The present study was conducted with this cultural context in mind, to re-examine the interaction between the expected evaluation and cognitive style on adolescents' creative performance.

According to the cognitive evaluation theory (Deci & Ryan, 1980, 1985), evaluation can be either informational or controlling. Thus, another limitation of the previous research results about the relation of the expected evaluation and creative performance is that different types of evaluation studied. Informational evaluation provides helpful information about how to improve creativity. In contrast, controlling evaluation pressures individuals and, as a result, creative performance can be impaired. Research has manipulated the evaluation type to explore the relation of the expected evaluation and creative performance, and sometimes tested individual difference factors (Herman, 2008; Hu et al., 2018; Shalley & Perry-Smith, 2001; Wang et al., 2016). However, cognitive factors such as cognitive style have not been examined. Adolescents who are field-dependent cognitive style pay more attention to social cues; they are more social-directed and sensitive to external factors, and interference, and therefore more vulnerable to external evaluation. Adolescents who are field-independent are depend more on their own internal reference and are more self-directed, and less affected by external factors and interference; thus, they are expected to be less vulnerable to external evaluation, with respect to their creative performance (e.g., Hall, 2000; Mefoh et al., 2017; Riding & Cheema, 1991; Warpner, 1986; Witkin et al., 1977; Witkin & Goodenough, 1981). Therefore, it was possible that adolescents' cognitive style would moderate the relation of different types of evaluation and creative

performance. Specifically, the field-dependent adolescents would perform more creatively in informational information than in controlling information.

In Chinese education system, teachers' evaluation for students is very important social cues and contextual factors in school environment. And teachers always provide informational evaluation such as give useful suggestions for adolescents' development or controlling information such as "if you do this, you will perform better." Then, crucial questions are does cognitive style (here field-dependence vs. field-independence) moderate the effects of expected evaluation on creative performance? And does cognitive style moderate the effects of different kinds of expected evaluation on creative performance?

THE PRESENT STUDY

We conducted two experiments to test the effects of expected evaluation on adolescents' creative performance using field dependence-independence as a moderator in Study 1 and effects of evaluation type and cognitive style on adolescents' creative performance in Study 2. Adolescents' creativity was measured by divergent thinking task. Their cognitive style was measured by EFT. Based on the cognitive evaluation theory and cognitive style theory, we predicted that there would be significant main effects of expected evaluation and cognitive style and significant interaction between expected evaluation and field dependence-independence cognitive style in Study 1. And we also predicted that there would be significant main effects of evaluation type and cognitive style and significant interaction between evaluation type and field dependence-independence cognitive style in Study 2.

STUDY 1

In Study 1, we investigated the impacts of expected evaluation (present vs. absent) and cognitive style (field-dependence vs. field-independence) on adolescents' creative performance. Expected evaluation was manipulated so that participants in expected evaluation condition providing evaluation by experts and participants without expected evaluation providing no evaluation. We proposed the following hypotheses:

Hypothesis 1: Adolescents with expected evaluation would be more creative than those without expected evaluation.

Hypothesis 2: The main effect of cognitive style would be found. Adolescents with field-dependent cognitive style will be more creative than those with field-independent cognitive style.

Hypothesis 3: The field dependence-independence cognitive style would moderate the relation of the expected evaluation and adolescents' creative performance. Specifically, adolescents with field-dependent cognitive style would be more creative in expected evaluation condition than those in no expected evaluation condition.

METHODS

Participants

We selected high school students from Shanxi Province in China as participants. A total of 89 students (46.2% males) in Grade 1 (equivalent to high school sophomores in the United States) participated in this study. The average age of the participants was 16.31 years ($SD = 0.59$). All the participants were volunteers and received a gift after completing the participation.

Materials

Embedded Figures Test. The cognitive style of the participants was measured using the Embedded Figures Test (EFT), Cronbach's $\alpha = 0.9$ (Meng & Chang, 1988). We categorized the participants into field-independent and field-dependent cognitive styles through the test T scores of the EFT. The participants whose T scores above than 50 were regarded as showing the field-independent cognitive style. The participants with T scores less than 50 were classified as displaying the field-dependent cognitive style.

Expected evaluation manipulation and check

Two differing task instructions were used to manipulate participants' expected evaluation condition. The participants with expected evaluation were told that their creative performance would be evaluated by experts in the field of creativity. In contrast, the participants without expected evaluation were told that the results of their creative performance were only used for research (see Appendix).

To check whether the manipulation was effective, all participants completed the evaluation susceptibility scale. Three items were used to check whether the participants felt or not feel expected evaluation. A sample

item was “My creative performance was measured and evaluated compared with others in this task.” All items were rated with 1 (strongly disagree) to 7 (strongly agree).

Creative task

Adolescents’ creativity was measured with the fifth part of Torrance Test of Creative Thinking (TTCT; Torrance, 1966): the unique use of cans. The task of the test was to list interesting and unusual uses of cans as many as possible, and to consider as many novel ideas as possible. The test results were scored by three graduate students majoring in psychology according to the well-established three indicators: fluency, flexibility, and originality. We averaged three raters’ scores as each participants’ final creativity score. The inter-rater reliability was 0.99, 0.98, and 0.97 for fluency, flexibility, and originality, respectively.

Procedure

Participants first completed the Embedded Figures Test (EFT; Meng & Chang, 1988). Then, they were randomly assigned to different groups (have evaluation vs. no evaluation). The experimenter explained the procedure and rules to the participants and used different instructions for manipulating different evaluation conditions. All participants completed the creative task. Subsequently, the participants completed the expected evaluation susceptibility scale. Finally, all the participants were thanked and received a gift. The whole process lasted approximately 50 min.

RESULTS

Manipulation check. In order to check the manipulation of the expected evaluation, independent-samples *t*-test was used. Results ($t = -11.05, p < .001$) indicated that the instruction manipulation was successful. The participants with expected evaluation (field-dependence, $N = 19$; field-independence, $N = 25$) reported that they felt the expected evaluation from the experts ($M = 8.78, SD = 1.91$). The participants without expected evaluation (field-dependence, $N = 21$; field-independence, $N = 24$) reported that they did not feel the expected evaluation from the experts ($M = 14.23, SD = 2.67$).

A MANOVA with 2 (expected evaluation: have vs. no) \times 2 (cognitive style: field-dependence vs. field-independence) between-group design was used, the expected evaluation and cognitive style as the independent variables and the creative performance as dependent variable. The results of the three dimensions were as follows: Fluency, we found a significant main effect of the cognitive style, $F(1, 85) = 11.90, \eta^2 = 0.12, p < .001$. Flexibility, there was no main effect of expected evaluation and cognitive style, and the interaction between them also was not significant. Originality, results of the MANOVA revealed a significant main effect of the expected evaluation (see Table 1 for all statistics), $F(1, 85) = 15.30, \eta^2 = 0.12, p < .001$. The data also showed a significant main effect of cognitive style, $F(1, 85) = 11.82, \eta^2 = 0.15, p = .001$. Most importantly, the results displayed a significant interaction between the expected evaluation and cognitive style, $F(1, 85) = 6.24, \eta^2 = 0.07, p = .014$. As Figure 1 shows, a simple effect test revealed that field-dependent participants produced more original ideas ($M = 8.63, SD = 3.86$) with expected evaluation than those without evaluation ($M = 4.54, SD = 2.82$).

TABLE 1. MANOVA for Effects of Expected Evaluation and Field Dependence–Independence Cognitive Style on All Dimensions of Creativity (F Values and Effect Size, η^2)

Dependent variable	Source of variation	F	η^2
Fluency	Cognitive style	11.90**	0.12
	Expected evaluation	1.23	0.01
	Cognitive style \times Expected evaluation	1.56	0.02
Flexibility	Cognitive style	3.20	0.04
	Expected evaluation	0.40	0.01
	Cognitive style \times Expected evaluation	0.07	0.00
Originality	Cognitive style	11.82**	0.15
	Expected evaluation	15.30**	0.12
	Cognitive style \times Expected evaluation	6.24*	0.07

Note. Cognitive style \times expected evaluation indicates interaction of cognitive style and expected evaluation. * $p < .05$, and ** $p < .01$.

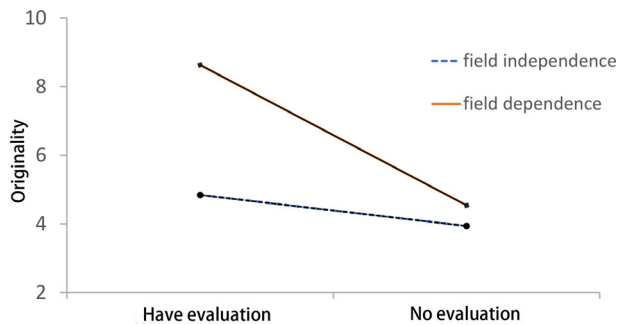


FIGURE 1. Interaction between expected evaluation and cognitive style.

DISCUSSION

Study 1 found the positive effects of expected evaluation on the originality dimension of adolescents' creativity. This was consistent with hypothesis 1. Adolescents in expected evaluation condition produced more original ideas than without expected evaluation. And we found main effect of cognitive style on both fluency and originality dimensions of adolescents' creativity. This was consistent with hypothesis 2. We also found cognitive style moderated the relationship of expected evaluation and adolescents' creative performance, which supported our hypothesis 3. Adolescents with field-dependent cognitive style performed more creative than those with field-independent cognitive style in expected evaluation condition. Since expected evaluation could influence adolescents' creative performance, the question was there were different kinds of expected evaluation in school environment, these would have different impacts on adolescents' creative performance or not? In order to further explore how different expected evaluation affected the adolescents' creative performance, we conducted Study 2. Study 2 used two types evaluation. As in Shalley and Perry-Smith (2001), one was informational evaluation and the other was controlling evaluation. We tested the effects of evaluation type on adolescents' creative performance and whether the cognitive style would moderate the relationship between them.

STUDY 2

Study 2 used a between-group design to investigate the effects of differing expected evaluation type (informational evaluation vs. controlling evaluation) and cognitive style (field-dependence vs. field-independence) on adolescents' creative performance. Evaluation type was manipulated. We proposed the following hypotheses:

Hypothesis 1: Adolescents in informational evaluation condition would be more creative than in controlling evaluation condition.

Hypothesis 2: The main effect of cognitive style would be found. Adolescents with field-independent cognitive style will be more creative than those with field-dependent cognitive style.

Hypothesis 3: The field dependence–independence cognitive style would moderate the relation of the evaluation type and adolescents' creativity. Specifically, adolescents with field-dependent cognitive style will generate more creative ideas in informational evaluation condition than in controlling evaluation condition.

METHODS

Participants

We selected high school students from Shanxi Province in China as participants. A total of 92 students (59.8% males) in Grade 1 participated in this study. The average age of the participants was 16.03 years ($SD = 0.67$). All the participants were volunteers and received a gift after completing the measures.

Materials

Embedded Figures Test. The cognitive style of the participants was measured using the Embedded Figures Test (EFT) as same as in Study 1.

Informational versus controlling evaluation introduction manipulation and check

Two different task instructions were used to manipulate evaluation type. According to the instructions Shalley used (Shalley & Perry-Smith, 2001), in the condition of informational evaluation, participants would not feel the pressure of the task and would receive suggestions from the experts. And the suggestions were useful information for improving their creative performance. In contrast, in the condition of the controlling evaluation, the creative performance of the participants would be strictly evaluated and should achieve special standards. Because the participants were high school students, they were different from company employees, slight changes had been made to the instructions. The main points of the two kinds of evaluation remain the same as used in Shalley and Perry-Smith (2001) (see Appendix).

In order to check whether the instruction of the evaluation type was effective, the participants completed the evaluation susceptibility scale. Minor modifications were made to Shalley and Perry-Smith's (2001) scale for the purpose of this study. The scale was formed by eight items. Four items were used to check the informational nature of the evaluation. A sample item was "I believe that I can learn more about how to improve creativity from the evaluation and advices of the experts." And the other four items were used to check the controlling nature of the evaluation. A sample item was "the researcher made me feel that I must do well on the task." All items were rated with 1 (strongly disagree) to 5 (strongly agree).

Creative task

Creative task in Study 2 was the same as Study 1. The inter-rater reliability was 0.99, 0.96, and 0.97 for fluency, flexibility, and originality, respectively.

Procedure

The procedure was also the same as Study 1.

RESULTS

Manipulation check. Paired-samples *t*-test was used to check the effectiveness of the manipulation of evaluation type. In the condition of the informational evaluation, results ($t = -3.68, p < .001$) indicated that the participants (field-dependence, $N = 20$; field-independence, $N = 25$) felt the evaluation more informational ($M = 9.47, SD = 2.67$) than controlling ($M = 11.62, SD = 2.81$). The group in the condition of controlling evaluation (field-dependence, $N = 20$; field-independence, $N = 27$) reported that they felt the expected evaluation more controlling ($M = 9.79, SD = 2.53$) than informational ($M = 11.94, SD = 2.79$), $t = -3.17, p < .001$. Therefore, the manipulation of evaluation type was successful.

A MANOVA with 2 (evaluation type: informational vs. controlling) \times 2 (cognitive style: field-dependence vs. field-independence) between-group design was used, evaluation type and cognitive style as the independent variables and the creative performance as dependent variable. The results of three dimensions were as follows: Fluency, there was a significant main effect for cognitive style, $F(1, 88) = 4.84, \eta^2 = 0.05, p = .030$. Flexibility, the results indicated a significant main effect for evaluation type (see Table 2 for all statistics), $F(1, 88) = 7.02, \eta^2 = 0.07, p = .010$. Originality, MANOVA revealed a significant main effect of cognitive style, $F(1, 88) = 4.47, \eta^2 = 0.05, p = .037$.

DISCUSSION

The results of Study 2 indicated that evaluation type influenced the flexibility of adolescents' creative performance. Opposite to hypothesis 1, the participants in controlling evaluation produced more categories of creative ideas than those in informational condition. Cognitive style also influenced adolescents' creativity. The field-independent participants scored significantly higher in fluency and originality than field-dependent participants. This was consistent with hypothesis 2. However, opposite to hypothesis 3, we did not find the moderate role of cognitive style on different types of evaluation and adolescents' creative performance. Whether in controlling evaluation condition or informational evaluation condition, field-dependent adolescents' performance did not differ significantly in any dimensions of creativity. The same performance showed by field-independence adolescents.

GENERAL DISCUSSION

In Chinese education system, expected evaluation may be beneficial for school students. This was apparent by the results above, with the interaction of the school environmental factor (expected evaluation) and the individual difference factor (cognitive style) of both studies. The results of Study 1 demonstrated that

TABLE 2. MANOVA for Effects of Evaluation Type and Field Dependence–Independence Cognitive Style on All Dimensions of Creativity (F Values and Effect Size, η^2)

Dependent variable	Source of variation	F	η^2
Fluency	Cognitive style	4.84*	0.05
	Evaluation type	0.39	0.00
	Cognitive style \times Evaluation type	1.47	0.02
Flexibility	Cognitive style	1.51	0.02
	Evaluation type	7.02*	0.07
	Cognitive style \times Evaluation type	0.01	0.00
Originality	Cognitive style	4.47*	0.05
	Evaluation type	0.24	0.00
	Cognitive style \times Evaluation type	1.35	0.02

Note. Cognitive style \times Evaluation type indicates interaction of cognitive style and evaluation type.

* $p < .05$.

expected evaluation affected adolescents' creative performance, but only for the field-dependent adolescents. The cognitive style moderated the relationship of the expected evaluation and adolescents' creative performance. Study 2 revealed the effect of evaluation type on the flexibility of adolescents' creativity, but no interaction of the evaluation type and cognitive style was found.

When they were in expected evaluation condition field-independent students were more creative. This result supported for Hu's model (Hu & Han, 2015). The model suggested that the school environment factor and the students' cognitive factor affected adolescents' creative performance jointly. Results in Study 1 revealed that the expected evaluation and cognitive style influenced adolescents' creative performance together, cognitive style moderated the relationship between expected evaluation and adolescents' creative performance. Specifically, field-dependent adolescents produced more original ideas in expected evaluation condition compared to no evaluation. Opposite to the field-dependent adolescents, field-independent adolescents did not perform more creatively in expected evaluation condition. These results were consistent with a previous study (Qu & Shi, 2005). On basis of earlier research, we can understand that the field-dependent adolescents and the field-independent adolescents were different to expected evaluation when performing creative tasks. The hypothesis in these studies was that field-dependent adolescents were more social-directed, sensitive to external factors, whereas field-independent adolescents are more self-directed, not easy to be affected by external factors (e.g., Hall, 2000; Mefoh et al., 2017).

In addition, we found a significant main effect of expected evaluation in the originality. The adolescents in expected evaluation condition performed more creatively than those without expected evaluation. This was not in line with previous studies (Amabile, 1979; Bartis et al., 1988; Heyman & Dweck, 1992). As an important extrinsic motivator, cultural factors may be responsible for the different effects of expected evaluation (Niu & Kaufman, 2013). In Western culture, students' grades are not been published and they less used to evaluation pressure. Therefore, the students showed poorer creative performance in expected evaluation compared to no expected evaluation. But in eastern cultures, especially in China, students are used to being evaluated, and they are more likely to be energized by the anticipated evaluation. Therefore, adolescents with expected evaluation produced more creative ideas than those without expected evaluation (Xue et al., 2018).

In order to further explore the effect of the expected evaluation, informational evaluation and controlling evaluation were introduced in Study 2. The significant main effect of evaluation type demonstrates that evaluation type could influence adolescents' creative performance. However, contrary to the theoretical prediction, adolescents in controlling evaluation condition produced more creative ideas with regard to the flexibility dimension of creativity. This result was not consistent with those of previous studies (Hu et al., 2018; Shalley & Perry-smith, 2001; Wang et al., 2016). One possible explanation was that in the condition of the controlling evaluation, instead of being perceived as controlling, the students might had perceived not only the accentuated evaluation pressure but also the ranking pressure as indicative of the importance of the task at hand, not unlike the high-stakes testing high school students frequently encounter in China, which inspired participants stronger extrinsic motivation, made students gear up effort, and then showed more

creative performance. In comparison, the informational evaluation condition presented less pressure and urgency, which just inspired lower intrinsic motivation therefore the participants may not value the task as much and did not try their best to complete the task. This result was indicated that compared with intrinsic motivation, extrinsic motivation was not always harmful to creativity. It was helpful for Chinese students in some tasks required creative performance, which was consistent with previous studies (Niu & Kaufman, 2013; Niu & Liu, 2009; Niu & Sternberg, 2001; Xue et al., 2018).

Study 2 showed that no significant interaction of the evaluation type and cognitive style. Either in informational evaluation condition or in controlling evaluation condition, there was no significant difference for field-dependent adolescents' creative performance. This maybe because two condition all conveyed the information that their creative performance would be evaluated. And these were important social cues for them.

This was an empirical study to test the common effects of expected evaluation and cognitive style on adolescents' creativity, and the common effects of evaluation type and cognitive style on adolescents' creativity in education situation. The results have important implications for our creativity education. First, teachers' evaluation is a very important factor influencing adolescents' creative performance. For field-dependent students, teachers can cultivate adolescents' creativity through external expected evaluation. And if teachers could give specific evaluation according to adolescents' cognitive style, adolescents' creativity maybe develop better. Second, it is worth noticing that controlling evaluation is not harmful to adolescents' creative performance. Teachers can cultivate adolescents' creativity through creating stressful situations. Third, creativity is a special and complicated ability; there are many factors influencing adolescents' creativity. And teachers could cultivate adolescents' creativity though a variety of ways combined with evaluation.

There are several limitations in our study. First, the participants were high school students in grade one, and we are not certain about the creative performance of students in other grades will be the same as ours. In future research, we can expand the range of participants. Second, the measurement we used in our study is only one divergent thinking task in TTCT, and divergent thinking is only one part of creative process, considering the convergent thinking is also an important manifestation of creative performance, we can try more creative tasks to test the effect of the expected evaluation. Third, expected evaluation maybe influence the creative performance combined with other individuals' factors, such as personality, emotion, motivation, and so on, what is the relationship between them, these are future problems we will explore.

REFERENCES

- Amabile, T.M. (1979). Effects of external evaluation on artistic creativity. *Journal of Personality and Social Psychology, 37*, 221.
- Amabile, T.M. (1993). Motivational synergy: Toward new conceptualizations of intrinsic and extrinsic motivation in the workplace. *Human Resource Management Review, 3*, 185–201.
- Amabile, T.M., Goldfarb, P., & Brackfield, S.C. (1990). Social influences on creativity: Evaluation, coercion, and surveillance. *Creativity Research Journal, 3*, 6–21.
- Baer, J. (1998). Gender differences in the effects of extrinsic motivation on creativity. *The Journal of Creative Behavior, 32*, 18–37.
- Barts, S., Szymanski, K., & Harkins, S.G. (1988). Evaluation and performance: A two edged knife. *Personality and Social Psychology Bulletin, 14*, 242–251.
- Besancon, M., Fenouillet, F., & Shankland, R. (2015). Influence of school environment on adolescents' creative potential, motivation and well-being. *Learning and Individual Differences, 43*, 178–184.
- Deci, E.L., & Ryan, R.M. (1980). The empirical exploration of intrinsic motivational processes. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 13, pp. 39–80). New York: Academic Press.
- Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Hall, J.K. (2000). *Field dependence-independence and computer-based instruction in geography*. Doctoral dissertation. Virginia State University.
- Herman, A. E. (2008). The influence of regulatory focus, expected evaluation, and goal orientation on cognitive processes related to creative problem solving. Unpublished Doctoral Dissertation, University of Nebraska.
- Heyman, G. D., & Dweck, C.S. (1992). Achievement goals and intrinsic motivation: Their relation and their role in adaptive motivation. *Motivation and emotion, 16*(3), 231–247.
- Hu, W. (2010). Factors that affect the development of creativity of primary and secondary school students in classroom teaching. *Theory and Practice of Education, 22*, 46–49.
- Hu, W., & Han, K. (2015). Theoretical research and practical exploration of adolescents' scientific creativity. *Psychological Development and Education, 31*, 44–50.
- Hu, W., Wang, X., Lan, Y., & Y, X. (2018). Creative self-efficacy as moderator of the influence of evaluation on artistic creativity. *Journal of Creativity Research, 28*, 39–55.
- Hu, W., Wu, B., Jia, X., Yi, X., Duan, C., Meyer, W., & Kaufman, J.C. (2013). Increasing students' scientific creativity: The "learn to think" intervention program. *The Journal of Creative Behavior, 47*(1), 3–21.

- Hu, W., Zhao, X., Jia, P., & Chen, Y. (2017). The effect of learn to think online program on creativity of primary school students: moderating effects of cognitive style. *Psychological Development and Education, 33*, 257–264.
- Kong, F., & Liu, X. (2018). An empirical study on the level of classroom instant evaluation among different types of primary school teachers. *Educational Measurement and Evaluation, 10*, 18–25.
- Liu, J., Niu, W., & Day, D. (2010). Stimulating or suppressing—The effects of different types of instruction on rated creativity. *The International Journal of Creativity and Problem Solving, 20*, 23–34.
- Mefoh, P.C., & Ezech, V.C. (2016). Effect of field-dependent versus field-independent cognitive styles on prospective and retrospective memory slips. *South African Journal of Psychology, 46*, 542–552.
- Mefoh, P.C., Nwoke, M.B., Chukwuorji, J.B.C., & Chijioko, A.O. (2017). Effect of cognitive style and gender on adolescents' problem solving ability. *Thinking Skills and Creativity, 25*, 47–52.
- Mellou, E. (1996). Can creativity be nurtured in young children? *Early Child Development and Care, 119*, 119–130.
- Meng, Q., & Chang, J. (1988). Furen applied psychology development center, Beijing normal university. (Internet data)
- Messick, R. (1976). The effect of individual differences in cognitive style and motives in solving insight problems. *Scandinavian Journal of Educational Research, 38*, 83–96.
- Miller, A.L. (2007). Creativity and cognitive style: the relationship between field – dependence-independence, expected evaluation, and creative performance. *Psychology of Aesthetics, Creativity, and the Arts, 1*, 243–246.
- Niu, W., & Kaufman, J.C. (2013). Creativity of Chinese and American cultures: A synthetic analysis. *The Journal of Creative Behavior, 47*, 77–87.
- Niu, W., & Liu, D. (2009). Enhancing creativity: a comparison between effects of an indicative instruction “to be creative” and a more elaborate heuristic instruction on Chinese student creativity. *Psychology of Aesthetics, Creativity, and the Arts, 6*, 93–98.
- Niu, W., & Sternberg, R.J. (2001). Cultural influences on artistic creativity and its evaluation. *International journal of psychology, 36*, 225–241.
- Niu, W., & Sternberg, R.J. (2003). Societal and school influence on students' creativity. *Psychology in the Schools, 40*, 103–114.
- Ogletree, E.J. (2000). Creative thinking development of Waldorf school students. *Transactions of the Intelligence Magazine, 8*, 1–6.
- Onyekuru, B.U. (2015). Field dependence-field independence cognitive style, gender, career choice and academic achievement of secondary school students in Emohua local government area of rivers state. *Journal of Education & Practice, 6*, 76–85.
- Pang, W., & Plucker, J.A. (2012). Recent transformations in China's economic, social, and education policies for promoting innovation and creativity. *The Journal of Creative Behavior, 46*, 247–273.
- Plucker, J.A. (1998). Beware of simple conclusions: The case for content generality of creativity. *Creativity Research Journal, 11*(2), 179–182.
- Qu, X., & Shi, J. (2005). Evaluation and reward effect on verbal creativity of field dependent-independent children. *Chinese Mental Health Journal, 19*, 408.
- Riding, R., & Cheema, I. (1991). Cognitive styles—An overview and integration. *Educational Psychology: An International Journal of Experimental Educational Psychology, 11*, 193–215.
- Shalley, C.E. (1995). Effects of coaction, expected evaluation, and goal setting on creativity and productivity. *Academy of Management Journal, 38*, 483–503.
- Shalley, C.E., & Perry-Smith, J.E. (2001). Effects of social-psychological factors on creative performance: the role of informational and controlling expected evaluation and modeling experience. *Organizational Behavior and Human Decision Processes, 84*, 1–22.
- Sternberg, R.J., & Lubart, T.I. (1999). The concept of creativity: Prospects and paradigms. In R.J. Sternberg (Ed.), *Handbook of creativity* (pp. 3–15). Cambridge, UK: Cambridge University Press.
- Sung, S.Y., & Choi, J.N. (2009). Do big five personality factors affect individual creativity? The moderating role of extrinsic motivation. *Social Behavior and Personality: an international journal, 37*, 941–956.
- Torrance, E.P. (1966). *The Torrance tests of creative thinking—norms- technical manual research edition-verbal tests, forms A and B—figural tests, forms A and B*. Princeton, NJ: Personnel Press.
- Vallerand, R.J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. *Advances in Experimental Social Psychology, 29*, 271–360.
- Wang, J., Wang, L., Liu, R.-D., & Dong, H.-Z. (2016). How expected evaluation influences creativity: Regulatory focus as moderator. *Motivation and Emotion, 41*, 147–157.
- Warpner, S. (1986). Introductory remarks. In M. Bertini, L. Pizzamiglio & S. Wapner (Eds.), *Field dependence in psychological theory, research, and application* (2nd ed., pp. 1–4). Hillsdale, NJ: Lawrence Erlbaum.
- Witkin, H.A. (1976). The perception of upright. In S. Messick (Ed.), *Individuality in learning: Implications of cognitive styles and creativity for human development*. San Francisco: Jossey Bass Publishers.
- Witkin, H.A., & Goodenough, D.R. (1981). *Cognitive styles: Essence and origin*. New York: International University Press.
- Witkin, H.A., Goodenough, D.R., & Karp, S.A. (1977). Stability of cognitive style from childhood to young adulthood. *Journal of Personality and Social Psychology, 7*, 291–300.
- Xue, Y., Gu, C., Wu, J., Dai, D.Y., Mu, X., & Zhou, Z. (2018). The effects of extrinsic motivation on scientific and artistic creativity among middle school students. *The Journal of Creative Behavior*.
- Yi, X., Hu, W., Plucker, J.A., & McWilliams, J. (2013). Is there a developmental slump in creativity in China? The relationship between organizational climate and creativity development in Chinese adolescents. *The Journal of Creative Behavior, 47*, 22–40.

Yuan, F., & Zhou, J. (2008). Differential effects of expected external evaluation on different parts of the creative idea production process and on final product creativity. *Creativity Research Journal*, 20, 391–403.

Weina Lei, Wenbo Deng, Rongjuan Zhu, Shaanxi Normal University

Mark A. Runco, Southern Oregon University

David Yun Dai, Shaanxi Normal University

Weiping Hu, Shaanxi Normal University, Beijing Normal University; weipinghu@163.com

Correspondence concerning this article should be addressed to Weiping Hu, MOE Key Laboratory of Modern Teaching Technology, Shaanxi Normal University, 199 South Chang'an Road, Xi'an, Shaanxi Province 710062, China. E-mail: weipinghu@163.com

AUTHOR NOTE

This study was financially supported by National Natural Science Foundation of China (31871118), Research Program Funds of the Collaborative Innovation Center of Assessment toward Basic Education Quality at Beijing Normal University (2019-05-002-BZPK01) and Fundamental Research Funds for the Central Universities (Shaanxi Normal University) (2019TS051).

APPENDIX

STUDY 1

INSTRUCTIONS FOR EXPECTED EVALUATION GROUP

Today we will invite everyone to complete a creativity test. The purpose of our test is to compare and evaluate your creativity. We will invite experts in the field of creativity to rate your tests and publish the results. So please be sure to answer carefully.

INSTRUCTIONS FOR NO EXPECTED EVALUATION GROUP

Today we will invite everyone to complete a creativity test. The test results are only used for research data collection, no scoring, and no evaluation. The result is confidential for you.

STUDY 2

INSTRUCTION FOR INFORMATIONAL EVALUATION GROUP

Today we will invite everyone to complete a creativity test. The purpose of the test is to know your creativity and it is very interesting. In the progress of completing the test, you can think as imaginative as you are. The test results will be evaluated by the experts of creativity field. They will give you advices about how to improve your creativity according to your test results. These advices will be helpful for you to solve problem creatively in the future. We hope that you will produce creative ideas as more as you can. We will provide you the results of your test and experts' advices the next day.

INSTRUCTIONS FOR CONTROLLING EVALUATION GROUP

Today we will invite everyone to complete a creativity test. You must complete the task according to the rules. In the progress of completing the test, you must read the title carefully and think hard to solve the problem. You would better not make mistakes. The results of your test will be evaluated by the experts of creativity field. They will evaluate your creativity very critically by analyzing your every idea and judging if you are creative or not. Therefore, be creative. We will let you know about your performance and how your score compares with those of others.