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ABSTRACT

Research has demonstrated that implicit theories of creativity are crucial in shaping an individual's behavior and real-life decisions toward being creative. The present study proposed and examined the underlying mechanisms of how two kinds of implicit theories—the growth mindset of the creative self and the stereotype of creative others—are associated with creative achievements through the mediating role of creativity motivation. Participants were 606 undergraduate students who were enrolled in an education major in two universities in China. Overall, the study found that Chinese students held a positive image toward a creative student, regarding him or her as highly competent, warm, and popular. Student perceptions of a creative other were positively related to their growth mindset of creativity. Moreover, results verified both the mediating role of creativity motivation on growth mindset, as well as the effect of positive stereotyping of the creative other on students' creative achievement. These findings point to promising creativity motivation strategies including the cultivation of a malleable view of creativity and of creative role models, that may, in turn, promote creative achievement by encouraging students to do, learn, and accomplish new things.

Keywords: stereotype, growth mindset, creativity motivation, creative achievement.

Implicit theories of creativity refer to laypeople's inner beliefs regarding creativity (Karwowski, 2014; Runco, 2011; Sternberg, 1985). Relevant research explores laypeople's understanding and perception of several aspects of creativity. For example, what is creativity (Lim & Plucker, 2001; Niu & Sternberg, 2002; Spiel & Von Korff, 1998) or what is the nature of creativity (Hass, Katz-Buonincontro, & Reiter-Palmon, 2016; Karwowski, 2014; Tang, Werner, & Karwowski, 2016); who is creative (Chan & Chan, 1999; Runco & Johnson, 2002); what is considered as a creative product (Paletz & Peng, 2008) and so on and so forth. Predominantly, current research on implicit theories of creativity diverges: The first school of thought refers to the creative mindset—is it malleable or is it fixed (for a review, see Karwowski & Brzeski, 2017); and the second is concerned with others' conceptions of the creative person (for a review, see Runco, 2018). In fact, the aforementioned implicit theories of creativity are crucial to our understanding of how they—coupled with behavior—engenders a creative self or creative other. For instance, Karwowski and Brzeski (2017) demonstrated that incremental theorists—individuals who believe that creative skills are trainable and can be developed—tend to engage in creativity training, perform creative activities, or engage in creative hobbies. Moreover, regarding the implicit conception of creative persons, Runco (2014), for instance, demonstrated that parents' and teachers' implicit conceptions on creative children determine how they react to the child and what opportunities they might provide (for a review of related empirical studies, see Andiliou & Murphy, 2010).

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Recently, studies exploring the function of implicit theories of creativity have underscored their motivational functions in creative pursuits. As a result, some implicit theories are characterized as motivational beliefs, which are defined as "a set of propositions that are accepted as true by an individual, regardless of evidentiary support, and that influence the direction and intensity of effort toward a target" (Hoffman, 2015). The motivational mechanism of implicit theories is grounded in a broader research framework that is based on social cognitive theory (SCT) (Job, 2016). According to SCT, the acceptance of implicit theories can have a generalized effect on life trajectory or outcomes because these theoretical principles can influence motivation and consequently, behavior (Job, 2016). From this perspective, implicit theories act as antecedences of motivation, cueing an individual to perform certain behaviors (Ziegler, 2001). In the case of creativity, relevant implicit theories might not directly contribute to creative behaviors or outcomes, but they facilitate higher motivation, thus maximizing creativity-related behavioral tendencies, such as learning, doing, and accomplishing new things per the creativity motivation theory (Zhang, Hoxha, et al., 2018). The role of motivation, therefore, is to bridge implicit theories and creative behaviors. Motivation results from certain motivational beliefs and contributes to creativity-related behaviors, actions, and outcomes.

Most of the research on the motivational function of implicit theories of creativity exists within the branch of the creative mindset (Karwowski & Brzeski, 2017; Karwowski & Kaufman, 2017). Specifically, a growing body of empirical studies now underscores the association between creative growth mindset and various motivational aspects of creative behaviors (for a review, see Zhang et al., 2019) . It implies that a creative growth mindset carries out motivational functions. That is to say, whether or not an individual believes that his/her creativity can be developed shapes his/her attitudes, motivation, and behavior toward being creative (Intasao & Hao, 2018; Karwowski, 2014; Karwowski, Lebuda, & Beghetto, 2019; Puente-Díaz & Cavazos-Arroyo, 2017; Royston & Reiter-Palmon, 2017). The Creative Behavior as Agentic Action (CBAA) model (Karwowski & Beghetto, 2019) is a representative theory that explains the motivational function of the creative mindset, or of creativity-related self-beliefs. According to CBAA, "creative behaviors result from a person's intentional actions, which are influenced by that person's belief system" (Karwowski & Beghetto, 2019). Indeed, implicit self-beliefs play a key role in transforming creative potential into creative actions and behaviors. When the growth mindset of creativity shifts to an increased or sustained level of motivation, it indirectly contributes to explicit creative behaviors.

Primary studies on implicit theories of creative persons examine several of the motivational or behavioral consequences experienced by creative others (such as children or students) who are affected directly or indirectly by persons (such as parents and teachers) with certain implicit understandings. For example, by examining teachers' beliefs about creativity, researchers found that teachers' implicit theories on creative students often inform the expectations they later imposed on those same students, thus influencing *student* creativity development (Andiliou & Murphy, 2010). Although these studies are constructive in the way that they examine the influence of an individual's implicit theories of creativity on others' creativity development, the work seems to have overlooked the possibility that the latter beliefs may also influence creativity development of the individual, i.e., the belief holder that espouses implicit theories of creative persons. A recent theory concerning the implicit social perception of creative persons sheds light on this theoretical link (Zhang, Hopp, Vialle, & Ziegler, in press). Specifically, the implicit social perception theory on creative persons (Zhang et al., in press) builds upon existing theory beginning with conceptions of creative persons (i.e., "What's the characteristics of creative persons?"); followed by the stereotyping of the creative person (i.e., "How do *I* think of creative persons?"); culminating with the resulting emotional prejudice bred by the stereotype (i.e., "How do *I* feel about creative persons?"). Unlike implicit conceptions of creative persons, implicit social perceptions like stereotyping and emotional prejudice are arguably contextually significant in the real world, because of the merit of social constructive processes (see Zhang et al., in press). Based on this theory, and depending on the context in which this specific dynamic arises, stereotypes attributed to creative persons may affect the observer's daily behavior and life choices.

In the broader field of social psychology, the consequences and mechanisms associated with several kinds of stereotyping (such as concerning gender, race, and profession) have been thoroughly examined (for a review see, Pennington, Heim, Levy, & Larkin, 2016); yet in the research field of creativity research, an thorough exploration of the implicit social perception on creative persons is still in its infancy. *Stereotype*, simply put, refers to "a set of beliefs about the personal attributes of a group of people" (Stroebe & Insko, 1989, p. 5). As the majority of stereotype research is concerned with its negative impact—resulting in a *stereotype* of the stereotype—the positive motivational or behavioral function of stereotyping is less acknowledged (Shih, Richeson, Ambady, Fujita, & Gray, 2002). If indeed a stereotype is merely a set of beliefs based on sparse

information about a group member or group members (Levy, Stroessner, & Dweck, 1998), then the stereotype itself and its consequences can be positive, negative, or neutral (Dionigi, 2015). For instance, stereotypes of aging can be positive (e.g., wealthy, wise), negative (e.g., ill health, dependency), or neutral (e.g., prefer relaxing music). Accordingly, the effect stereotyping has on the belief holder can be positive (e.g., being supportive), negative (e.g., being dependent), or inconsequential. In the case of the stereotype of creative others, for example, the positive stereotype of a creative person as welcomed and popular might, in consideration of benefits including gains by way of social impact, motivate the beholder to be more creative (Hopp, Zhang, Hinch, O'Reilly, & Ziegler, 2019). Similarly, a negative stereotype of a creative person as socially isolated and rebellious (Dawson, 1997; Karwowski, 2017) might demotivate others in their creative pursuits. In other words, assuming that the stereotype of the creative other depends on the beliefs held by the perceiver, a positive or negative impression could foster or hinder subsequent creative behavior, respectively. In a related empirical study examining the function of positive stereotypes on creative adolescents, researchers (Zhang et al., in press) discovered that German students held a positive image of creative individuals as highly competent, warm, and popular. These positive stereotypes statistically predicted the German students' subsequent admiration for creative persons. Findings indicate that positive stereotyping could lead to positive outcomes in which German adolescents can be swayed toward a more creative self. Thus, stereotyping of creative persons by an observer with implicit notions of creativity may have a positive motivational or behavioral function in the creative development of the observer, him or herself. We labeled this effect as "stereotype inspiring"; it refers to the phenomenon wherein the positive stereotyping of a group of people encourages the observer to acquire the same attributes possessed by the stereotypical group. Simply put, the logic is that if people think highly of creative others, then they are more likely to want to be creative themselves. In this way, the social perception of creative others (positive stereotyping) can also serve as an antecedence to motivation and behaviors related to creativity. Thus, the positive stereotyping of creative others can be associated with higher creative motivation, ultimately contributing to creative outcomes including creative behaviors and achievements.

In summary, implicit theories of creativity, specifically the schools of thought concerned with either the creative mindset or the perception of the creative other, have a motivational function and do contribute to creative behaviors. By working off previous studies indicating that implicit theories are promising antecedences to motivation and predictors of future behaviors, we created and relied on the following theoretical model illustrated in Figure 1. The social perceptions of creative others and the growth mindset of the creative self are connected. Together, they influence creative behaviors through the mediating role of motivation. Since adherents of the implicit theory are often not aware of the implicit nature of their position, the examination of the hidden motivational function of their beliefs can lead us to a better understanding of the motivational mechanisms characteristic of implicit theories and creative behaviors. In practice, there is promise in motivating others to develop deliberately the creative self through analyses of their own implicit theories, and by way of creative interventions where need be. With this model, we aim to verify *if and how* these two kinds of implicit theories—the growth mindset of the creative self and the stereotype of creative others—shape the perceivers' creative behaviors, in particular, through the mediating role of motivation.

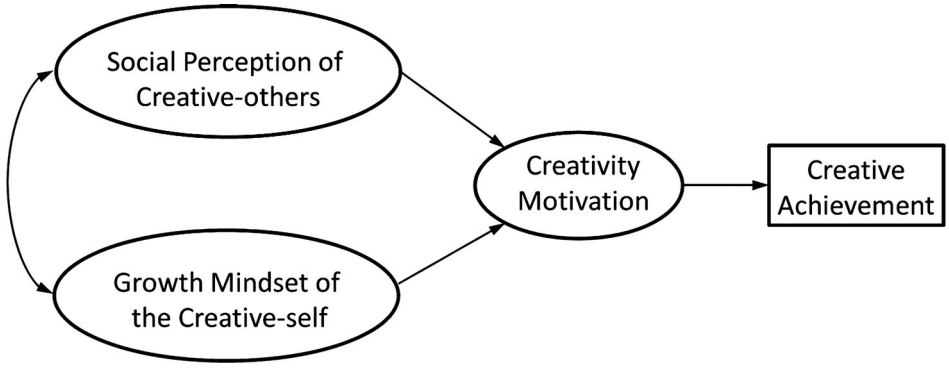

FIGURE 1. Theoretical model.

THE PRESENT STUDY

To better examine our theoretical model, we conducted an empirical investigation that explores whether and how implicit theories shape student creative behavior among a sample of Chinese university students enrolled in an education major. We first depicted some fundamental attributes shaping the social perception of creative persons. Specifically, whether students have a generally positive or negative image of creative persons; whether they imagine creative persons as male or female; and whether those impressions can be categorized along gender lines. Based on research by Hopp, Händel, Stoeger, Vialle, and Ziegler (2016) and Zhang, Hopp and et al., (in press) indicating that: (a) individuals view creative persons as competent, warm, and popular; and (b) observers anticipate that they share the same gender as the creative person, we hypothesized the following:

Hypothesis 1: Chinese college students positively perceive a creative other as competent, warm and popular.

Hypothesis 2: Chinese college students tend to expect that the creative other is of the same gender as themselves.

Second, we explored the inner mechanisms of how implicit theories influence behavior and real-life decisions. We hypothesized that implicit theories, including the growth mindset of the creative self and the social perception of the creative other (stereotype), influence creative achievement through the mediation role of motivation—specifically creativity motivation (Zhang, Hoxha, et al., 2018): the motivation to do, learn, and accomplish new things.

Hypothesis 3: Growth mindset (3a); stereotype on a creative student (3b) is associated with creative achievement through the mediation role of creativity motivation.

To determine the validity of Hypothesis 3 in particular, we compared three subscales of the social perception of creative others—competence, warmth, or popularity—and examined which subscale made the greatest contribution to creativity motivation and creative achievement. Given the dearth of research examining the function of those stereotypes, we acknowledge that this is an exploratory hypothesis.

METHOD

PARTICIPANTS AND PROCEDURE

In total, 606 undergraduate students majoring in education from China's Capital Normal University (n = 293; 48%) and Chengdu Normal University (n = 313; 52%) volunteered to participate in this study. We used convenience samples of participants from each university. The samples included more female (n = 431; 71%) than male (n = 175; 29%) participants; they ranged in age from 17 to 24 (M = 19.34; SD = 1.36) years.

The original questionnaire was in English. A back-translation was conducted to create the Chinese-language versions employed in this study. Bilingual individuals in China translated the scales from English to Chinese. Then other bilingual individuals, who had not seen the original scales, translated the Chinese version back into English. To obtain the final version used in the study, disagreements were resolved through discussion.

A multi-section questionnaire was administered to participants in a quiet classroom environment. Researchers briefed the students who participated in the study and then provided a set of questionnaires containing the items of the scales. The participants did not place their names on the measures; the confidentiality of their responses was assured. The participants were given an unlimited amount of time to complete the questionnaire.

MEASURES

Growth mindset

We adapted four intelligence mindset items from Castella and Byrnes' (2015) and substituted the keyword "intelligence" with "creativity." The four modified items read as follows: "I believe I have the ability to change my basic creativity level considerably over time"; "Regardless of my current creativity level, I think I have the capacity to change it quite a bit"; "I believe I can always substantially improve my creativity"; and "With enough time and effort, I think I could significantly improve my creativity level." Each item is

answered on a six-point Likert type scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). In the present study, the Cronbach's alpha coefficient was .83.

Stereotype

To assess stereotyping of a creative person, we used the Stereotype Scales (Zhang, Hopp, et al., in press), which cover a gender stereotype question, and stereotype items with the priming scenario:

> Please imagine that you are attending an exchange program with another university. You are assigned to work with a teacher education student. The only information you get about this student before you meet is that he/she has creative ideas on teaching. We want to know what you think about this student.

Participants were offered two options with which to identify the gender of the creative other: "male" or "female." Students rated the hypothetical creative student on three factors: competence, warmth, and popularity. We selected five items to reflect the positive side of competence traits (intelligent, confident, competent, efficient, skillful); six warmth traits (sincere, well-intentioned, good-natured, friendly, trustworthy, warm); and four popularity traits (attractive, popular, welcomed by others, liked by others), using a six-point scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). In the present study, the Cronbach's alpha coefficient was .83 for a total of 15 items.

Creativity motivation

Creativity motivation was measured by the Creativity Motivation Scale (CMS) (Zhang, Hoxha, et al., 2018). The CMS is a nine-item, self-report questionnaire based on the conceptualization that creativity motivation is the force that drives individuals to create as indicated by doing, learning, and accomplishing new things. Each item is developed as the combination of three types of forces (value, high-quality experience, and instrumental purpose) and three types of creativity-related behaviors (do, learn, and accomplish new things). A six-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) was used for the CMS. In the present study, the Cronbach's alpha coefficient was .88.

Creative achievement

Creativity achievement was assessed by the Biographical Inventory of Creative Behaviors (BICB) (Batey, 2007). The BICB consists of 34 items with two options: "yes" and "no," that cover the common domains of everyday creativity, across a broad range of disciplines including coaching, leadership, and writing. In the present study, the Cronbach's alpha coefficient was .88.

DATA ANALYSIS

Before data analysis, we conducted the data cleaning according to the subsequently specified process and standards. First, we checked data entry errors, such as an extraneous *7* in the six-point Likert scale. Secondly, we identified and removed unusual cases, such as missing data constituting more than 25% of the whole number of items; missing data appearing in non-random fashion; instances in which the same option was selected more than 50% of the time; and finally, results in which the creative achievement z-score > 3, which we identified as data anomalies or outliers. After the data cleaning, we excluded 22 participants from the original sample. As a result, there were 584 remaining participants for the following data analysis process.

We then analyzed the data in four steps. First, we conducted three confirmatory factor analyses (CFA) and reliability analyses to measure the construct validity and reliability of the scales. Then, we verified Hypotheses 1 and 2 via descriptive information and later tested the gender group difference. Third, we created a structural equation model with second-order stereotype latent variable to confirm our theoretical model (Figure 1), examining how and to what extent creative achievement was both influenced by the growth mindset and by stereotype as mediated by creativity motivation. Lastly, in order to explore various roles of three different stereotypes in the theoretical model respectively, three structural equation models, each with a different first-level latent variable for stereotype, were assessed and compared.

All CFA and SEM analyses were conducted with Mplus 7.1. The models were tested using maximum likelihood estimation of the sample covariance matrix.

The following five indices were used to evaluate the fit accuracy of the model (Hu & Bentler, 1999): chi-square statistics; standardized root-mean-square residual (SRMR) less than .08; root-mean-square error of

approximation (RMSEA) less than .10; the goodness of fit index (GFI) above .90; and comparative fit index (CFI) above .95.

RESULTS

CFA AND RELIABILITY

For the stereotype model, a summary of the CFA item indices, reliability (internal consistency), and factor loadings are offered in Tables 1 and 2. The reliability of each stereotype subscale is offered in Table 3. Confirmatory factor analysis supports the measure of the three items indicating competence (confident; competent; efficient); the four items indicating warmth (well-intentioned; good-natured; friendly; trustworthy); and the three items measuring popularity (attractive; popular; welcomed by others). After confirming the coherence of the scales, the items were averaged to create composite variables.

The three-factor stereotype model (competence, warmth, and popularity) showed satisfactory fit indices, $\chi^2 = 208.59$, $df = 32$, CFI = .94, TLI = .92, RMSEA = .097, SRMR = .041. The stereotype scale ($\alpha = .89$) was sufficiently consistent. The warmth subscale consisting of four items ($\alpha = .85$) and the popularity subscale consisting of three items ($\alpha = .81$) were sufficiently consistent. The competence subscale consisting of three items ($\alpha = .77$) was also acceptably consistent.

Concerning the creativity motivation structural model, a summary of the CFA item indices, reliability, and factor loadings are illustrated in Tables 1 and 4. The three-factor Creativity Motivation Model (learn, do, and accomplish) show good fit indices, $\chi^2 = 65.89$, $df = 24$, CFI = .97, TLI = .95, RMSEA = .055, SRMR = .030. The Creativity Motivation Scale ($\alpha = .81$) was sufficiently consistent.

For the growth mindset structural model, a summary of the CFA item indices, reliability, and factor loadings are captured in Tables 1 and 5. The four-item model showed good fit indices, $\chi^2 = 1.37$, $df = 2$, CFI = 1.00, TLI = 1.00, RMSEA = .000, SRMR = .006. The Growth Mindset Scale ($\alpha = .83$) was sufficiently consistent.

GENDER GROUP COMPARISON RESULTS

The descriptive statistics of all variables measured, and the intercorrelations between variables are presented in Table 6. Independent sample *t*-tests revealed no statistically significant gender differences among growth mindset, motivation, creative achievement, and stereotype (competence, warmth, and popularity). The proportion of participants' own gender and their own gendered expectations of the creative other are illustrated in Figure 2. Data reveals a clear pattern among both male students and female students relative to their gendered expectations of the hypothetical creative student: Male students anticipated a creative male other at a 60.3% rate; female students expected a creative female other at a rate of 53.3%. In addition, we also examined whether participants were choosing their gendered expectations of the hypothetical creative student at random by applying a chi-square goodness-of-fit test. Results indicate that for the male students, their proportion of expecting a female creative other was significantly higher than the chance level, $\chi^2(1) = 5.76$, $p = .016$; whereas female students statistically anticipated a creative female at chance level, $\chi^2(1) = 1.66$, $p = .198$.

STRUCTURAL MODELS

As indicated in Table 6, all latent constructs were significantly correlated as the expectations outlined in this study's hypotheses. In order to identify how growth mindset combined with stereotype or with three stereotypical impressions (competence, popularity, warmth) influenced creativity motivation and creative

TABLE 1. Goodness-of-Fit Indices and Reliability of the Stereotype Model, Motivation Model, Growth Mindset Model

Scale	Chi-square	*df*	CFI	TLI	RMSEA	SRMR	Cronbach's Alpha
Stereotype	208.59	32	.94	.92	.097	.041	.89
Creativity Motivation	65.89	24	.97	.95	.055	.030	.81
Growth Mindset	1.37	2	1.00	1.00	.000	.006	.83

Notes RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual; CFI = comparative fit index; TLI = Tucker–Lewis index.

TABLE 2. Factor Loadings for Confirmative Factor Analysis of Stereotype Scales

Scale	Competence	Warmth	Popularity
. . .is confident.	**.78**	.00	.00
. . .is competent.	**.77**	.00	.00
. . .is efficient.	**.66**	.00	.00
. . .is well-intentioned.	.00	**.83**	.00
. . .is good-natured.	.00	**.75**	.00
. . .is friendly.	.00	**.80**	.00
. . .is trustworthy.	.00	**.69**	.00
. . .is attractive.	.00	.00	**.77**
. . .is popular.	.00	.00	**.86**
. . .is welcomed by others.	.00	.00	**.70**

Note: Factor loadings > .50 are in boldface.

TABLE 3. Reliability of Each Stereotype Subscale

	Competence (3 items)	Warmth (4 items)	Popularity (3 items)
Cronbach's Alpha	.77	.85	.81

TABLE 4. Factor Loadings for Confirmative Factor Analysis of Creativity Motivation Scales

Scale	Learn	Do	Accomplish
Value	**.57**	.00	.00
High-Quality Experience	**.60**	.00	.00
Instrumental Purpose	**.68**	.00	.00
Value	.00	.38	.00
High-Quality Experience	.00	**.62**	.00
Instrumental Purpose	.00	**.66**	.00
Value	.00	.00	**.54**
High-Quality Experience	.00	.00	**.72**
Instrumental Purpose	.00	.00	**.53**

Note: Factor loadings > .50 are in boldface.

TABLE 5. Factor Loadings for Confirmative Factor Analysis of Growth Mindset Scales

Scale	Factor loading
I believe I have the ability to change my basic creativity level considerably over time.	**.75**
Regardless of my current creativity level, I think I have the capacity to change it quite a bit.	**.75**
I believe I can always substantially improve my creativity.	**.78**
With enough time and effort, I think I could significantly improve my creativity level.	**.70**

Note: Factor loadings > .50 are in boldface.

TABLE 6. Summary of Intercorrelations, Means, and Standard Deviations for Scores on Subscales

	1	*2*	*3*	*4*	*5*	*6*	*7*	*M*	*SD*
1. Stereotype								5.06	0.62
2. Competence	.84***							5.16	0.64
3. Popularity	.88***	.65***						4.97	0.79
4. Warmth	.86***	.65***	.65***					5.07	0.72
5. Growth Mindset	.30***	.26***	.23***	.31***				4.53	0.87
6. Creativity Motivation	.34***	.34***	.30***	.31***	.62***			4.70	0.64
7. Creative Achievement	.10*	.09*	.09*	.11**	.25***	.23***		8.40	4.92

Note: : *$p < .05$, **$p < .01$, ***$p < .001$.

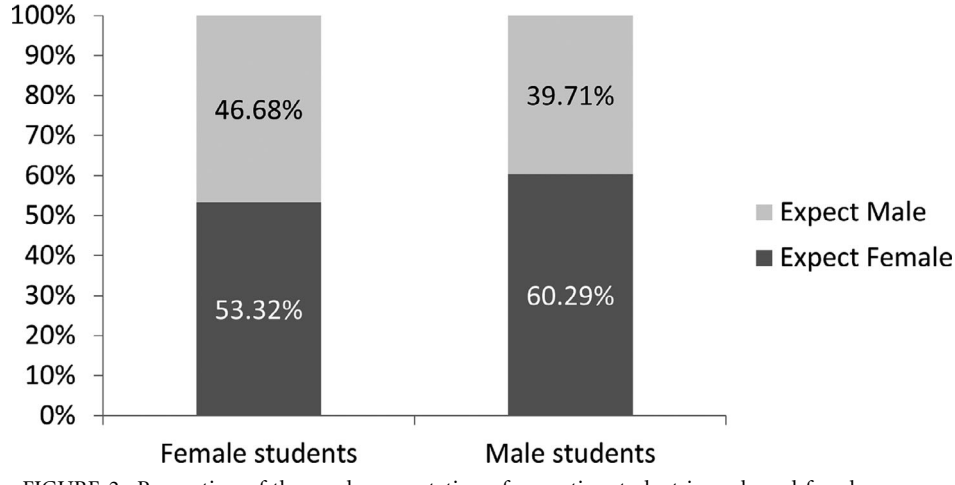

FIGURE 2. Proportion of the gender expectation of a creative student in male and female groups.

achievement, we assessed and compared four alternative models depicted in Figures 3–6. The divergence of the stereotypes within the models was of particular note. More specifically, Model 1 included a second-order stereotype latent variable, with three latent variables (competence, popularity, warmth), while the other three models presented different first-level latent variable for stereotype. For example, Model 2 used the competence stereotype (see Figure 4); Model 3 used the popularity stereotype (see Figure 5); Model 4 used the warmth stereotype (see Figure 6).

Four inaugural tests of the measurement models revealed that the data fit satisfactorily (see Table 7). An examination of each model's individual parameters revealed that all factor loadings were significant and pointed in the expected direction. Consequently, we proceeded to test the four structural models: It presented with suitable fit indices (see Table 8). Interestingly, among Model 2, Model 3, and Model 4, the path coefficients from competence, popularity, and warmth to motivation were different. The path coefficient from competence to motivation (1.57) in Model 2 (see Figure 4) was higher than the path coefficient from popularity to motivation (1.23) in Model 3 (see Figure 5), while the path coefficient from warmth to motivation in Model 4 was not significant (see Figure 6).

The significances of the mediating effects of motivation in Model 1, Model 2, and Model 3 were then tested using the Bootstrap estimation procedure. We generated 5,000 bootstrapping samples from the original data set (N = 584) by random sampling. Tables 9–11 display the indirect effects and their associated 95% confidence intervals relative to Model 1, Model 2, and Model 3. As shown in Table 9, Model 1 demonstrates that stereotype and growth mindset exert significant indirect effects on creative achievement via motivation. Moreover, Model 2 suggests that competence and growth mindset exert significant indirect effects on

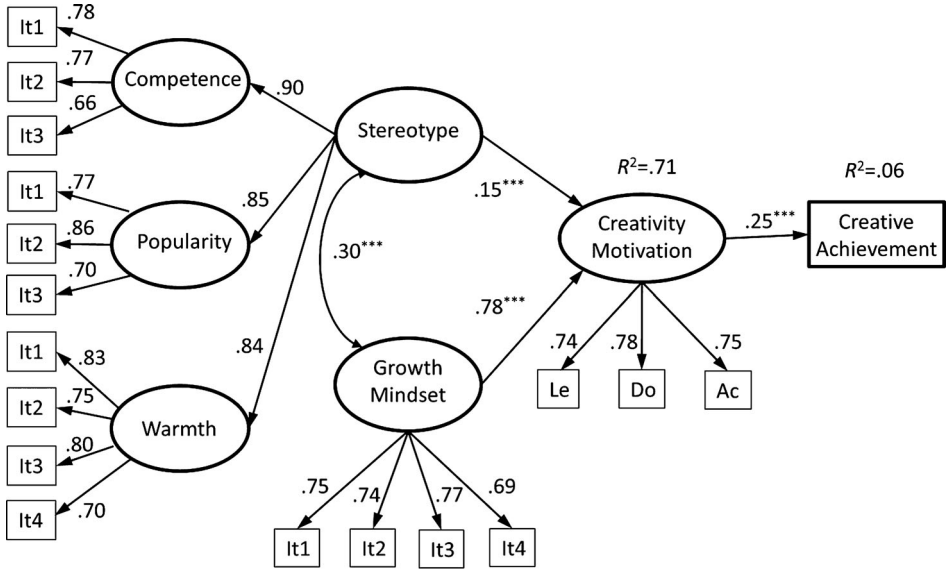

FIGURE 3. Model 1. Factor loading is standardized. Le = Learn new things; Do = Do new things; Ac = Accomplish new things; It1–It4 = Item1–Item4. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

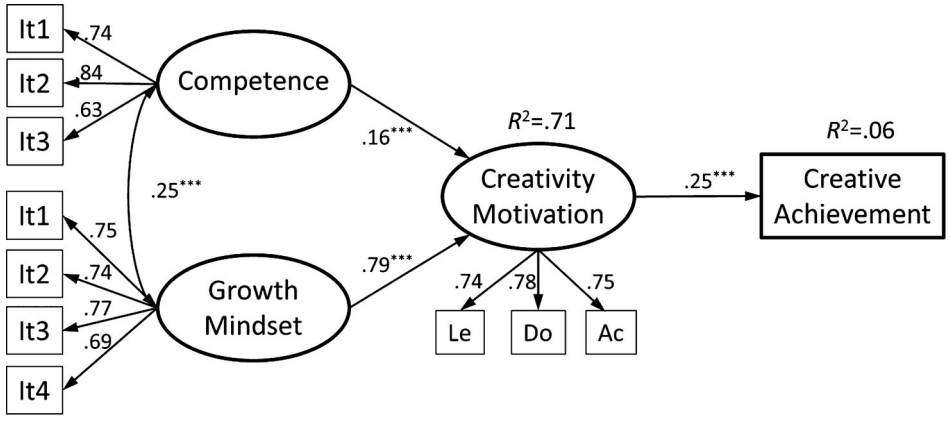

FIGURE 4. Model 2. Factor loading is standardized. Le = Learn new things; Do = Do new things; Ac = Accomplish new things; It1–It4 = Item1–Item4. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

creative achievement via motivation (see Table 10); in Model 3, popularity and growth mindset exert significant indirect effects on creative achievement via creativity motivation (see Table 11). Furthermore, the indirect effect linking competence to achievement in Model 2 is higher than the effect linking popularity to achievement in Model 3.

DISCUSSION

Similar to an earlier study of German adolescents (Zhang, Hopp, et al., in press), and in line with Hypothesis 1, we found that Chinese university students have a positive image of a creative other, and regard the hypothetical student as highly competent, warm, and popular.

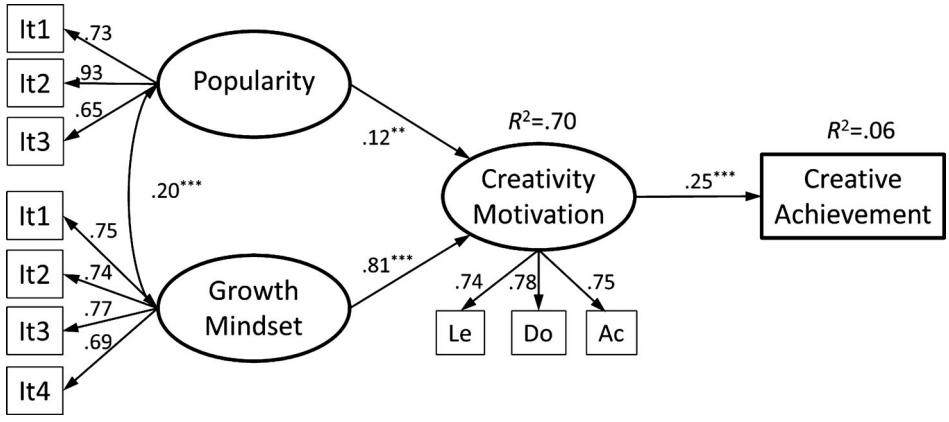

FIGURE 5. Model 3. Factor loading is standardized. Le = Learn new things; Do = Do new things; Ac = Accomplish new things; It1–It4 = Item1–Item4. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

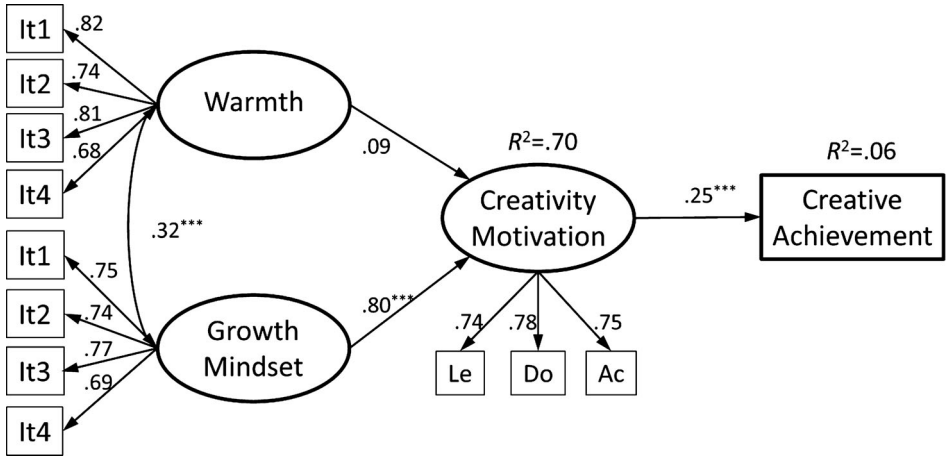

FIGURE 6. Model 4. Factor loading is standardized. Le = Learn new things; Do = Do new things; Ac = Accomplish new things; It1–It4 = Item1–Item4. $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

TABLE 7. Goodness-of-Fit Indices Among Competing Measurement Models

	Chi-square	*df*	CFI	TLI	RMSEA	SRMR
Model 1	417.62	130	.94	.93	.062	.055
Model 2	75.87	32	.98	.97	.048	.028
Model 3	83.69	32	.98	.97	.053	.031
Model 4	82.80	41	.99	.98	.042	.025

Note: RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual; CFI = comparative fit index; TLI = Tucker–Lewis index.

TABLE 8. Goodness-of-Fit Indices Among Competing Structural Models

	Chi-square	*df*	CFI	TLI	RMSEA	SRMR
Model 1	385.72	129	.95	.94	.058	.039
Model 2	92.24	41	.98	.97	.046	.030
Model 3	102.98	41	.98	.97	.051	.033
Model 4	113.07	51	.98	.97	.046	.029

Note: RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual; CFI = comparative fit index; TLI = Tucker–Lewis index.

TABLE 9. Summary of Indirect Effects Obtained in the Structural Model 1

IV	Mediator	DV	Unstandardized estimates (*SE*)	Standardized estimates (95% CI)
Stereotype	Creativity Motivation	Creative Achievement	0.33 (0.14)	.04** (.01, .06)
Growth Mindset	Creativity Motivation	Creative Achievement	1.24 (0.25)	.20*** (.14, .26)

Note: IV = independent variable, DV = dependent variable; SE = standard error. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

TABLE 10. Summary of Indirect Effects Obtained in the Structural Model 2

IV	Mediator	DV	Unstandardized estimates (SE)	Standardized estimates (95% CI)
Competence	Creativity Motivation	Creative Achievement	0.38 (0.15)	.04** (.02, .06)
Growth Mindset	Creativity Motivation	Creative Achievement	1.25 (0.25)	.20*** (.14, .26)

Note: IV = independent variable, DV = dependent variable; SE = standard error. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

TABLE 11. Summary of Indirect Effects Obtained in the Structural Model 3

IV	Mediator	DV	Unstandardized estimates (SE)	Standardized estimates (95% CI)
Popularity	Creativity Motivation	Creative Achievement	0.24 (0.10)	.03* (.01, .05)
Growth Mindset	Creativity Motivation	Creative Achievement	1.27 (0.26)	.20*** (.14, .27)

Note: IV = independent variable, DV = dependent variable; SE = standard error. $* p < .05$, $**p < .01$, $***p < .001$.

Moreover, while female students showed no clear differentiation in their anticipation of a creative other as a male or a female student, male students tended to anticipate the creative other as a female. Therefore, study findings did not support Hypothesis 2: Students across both genders did not tend to assume that creatives others share the same gender as themselves. This result differs from the "same-gender preferences"

result outlined in previous studies of German adolescents (Hopp et al., 2016; Zhang, Hopp, et al., in press). There may be several explanations for this inconsistent result, including differences in nationality (Chinese students versus German students) and age (university students versus adolescents). The prompt brief delivered by study administrators in which they described the creative other as part of the teaching domain might also play a key role in the discrepancies between our and the German results. The German adolescent study introduced a creative student in a more general context and did not reveal to its participants the domain in which the *other* flourishes creatively. Although previous studies suggested that Chinese students tend to regard male students as more creative (Lau & Li, 1996), our results indicate that when the prompt described a creative student in the education major, it elicited an implicit suspicion that the creative person in question—purportedly from the teaching domain—is *female*, rather than male. What's more, when gender preference of a creative other is confronted with work-place gender bias, compellingly, the female archetype abounds. This implies that among this study's participants, male students could be faced with a gender threat or may possibly lean toward a belief that female students are more likely to be creative in the teaching domain. The latter implication is reminiscent of modern studies suggesting that, in certain professions, one gender is more creative or more likely to achieve excellence than the other. Society's impression of women as educators or in nursing professions, and of men as engineers or in technology-related fields possibly cultivates a gendered threat that demotivates the "lesser" or contextually subordinate sex in the pursuit of excellence (Cushman, 2005; Lewis Jr & Sekaquaptewa, 2016; Pennington, Heim, Levy, & Larkin, 2016). Consider that, as is typically the case around the world, the majority of university students in China pursuing degrees in education are, in fact, female (Liao, Xiong, & Hu, 2017). Does this exacerbate the *female as creative educator* stereotype?

THE STRUCTURAL RELATIONSHIP BETWEEN GROWTH MINDSET, STEREOTYPE, CREATIVITY MOTIVATION, AND CREATIVE ACHIEVEMENT

This study found that the variables explored herein (stereotype, growth mindset, creativity motivation, and creative achievement) are positively and strongly associated with each other—the first step in validating the following causal model. A growth mindset is especially associated with the positive stereotypes of a creative person (stereotype: .30 ($p < 0.001$); competence: .26 ($p < 0.001$); warmth: .31 ($p < 0.001$); popularity: .23 ($p < 0.001$), and supports the theoretical assumption that the growth mindset of the creative self and the social perception of creative others are interconnected. Nonetheless, other contextual elements may very well play a significant role in creativity achievement. For example, imitative behavior is an essential mechanism in the social learning process (Chartrand, Maddux, & Lakin, 2005; Dijksterhuis, Chartrand, & Aarts, 2007); a growth mindset of creative ability and the perception of a creative other as highly competent could result in the modeling of the other's behavior. Indeed, research points to the positive impact that creative role models have on students' motivation to create, especially when those students have a growth mindset. When individuals believe that they can one day match other's creativity level, they exhibit high creativity motivation and are more likely to imitate the other's creative behavior in doing, learning, and accomplishing new things.

Moreover, results of the structural equation model support Hypothesis 3a: Growth mindset is associated with creative achievement and mediated by creativity motivation. In comparison to previous studies (Royston & Reiter-Palmon, 2017), the present work verifies an alternative mechanism to creative efficacy that explains why and how growth mindset influences creative behavior. The mediation model result implies that when students have a higher growth mindset, they tend to behave creatively by doing, learning, and accomplishing new things, thus accommodating creative achievement. This mechanism is similar to the contextual learning achievement articulated by Dweck and Leggett (1988): individuals who believe that intelligence is malleable tend to have learning goal orientation, which in turn, increases competence. Our results build on this underlying mechanism to include contextual *creative* achievement.

Finally, as predicted by the "stereotype inspiring" theory, findings support Hypotheses 3b: The positive stereotype of creative others is associated with higher levels of creative achievement and is mediated by creativity motivation. Furthermore, by comparing three types of stereotypes separately in Model 2, 3, and 4, we found the effect of *competent* and *popular* are both significant; the effect of *competent* is stronger than that of *popular*. The perception of a creative person as *warm* does not lead to increased creativity motivation and creative behaviors. These distinct results suggest that, of the three kinds of stereotyping observed in this study, the perception of creative others as competent and popular might be significantly motivating students to do, learn, and accomplish new things, yielding more student creative achievement. Moreover, while individuals generally perceive creative others as warm, the warmth aspect does not lead observers to be more

creative. While warmth does play a decisive role in the classification of creative others as friend or foe (Cuddy, Fiske, & Glick, 2008), competence is the most decisive factor in motivating the creative self. One interpretation of our results proposes that when a student observes a creative other, he or she may focus more on performance-related elements like professional distinction or general social status. And another suggests that these differences are attributable to cultural aspects unique to the Chinese students in our group. Compared to their European counterparts, studies show that Chinese students are considerably more achievement goal-oriented (Leung & Chan, 2003). In other words, the students that participated in this investigation may be more concerned with performance and implicitly attribute a vital role to the competence stereotype. Considering that implicit theories are closely associated to cultural context (Tang et al., 2016), to better examine this possibility, future studies should consider a more nuanced, cross-cultural approach to creativity research.

The implicit theory of the creative self and creative other alludes to a motivating function that significantly contributes to creative behavior. It should be noted, however, that it is the growth mindset as it applies to the creative self, rather than the creative other, that carries more scientific weight. From this point of view, we can compare two kinds of implicit theories to better understand the significance of positive stereotyping: Although impressions of the creative other do play an important role in creativity achievement, the motivating function of the growth mindset of the creative self is critical. This makes sense because the investigation was conducted in a natural setting in which different aspects of the creative self—growth mindset, creativity motivation, and creative behavior—are closer connected than those related to the perception of creative others. Future studies should explore the prospect of increasing the motivating function of positively stereotyping the creative other as priming or intervention.

IMPLICATIONS

Expanding on existing implicit theories of creativity, both our results and our approach have implications for future research concerning the function of the social perception of creative others on the promotion of the creative self. Our study applied the stereotype theory to creative behavior, motivation and verified the underlying mechanisms. From practical purposes of fostering creativity, our findings suggest fostering an incremental view of creativity and identifying creative role models. Ultimately, this study highlights the promising function of creative role models, who are competent and popular, on motivating students to do, learn, and accomplish new things. Creative role models can certainly activate social cues in order to guide students to a more creative self.

LIMITATIONS AND FUTURE RESEARCH

The prompt in the present study is not identical to those employed in previous studies (Zhang, Hopp, et al., in press), making it difficult to isolate a concise explanation of our results. We prompted participants with a hypothetical creative student from the teaching domain; consequently, we cannot confirm a same-gender preference because participant predilection could have also been influenced by age, nationality, or domain familiarity. Future studies should acknowledge the effect such factors on prompt delivery. For instance, in a Chinese context, to catalogue a difference between a scenario in which a creative other hails from a general background or a specific professional domain, it would be necessary to conduct studies among two homogenous samples of Chinese students marked by a fixed age, academic major, and university situation. To verify whether specific or general domains affect student gender expectations, one sample of students would be briefed with a creative other from a teaching background, and the remaining group would be tasked with a hypothetical involving an indistinct professional scenario.

We detected a gender bias in the present study; however, we could not make a causal conclusion regarding a gender bias or threat, if any indeed exists. Future studies, especially from the discipline of psychology, can test whether gender bias plays a motivating or demotivating role for male and female students in the teaching domain.

Lastly, the function of social perception on creative others can be generally attributed to culture, or it can be inherently culturally independent. Cross-culture studies are needed to examine which stereotypes play the most important, motivating role across different cultures.

CONCLUSION

The current research verifies the impact of implicit theories of creativity on creative outcomes. It is the first empirical study that illustrates an association of student social perception of the creative other—that is,

positive stereotyping; several crucial components of the creative self—growth mindset; creativity motivation; and creative achievement using a path model to demonstrate the inner mechanism.

Aligned with the theory that addresses the function of stereotypes and prejudice on people's real-life behavior and decisions (Zhang, Hopp, et al., in press), this study demonstrates the influence of the social perception of creative others on creativity motivation and achievement, supporting the "stereotype inspiring" function of a positive image of creative others. Specifically, the stereotype of high competence and popularity are the most essential components. This study also reveals that positive stereotyping, creativity motivation, and growth mindset are interconnected, and work together to affect real-life creative attitudes, beliefs, and behaviors. These findings point to promising creative motivation strategies such as setting an incremental view of creativity and identifying creative role models.

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