

Copyright by Lana M. Minshew
December 2012

GENDER DIFFERENCES IN CREATIVE
THINKING IN A GIFTED AND TALENTED
AND ARTISTICALLY TALENTED
POPULATION

A Thesis Presented to the Faculty
of the College of Education
University of Houston

In Partial Fulfillment
of the Requirements for the Degree

Master of Education
or
Master of Science

by

Lana M. Minshew

December, 2012

GENDER DIFFERENCES IN CREATIVE
THINKING IN A GIFTED AND TALENTED
AND ARTISTICALLY TALENTED
POPULATION

A Thesis for the Degree

Master of Education

by

Lana M. Minshe

Approved by Thesis Committee:

Dr. Margit Wiesner, Chairperson

Dr. Richard Olenchak, Committee Member

Dr. John Gaa, Committee Member

Dr. Robert H. McPherson, Dean
College of Education

December, 2012

GENDER DIFFERENCES IN CREATIVE
THINKING IN A GIFTED AND TALENTED AND
ARTISTICALLY TALENTED POPULATION

An Abstract
of a
Thesis Presented to the
Faculty of the College of Education
University of Houston

In Partial Fulfillment
of the Requirements for the Degree

Master of Education

by

Lana M. Minshe

December, 2012

Minshew, Lana. "Gender differences in creative thinking in a gifted and talented and artistically talented population." Unpublished masters of Education Thesis, University of Houston, December 2012.

Abstract

Gender differences in adolescents are a thoroughly researched topic of educational psychology. One of the gender differences between adolescents is creative thinking. Current findings have inconsistent results of which gender has superior ability in creative thinking. The current study focused on gifted and talented adolescents, to determine if there are differences between the genders' creative thinking with in a specific population. The *Torrance Test of Creative Thinking* (TTCT, Torrance 1966), Figural Form A was used as the measure for creative thinking. Kaufman and Baer (2006) state that the TTCT is a useful tool in identifying highly creative individuals and gifted and talented individuals. Adolescent fluency, flexibility, and overall scores were used to determine if there were significant differences in creative ability between the genders.

References

Kaufman, J. C. & Baer, J. (2006). Intelligent testing with Torrance. *Creativity Research Journal*, 18, 99-102.

Table of Contents

Introduction	1
<i>Background Information</i>	1
Review of Related Literature.....	1
<i>Gifted and Talented</i>	1
<i>Creativity and the TTCT</i>	2
<i>Gender Differences and Creativity</i>	5
<i>Research Questions</i>	6
<i>Hypothesis</i>	7
Methods	7
<i>Participants</i>	7
<i>Instrument</i>	8
<i>Procedure</i>	11
<i>Analysis</i>	12
Results	12
Discussion.....	14
<i>Hypotheses</i>	14
<i>Limitations and Improvements</i>	15
References	17
Tables	25
Table 1 Descriptive Statistics	25
Table 2 Power.....	25

GENDER DIFFERENCES IN CREATIVE THINKING IN A GIFTED AND TALENTED AND ARTISTICALLY TALENTED POPULATION

Introduction

Background Information

Creativity and gender has been a highly researched topic for decades. There has been minor progress in developing a clearly defined relationship between gender and creativity. Of the many research studies focused on gender differences and creativity results have been inconsistent. Findings are mixed as to clear depiction of which gender has superior creative ability. The inconsistencies are even more abundant in the less researched group of adolescents who are identified as gifted and talented as well as creative. The population of adolescents of who are talented in visual arts as well as identified as gifted and talented has little to no results documenting if there is a significant difference in their creative abilities.

Review of Related Literature

Gifted and Talented

Boys and girls often display their giftedness in many different forms and broadening what defines a gifted child improves how those children are educated. Giftedness is a multidimensional component in education. There are many viewpoints on how giftedness is identified and defined. Renzulli (1978) promotes that giftedness is the interaction between three equally important components: above average ability, task commitment, and creativity. Fletcher (2011) states that the National Association for Gifted Children described gifted learners as those who demonstrate high abilities in creative, intellectual, and artistic pursuits; these gifted learners also frequently assume leadership roles. Harrison (1997) observed that gifted students were able to focus on

details, have higher task commitment, and draw and conceptualize abstract things at a much younger age than students who were not identified as gifted. With so many definitions of what makes someone gifted there is often difficulty as to how to identify gifted students.

Gifted and talented programs have often been criticized for only servicing those students who are considered gifted academically. There is an ever evolving debate on how to identify students as gifted; and Pfeiffer (2002) discusses the potential vs. product debate of giftedness. Pfeiffer (2002) comments that one theory focuses on a student's potential for future gifted performances or future products, whereas the other theory classifies students as gifted who have existing products that are noteworthy or whom have demonstrated their creativity. Giftedness and creativity have also long been debated by researchers and psychologists. Some psychologists feel as though creativity is a part of giftedness, others suggest that creativity is a distinct type of giftedness, while some think creativity is a separate piece altogether (Pfeiffer, 2002). The three distinct outlooks on creativity and giftedness lead one to question whether or not a child is gifted; does that make him or her more creative? Does a child's artistic ability increase because he or she is identified as a gifted and talented student?

Creativity and the TTCT

Dollinger, Dollinger, and Centeno (2005) state that creativity promotes the discovery of the self. Creativity is also thought to be a part of one's identity. Sternber and Lubart (1999) view creativity as a person's ability to produce work that is both novel and appropriate. Runco (2007) notes that creativity involves the creation of something new and useful. Even still Torrance (1962) defines creativity as a distinguishing

characteristic of individuals in every field of study. With so many definitions for creativity it can be difficult to denote what is creative and what is not. Kaufman, Plucker, and Russell (2012) give a succinct definition of creativity stating that it is the interaction among aptitude, process, and environment where the individual produces a product that is both novel and useful. Traditional creativity tests break creative thinking into either convergent thinking or divergent thinking. Convergent thinking is finding a single correct solution to a problem whereas divergent thinking is creatively finding many possible solutions to a given problem, all of which differ in quality (Benedek, Konen, & Neubauer, 2012). Renzulli (1978) confers that divergent thinking is a characteristic of highly creative individuals, and is used as part of Renzulli's definition of giftedness.

Creativity is important because it is one component to the development and nurturing of gifted and talented students (Kim, 2008). One problem with identifying artistically creative gifted students is that the identification process was one-dimensional, focusing only on the academic side of giftedness (Kim, 2008). Many creative gifted and talented students can go through school unidentified because they do not perform well on standardized achievement tests or IQ tests which are commonly used. Gifted and talented students may also be a behavioral challenge in the classroom because they do not conform to traditional school structure (Kim, 2008). The *Torrance Tests of Creative Thinking* (TTCT, Torrance 1966), Figural Form A and B is used for testing individuals' capacity for creative ability. Kaufman and Baer (2006) state that the TTCT could prove to be a useful tool in the identification and placement of students in gifted and talented programs. The implementation of creativity testing along with the standardized tests and IQ tests could increase the number of creatively gifted students in gifted and talented

programs. The TTCT is focused on divergent thinking as the basis for creativity, Kaufman, Plunker, and Russell (2012) describe the test as not merely a means to measure creativity but a tool that can be used to better understand what fosters and nurtures creativity.

The Torrance Test of Creative Thinking (TTCT) figural form is divided into three activities: picture construction, picture completion, and parallel lines. Subjects are given ten minutes for each activity, after which he or she is scored on originality, fluency, flexibility, and elaboration. The TTCT is the most widely used divergent thinking test and has the most research concerning its validity and reliability (Villalba, 2008). This study focuses on the four sub scores: fluency, flexibility, originality, and elaboration, as well as the overall or total score of the figural TTCT. Fluency score is the subject's ability to produce as many different ideas or forms as they can within the parameters of the three activities. Matud, Rodriguez, and Grande (2007) describe the fluency score as the number of interpretable, meaningful, and relevant responses that a participant is able to produce. The flexibility score is the subject's ability to produce a variety of ideas or to use a variety of strategies when creating a product or answering an open ended question (Matud et al., 2007). The Originality score is based upon a participant's ability to provide a unique response; a response that four percent or fewer participants would give makes it original. Matud et al. (2007) describe it as a statistically rare or unexpected response. Elaboration is credited when the participant adds pertinent details that enhance the overall response. The elaboration score is a reflection of how the participant embellishes or expands ideas (Matud et al., 2007).

Gender Differences and Creativity

Gender differences in education are a captivating topic. One aspect of study is the differences in male and female creative ability. The results of previous research have led to inconsistent findings. When creativity is viewed as a standalone entity many have found that there are no significant differences between males and females (Baer & Kaufman, 2008; He & Wong, 2011; Matud, Rodriguez, & Grande, 2007; Stoltzfus et al., 2011). Others have found that males excel in overall creativity during adolescence and adulthood (Lau & Cheung, 2010; Furnham et al., 2009). Still others note that females out-perform males on creativity standards (Kershner & Ledger, 1985; Reuter et al., 2005). Baer and Kaufman (2008) identified thirty five studies that did not have significant gender differences in creativity, four studies where males scored higher, nine studies where females had higher creativity scores, and thirty studies where the results were mixed. The mixed results indicated that males outperformed females on select topics of creativity and females outperformed males in other aspects. Of the studies that used participants from gifted and talented populations six disclosed no significant gender differences, zero studies displayed males scoring higher on creative assessments, two studies showed females scoring higher on creative assessments, and four studies indicated mixed findings.

Kaufman, Baer, and Gentile (2004) divided creativity into verbal and artistic; upon doing this they found that girls are more creative verbally whereas boys have more artistic creativity. Of the four studies that had gifted and talented students as their population of study two of them had the same results as Kaufman et al. (2004). Kershner and Ledger (1985) also had similar findings to Kaufman et al. (2004) upon isolating verbal and figural creativity. Females excelled on all verbal tests and figural elaboration,

but boys excelled in figural originality and flexibility (Kershner & Ledger, 1985). DeMoss, Milich, and DeMers (1993) used the TTCT and found that girls had higher verbal scores and boys had higher figural scores. Kershner and Ledger (1985) also found that girls had a higher fluency score than boys did for both gifted and average IQ children. These findings designate that males and females have their own strengths and weaknesses in creative thinking (He & Wong, 2011). This suggests that creativity is more than one entity; it can be sub-divided into various forms, with males and females having their own strengths respectively. Do the recognized gender differences translate to a population that is deemed visually artistic?

Research Questions

Known literature on gender differences in creativity within a gifted population is limited. The previous research also does not focus on gender differences in a population that is identified as gifted and talented and artistically talented. This study focuses on gender differences in creativity within adolescents identified as artistically gifted and talented in the visual arts. The present study is designed to determine if gender differences exist in gifted students in the arts in respect to total score, fluency, flexibility, originality, and elaboration scores.

The three research questions that this study attempted to answer are.

To what extent do artistically gifted and talented males and females differ in overall scores on the Torrance Tests of Creative Thinking?

To what extent do artistically gifted and talented males and females differ in flexibility scores on the Torrance Tests of Creative Thinking?

To what extent do artistically gifted and talented males and females differ in fluency scores on the Torrance Tests of Creative Thinking?

Hypothesis

There will be a significant difference between males' and females' Overall score on the TTCT. There will be a significant difference between males' and females' Fluency scores. There will be a significant difference between males' and females' Flexibility scores. There will be a significant difference between males' and females' Originality scores. There will be a significant difference between males' and females' Elaboration scores.

Methods

Participants

The participants in this study were incoming freshmen who were admitted to a visual arts program at a gifted and talented magnet high school in a major metropolitan area in the southern United States. The high school is a specialized school for academically gifted and artistically gifted students in theatre, vocal music, instrumental music, dance, and visual arts. All participants in the study were academically gifted as well as artistically gifted. There were a total of 41 participants, 26 participants were female and 15 are male. The average age of the participants was 14 years old. The data were archival data; the participants completed the Torrance Tests for Creative Thinking Figural Form A as a portion of the application process to the high school's visual arts program. The researcher did not administer the TTCT test to the participants.

Instrument

For this study the instrument used was the Torrance Tests for Creative Thinking Figural form A (TTCT, Torrance, 1966). The Torrance Tests for Creative Thinking was re-normed for the fourth time in 1998 and included 55,600 kindergarten through Grade 12 students (Kim, 2006a). Students were from the central (3.6%), northeast (11.4%), southeast (15.2%), and western (57.6%) regions of the United States (Torrance, 1998). According to Kim (2006a) the reliability from Kuder-Richardson 21 for the TTCT was between .89 and .94; however the test-retest reliability coefficients ranged from .50 to .93. Kim (2006a) reasoned with Treffinger (1985) that due to the complexity of creative thinking, the TTCT can be seen as having reasonable reliability. There are several longitudinal studies of the TTCT (Cropley, 1971; Torrance, 1972, 1980, 1981, 2002; Torrance, Tan, & Allman, 1970; Witt, 1971) that show significant correlations between the TTCT subscales and creative achievements (Kim, 2006b). The reliability and validity of the TTCT test has been continuously studied since its inception and in general has been deemed to be a reliable and valid test (Kim, 2006b).

The TTCT can be administered individually or in small group settings, with the only necessary materials being the test booklet, a pencil, and crayons. The TTCT test consists of three activities that subjects must complete: Picture Construction, Picture Completion, and Repeated Figures of Parallel Lines. Each participant is given ten minutes to complete each activity for a total of thirty minutes for the full battery. Activity 1, Picture Construction, the subject is given a dark oval shape with which they must build a picture utilizing the shape. Participants' responses are scored for originality and elaboration. Activity 2, Picture Completion, consists of ten incomplete forms, and subjects are instructed to complete as many of the forms as he or she see fit. Participants'

responses are scored for originality and elaboration for each picture he or she completes. Fluency and flexibility are calculated using all of the pictures generated in the picture completion section. In Activity 3, Repeating Figures of Parallel Lines, there are thirty sets of repeating vertical parallel lines. Participants are instructed to use the parallel lines to create as many objects or pictures as he or she can, the parallel lines should be the main part of the drawing. Each individual completed object or picture is scored for originality and elaboration. Fluency and flexibility are calculated using all of the pictures generated in the parallel lines section. (Torrance, 1966, 1974, 1990, 1998).

To score the Picture Construction activity the scoring guide is needed to determine the originality weight for a response (Torrance, 1966, 1974, 1990, 1998). The originality weight ranges from zero to five points. A norming group of 500 subjects ranging from kindergarten through college were used to tabulate the originality weights (Torrance, 1966, 1974, 1990, 1998). A score of zero indicates that the response occurred five percent or more in the norming group; these responses include obvious or common responses (Torrance, 1966, 1974, 1990, 1998). A score of five has high originality weight because less than one percent of the norming group produced the response. The elaboration score is determined by noting each pertinent detail or idea that the participant adds to the original figure and its surrounding space (Torrance, 1966, 1974, 1990, 1998). One point is given for each of the following things in the participants' response: each essential detail, color, deliberate shading, decoration, and each major variation (Torrance, 1966, 1974, 1990, 1998).

To score the Picture Completion portion of the test the rater should use the scoring guide to determine the category and originality weight for each response. The

scoring guide has several categories that participants' responses are placed under. The category is important because a participant obtains one flexibility point per different category their pictures are associated with. A norming group of 500 subjects ranging from kindergarten through college were used to tabulate the originality weights (Torrance, 1966, 1974, 1990, 1998). The originality weight is zero, one, or two points (Torrance, 1966, 1974, 1990, 1998). Zero points are awarded for responses that five percent or more subjects from the norming group reported (Torrance, 1966, 1974, 1990, 1998). One point is awarded for responses that two percent to 4.99 percent of subjects reported (Torrance, 1966, 1974, 1990, 1998). Finally two points are awarded for any response that less than two percent of the subjects reported (Torrance, 1966, 1974, 1990, 1998). The fluency score is the number of figures the participant completes in the ten minute time period; the maximum fluency score is ten points. The elaboration score for each picture is generated by counting the number of meaningful extras that the participant adds to the response. Each picture completed will have an elaboration score.

The third activity, Parallel Lines, is scored similarly to the picture completion activity. Each picture has a flexibility category that it is associated with, the more categories reported the higher the flexibility. A norming group of 500 subjects ranging from kindergarten through college were used to tabulate the originality weights (Torrance, 1966, 1974, 1990, 1998). The originality weights for each picture constructed are zero, one, two, or three points. Zero points are awarded for responses that twenty percent or more of the norming group reported. One point is awarded for responses that correspond with five to nineteen percent of the norming group's responses. Two points are awarded for responses that correspond with two to four percent of the norming

group's responses. Three points are awarded for responses that correspond with less than two percent of the norming group's responses. The fluency score for the parallel lines portion of the test is the number of unique responses minus any response that is a duplicate (Torrance, 1966, 1974, 1990, 1998). Any response that is a duplicate or a repeat of another parallel line picture is eliminated (Torrance, 1966, 1974, 1990, 1998). Elaboration is scored the same as the Picture Construction and Picture Completion Activities (Torrance, 1966, 1974, 1990, 1998).

The raw scores for Fluency, Flexibility, Originality, and Elaboration are computed by adding the totals from all three activities. For example the originality score from Activity 1, Activity 2, and Activity 3 are added together to get the raw score for originality. Fluency, Flexibility, and Elaboration raw scores were computed in the same manner.

The raw scores were then converted to a T-score or standard score. The T-score that was obtained from each of the two raters was then averaged. The average T-score for Fluency, Flexibility, Originality, and Elaboration was then used to calculate the average total or overall score on the Torrance Tests of Creative Thinking.

Procedure

The data used for this study was archival data, and permission to use the data was granted by the Institutional Review Board (IRB) at the University of Houston. Students took the Torrance Tests of Creative Thinking as a part of the application process for a visual arts program at the high school. Students were administered the test in group settings by school personnel on designated testing dates. The participants were instructed that it was not necessary to give each figure a title. As of such the verbal portion of the

Figural Form A of the TTCT was not scored, instead only the figure portion of each test was scored. The TTCT tests were then scored by the researcher and trained graduate assistants at the University of Houston. The raters had to be in agreement on the rating, meaning they could not be more than four points apart on one participant's score. If the scores from each rater were more than four points away, then the two raters met and discussed the score until they reached a resolution.

Analysis

The independent variable was gender, male or female. The dependent variables were the total scores and the scores for each of the four sub-scores: fluency, flexibility, originality, and elaboration. A series of five analysis of variance procedures were performed to test whether there were differences between male and female averages on Overall score, Fluency, Flexibility, Originality, and Elaboration. The major assumptions that must be met for an ANOVA are: each population is assumed to be normal, the sample is randomly selected and independent, and the populations are assumed to have equal standard deviations.

Results

Means, standard deviations, and sample sizes for Overall scores, Fluency, Flexibility, Originality, and Elaboration are reported in Table 1. The results of the ANOVA in which Overall score was the dependent variable and males and females were the independent variables are given in Table 1. The main effect of the Overall score was not significant, $F(1, 39) = .741, p = .395$. Males ($M = 48.30, SD = 6.11$) and females ($M = 50.71, SD = 9.78$) did not display a statistically significant difference between average overall scores. The results of the ANOVA in which Fluency score was the dependent

variable and males and females were the independent variables are given in Table 1. The main effect of the Fluency score was not significant, $F(1, 39) = .116, p = .736$. Males ($M = 48.53, SD = 8.29$) and females ($M = 49.62, SD = 10.57$) did not display a statistically significant difference between average Fluency score. The results of the ANOVA in which Flexibility score was the dependent variable and males and females were the independent variables are given in Table 1. The main effect of the Flexibility score was not significant, $F(1, 39) = .339, p = .564$. Males ($M = 48.80, SD = 7.39$) and females ($M = 50.69, SD = 11.23$) did not display a statistically significant difference between average Flexibility scores. The results of the ANOVA in which Originality score was the dependent variable and males and females were the independent variables are given in Table 1. The main effect of the Originality score was not significant, $F(1, 39) = .380, p = .541$. Males ($SD = 48.73, M = 6.92$) and females ($M = 50.69, SD = 11.10$) did not display a statistically significant difference between average Originality scores. The results of the ANOVA in which Elaboration score was the dependent variable and males and females were the independent variables are given in Table 1. The main effect of the Elaboration score was not significant, $F(1, 39) = 2.650, p = .112$. Males ($M = 47.13, SD = 7.70$) and females ($M = 51.85, SD = 9.55$) did not display a statistically significant difference between average Elaboration scores.

Using Cohen's (1988) categories of small, medium, and large effect sizes, a power analysis revealed that most of the effect sizes for males' and females' differences in creativity in this study were medium to large. Therefore the effect size for each component, overall score, fluency, flexibility, originality, and elaboration was sufficient.

A larger sample size would enhance statistical power of the study. Refer to Table 2 for statistical power and effect sizes.

Discussion

Hypotheses

The purpose of the study was to examine if there were differences between identified Gifted and Talented, and visually gifted males and females creative ability using the Torrance Tests for Creative Thinking. The Overall score, Fluency, Flexibility, Originality, and Elaboration scores were used in determining if there were differences between males and females creative ability. There were no significant differences between males and females for Overall score, Fluency, Flexibility, Originality, and Elaboration scores. Therefore all hypotheses were rejected. Females had slightly higher average scores for all five components.

According the data artistically gifted and talented males and females do not differ drastically in overall score on the Torrance Tests of Creative Thinking. The results also indicate that artistically gifted and talented males and females do not differ considerably in Fluency and Flexibility scores on the Torrance Tests of Creative Thinking. The largest difference in score was on the Fluency test, the difference was not significant. The small sample size was not a factor because statistical power was met.

Having no significant difference in male and female creativity is in concurrence with Runco and Albert (1986), Runco and Bahleda (1986), Runco, Okuda, and Thurston (1987), Chan (2005), Charyton (2005), and Donnell (2005). Each of these studies used populations of Gifted and Talented students to examine differences in male and female

creativity. These studies did not obtain a significant difference between males and females in creativity.

Having no significant gender difference does disagree with DeMoss, Milich, and DeMers (1993). DeMoss, Milich, and DeMers (1993) found that males outperformed females on the figural portion of the TTCT and females performed better on the verbal portion of the test. This is interesting because the research study utilized only the Figural portion of the TTCT, and did not use the Verbal section of the TTCT. The different outcomes could be the result of the lower number of male participants used in the study.

The outcome of no significant difference between males and females indicates that the Torrance Tests for Creative Thinking doesn't introduce a potential bias. The TTCT is an excellent test for admittance into the visual arts program at the urban high school used in this study. The TTCT is an unbiased test for gender amongst a population that is identified as talented in the visual arts.

Limitations and Improvements

One aspect of this study is that the sample size is small; it is comprised of only students who had been in the visual arts program for one academic term. Due to the low number of students admitted to the program there are more females in the study sample than males. To improve upon the study admitted students from previous terms and/or future terms could be used. By including multiple terms the overall sample size increases as well as the number of males and females. The increased sample size could then lead to a significant difference in scores between males and females.

Future studies could include comparing creativity of the adolescents who were not admitted, but were semi-finalist to the visual arts program to those adolescents who were admitted. Then the participants could be compared based upon gender and whether or not they were admitted to the program. The proposed future study would look at the same subtests as the current research to determine if the TTCT was a critical factor in the adolescents' placement in the visual arts program.

References

- Baer, J. (1994). Performance assessments of creativity: Do they have long-term stability?. *Roeper Review*, 17.
- Baer, J. & Kaufman, J. C. (2008). Gender differences in creativity. *Journal of Creative Behavior*, 42(2), 75-105.
- Benedek, M., Konen, T., & Neubauer, A. C. (2012). Associative abilities underlying creativity. *Psychology of Aesthetics, Creativity, and the Arts*. Advance online publication. doi:10.1037/a0027059
- Campos, A., Lopez, A., Gonzalez, M. A., Perez-Fabello, M. J. (2000). Aspects of creativity affected by imaging capacity. *North American Journal of Psychology*, 2(2), 313-322.
- Carroll, K. L. (2008). In their own voices: Helping artistically gifted and talented students succeed academically. *Gifted Child Today*, 31(4), 36-43.
- Chan, D. W. & Chan, L. (2007). Creativity and drawing abilities of Chinese students in Hong Kong: Is there a connection?. *New Horizons in Education*, 55(3), 77-94.
- Cheung, P. C. & Lau, S. (2010). Gender differences in the creativity of Hong Kong school children: Comparison by using the new electronic Wallach-Kogan Creativity Tests. *Creativity Research Journal*, 22(2), 194-199. doi: 10.1080/10400419.2010.481522
- Cropley, A. J. (1971). Some Canadian creativity research. *Journal of research and development in Education*, 4(3), 113-115.

- DeMoss, K., Milich, R., & DeMers, S. (1993). Gender, creativity, depression, and attributional style in adolescents with high academic ability. *Journal of Abnormal Child Psychology, 21*, 455-467.
- Dollinger, S. J., Clancy Dollinger, S. M. & Centeno, L. (2005). Identity and creativity. *Identity: An International Journal of Theory and Research, 5(4)*, 315-339.
- Faul, F., Erdfelder, E., Lang, A.-G. & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175-191.
- Fletcher, T. S. (2011). Creative thinking in schools: Finding the "just right" challenge for students. *Gifted Child Today, 34(2)*, 37-42.
- Furnham, A., Crump, J., Batey, M., & Chamorro-Premuzic, T. (2009). Personality and ability predictors of the 'Consequences' Test of Divergent Thinking in a large non-student sample. *Personality and Individual Differences, 46(4)*, 536-540.
doi:10.1016/j.paid.2008.12.007
- Harrison, C. (1999). Visual representation of the young gifted child. *Roeper Review, 21(3)*, 189-194.
- He, W. & Wong, W. (2011). Gender differences in creative thinking revisited: Findings from analysis of variability. *Personality and Individual Differences, 51*, 807-811.
doi:10.1016/j.paid.2011.06.027
- Hunsacker, S. L. (1994). Creativity as a characteristic of giftedness: Teachers see it, then they don't. *Roeper Review, 17(1)*, 11-15.

- Kaufman, J. C. & Baer, J. (2006). Intelligent testing with Torrance. *Creativity Research Journal*, 18, 99-102.
- Kaufman, J. C., Baer, J., & Gentile, C. A. (2004). Differences in gender and ethnicity as measured by ratings of three writing tasks. *Journal of Creative Behavior*, 38, 56-69.
- Kaufman, J. C., Cole, J. C., & Baer, J. (2009). The construct of creativity: Structural model for self-reported creativity ratings. *Journal of Creative Behavior*, 43(2), 119-132.
- Kaufman, J. C., Plucker, J. A., & Russell, C. M. (2012). Identifying and assessing creativity as a component of giftedness. *Journal of Psychoeducational Assessment*, 30(1), 60-73. doi:10.1177/0734282911428196
- Kershner, J. R. & Ledger, G. (1985). Effect of sex, intelligence, and style of thinking on creativity: A comparison of gifted and average IQ children. *Journal of Personality and Social Psychology*, 48(4), 1033-1040. doi:0022-3514/85/\$00.75
- Kim, K. H. (2005). Can only intelligent people be creative?. *The Journal of Secondary Gifted Education*, 16(2), 57-66.
- Kim, K. H. (2006a). Can we trust creativity tests? A review of the Torrance Tests of Creative Thinking (TTCT). *Creativity Research Journal*, 18(1), 3-14.
- Kim, K. H. (2006b). Is creativity unidimensional or multidimensional? Analyses of the Torrance Tests of Creative Thinking. *Creativity Research Journal*, 18(3), 251-259.

- Kim, K. H. (2008). Underachievement and creativity: Are gifted underachievers highly creative?. *Creativity Research Journal*, 20(2), 234-242.
doi:10.1080/10400410802060232
- Kim, K. H. (2011a). Proven reliability and validity of the Torrance Tests of Creative Thinking (TTCT). *Psychology of Aesthetics, Creativity, and the Arts*, 5(4), 314-315. doi:10.1037/a0021916
- Kim, K. H. (2011b). The APA 2009 division 10 debate: Are the Torrance Tests of Creative Thinking still relevant in the 21st century?. *Psychology of Aesthetics, Creativity, and the Arts*, 5(4), 302-308. doi:10.1037/a0021917
- Kim, K. H., Cramond, B., & Bandalos, D. L. (2006). The latent structure and measurement invariance of scores on the Torrance Tests of Creative Thinking-Figural. *Educational and Psychological Measurement*, 66(3), 459-477.
doi:10.1177/0013164405282456
- Lau, S. & Cheung, P. C. (2010). Developmental trends of creativity: What twists of turn do boys and girls take at different grades?. *Creativity Research Journal*, 22(3), 329-336. doi:10.1080/10400419.2010.503543
- Lubart, T. & Zenasni, F. (2010). A new look at creative giftedness. *Gifted and Talented International*, 25(1), 53-57.
- Matud, M. P., Rodriguez, C., & Grande, J. (2007). Gender differences in creative thinking. *Personality and Individual Differences*, 43, 1137-1147.
doi:10.1016/j.paid.2007.03.006

- Meredith, C. C. (2009). Young, gifted, and female: A look at academic and social needs. *Gifted and Talented International, 24*(2), 109-120.
- Miller, A. L. (2012). Conceptualizations of creativity: comparing theories and models of giftedness. *Roeper Review, 32*(2), 94-103. doi:10.1080/02783193.2010.660683
- Payne, D. A., Halpin, W. G., Ellett, C. D., & Dale, J. B. (1975). General personality correlates of creative personality in academically and artistically gifted youth. *The Journal of Special Education, 9*(1), 105-108.
- Pfeiffer, S. I. (2002). Identifying gifted and talented students: Recurring issues and promising solutions. *Journal of Applied School Psychology, 19*(1), 31-50. doi:10.1300/J008v19n01_03
- Renzulli, J. S. (1978). What makes giftedness? Reexamining a definition. *Phi Delta Kappan, 60*(3), 180-184.
- Reuter, M., Panksepp, J., Schnabel, N., Kellerhoff, N., Kempel, P., & Hennig, J. (2005). Personality and biological markers of creativity. *European Journal of Personality, 19*, 83-95.
- Rostan, S. M., Pariser, D., & Gruber, H. E. (2002). A cross-cultural study of the development of artistic talent, creativity and giftedness. *High Ability Studies, 13*(2), 125-155. doi:10.1080/135981022000048789
- Runco, M. A., Millar, G., Acar, S., & Cramond, B. (2010). Torrance Tests of Creative Thinking as predictors of personal and public achievement: A fifty year follow

up. *Creativity Research Journal*, 22(4), 361-368.

doi:10.1080/10400419.2010.523393

Sak, U. (2004). About creativity, giftedness, and teaching the creatively gifted in the classroom. *Roeper Review*, 26(4), 216-222.

Snyder, A., Mitchell, J., Bossomaier, T., & Pallier, G. (2004). The creativity quotient: An objective scoring of ideational fluency. *Creativity Research Journal*, 16(4), 415-420.

Stoltzfus, G., Nibbelink, B. L., Vredenburg, D., & Thyrum, E. (2011). Gender, gender role, and creativity. *Social Behavior and Personality*, 39(3), 425-432.

dii:10.2224/sbp.2011.39.3.425

Torrance, E. P. (1962). *Guiding creative talent*. Englewood Cliffs, NJ: Prentice Hall.

Torrance, E. P. (1966). *The Torrance Tests of Creative Thinking-Norms-Technical Manual Research Edition-Verbal Tests, Form A and B-Figural Tests, Forms A and B*. Princeton, NJ: Personnel Press.

Torrance, E. P. (1971). Are the Torrance Tests of Creative thinking biased against or in favor of "disadvantaged" groups? *Gifted Child Quarterly*, 15, 75-80.

Torrance, E. P. (1972). Predictive validity of the Torrance Tests of Creative Thinking. *Journal of Creative Behavior*, 6(4), 236-252.

Torrance, E. P. (1974). *The Torrance Tests of Creative Thinking-Norms-Technical manual Research Edition-Verbal Tests, Forms A and B- Figural Tests, Forms A and B*. Princeton, NJ: Personnel Press.

- Torrance, E. P. (1980). Growing up creatively gifted: A 22-year longitudinal study. *Creative Child and Adult Quarterly*, 5, 148-158, 170.
- Torrance, E. P. (1981). Empirical validation of criterion-referenced indicators of creative ability through a longitudinal study. *Creative Child and Adult Quarterly*, 6, 136-140.
- Torrance, E. P. (1990). *The Torrance tests of creative thinking norms-technical manual figural (streamlined) forms A & B*. Bensenville, IL: Scholastic Testing Service, Inc.
- Torrance, E. P. (1998). *The Torrance tests of creative thinking norms-technical manual figural (streamlined) forms A & B*. Bensenville, IL: Scholastic Testing Service, Inc.
- Torrance, E. P. (2002). *The manifesto: A guide to developing a creative career*. Westport, CT: Ablex.
- Torrance, E. P., Tan, C. A., & Allman, T. (1970). Verbal originality and teacher behavior: A predictive validity study. *Journal of Teacher Education*, 21, 335-341.
- Treffinger, D. J. (1985). Review of the Torrance Tests of Creative Thinking. In J. V. Mitchell Jr. (Ed.), *The ninth mental measurements yearbook* (pp. 1632-1634). Lincoln: University of Nebraska, Buros Institute of Mental Measurements.
- Villalba, E. (2008). On creativity: Towards an understanding of creativity and innovation. *JRC Scientific and Technical Reports*. doi: 10.2788/2936

Wilson, H. E. (2009). The Picasso in your classroom how to meet the needs of talented artists in elementary school. *Gifted Child Today*, 32(1), 36-45.

Witt, G. (1971). The Life Enrichment Activity Program, Inc.: A continuing program for creative, disadvantaged children. *Journal of Research and Development in Education*, 4(3), 14-22.

Tables

Table 1 Descriptive Statistics

		N	Mean	Standard Deviation	F	<i>p</i>
Fluency	Female	26	49.6154	10.56817	0.116	0.736
	Male	15	48.5333	8.28826		
	Total	41	49.2195	9.70184		
Flexibility	Female	26	50.6923	11.23484	0.339	0.564
	Male	15	48.8	7.38918		
	Total	41	50	9.94233		
Overall Score	Female	26	50.7115	9.77745	0.741	0.395
	Male	15	48.3	6.10781		
	Total	41	49.8293	8.6133		
Originality	Female	26	50.6923	11.09872	0.38	0.541
	Male	15	48.7333	6.9227		
	Total	41	49.9756	9.73008		
Elaboration	Female	26	51.8462	9.54858	2.65	0.112
	Male	15	47.1333	7.69848		
	Total	41	50.122	9.11097		

Table 2 Power

	Power	Effect Size	Critical F
Fluency	0.9	0.521	4.09
Flexibility	0.99	0.911	4.09
Overall Score	0.99	1.16	4.09
Originality	0.99	0.943	4.09
Elaboration	1	2.27	4.09