Effects of Positive Mood on Generative and Evaluative Thinking in Creative Problem Solving

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Abstract
The goal of this study was to examine the role of positive mood on generative and evaluative thinking in creative problem solving. Participants included 89 middle school students who watched either a positive or neutral mood video program. After students watched the video, they completed the Positive and Negative Affect Schedule (PANAS) scale to determine their current mood. Participants were then divided into three groups and given a divergent thinking task to complete. Group A was asked to generate potential solutions to a problem (generative thinking). Group B was given one solution to the problem that had been offered by participants’ peers in a previous pilot study and then asked to generate possible advantages to this particular solution (evaluative thinking). Group C was given the potential solution but asked to generate potential disadvantages (also evaluative thinking). Students in the positive mood condition were significantly more fluent than those who watched the neutral video. Students in the neutral mood condition generated more disadvantages than advantages, but this difference was significant only at $p < .10$. Implications and limitations of these results were discussed.

Keywords
mood, creativity, divergent thinking, evaluative thinking, creative problem solving

Background and Purpose
Creativity and creative problem solving (CPS) is an important educational goal with a long and substantial research history (Fasco, 2000-2001; Strom & Strom, 2002; Treffinger, Schoonover, & Selby, 2013; Treffinger, Solomon, & Woythal, 2012). Indeed, the goal preparing learners to be able to effectively deal with ever increasing and complex problems of the modern world is more and more a concern of business and political leaders as well as educators (Coy, 2000; National Governors Association, Council of Chief State School Officers, and Achieve, Inc, 2008; Partnership for 21st Century Schools, 2007). Many corporate, government, and nonprofit organizations worldwide have called for expanded attention to education for creativity. Creativity, knowledge, and access to information are “powerful drivers of development” (p. 3) and “Creativity is . . . the key resource in the knowledge economy, leading to innovation and technological change and conferring competitive advantage on businesses and national economies . . .” (United Nations Committee on Trade and Development and the UNDP Special Unit for South-South Cooperation, 2008, p. 202).

What is known about creativity and CPS is that it is a complex phenomenon, involving skills of both idea generation and evaluation (Lubart, 2001; Mumford et al., 2012; Treffinger, Isaksen, & Stead-Dorval, 2006). Generative thinking involves developing many new possibilities. Generation of ideas is an open exploration or search for ideas in which a person generates many ideas (fluency in thinking), varied ideas and new perspectives (flexibility), and unusual or novel ideas (originality). According to Treffinger and Isaksen (2005), generating ideas is viewed by many people as “creative,” and is sometimes (in error) equated with “brainstorming.” Generating ideas is but one important component and stage in CPS and brainstorming is one specific tool (among many) for generating options.

On the contrary, evaluative thinking involves exploring ways to make promising options into workable solutions and preparing for successful implementation. Evaluation of ideas is essential when solutions are presented and individuals must develop the solutions and make them as appropriate, useful, or workable as possible (Gibson & Mumford, 2013). Applying planned strategies and tools to analyze, develop, and refine possibilities, and to transform them into promising options.
solutions is evaluative thinking. In its latest formulation, instruction in CPS (V. 6.1™; Treffinger et al., 2006; Treffinger et al., 2013) involves both generative and evaluative thinking tools. At each stage of the creative problem-solving process, the individual applies both types of tools, and with each successive step or task in the process, the individual engages in appraisal or evaluative activity, providing information and insight to guide further efforts. Although the CPS model had many revisions over the last 50 years (Isaksen & Treffinger, 2004), CPS has been shown to be a powerful tool and effective method for igniting creative potential and making productive change (Christie & Kaminski, 2002; Freeman, Wolfe, Littlejohn, & Mayfield, 2001; Isaksen, 2008; Isaksen & De Schryver, 2000; McCluskey, Baker, & McCluskey, 2005; Puccio, Firestein, Coyle, & Masucci, 2006; Scott, Leritz, & Mumford, 2004). However, numerous researchers have argued that skill building is of limited utility unless more personal, affective qualities in the problem situation are considered (Davis, Kaufman, McCluskey, Baker, & McCluskey, 2005; English, 1987; Isen, Rosenzweig, & Young, 1991; Stankos-Kaczmarek, 2012). No less a major figure than J. P. Guilford (1962, 1977) long ago proposed that personal qualities of the individual were the real determinants of a creative response.

With regard to responding to individuals’ affective qualities, teachers and trainers have had a limited number of tools (Beghetto, 2010). But, one area that has interested researchers for many years is that of the effect of mood on performance (Martin, 1990; Westermann, Spies, Stahl, & Hesse, 1996). “Mood induction procedures” (MIPs) include a broad diversity of methods “whose aim is to provoke in an individual a transitory emotional state in a non natural situation and in a controlled manner . . . an experimental analogue of the mood that would happen in a certain natural situation” (García-Palacios y Baños, 1999, p. 16). MIPs have been used in both clinical and educational situations, and involved induction of both positive and negative feelings.

A substantial amount of research exists on the relationship of mood to creativity (Abele, 1992; Clapham, 2001; Greene & Noice, 1988; Isen, 2000; Isen & Daubman, 1984; Isen, Daubman, & Nowicki, 1987; Isen, Johnson, Mertz, & Robinson, 1985; Isen, Rosenzweig, & Young, 1991; Kaufmann, 2003; Vosburg, 1998a, 1998b). Isen’s studies have consistently shown that positive mood inductions lead to better, more efficient decision making, including decision making requiring more careful, systematic, and thorough processing. Several recent studies continue to show beneficial effects of positive affect (Eubanks, Murphy, & Mumford, 2010; Xiao, Wang, Chen, Zheng, & Chen, 2015).

However, not all of the literature supports the position that positive mood broadens one’s ability to think (Harmon-Jones, Gable, & Price, 2013). Kaufmann and Vosburg (1997, 2002; Vosburg & Kaufmann, 1999) found that negative affect facilitated divergent thinking late in the idea generation process. Kaufmann (2003) later concluded that the positive mood–creativity link is not guaranteed. The results from some mood induction studies indicate that participants in a happy or positive mood perform many tasks more poorly than participants with neutral or sad affect. Happy participants tended to be less critical and analytical in their thinking and are more easily persuaded by weak arguments (Bless, Hamilton, & Mackie, 1992; Mackie & Worth, 1989), and more likely to make inaccurate judgments, even in situations where there are objective criteria (Sinclair & Mark, 1995). In the Sinclair and Mark study, participants with statistical training were asked to estimate the magnitude and direction of correlation coefficients associated with several scatter plots. Participants who were in a positive or happy mood processed the material less systematically, took less care, and consequently made more errors than did participants in a neutral or negative mood.

One reason for these different findings may be the fact that researchers have more often examined only the generation of solution possibilities—fluency or divergent thinking. When evaluative thinking is called for, results of positive moods are less clear. Therefore, the purpose of the present study was to investigate the effect of positive mood on both generative and evaluative thinking in the creative problem-solving process.

Method
Participants
Participants were 89 sixth-, seventh-, and eighth-grade middle school students from a middle-class suburban school district, approximately 40 miles from New York City. Participants ranged in age from 11 to 14. There were 75 Caucasian, 11 Asian, 2 Hispanic, and 1 African American students. In terms of academic achievement, each grade scored above the 90th percentile on recent statewide tests in language arts.

Instruments and Materials
Positive and Negative Affect Schedule (PANAS). The PANAS (Watson & Clark, 1988) is a 20-item list of positive and negative adjectives scored on a 5-point scale that asks the participant to respond to given words describing emotions and feelings and indicate to what degree the participant feels this way (1 = very slightly, not at all; 2 = a little; 3 = moderately; 4 = quite a bit; 5 = extremely) for a given time period (at the moment). The positive affect items, which are interspersed with the negative affect items, include interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active. The negative affect items are distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, and afraid.

Internal consistency coefficients range from .84 to .90. Test-retest reliabilities range from .39 to .71, with the higher
coefficients reported for the longer durations. The PANAS scale is one of the most widely used measures of affectivity and has been reported with excellent psychometric properties with U.S. samples. The scale, which has been validated across diverse time frames, response formats, and cultures, measures positive and negative affect (mood) separately, treating them as two dimensions of a mood state rather than as the opposite ends of a continuum.

Mood induction videos. Participants were randomly assigned to either a positive induction experience group or the control group. A 20-min nature video was used for the control group. This video was used to not elicit any emotion at all. The video segment was taken from the Planet Earth DVD series from the Discovery Channel. A 20-min comedy video was used to induce a positive mood experience. The video consisted of excerpts from a Bill Cosby humor routine from the video titled, Himself. The routine was specifically selected to be essentially free from aggressive content, dealing with such topics as Cosby’s experiences as an expectant and new father, the birth of his child, the training of his son to be a successful athlete, an encounter at the dentist office, and so forth.

It should be noted that when examining the mood induction studies, the majority of research did not specify the type of video used. However, in all studies with a neutral mood or control group, video of nature was used. The most common videos used for the positive mood induction was a comedy video of famous comedians such as Robin Williams, Eddie Murphy, and Bill Cosby. The majority of the mood research focused on college participants and adults. Given the ages of the participants, a comedy video of Bill Cosby was more appropriate given the rating of Parental Guidance (PG). Previous studies (Dienstbier, 1995; Lucas & Baird, 2004) used the same comedy routine for the mood induction procedure with successful results.

Before beginning the present study, both video segments were shown to colleagues and participants in the pilot study to assess whether their reactions matched the expected ones. The PANAS scores reported a positive mood after the comedy video as the nature video elicited a neutral mood because all participants did not score high on the positive or negative PANAS scale.

Problem-solving task. During the pilot study, participants were given sample questions that consisted of generative and evaluative types of thinking. From these questions, the solutions given were then used for the current study. The hypothetical problem of the cell phone company was used as participants showed the most interest in that problem; it was relatable and they were familiar with the content. When considering the problem-solving task, a model used by Treffinger and Feldhusen (1998) was considered for productive thinking applied to CPS. This model stated that three areas that should be considered in the problem were the foundations, realistic tasks, and real-life opportunities and challenges. Given the age of the participants, it was important to use a task that was age and level appropriate.

Procedures

The institutional review board of Fordham University reviewed and approved this study at the proposal stage for adherence to ethical standards and protection of human participants. School administrators were contacted about the nature of this research and gave their permission. Parents of prospective student participants were contacted and 89 returned signed consent forms for their sons and daughters to participate.

The study was conducted in students’ guidance classes, which are classes they have once a week with their guidance counselor to discuss personal and social concerns. In each class, participants were separated randomly into two groups. Participants then watched either the comedy video or the neutral video. Each movie was 20-min long.

Nonparticipant students were excused from guidance class and attended supervised library and/or study hall.

After students watched the movie, they completed the PANAS scale. Then, students were given a piece of paper and a pencil. Within the positive mood induction group and the neutral mood induction groups, participants were further divided randomly into three conditions via distinct written directions: (a) Group A participants were asked to generate ideas to a problem situation (possible ideas to reverse a company’s declining cell phone sales), (b) Group B was asked for the advantages of using one possible solution to the “declining sales” problem, and (c) Group C was asked for the disadvantages of using the one possible solution to the “declining sales” problem. Participants were given 15 min to work on their respective tasks. The possible solution to the “cell phone sales” problem that was given to Groups B and C was selected from those offered by different participants in an earlier, separate pilot study.

It should be noted that the lead author was the experimenter for all the groups as she was the teacher for the guidance class where the participants were examined. While the participants were completing the problem-solving tasks, the lead author scored the PANAS to determine whether any participant scored extremely high in the negative mood category. This was not the case for any participant. If any such case or cases had occurred, a school counselor was available to assure adequate and appropriate assistance to the students.

Results

Descriptive Statistics

Table 1 presents the means, standard deviations, standard error, and range of all variables in the study. These variables
include the math and language arts standardized test scores, the positive and negative PANAS scores, and fluency scores, that is, the number of responses generated by participants in each directions group. Pearson intercorrelations among the variables were also computed. Only the correlation between the standardized state math and language arts scores (r = .457, p < .01) and between the language arts scores and fluency (r = .239, p < .05) were significant.

**Test of treatment fidelity.** Analyses of variance were computed to compare the two mood induction groups (positive and neutral) on the positive and negative PANAS scores. Table 2 presents these results. There was a significant F ratio comparing the two mood groups on the positive PANAS scores. The means of the positive and neutral groups were 35.15 (SD = 6.98) and 26.93 (SD = 8.66), respectively. The positive mood induction group scored significantly higher on the positive PANAS score. The F ratio for the comparison of negative PANAS scores was, technically, not statistically significant (p = .052). The means, however, for the positive and neutral induction groups on the negative PANAS scores were 15.71 (SD = 4.00) and 18.07 (SD = 7.11), respectively. The neutral mood induction group had a higher negative PANAS score.

**Tests of possible covariates.** Analyses of variance comparing Mood Induction and Directions groups on standardized language arts test scores were computed to determine if the language arts scores would be an appropriate covariate in tests of the study hypotheses. There were no significant F ratios. A second ANOVA was computed using the dummy code for grade level. In Table 3, there is a significant F ratio for the main effect of Mood Induction group. Further tests of homogeneity of variance, normality, and correlation between the dependent measure (fluency of response) and grade code across each experimental group suggested that the use of grade code as a covariate was appropriate.

**Tests of the hypotheses**

**Tests of the first hypothesis.** Hypothesis 1 was that the positive mood induction group would generate more responses than the neutral mood induction group. Table 4 presents the results of the 2 × 3 factorial analysis of covariance. As can be seen, the main effects of Mood Induction Group and Directions were both significant (Fs = 24.572 and 3.88, dfs = 1, 87, ps < .01, respectively). Eta square for the main effects of Mood and Directions ranged from .14 to .16. These effect sizes are considered small to moderate (Cohen, 1988). However, the statistical power of each significant F ratio was above .9.

Table 5 presents the means and standard deviations of the various groups being compared. The positive mood induction
group generated more responses overall than the neutral mood induction group. As for the directions groups, the overall means of the “solutions” and “disadvantages” groups were greater than the “advantages” groups. These differences were statistically significant according to both Scheffe and Neuman–Keuls’ post hoc procedures beyond the .01 (Kirk, 2013).

**Tests of the second and third hypotheses.** Hypothesis 2 was that participants in the positive mood induction group would generate more advantages than the neutral group. Hypothesis 3 was that participants in the neutral mood induction group would generate more disadvantages than participants in the positive mood group. Simple main effects (Winer, 1971) were computed comparing the fluency of positive and neutral mood group students in the advantages directions group and the disadvantages directions groups. The F ratios for these analyses were 3.29 (df = 1, 12, p < .10) and 4.194 (df = 1, 18, p < .10), respectively. Although these tests are significant only at .10, the means of the disadvantages directions groups are larger by more than two points compared with the advantages groups. Hypothesis 2 was not supported, and results in favor of the third hypothesis were significant at only .10.

**Discussion**

In this study, the question was what effect mood would have on both generative and evaluative thinking. Would the effects be the same? Or, would positive or neutral moods affect generative and evaluative thinking in different ways? The mood literature suggested that a positive mood would result in more ideas being generated (Fredrickson, 2001; Isen et al., 1987). The creative problem-solving literature clearly argues for the avoidance of negative attitudes and negative, judgmental, evaluative comments during idea generation stages (Guilford, 1962; Isaksen, Dorval, & Treffinger, 2000; Osborn, 1966; Sternberg & Lubart, 1996). Thus, it was hypothesized that a positive mood condition would result in a greater number of ideas being generated. This hypothesis was supported. The main effect of mood on fluency was statistically significant with the positive mood group generating more ideas than students in the neutral condition. This result was also evident in the interaction effect means, with the mean of the positive-mood-solutions group greater by more than four and two ideas, respectively, compared with the positive-mood-advantages- and positive-mood-disadvantages groups.

However, a differential effect of mood on evaluative thinking was not demonstrated. There is some literature that suggests that in the evaluative domain, it is easier for individuals to be more negative than positive (Isaksen et al., 2000). That is, it is more likely that people can think of what is wrong with an idea rather than what is good about a new idea. However, in this study, it was hypothesized that a positive mood would reverse that relationship. Thus, it was expected that the positive mood group given directions to think of advantages about a potential solution would generate more ideas than would participants given directions to think of disadvantages about the potential solution. This was not the finding in this study. The overall main effect of directions clearly showed that more disadvantages than advantages were generated. Furthermore, the positive-mood-disadvantages group generated more ideas than the positive-mood-advantages group.

Are we a pessimistic population? Are we hypercritical? Do people easily learn to be more negative rather than positive? This study did not address these questions, but one explanation may be offered for the greater number of disadvantages. Although the solution presented to student participants was one that was generated by participants’ peers in the pilot study, perhaps it is more difficult to think of advantages without greater information about how the solution was developed, how it might be implemented, or what, exactly, might be the criteria for a good solution. Participants in the disadvantages group (neutral or positive mood) could easily “turn around” the three points just mentioned and make them negatives. For example, the solution may not be a good one.

**Table 5.** Means and Standard Deviations of Fluency by Mood Induction and Directions Groups.

| Variable              | n  | M   | SD  | SE  | Minimum | Maximum |
|-----------------------|----|-----|-----|-----|---------|---------|
| Positive mood         | 48 | 7.479 | 2.361 | .340 | 3       | 11      |
| Neutral mood          | 41 | 4.902 | 2.538 | .396 | 2       | 10      |
| “Solutions” group     | 28 | 7.143 | 2.368 | .448 | 3       | 11      |
| “Advantages” group    | 27 | 4.556 | 2.026 | .390 | 2       | 10      |
| “Disadvantages” group | 34 | 6.971 | 2.970 | .509 | 2       | 11      |
| Positive mood × “Solutions” | 19 | 7.947 | 2.297 | .527 | 3       | 11      |
| Positive mood × “Advantages” | 10 | 3.941 | 1.190 | .600 | 3       | 9       |
| Positive mood × “Disadvantages” | 19 | 5.667 | 2.236 | .513 | 4       | 11      |
| Neutral mood × “Solutions” | 9  | 5.444 | 1.509 | .503 | 3       | 8       |
| Neutral mood × “Advantages” | 17 | 5.600 | 1.887 | .458 | 2       | 10      |
| Neutral mood × “Disadvantages” | 15 | 8.000 | 3.331 | .861 | 2       | 10      |
because we don’t know how the solution was developed (or by whom); it might not be able to be put into practice (that is, it is impractical, it won’t work); or the solution won’t completely solve the problem (that is, we don’t know how to judge if it works well enough). Put another way, it may take more technical knowledge and background to argue in favor of a solution.

As described above, the latest model of CPS (Version 6.1™; Treffinger et al., 2006) stresses a ubiquitous context of evaluative thinking. As individuals work on problems, they uncover, generate, or transform information that affects the successive steps they may take. Treffinger et al. refer to this as appraising tasks, and it is an essential process integral to effective problem solving. We may conclude the present study has again demonstrated that mood is a variable that can affect generative thinking. Inducing a positive mood can be a useful method in problem solving and instructional situations when fluency of ideas is an important outcome. But the question remains whether and how mood can affect evaluative thinking. Additional research is needed to answer the question “Can a positive mood increase individuals’ positive task appraisals or reduce negative appraisals?”

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References
Abele, A. (1992). Positive and negative mood influences on creativity: Evidence for asymmetrical effects. Polish Psychological Bulletin, 23, 203-221.

Beghetto, R. A. (2010). Creativity in the classroom. In J. C. Kaufman & R. J. Sternberg (Eds.), The Cambridge handbook of creativity (pp. 447-463). New York, NY: Cambridge University Press.

Bless, H., Hamilton, D. L., & Mackie, D. M. (1992). Mood effects on the organization of person information. European Journal of Social Psychology, 22, 497-509.

Christie, K., & Kaminski, K. (2002). Creative problem solving at the United Way. CPSB Communique, 13, 8-11.

Clapham, M. (2001). The effects of affect manipulation and information exposure on divergent thinking. Creativity Research Journal, 13, 335-350.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Coy, P. (2000, August 28). The 21st century corporation: The creative economy. Business Week Magazine, pp. 76-82.

Davis, C. D., Kaufman, J. C., & McClure, F. H. (2011). Non-cognitive constructs and self-reported creativity by domain. The Journal of Creative Behavior, 45, 188-202.

Dienstbier, R. A. (1995). The impact of humor on energy, tension, task choices and attributions: Exploring hypotheses from toughness theory. Motivation and Emotion, 19, 255-267.

Eubanks, D. L., Murphy, S. T., & Mumford, M. D. (2010). Intuition as an influence on creative problem-solving: The effects of intuition, positive affect, and training. Creativity Research Journal, 22, 170-184.

Fasco, D., Jr. (2000-2001). Education and creativity. Creativity Research Journal, 13, 317-327.

Fernandez-Abascal, E. G., & Martin Diaz, M. D. (2013). Affective induction and creative thinking. Creativity Research Journal, 25, 213-221.

Fredrickson, B. (2001). The role of positive emotions in positive psychology: The broaden-and-built theory of positive emotions. American Psychologist, 56, 218-226.

Freeman, T., Wolfe, P., Littlejohn, B., & Mayfield, N. (2001). Measuring success: Survey shows CPS impacts Indiana. CPSB Communique, 12, 1-6.

García-Palacios y Baños. (1999). Eficacia de dos procedimientos de inducción del estado de ánimo e influencia de variables modulatoras. Revista de Psicopatología y Psicología Clínica [Efficacy of two methods for inducing state of mind and influences of moderating variables, Review of Clinical Psychopathology and Psychology], 4, 15-26.

Gibson, C., & Mumford, M. D. (2013). Evaluation, criticism, and creativity: Criticism contents and effects on creative problem solving. Psychology of Aesthetics, Creativity, and the Arts, 7, 314-331.

Greene, T. R., & Noice, H. (1988). Influence of positive affect upon creative thinking and problem solving in children. Psychological Reports, 63, 895-898.

Guilford, J. P. (1962). Factors that aid and hinder creativity. Teachers College Record, 65, 180-192.

Guilford, J. P. (1977). Way beyond the IQ: Guide to improving intelligence and creativity. Buffalo, NY: Creative Education Foundation.

Harmon-Jones, E., Gable, P. A., & Price, T. F. (2013). Does negative affect always narrow and positive affect always broaden the mind? Considering the influence of motivational intensity on cognitive scope. Current Directions in Psychological Science, 22, 301-307.

Isaksen, S. G. (2008). A compendium of evidence for creative problem solving. Buffalo, NY: Creative Research Unit, Creative Problem Solving Group.

Isaksen, S. G., & De Schryver, L. (2000). Making a difference with CPS: A summary of the evidence. In S. G. Isaksen (Ed.), Facilitative leadership: Making a difference with creative problem solving (pp. 187-248). Dubuque, IA: Kendall/Hunt.

Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (2000). Creative approaches to problem solving: A framework for change (2nd ed.). Dubuque, IA: Kendall/Hunt.

Isaksen, S. G., & Treffinger, D. J. (2004). Celebrating 50 years of reflective practice: Versions of creative problem solving. The Journal of Creative Behavior, 38, 75-101.

Isen, A. M. (2000). Positive affect and decision making. In M. Lewis & J. Haviland-Jones (Eds.), Handbook of emotions (2nd ed., pp. 417-435). New York, NY: Guilford Press.
Isen, A. M., & Daubman, K. (1984). The influence of affect on categorization. *Journal of Personality and Social Psychology, 47*, 1206-1217.

Isen, A. M., Daubman, K., & Nowicki, G. (1987). Positive affect facilitates creative problem-solving. *Journal of Personality and Social Psychology, 52*, 1122-1131.

Isen, A. M., Johnson, M. M. S., Mertz, E., & Robinson, G. (1985). The influence of positive affect on the unusualness of word associations. *Journal of Personality and Social Psychology, 48*, 1413-1426.

Isen, A. M., Rosenzweig, A. S., & Young, M. J. (1991). The influence of positive affect on clinical problem-solving. *Medical Decision Making, 11*, 221-227.

Kaufmann, G. (2003). Expanding the mood-creativity equation. *Creativity Research Journal, 15*, 131-135.

Kaufmann, G., & Vosburg, S. K. (1997). Paradoxical mood effects on creative problem-solving. *Cognition and Emotion, 11*, 151-170.

Kaufmann, G., & Vosburg, S. K. (2002). The effects of mood on early and late idea production. *Creativity Research Journal, 14*, 317-330.

Kirk, R. E. (2013). *Experimental design: Procedures for the behavioral sciences* (4th ed.). Thousand Oaks, CA: SAGE.

Lubart, T. I. (2001). *Models of the creative process: Past, present, and future*. *Creativity Research Journal, 13*, 295-308.

Lucas, R. E., & Baird, B. M. (2004). Extraversion and emotional reactivity. *Journal of Personality and Social Psychology, 83*, 473-485.

Mackie, D. M., & Worth, L. T. (1989). Processing deficits and the mediation of positive affect in persuasion. *Journal of Personality and Social Psychology, 57*, 27-40.

Martin, M. (1990). On the induction of mood. *Clinical Psychology Review, 10*, 669-697.

Mccluskey, K. W., Baker, P. A., & Mccluskey, A. (2005). Creative problem solving with marginalized populations: Reclaiming lost prizes through in-the-trenches interventions. *Gifted Child Quarterly, 49*, 330-341.

Munford, M. D., Hester, K. S., Robledo, I. C., Peterson, D. R., Day, E. A., Houghen, D. F., & Barrett, J. D. (2012). Mental models and creative problem-solving: The relationship of objective and subjective model attributes. *Creativity Research Journal, 24*, 311-330.

National Governors Association, Council of Chief State School Officers, and Achieve, Inc. (2008). *Benchmarking for success: Ensuring US students receive a world-class education*. Retrieved from www.corestandards.org/assets/0812Benchmarking.pdf

Osborn, A. F. (1966). *Applied Imagination: Principles and procedures of creative problem solving*. New York, NY: Charles Scribner’s Sons.

Partnership for 21st Century Skills. (2007). *Beyond the three Rs: Voter attitudes toward 21st century skills*. Tucson, AZ: Public Opinion Strategies and Peter D. Hart Research Associates. Retrieved from www.p21.org/storage/documents/p21_pollreport_2pg.pdf

Puccio, G. J., Firestein, R. L., Coyle, C., & Masucci, C. (2006). A review of the effectiveness of CPS training: A focus on workplace issues. *Creativity and Innovation Management, 15*, 19-33.

Scott, G., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal, 16*, 361-388.

Sinclair, R. C., & Mark, M. M. (1995). The effects of mood state on judgmental accuracy: Processing strategy as a mechanism. *Cognition and Emotion, 9*, 417-438.

Stanko-Kaczmarek, M. (2012). The effect of intrinsic motivation on the affect and evaluation of the creative process among fine art students. *Creativity Research Journal, 24*, 304-310.

Stemberg, R. J., & Lubart, T. I. (1996). Investing in creativity. *American Psychologist, 51*, 677-688.

Strom, R. D., & Strom, P. S. (2002). Changing the rules: Education for creative thinking. *The Journal of Creative Behavior, 36*, 183-200.

Treffinger, D. J., & Feldhusen, J. F. (1998). *Planning for productive thinking and learning*. Waco, TX: Prufrock.

Treffinger, D. J., & Isaksen, S. G. (2005). Creative problem solving: History, development, and implications for gifted education and talent development. *Gifted Child Quarterly, 49*, 342-353.

Treffinger, D. J., Isaksen, S. G., & Stead-Dorval, K. B. (2006). *Creative problem solving: An introduction* (4th ed.). Waco, TX: Prufrock.

Treffinger, D. J., Schoonover, P. F., & Selby, E. C. (2013). *Education for creativity and innovation*. Waco, TX: Prufrock.

Treffinger, D. J., Solomon, M., & Woythal, D. (2012). Four decades of creative vision: Insights from an evaluation of the Future Problem Solving Program International (FPSPI). *The Journal of Creative Behavior, 46*, 209-219.

United Nations Committee on Trade and Development and the UNDP Special Unit for South-South Cooperation. (2008). *Creative economy report 2008*. New York, NY: United Nations.

Vosburg, S. K. (1998a). The effects of positive and negative mood on divergent-thinking performance. *Creativity Research Journal, 11*, 165-172.

Vosburg, S. K. (1998b). Mood and the quantity and quality of ideas. *Creativity Research Journal, 11*, 315-324.

Vosburg, S. K., & Kaufmann, G. (1999). Mood and creativity research: The view from the conceptual organizing perspective. In S. W. Russ (Ed.), *Affect, creative experience, and psychological adjustment* (pp. 19-39). Philadelphia, PA: Brunner/Mazel.

Watson, D., & Clark, L. A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063-1070.

Westermann, R., Spies, K., Stahl, G., & Hesse, F. W. (1996). Relative effectiveness and validity of mood induction procedures: A meta-analysis. *European Journal of Social Psychology, 26*, 557-580.

Winer, B. J. (1971). *Statistical principles in experimental design*. New York, NY: McGraw Hill.

Xiao, F., Wang, L., Chen, Y., Zheng, Z., & Chen, W. (2015). Dispositional and situational autonomy as moderators of mood and creativity. *Creativity Research Journal, 27*, 76-86.

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