

## Age, Emotion Regulation Strategies, Temperament, Creative Drama, and Preschoolers' Creativity

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### ABSTRACT

Based on Yeh's (2004) *Ecological Systems Model of Creativity Development*, this study investigated the effects that age, the use of emotion regulation strategies, temperament, and exposure to creative drama instruction have on the development of creativity among preschool children. Participants were 116 4- to 6-year-old preschool children. This study categorized the emotion regulation strategies used by preschool children and developed a creativity test which includes the measurement of *usefulness*, an indicator of creativity that has, until now, been ignored. The main findings are that (a) 6-year-olds outperform 4- and 5-year-olds in terms of creativity; (b) emotion regulation strategies as well as a positive temperament have positive effects on children's creativity; (c) creative drama instruction contributes to children's creativity; and (d) age group, emotion regulation strategies, temperament, and creative drama instruction can collectively predict children's creativity.

Keywords: Age, emotion regulation strategy, temperament, creative drama, creativity.

### INTRODUCTION

The trend toward interpreting creativity from a more holistic, dynamic and multidimensional perspective has been gaining considerable momentum over the past decade (e.g. Amabile, 1996; Csikszentmihalyi, 1999; Lubart & Getz, 1997; Yeh, 2004). In her *Ecological Systems Model of Creativity Development*, Yeh (2004) claims that four systems — the microsystem, mesosystem, exosystem and the macrosystem — have a far-reaching impact on an individual's development of creativity. The microsystem comprises inherent and learned personal characteristics which are the most fundamental to the generation of a creative product. The mesosystem consists of family and school experiences. The exosystem is made up of factors that relate to an individual's work. Finally, the macrosystem refers to an individual's social milieu. According to this model, the microsystem may interact with the mesosystem and this should have an impact on the development of preschool children's creative potential.

In this study, the focus of the analysis was on the extent to which three microsystem variables and one mesosystem variable influence preschool children's development of creativity. The three microsystem variables are the personal characteristics of age, emotion regulation strategies, and temperament. Emotion regulation strategies may modulate emotional expression and then influence cognitive flexibility and creative problem-solving (Russ & Kaugars, 2000-2001). With regard to temperament, it is closely linked to the likelihood of completing tasks and enjoying new situations (Wills, Windle, & Cleary, 1998). These two personal characteristics may well contribute to preschool children's creativity although no substantive evidence of this has been reported. Moreover, it is widely accepted that the preschool stage, especially the 5- to 6 year range, is the first critical period for the development of creativity (Dacey, 1989), but studies that have focused on how such creative development progresses among 4-, 5-, and 6-year-old children are scarce. As for the mesosystem variable of concern here — creative drama instruction, it has been found to be effective in stimulating children's imagination and encouraging reflection on life experiences (Baker, 1996; Roper & Davis, 2000); therefore, it can be an important vehicle for developing preschool children's creative potential.

To date, there has been little research on the development of creativity among preschool children in large part because of the inadequacy of testing instruments. For this reason, this study developed a creativity test targeted at preschoolers and examined changes in their level of creativity by age group. In addition, this study explored the emotion regulation strategies that preschool children commonly use and investigated the relationships between creativity and the factors of age, emotion regulation strategies, temperament, and creative drama instruction among preschool children.

### THE EVALUATION OF PRESCHOOLERS' CREATIVITY

Mayer (1999) reviewed the relevant findings reported over the last 5 decades and noted that a general consensus had emerged as to the major indicators of creativity; among these, one of the most salient is that creativity must include *originality* and *usefulness*. Granted very few instruments for the evaluation of preschoolers' creativity have been developed to date, but the most commonly used are likely the well-known *Torrance Tests of Creative Thinking* (TTCT) and the *Test for Creativity Thinking-Drawing Production* (TCT-DP). The TCT-DP was developed by Jellen and Urban in 1986 and has been used in several countries (as cited in Chae, 2003).

Yet, both the TTCT and TCT-DP only measure one of the indices of creativity — either *originality* or *novelty*. Research findings, however, have suggested that even preschool children, as young as toddlers (Daehler, 2000), have the ability to solve problems and think logically (Gauvain, Fagot, Leve, Kavanagh, 2002; Heyman & Gelman, 2000). In developing the *Preschooler's Creativity Test* (PCT) here, we added a measure to gauge the *usefulness* of a solution. The PCT measures *novelty* through the tasks in *Number Association* and it measures *usefulness* through the tasks in *Situation-based Problem Solving*.

## PERSONAL CHARACTERISTICS AND CREATIVITY

### Age and Creativity

Creativity can broadly be defined as the ability to observe and transform materials and objects into new and original forms (Donnelly, 1994); evidently, these abilities are nurtured through the accumulation of various life experiences (Simonton, 2003), but seldom has the manner in which creativity develops during the preschool stage been investigated. A relatively recent study of 1,366 Korean preschool children determines that older-age children outperform younger-age children on the TCT-DP (Chae, 2003). Similarly, Liao (2005) finds that 6-year-olds outperform 4- and 5-year-olds in her creativity test but that 5-year-olds do not outperform 4-year-olds; nevertheless, the mean score of the 5-year-olds is higher than that of the 4-year-olds. These empirical findings suggest that the development of creativity is closely related to cognitive maturity, especially during early childhood.

### Emotion Regulation Strategies and Creativity

Regulating emotions is a core function of emotional intelligence (EI) (Mayer & Salovey, 1997); it involves dynamic processes that modulate emotional expression within the framework of contextual demands, and these processes influence cognitive as well as behavioral performance (Conway, 2005; Rydell, Berlin, & Bohlin, 2003). True that little research has been done to determine the relationship between preschool children's ability to regulate emotions and their creativity, but many research findings (e.g. Guastello, Guastello, & Hanson, 2004) indicate that EI is related to creativity. Others, meanwhile, contend that positive emotions spark originality, cognitive flexibility, and creative problem-solving (e.g., Ashby, Isen, & Turken, 1999; Isen, 1999, 2002 ). As a case in point, Russ & Kaugars (2000-2001) find that children's performance of originality is reflective of a positive mood during play. At the same time, even negative mood states can also be a contributing factor to creative performance (e. g. George & Zhou, 2002; Kaufmann & Vosburg, 1997). In fact, Kaufmann and Vosburg (1997) found that negative mood states lead to better creative problem-solving than do positive moods. Negative moods may be a sign that there are issues that need to be improved, which may serve as an incentive for individuals to make changes and thus stimulate their creativity (Frijda, 1988; Martin & Stoner, 1996). Accordingly, there should be some causal nexus between preschool children's ability to regulate emotions, which is closely related to EI and emotions, and their degree of creativity.

Although some may question preschool children's ability to regulate their emotions, this has been confirmed in numerous studies (Eisenberg, Fabes, Murphy, Maszk, Smith, & Karbon, 1995; Eisenberg, Fabes, Guthrie, Murphy, Maszk, & Holmgren, 1996). Baumeister, Heatherton, and Tice (1994) further proposed that emotion regulation strategies include the dimensions of relaxation, distraction, cognition, and sociability. Parkinson, Totterdell, Briner, and Reynolds (1996) refined the definition of emotion regulation by dividing it into three dimensions: implementation medium (cognitive level vs. behavioral level), strategic intention

(diversionary vs. non-diversionary), and resource deployment focus (situation-directed vs. affect-directed). As for the dimension of strategic intention, avoidance and distraction make up diversionary strategies, while engagement and acceptance comprise non-diversionary strategies. These can manifest themselves on both the cognitive and behavioral level. Though these categorizations seem reasonable, their formulation was not based on empirical data of young children, especially those between 4 and 6 years of age. For this very reason, in this study, we investigated the specific emotion regulation strategies used by children in this age range.

### Temperament and Creativity

According to Strelau (1993), temperament refers to basic, relatively stable personality traits. Rothbart, Ahadi, and Evans (2000), meanwhile, advocate that temperament may influence the links between the self and external concepts, schemas, and life narratives; it may also be related to self-regulation and positive motivation. Obviously, temperament comprises an important set of personal traits that are closely integrated with cognitive functioning and motivation.

In the earliest of relevant research studies, the measurement of temperament was based on Thomas, Chess and Birch's (1970) classification which includes 9 dimensions: activity level, rhythmicity, distractibility, approach/withdrawal, adaptability, attention span and persistence, intensity of reaction, threshold of responsiveness, and quality of mood. The dimensions explained in the following, however, have been more commonly used in recent studies (Wills et al., 1998). *Activity level* is defined as the typical level of physical activity, vigor, and overt motor behavior; *negative emotionality* is the tendency to become easily and intensely upset; *rigidity or inhibition* is the tendency to react inflexibly to new situations; *sociability* is the tendency to enjoy being in the company of others; *task attention orientation or persistence* refers to the ability to focus one's attention in order to complete tasks; *positive emotionality* is the tendency to easily experience positive affect; and finally, *approach* is the tendency to enter and enjoy new situations (Wills et al., 1998).

Temperament is likely related to creativity as some personal traits are common to both, especially in the aspects of activity level, sociability, persistence, positive emotionality, and approach. For example, Simonton (2000) contends that creative people are likely to have wide interests, great openness to new experiences, conspicuous behavioral and cognitive flexibility, and risk-taking boldness. Torrance (1988) determined that creative individuals are courageous, independent, honest, perseverant, curious and willing to take risks. Yeh (2004) also finds that creative people like to try new things, enjoy challenging work, have broad interests, stay enthusiastic, keep up their efforts and are persistent when doing a task, are good at communicating and managing emotions, and like to share their creative ideas with others. Along similar lines, Wills et al. (1998) asserted that novelty-seeking is derived from systems involved in the activation of behavior and that it is related to certain dimensions of temperament, namely activity level, negative emotionality, and approach. It is perhaps not surprising that the core personal traits associated with creativity are related to those of temperament.

### CREATIVE DRAMA INSTRUCTION, PERSONAL CHARACTERISTICS, AND CREATIVITY

Creative drama is defined by the American Alliance of Theatre and Education (AATE) as a group creation of a play under the guidance of a leader, using the theatrical techniques of pantomime and voice improvisation; it is improvisational, non-exhibitional, reflective, and most importantly, process-oriented (AATE, 2005). Freeman, Sullivan, and Fulton (2003) also contend that dramatic activities are holistic in nature, requiring participants to represent externally what takes place internally; needless to say, internal reflection combined with external representation involves the cognitive, affective, aesthetic, and moral domains. On these grounds, creative drama contributes to not only children's development of creativity (Roper & Davis, 2000) but also their advances in communication skills, social awareness, clarification of values and attitudes, and active participation (Waldschmidt, 1996). The most commonly used activities that comprise creative drama instruction include imaging, making use of fantasy, doing role plays and pretend plays, imitating movements, acting in dramatic plays, and telling stories (Baker, 1996; Freeman et al., 2003; Lightfoot, 1988; Russ & Kaugars, 2000-2001).

Even though creative drama instruction differs in its specific methods and emphases, what is at front and center of basic creative drama is clear: it is always improvised and playful. "Play" is essential to children's creative drama activities for it fosters the development of the cognitive and affective processes that are fundamental to creative performance. Howard-Jones, Taylor, and Sutton (2002) hold that children's attraction to play or to playfulness is linked to creative thinking skills. Russ & Kaugars (2000-2001) also take the view that pretend play is important in developing creativity since so many of the affective processes involved in creativity occur in play, and pretend play, in particular, is one domain where the creative affective processes can be accessed and developed.

Based on a holistic perspective as the *Ecological Systems Model of Creativity Development* suggests (Yeh, 2004), there may very well be interactions among the personal characteristics being studied here (age, emotion regulation strategies, and temperament) and the school experience of receiving creative drama instruction and this in turn may influence preschool children's development of creativity. It is suggested that both internal and external factors are beneficial in shaping effective emotion regulation behavior in young children (Wiggins, 2005). Lending further support to this view, Power (2005) argues that cognitive development, temperament, and attachment are influential factors in a child's ability to regulate his or her emotional reactivity; Saarni (2006) finds that the ability to regulate emotions is explicitly related to an individual's temperament. And Yeh (2005) finds that integrating creative drama into thematic instruction can effectively enhance preschool children's ability to regulate emotions. Similarly, some researchers (Strelau, 1998; Zawadzki, Strelau, Oniszczenko, Riemann, & Angleitner, 2001) advocate that temperament is subject to changes brought about by maturation and certain environmental factors. As a result, it is reasonable to assume that effective emotion regulation strategies and a positive temperament are possibly enhanced as the individual matures and that they can both be cultivated via creative drama instruction. Accordingly, we postulate that preschool

children's performance vis-à-vis creativity can be predicted on the basis of their age, their ability to use emotion regulation strategies, their overall temperament, and their exposure to creative drama instruction.

## HYPOTHESES

In keeping with the major findings presented in the review of the extant literature, we proposed the following hypotheses:

1. Being older should have a positive influence on preschool children's creativity.
2. The use of emotion regulation strategies should have a positive influence on preschool children's creativity, and the indices between these strategies and creativity should be positively correlated.
3. Positive temperament should have an influence on preschool children's creativity, and the indices between temperament and creativity should be positively correlated.
4. Creative drama instruction should have a positive influence on preschool children's creativity.
5. Preschool children's age, their use of emotion regulation strategies and their temperament, as well as the amount of creative drama instruction they are exposed to should collectively be able to predict their level of creativity.

## METHODOLOGY

Participants were 116 preschool children (62 boys and 54 girls) purposively sampled from 4 preschools in Taiwan, each including 2 classes — one younger-age class and 1 older-age class, for a total of 8 classes. All classes were taught by different teachers. While 52 children (44.8%) were in the younger-age classes ( $M = 4.88$  years,  $SD = .42$  years), 64 children (55.2%) were in the older-age classes ( $M = 6.10$  years,  $SD = .27$  years). More specifically, 28 children (24.1%) were between 4 and 5 years of age ( $M = 4.58$  years;  $SD = .29$  years), 41 (35.3%) were between 5 and 6 years of age ( $M = 5.45$  years;  $SD = .33$  years), and 47 children (40.5%) were over 6 years of age ( $M = 6.23$  years;  $SD = .18$  years).

### Instruments

The instruments employed in this study were the *Preschoolers' Creativity Test* (PCT), the *Checklist of Emotion Regulation Strategies*, the *Childhood Temperament Inventory*, and the *Checklist of Creative Drama Instruction*. The PCT is comprised of two subtests: the *Number Association* and the *Situation-based Problem Solving*. In the *Number Association* subtest, children are required to draw pictures based on the numbers 7 and 9. In the *Situation-based Problem Solving* subtest, children are required to solve two problems: (a) "So hot!" which pictures a little boy sweating in a park; and (b) "Oh, my kite!" which pictures a kite hanging from a tall tree. In other words, the children have to solve the problems associated with being hot and with getting the kite down. For each task, a total of thirty relevant and irrelevant instruments are provided in the form of

pictures; the children can solve the problems based on the instruments provided or by using their own imagination. The time limit for the *Number Association* subtest is 20 minutes, while that for the *Situation-based Problem Solving* subtest is 10 minutes.

The indices measured in the PCT include novelty and usefulness. *Novelty*, representing the originality of the children's responses, is scored from 0 to 3 points. *Usefulness*, as judged by both the validity and the appropriateness of their responses, is scored from 0 to 5. A higher score is indicative of a better performance. While *validity* refers to the degree of effectiveness of the children's problem-solving, *appropriateness* refers to the accessibility of suitable solutions and whether these can be obtained within a relatively short period of time. For example, standing under a big tree can solve the problem of being hot (valid) and it is easy to find a big tree in a park (appropriate). The total score for creativity is the averaged t-score on *novelty* and *usefulness*. The PCT has an acceptable level of reliability. The inter-rater reliability of 2 raters for *novelty* and *usefulness* are  $r(19) = .97$  and  $.99$ ,  $ps < .001$ , respectively; the test-retest reliability after 3 months is  $r(26) = .69$ ,  $p < .01$ ; and the correlations of the two indices with the total score for creativity are  $r(350) = .78$  and  $.75$ ,  $ps < .001$ . As for the criterion-related validity, the correlation coefficients between the PCT and the integrated level of multiple intelligences which emphasize creative performance are  $r(273) = .23 - .47$ ,  $ps < .001$  (Yeh, 2006). The intelligences are linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalist intelligence.

In this study, the *Checklist of the Emotion Regulation Strategies* was completed through classroom observation. Here, a basic checklist was first developed based on both a pilot study of classroom observations and the dimensions of the emotional strategies, as discussed earlier (Baumeister et al., 1994; Bridges, Grolnick, Connell, 1997; Parkinson et al., 1996); new strategies were subsequently added during our field observations. Finally, all of these strategies were integrated into 6 dimensions: cognition, avoidance, aggression, relaxation, distraction, and sociability. During the observations, the children's emotion regulation strategies were recorded and each relevant behavior was counted as 1 point each time. The observations were first recorded with a video camera and were then analyzed by the researchers based on their consensus. The score for each dimension is the sum of all relevant behaviors during the observation period, and the total score for the emotion regulation strategies is the sum of the scores of all 6 dimensions.

The *Childhood Temperament Inventory* consists of 48 items, evenly divided into 6 factors: activity, adaptability, approach, emotional intensity, distractibility, and persistence (Wang, 1995). The Cronbach's  $\alpha$  coefficients for the 6 factors and the total score are  $.89$ ,  $.80$ ,  $.85$ ,  $.73$ ,  $.82$ ,  $.86$ , and  $.86$ , respectively. The *Childhood Temperament Inventory*, with a test-retest reliability of  $.83$ , is scored from 1 (never) to 7 (always). In this study, the inventory was completed by the class teachers as we believe that, based on their long-term interactions with the students, they would do a more reliable and valid evaluation than the researchers who would have had to do their evaluations on the basis of a rather short-term

observation period. All teachers completed the inventory based on their observations during the 3-month period prior to the start of this research. If more than 3 test items were not completed, the inventory was considered invalid.

The *Checklist of Creative Drama Instruction* includes 5 dimensions: (1) the frequency of implementing creative drama instruction; (2) the approaches taken in implementing creative drama instruction; (3) the teaching activities and the extent of teachers' training in creative drama instruction; (4) the design of and décor in the classroom environment; and (5) the choice of teaching materials (Yeh, 2005). The total score for the creative drama instruction is the sum of the scores of all 5 dimensions. In this study, the instructional approach for different classes within a preschool was highly consistent and the principals fully supervised their teachers' instructional activities. We therefore interviewed the principal of each preschool to complete the *Checklist of Creative Drama Instruction*. Based on the total scores on the *Checklist of Creative Drama Instruction*, we divided the 8 classes in the 4 preschools into three groups which represented the extent to which creative drama instruction had been implemented during the semester; the three groups were: (a) High: 19 points and over; (b) Medium: between 12 and 18 points; and (c) Low: 11 points and less. Each of the High-level and Medium-level group involved only 2 classes; the Low-level group, however, consisted of 4 classes.

### Procedures

Since preschool children frequently tend to get somewhat anxious when they are solely in the company of strangers, we asked the class teacher to administer the PCT after she had had a short private discussion with the researchers. Nevertheless, the researchers were in class to assist and supervise the test administration. Trying to keep the instructions and procedures standardized, as requested by the researchers, the teachers first captured the children's full attention and then explained how to do the *Number 7* subtest in the *Number Association* test by giving an example using other numbers. Then the teachers administered the test to their class. As the children finished the test, they were immediately interviewed individually to ensure that their drawings would not be misunderstood. After all of the children had finished the first subtest and had been interviewed, the teachers proceeded to administer the second subtest – the *Number 9* subtest. Again, this was immediately followed by individual, personal interviews. Afterwards, the children took a 10-minute break. When the children returned, the teachers once again commanded their attention and administered the two subtests of the *Situation-based Problem Solving*. The teachers first explained the situations by telling the children each story and then asked them to solve the problems by circling an appropriate option provided through pictures on the answer sheets. Individual interviews immediately followed once the children had finished each of the subtests. It took about 1.5 hours to finish the whole test. Finally, the teachers were given the *Childhood Temperament Inventory* and a stamped return envelope. All of the teachers sent the completed forms back within a month. Before



the researchers left each preschool, we briefly interviewed the principal of each preschool to gain a more thorough understanding of the implementation of creative drama instruction. With the approval of the respective principal, each interview was recorded in full.

As for the emotion regulation strategies that the children used in the classroom, we made observations of these on the condition that it was not an imposition on the preschool classes in the sample. Each class was observed for 4 hours a day for a fairly uninterrupted 7-day period. Since the classroom observations as well as the analyses of the qualitative data were very time-consuming and the observations required the principals' approval, we were only able to sample 51 children from a total of 3 classes with varying degrees of creative drama instruction; that is, we sampled 1 class from each of the groups that had a High-, a Medium-, and a Low-level of drama instruction. During the observations, we made notes and used video cameras and recorders to obtain complete records of the situations.

## RESULTS

### Preliminary Analyses

The correlation coefficients between age and the emotion regulation strategies, temperament, creative drama instruction, and creativity are .44 ( $p = .001$ ), .03 ( $p = .710$ ), .24 ( $p = .009$ ), and .26 ( $p = .005$ ), respectively. Except for the emotion regulation strategies ( $N = 51$ ), the sample size for the correlation analyses was 116. To ensure that the concerned independent variables and creativity were not interrelated due to age, we used age as a covariate when analyzing the relationships among the emotion regulation strategies, temperament, creative drama instruction, and creativity.

### Age Group and Creativity

To better depict the pattern of development of creativity among preschool children, we used the 3 age groups (4-, 5-, and 6-year-olds), instead of the 2 class levels (younger-age and older-age), to proceed with the analyses. The results of the ANOVA show a significant difference among the age groups,  $F(2, 113) = 3.85$ ,  $p = .024$ ,  $\eta^2 = .06$ . The Scheffé post hoc test reveals that the 6-year-olds outperform the 4-year-olds,  $p = .026$ ; however, there is no significant difference between either the 6- and 5-year-olds or the 4- and 5-year-olds (see Table 1 for *Ms* and *SDs*).

Using *novelty* and *usefulness* as the dependent variables, we conducted a MANOVA and it is important to note that age group has a significant effect on the two indices of creativity ( $\Lambda = .91$ ,  $p = .034$ ,  $\eta^2 = .05$ ). Equally important, the ANOVAs that followed show that age group has a significant effect on *novelty*,  $F(2,113) = 5.33$  ( $p = .006$ ,  $\eta^2 = .09$ ), and the Scheffé post hoc test indicates that the 6-year-olds outperform the 4-year-olds,  $p = .006$  (see Table 1). But, it is evident that age has no significant effect on *usefulness*,  $F(2, 113) = 1.38$  ( $p = .256$ ,  $\eta^2 = .02$ ) (see Table 1 for *Ms* and *SDs*).

TABLE 1. Means and standard deviations for the 3 age groups on creativity.

Group	N	Creativity		Novelty		Usefulness	
		M	SD	M	SD	M	SD
4-year-old	28	46.69	7.13	45.41	6.33	47.96	10.52
5-year-old	41	49.59	8.24	49.79	9.44	49.39	9.17
6-year-old	47	52.33	9.63	52.92	11.29	51.74	10.30

### Emotion Regulation Strategies and Creativity

Table 2 presents the top 5 strategies for each of the 6 dimensions used by the children. Since only 51 children were observed for their use of emotion regulation strategies, we used two groups (High vs. Low) and one covariate (age) to investigate the effects of the emotion regulation strategies on creativity. The sample was divided on the basis of the median. Using age as a covariate, we employed the Analysis of Covariance (ANCOVA) and found a significant difference in creativity between the two groups,  $F(1, 48) = 78.65, p < .001, \eta^2 = .63$ . A comparison of the adjusted means determines that those children who are more capable of using the emotion regulation strategies outperform their less capable counterparts ( $M_s = 47.43$  and  $60.98$ ).

To further enhance our understanding of and gain insight into the relationships between the 6 indices of the emotion regulation strategies and the 2 indices of creativity, a canonical correlation analysis was performed and age was controlled for. Although two canonical factors are extracted ( $\Lambda = .13, p = .000$ ), only the first is significant. The following explanation focuses on the results of the first canonical factor. The first analysis yields a significant canonical correlation (.93), representing an 86% overlap in the variance of the pair of canonical variates. On the IV side (emotion regulation strategies), the factor loadings for *cognition, avoidance, aggression, relaxation, distraction, and sociability* are .89, .37, .42, .51, .76, .76, respectively. On the DV side (creativity), the factor loadings for *novelty* and *usefulness* are .87 and .84. It is clear that the emotion regulation strategies of cognition, distraction, and sociability and the creative ability of novelty and usefulness are strongly correlated.

### Temperament and Creativity

This study divided temperament into three groups: High, Medium, and Low on the basis of the cut-off points of the upper and lower 27% (the group sizes were 35, 46, and 35). Using age as a covariate, the ANCOVA determined that temperament has significant effects on creativity,  $F(2, 112) = 8.10, p = .001, \eta^2 = .13$ . The Scheffé post hoc test shows that the High temperament group outperforms the Medium group as well as the Low group,  $p_s < .01$ . However, the Medium group does not outperform the Low group ( $p = .706$ ). The adjusted means for the 3 groups are, respectively, 47.48, 49.08, and 55.11.

**TABLE 2.** Number and percentages of the top 5 emotion regulation strategies used for each of the 6 dimensions.

6 dimensions and their strategies	Total ( <i>N</i> = 51)	
	Count	%
<b>Cognition</b>		
Accepting the fact and obeying the authority	50	98.0
Ignoring	46	90.2
Asking for reasons	42	82.4
Using words of despise	32	62.7
Rationalizing	19	37.3
<b>Avoidance</b>		
Withdrawing and staying alone	33	64.7
Leaving the place and playing alone	32	62.7
Rejecting others' help	26	51.0
Getting out of the situation	13	25.5
Giving up and walking around	10	19.6
<b>Aggression</b>		
Shouting back	51	100.0
Staring at people	32	62.7
Pointing at people	26	51.0
Pushing people away	21	41.2
Hitting people	16	31.4
<b>Relaxation</b>		
Calling people names	17	33.3
Crying	17	33.3
Singing	15	29.4
Acting with great energy	8	15.7
Putting hands on waist	7	13.7
<b>Distraction</b>		
Returning to what one had been doing	44	86.3
Turning away	35	68.6
Looking for substitutes	29	56.9
Avoiding eye-contact	26	51.0
Playing with toys	16	31.4
<b>Sociability</b>		
Seeking praise or recognition	51	100.0
Seeking sympathy or comfort	50	98.0
Playing pretend games	32	62.7
Playing simple social games	30	58.8
Trying to catch people's attention	29	56.9

Again, to further investigate the relationship among each of the indices of temperament and creativity, a canonical correlation analysis was performed and age was controlled for. Although two canonical factors are extracted ( $\Lambda = .73$ ,  $p < .001$ ), only the first is significant. The following explanation focuses on the results of the first canonical factor. The first analysis yields a significant canonical correlation (.49), representing a 24% overlap in the variance of the pair of canonical variates. On the IV side (temperament), the factor loadings for *activity*, *adaptability*, *approach*, *emotional intensity*, *distractibility*, and *persistence* are  $-.01$ ,  $.47$ ,  $.61$ ,  $.44$ ,  $-.06$ ,  $.81$ , respectively. On the DV side (creativity), the factor loadings for *novelty* and *usefulness* are  $.78$  and  $.94$ . This indicates that the temperament of approach and persistence and the two indices of creativity have strong positive correlations.

### Creative Drama Instruction and Creativity

Creative Drama Instruction here includes the High-, Medium-, and Low-level groups, as mentioned earlier. The sample sizes for the 3 groups were 17, 35, and 64, respectively. Using age as a covariate, the ANCOVA determined that creative drama instruction has significant effects on creativity,  $F(2, 112) = 42.27$ ,  $p < .001$ ,  $\eta^2 = .43$ . The Scheffé post hoc test shows that those who received a high level of creative drama instruction outperformed those who received either a medium level or a low level of creative drama instruction on creativity ( $ps < .01$ ), and that those who received a medium level of creative drama instruction outperform those who received a low level of creative drama instruction ( $p < .001$ ). The adjusted means for the 3 groups are 60.95, 53.23, and 45.33.

Furthermore, we used the 2 indices of creativity as dependant variables to conduct a multivariate analysis of covariance (MANCOVA) and find a significant effect,  $\Lambda = .52$ ,  $p = .000$ ,  $\eta^2 = .28$ ). The ANCOVAs that followed find significant group effects on both the indices of *novelty* ( $F(2,112) = 35.59$ ,  $p < .001$ ,  $\eta^2 = .39$ ) and *usefulness*, ( $F(2,112) = 24.88$ ,  $p = .000$ ,  $\eta^2 = .31$ ). The Scheffé post hoc test indicates that those who received a high level of creative drama instruction outperformed those who received a low level of creative drama instruction with respect to both *novelty* and *usefulness* ( $ps < .001$ ), while those who received a high level of creative drama instruction outperformed those who received a medium level of creative drama instruction, but only in the aspect of *usefulness* ( $p < .001$ ).

### Prediction of Age, Emotion Regulation Strategies, Temperament, and Creative Drama Instruction on Creativity

Finally, we focused on ascertaining a more holistic picture of the relationships among the independent variables of concern and creativity even though the sample size was only 51 owing to the limited data for the emotion regulation strategies. To achieve this, we employed a multiple regression using the enter method.

The correlation analyses indicate that there are significant correlations between age, emotion regulation strategies, creative drama instruction and the total score for creativity,  $rs(50) = .50$ ,  $.91$ ,  $.33$ ,  $ps < .01$ , respectively; there are also significant correlations between age, temperament, creative drama instruction and emotion regulation strategies,  $rs(50) = .44$ ,  $.24$ ,  $.31$ ,  $ps < .05$ , respectively. Moreover, cre-

ative drama instruction is significantly correlated with emotion regulation strategies and temperament,  $r_s(50) = .31$  and  $.32$ ,  $p_s < .05$ . However, the score for temperament is insignificantly correlated with creativity,  $r(50) = .23$ ,  $p = .056$ , which is contradictory to the previous findings from the canonical correlation analysis and the correlation based on the sample size of 116. Nevertheless, the results of the regression analysis indicate that age, emotion regulation strategies, temperament, and drama instruction can indeed collectively predict the preschool children's creativity,  $R^2 = .85$ ,  $F(4, 45) = 65.64$ ,  $p < .001$ . Among the predictors, emotion regulation strategies has the highest predictive power ( $\beta = .82$ ); in second place, though still far behind, is that of age ( $\beta = .15$ ) (see Table 4).

TABLE 4. Summary table of the multiple regression analysis.

	Standardized coefficients			Model			
	$\beta$	$T$	Sig.	$R$	$R^2$	Adjusted $R^2$	$F(4, 45)$
Age	.15	2.23	.031	.92	.85	.84	65.64***
Emotion regulation	.82	11.48	.000				
Temperament	.02	.32	.749				
Drama	.09	1.39	.172				

Note. \*\*\*  $p < .001$ .

## DISCUSSION AND CONCLUSIONS

To resolve the debate as to whether or not the relationships among the studied independent variables and creativity among preschool children are actually a result of natural development, we used age as the covariate to proceed with the data analyses concerning the relationships among the emotion regulation strategies, temperament, creative drama instruction and creativity. It is worth noting that the findings support all five of the hypotheses put forth in this study. Although the analyses regarding the emotion regulation strategies were based on a rather small sample size ( $N = 51$ ), the data which we obtained from the series of careful observations are reliable; thus, the findings in this study help us to understand the types of emotion regulation strategies that are frequently used by preschool children.

Concerning the influence of age, the means of creativity indicate that the children's performance on overall creativity, as well as that on *novelty* and *usefulness*, increase as they matured although significant differences are only found between the 6-year-olds and the 4-year-olds, suggesting that 4- and 5-year-olds may be regarded as being in the same developmental stage of creativity. According to Ward, Smith, and Finke's (1999) *Creative Cognition Approach* of creativity, 5 processes are important for creative performance: the retrieval of existing structures from memory, the formation of simple associations among structures or combinations thereof, the mental synthesis of new structures, the mental transformation of existing structures into forms, and the analogical transfer of information from one domain to another categorical reduction. The abilities involved

in these processes are evidently related to cognitive maturity in early childhood, and our findings confirm that 6-year-olds are more effective with these processes and therefore have better creative performance than 4- and 5-year-olds. This study also provides evidence to substantiate that even the youngest children at 4 years of age can successfully solve the problems in the *Preschooler's Creativity Test* although they still show room for improvement. This finding not only supports the view that young children have the ability to solve problems (Heyman & Gelman, 2000; Gauvain et al., 2002) but also reinforces the rationale behind adding the measure of *usefulness* to the *Preschooler's Creativity Test*.

This study also confirms that the use of emotion regulation strategies has positive effects on children's creativity. Regulating emotions requires a set of processes that draw on initiating, maintaining, and modulating emotional responsiveness as well as other strategies that are used to regulate emotional experiences (Bridges et al., 1997; Grolnick, Bridges, Connell, 1996); it is closely related to EI and positive emotions. Guastello et al. (2004) find that EI is significantly related to creative personality variables and that people who are emotionally intelligent produce a superior quality of creative work. In Lubart and Getz' (1997) point of view, positive emotions can contribute to creativity because they are related to formulating concepts, finding problems, and reaching insightful solutions. The findings here therefore support the claims that EI (Guastello et al., 2004) and positive emotions (Kaugars & Russ, 2000; Isen, 1999; Lee & Sternthal, 1999; Martin & Stoner, 1996; Russ, 1993) contribute to the enhancement of abilities underlying innovation; this in turn triggers further creativity.

In addition, this study finds that *sociability*, one dimension of the emotion regulation strategies, has high correlation with children's creativity performance. In this regard, many researchers have suggested that regulating emotions is virtually associated with social functioning (Calkins, 1994; Conway, 2005; Eisenberg, Fabes, Guthrie, & Reiser, 2000). For example, Lopes, Salovey, and Côté (2005) find that interpersonal sensitivity and pro-social tendencies are associated with emotion regulation abilities. Rydell et al. (2003) similarly take the position that emotion regulation involves the successful management of emotional arousal to secure effective social functioning. In the same vein, Yeh (2003, 2004) finds that the personal characteristics of willingness to share ideas, interact and discuss with others, and self-reflection are prerequisites for an individual to become creative; such personal traits are obviously critical to an individual's social functioning. Accordingly, regulating emotions may influence social functioning and then carry the effects over into preschool children's creative behavior.

As for the relationship between temperament and creativity, this study determines that those with a highly positive temperament outperform those with a less positive temperament on overall creativity performance; moreover, the temperaments of *approach* and *persistence* have high correlations with children's creative performance. These results are in agreement with previous findings that preschoolers who are high in approach have better originality (Bomba & Moran, 1988; Tegano, Moran, & Sawyers, 1991) and that persistence is a key personal trait shared by the most creative people (Yeh, 2004).

One particularly important finding that emerges from our results is that there is a positive relationship between creativity and creative drama instruction, the sole mesosystem variable we concentrated on in the present study. Creative drama instruction can be provided in various ways (Baker, 1996; Freeman et al., 2003; Russ & Kaugars, 2000-2001) and such instruction provides opportunities for children to participate in activities that require them to do role plays, analyze roles, and work cooperatively on creative tasks. Furthermore, the findings in this study echo previous findings (Feist, 1999; Russ, 1999; Russ & Kaugars, 2000-2001; Wortham & Wortham, 1989) that plays are effective activities in improving children's creativity. Russ and Kaugars (2000-2001) demonstrate that pretend play can facilitate creativity in two ways: First, it involves direct practice in divergent thinking skills. Second, the expression of both affect states and affect-laden fantasies in play helps learners develop a broader repertoire of affect-laden associations, and this very repertoire of associations should facilitate divergent thinking. How such affect-laden fantasies are generated and how they in turn influence young children's creative performance is worth exploring further.

On the basis of our interviews with principals, we also determine that the teachers of the group with the High-level of creative drama instruction in this study incorporate all the major forms of creative drama into their thematic instruction and this has previously been found to be effective in improving children's creativity (Arnold & Schell, 1999; Hargreaves & Moore, 2000). Thematic instruction emphasizes the cultivation of students' abilities to integrate and make associations with various strings of information, to make connections between what is being learned and the real world, and to become self-directed as well as motivated learners; it also stresses the importance of teachers' guidance and scaffolding (Pate, Homestead, & McGinnis, 1997; Still, 1996). More specifically, Walsh-Bowers and Basso (1999) found that an integrated approach to creative drama contributes to improvements in students' interpersonal skills. O'Day (2001) also proposes that creative drama through scaffolded plays allows for a sharing of knowledge between teachers and students. Evidently, an improved personality and enhanced knowledge, both products of creative drama activities, are also central to creative performance.

Finally, the significant correlations between age, temperament, creative drama instruction and emotion regulation strategies ( $r_s = .44, .24, .31$ ) as well as the strong correlations between emotion regulation strategies and creativity ( $r = .91$ ) suggest that age, temperament, and creative drama instruction may influence preschool children's creative performance via their use and development of emotion regulation strategies. This study did not try to confirm this potential model as the small sample size was not appropriate for the analysis of Structural Equation Modeling (SEM) which is commonly employed for model testing. Further studies might consider expanding the sample size and try to confirm this model.

To conclude, the findings in this study make it clear that age, emotion regulation strategies, temperament, and creative drama instruction are all influential factors in the development of creativity among preschool children. Beyond this, the collective prediction power of all the independent variables of concern here

that affect creativity as well as the significant correlations among the emotion regulation strategies, temperament, and creative drama instruction confirm the theory that the inherent and learned personal characteristics (microsystem) and the school experiences (mesosystem) may interact and have an impact on the development of creativity among young children (Yeh, 2004). Other major contributions that this study makes to this line of research include the in-depth investigation of preschool children's use of emotion regulation strategies as well as the development of the *Preschoolers' Creativity Test* which includes the measurement of *usefulness* that has, for so long, been ignored.

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