

Who is more creative? Assessing the role that individual characteristics play in
their relationship with creativity in various domains

By

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A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts in Industrial Organizational Psychology

Middle Tennessee State University

May 2017

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ACKNOWLEDGMENTS

I would like to thank Dr. Hein, Dr. Magne, and Dr. Schmidt for supporting me through a rather exploratory research study and for giving me such diverse perspectives and guidance as various issues arose. I would also like to thank the 14 MTSU Psychology Students that gave me multiple hours of their winter break in order to help me code thousands of responses: Jeanette Badar, Natalia Ramirez, Kyera Fletcher, Sydney Cooper, Beth Adams, Megan Snodgrass, Jessi Pope, Andrea Meggison, Dare McNamara, Tara Schlacter, Jeeun Yi, Sydney Reichin, Emilie Seyfang, and Lindsey Murry. Lastly, I would like to thank Jake Fields, Lauren McClain, Jacqui Masso, Suzette Grindle, Kelly Buss, and Kevin Loftis for lending me their expertise so that I could cater the Alternative Uses Task to each domain under investigation.

ABSTRACT

The relationship between artistic domains (such as music, painting, dancing, etc.) and creativity is not a novel idea, but researchers have yet to identify the exact relationship that exists. This study seeks to shed light on the relationship between artistic domains and creativity in regard to expertise, novel production, generalizability, and personality. The domains in question include music, visual arts, creative writing, dance, soccer, and softball/baseball.

For this study, participants from the MTSU Psychology Research Pool completed a survey that was made up of three components: a portion of the HEXACO-PI-R, a Biodata Questionnaire, and a creativity measure called the Alternative Uses Task (Guilford, 1967). For this task, participants were asked to come up with as many creative and practical uses for the item pictured within two minutes. Significant relationships were only found within the music domain. Music experience and production of novel work were found to predict the number of creative uses and that the interaction of music experience and openness to experience was the strongest predictor.

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CHAPTER ONE

REVIEW OF LITERATURE

Introduction

The relationship between artistic domains (such as music, painting, dancing, etc.) and creativity is not a novel idea. There is even a sector found within education and business called creative arts, which is composed of these domains, and the label of “creative” implies there is a degree of creativity involved in the work. However, while this relationship has been recognized for quite some time, researchers have yet to identify the exact relationship between creativity and artistic domains. There are three different speculations revolving around the link between artistic domains and creativity: these activities enhance creativity, creative individuals are more likely to choose these activities, or other pre-existing individual differences lead individuals to participate in an artistic domain. The research on these speculations has shown a great deal of inconsistency; thus, there is a need for further analysis. This study seeks to shed light on the relationship that exists between artistic domains and creativity in regard to expertise, novel production, generalizability, and personality.

Creativity

Sternberg (1999) criticizes the lack of creativity research that existed until the 1950s, and even after that time, the concept of creativity has been highly neglected despite his argument that creativity can support both the individual and society through problem solving, scientific findings, inventions, etc. The lack of a concrete definition for creativity has caused issues for researchers, especially when it comes to showing

consistent findings in the relationship between creativity and music. This research will focus on a component of creativity that has a solid definition, supporting research, and a reliable measure. This component is called divergent thinking. Divergent thinking was first proposed by J.G. Guilford in the 1950s, and it is defined as “generating novel situations” (Guilford, 1979). In other words, it is the ability to take the information that is in front of you and come up with multiple solutions (Sovansky, Wieth, Francis, & McIlhagga, 2016). From a musician’s perspective, there may be a specific chord progression that must be followed, but divergent thinking can be used in order to create various combinations of rhythms and sounds based on that progression.

Another aspect of creativity that has been increasingly common in research is convergent thinking, which is the ability to analyze multiple possibilities and find the correct solution (Gibson et al., 2009). Convergent thinking is often the preferred method to divergent thinking when there is a well-defined problem that requires a specific response. In contrast, divergent thinking works best in a poorly-defined problem-solving situation. Guilford (1959) said that divergent thinking is what gives the foundation for creative productivity since one can search multiple possibilities without boundaries and limitations, and the quality of the idea is determined by its fluency, flexibility, and originality. For this study, divergent thinking will be used as a basis for creativity.

As mentioned earlier, this study is examining the relationship that exists between artistic domains and creativity in regard to expertise, novel production, generalizability, and personality. Some of these artistic domains in question include music, visual arts (i.e., painting, sculpting, and drawing), creative writing, and dance. While not everyone

may consider sports to be an art form, soccer and baseball/softball are also included in the domains under investigation.

In sports, complex situations constantly arise which require game intelligence and tactical creativity to be a successful athlete (Memmert, 2011). Game intelligence is synonymous to convergent thinking in that it is an athlete's ability to find the best solution to a given problem during a specific situation. Game intelligence often comes about by studying specific plays and strategies of a given sport. Tactical creativity, or divergent thinking, is the ability to use a variety of flexible and unique decisions in different kinds of situations (Memmert, 2011).

Baseball/softball and soccer were chosen for this study because one more closely relies on game intelligence and the other relies on both. While playing baseball/softball, most athletes follow very specific instructions regarding where to throw the ball depending on which base is taken and how many players are on bases (Stallings & Bennett, 2002). Therefore, they rely on their game intelligence to find the best solution for that specific situation. Baseball Strategies (2002) is one of the many books that detail a multitude of specific steps and strategies that coaches need to use depending on the situation. The authors even provide the exact drills that can be used in practice situations that transfer right over to the same situation in a game. Soccer, on the other hand, introduces much more variability in the events that may occur, so tactical creativity seems more essential in this sport so that the athletes can be flexible in their decision-making process. Due to the lack of research on the relationship between sports participation, training in sports, and creativity, this part of the study is more exploratory in nature.

Expertise

Sovansky et al. (2016) define expertise as an individual who has extensive knowledge or skills within a certain domain due to lengthy training. Research has found that it typically takes approximately 10,000 hours of practice, about 2.5-3 hours a day for 10 years, to become an expert in a complex field (Ericsson & Charness, 1994). All of this practice leads to a high degree of knowledge, an enhanced ability to organize this knowledge, and better performance. Chase and Simon (1973) explain one benefit of expertise is having an enhanced ability to extract and remember information in the expert domain compared to novices. This will enable a musician, for example, to remember a musical phrase as a whole rather than having to remember each note separately.

However, there are situations in which expertise can be a hindrance. An expert with a specific knowledge set may find it difficult to look at a problem from a broad standpoint and come up with multiple solutions if their knowledge base does not contain a possible answer to the problem (Wiley, 1998). Therefore, an expert may become fixated in solving a problem using only the knowledge they know well, rather than thinking outside of the box. The findings of Wiley (1998) supports this notion in that high-knowledge subjects were less likely to find the answer to a problem-solving task compared to low-knowledge subjects. In addition, despite an expert subject being told not to use their existing knowledge, activation of knowledge may lead to fixation. Sovansky et al. (2016) found that expert musicians who simply play music rather than create music exhibited a lower divergent thinking score compared to novice and non-musicians. They suspect that fixation may have been what caused the decrease in divergent thinking. This study will investigate the impact of expertise on creative thinking tasks.

Research Question 1: Does additional experience and expertise narrow your creativity or broaden it within your domain?

Music Training

Research has analyzed the relationship that exists between music training and creativity. Gibson, Folley, and Park (2009) measured the difference in intelligence, personality, and creativity between classical music students and non-musicians. They used the Remote Associates Test, a measure of convergent thinking, and the Divergent Thinking Test to measure creativity. Results showed that musicians had enhanced divergent and convergent thinking compared to non-musicians. Hamann et al. (1990) found that music majors scored higher on overall creativity using the Unusual Consequences Test compared to non-music majors. However, the research previously mentioned by Sovansky et al. (2016) revealed that only expert musicians who create music had increased divergent thinking compared to expert musicians who simply play music, novices, and non-musicians. This indicates that not every form of music training will be linked to creativity.

Initially, researchers believed that involvement in music leads to enhanced creativity, but over time research began indicating that not every form of music training is linked to creativity. There are specific aspects of music training that may be causing the link between music training and creativity. These specific aspects are musical activities that involve idea generation and evaluation (e.g. composing, arranging, and improvising). Balkin (1990) would support the idea that it is only the idea generation activities in music training that enhances creativity; he argues that creativity is an acquired behavior that you gain from making new connections from experiences. Simply

playing the notes and the rhythms on the page does not influence creative development. Koutsoupidou and Hargreaves (2009) found that children in an improvisation program showed higher levels of originality, musical flexibility (number of different categories), and syntax (patterns of repetition and contrast) compared to the children in the control group. Research by Kleinmintz et al. (2014) and Benedek et al. (2014) also found that musicians who improvise have high creativity scores compared to musicians who do not improvise and non-musicians.

The current study sought to provide additional evidence in the relationship between creativity and idea generation components in music. However, this study investigated this relationship amongst multiple domains, which is currently under-represented in research.

Research Question 2: Does producing novel work in any of the domains predict better creativity test scores within and across domains?

Music aptitude will also be taken into consideration. This is a measure of an individual's potential to learn music rather than measuring what one already knows (Gordon, 1990). Auh (1995) found that compositional creativity was significantly related to music aptitude, and Ukkola et al (2009) found that musical aptitude is associated with AVPRIA-Haplotypes, which are receptors in the brain that have a large role in controlling high cognitive functions. As mentioned earlier, it takes approximately 10,000 hours of practice in order to become an expert (Ericsson & Charness, 1994). However, research by Ruthsatz et al (2008) found that practice is not the only mediating factor in becoming an expert in the music domain; practice serves as a mediating factor when individuals are selected on high general intelligence and music aptitude. This research

seeks to find additional connections between musical experiences/expertise, music aptitude, and creativity.

Creative Generalizability

Generalizability in creative productivity refers to an individual's ability to transfer their creativity in one domain to another domain. If creativity is only found within the domain under which the individual works it is considered a domain-specific trait. If creativity can be transferred to other domains, then it is called a domain-general trait. Research by Sovansky et al. (2016) showed that expert musicians who created music scored higher on the domain-specific divergent thinking task as compared to non-experts and expert musicians who did not create music. However, they did not score higher on the domain-general items of the creativity task. Therefore, Sovansky et al. (2016) argued that while creating music did predict higher creativity scores amongst the musicians, their creativity was limited to their domain. Sowden, Clements, Redich, and Lewis (2015) examined domain creativity by conducting two experiments with an improvisation and control condition in a dance activity and a verbal activity. The participants in the improvisation condition scored higher than the control condition on the divergent thinking task when it was domain-specific and when it was measuring overall creativity. The conflicting research shows a need for additional investigation as to whether creativity is domain-specific or domain-general.

It may be that creativity is not entirely domain-general or domain-specific but that there are groups of activities in which the creativity transfers. Silvia, Kaufman, and Pretz (2009) studied creative accomplishments in 10 domains (visual arts, music, dance, architectural design, creative writing, inventions, humor, scientific discovery, culinary

arts, and theater) using latent class analysis. Their results gave three classes: uncreative, visual arts, and performing arts. According to these results, an individual with creativity in dance may be able to transfer their creative abilities to other areas of performing arts, such as theater and music, but not to visual arts. This study will investigate the conflicting idea of creative generalizability.

Research Question 3: Does creative productivity generalize across domains?

Pre-Existing Individual Differences

Individual differences outside of creativity and music training are important to consider in order to find additional variables that may influence the relationships under investigation. Cognitive ability and personality are examples of potential individual differences. Rauscher et al. (1997) found that children in the music training condition showed significant improvements in spatial-temporal reasoning compared to the children taking computer lessons and the children not taking lessons. Roden et al. (2014) found that music training may enhance some cognitive elements but not others. The children in the music lessons condition had higher scores in processing speed, while the children in the science lessons condition had higher scores on visual attention.

Corrigall, Schellenberg, and Misura (2013) found that personality variables predicted how long people stayed involved in music while controlling for demographics and cognitive ability. Additionally, when personality was held constant, cognitive ability no longer predicted how long people stayed involved in music. This research suggests that personality dimensions are important to consider when analyzing music training. To be more specific, openness to experience was best at predicting time involved in music. An individual that scores high in openness to experience appreciates the beauty of nature

and art, is curious about various domains, freely uses their imagination, and is interested in the unusual. Openness to experience was found to be significantly related to creativity in Kaufman, Pumacahua, and Holt's (2013) research. They found that college students majoring in art and investigative studies scored higher on both openness to experience and on self-assessed creativity. This study also analyzed the importance that personality has in creativity research. Two hypothesized mediation models have been created to analyze the uncertain relationship between creativity, experience/expertise, and openness to experience.

Research Question 4: Does creativity generalize across domains as a function of an individual's personality?

Hypothesized Mediation Model 1:

Experience/Expertise → Openness to Experience → Creativity

Hypothesized Mediation Model 2:

Openness to Experience → Experience/Expertise → Creativity

CHAPTER TWO

METHODOLOGY

Participants

In total, 341 college undergraduate students participated in this study. There were 203 freshmen, 86 sophomores, 27 juniors, 12 seniors, and 4 graduate students.

Participants were made of up of students in the General Psychology Research Pool and students in the Middle Tennessee State University (MTSU) School of Music. Students in the General Psychology Research Pool were the first and primary source of participants for this study. Additional participants were recruited from the School of Music in order to achieve the desirable sample size.

Materials

The Biodata Questionnaire (adapted from Sovanksy et al, 2016) provided information on experience and expertise as well as the production of novel work in their domain. This questionnaire was administered through Qualtrics to allow for Skip Logic, so in-depth questions were only asked about domains in which participants have experience. See Appendix A for the adapted questionnaire. Experience and expertise were defined by a combination of the number of years they have been involved in their domain, the number of years they have taken lessons/been coached, and whether they perform their domain in a structured setting. Different point values were awarded based off their responses, and the total number of points reflect their expertise score (see Appendix B for the scoring guide). For example, if the participant selected that they have

taken lessons for seven years, then four points were added to their overall score, but if they have only taken lessons for two years then they received one point.

The second set of questions dealt with the production of novel work in their domain. Production of novel work was defined by creating an original piece/work within their domain, adapting another's piece/work to create something new, and improvising. Participants were asked a question based on each of the three components, and their answer was on a response scale of "never" to "all of the time." The scale was defined to the participants before they began answering questions. Points were awarded based on their responses, and the points added up together represent their total score for production of novel work (See Appendix B for the list of questions and scoring guide). For example, musicians were asked, "How often do you compose an original musical work?" If the participant responded with sometimes, he/she was awarded two points to their overall production of novel work score.

The ACT scores were gathered as a proxy measure of intelligence. The highest overall ACT score on record was used for each participant. The ACT is a standardized test that colleges use to evaluate candidates. The test takes approximately three hours to complete and evaluates five academic topics: English, mathematics, reading, science, and writing. Scores could range from 1 – 36.

All participants completed a version of Guilford's alternative uses task (1967). This task was selected because the items could be adjusted to measure domain-specific and general creativity, and it is also a well-known, widely used measure for divergent thinking. In Guilford's (1967) original version of this task, participants were asked to list as many possible uses for common household items, such as a newspaper and a paperclip.

For this study, participants saw pictures of domain-specific items that relate to their highest-scored domain and lowest-scored domain, and they also saw non-domain items. The two non-domain items that every participant saw were a brick and a paperclip; these items were pulled directly from the original alternative uses task (Guilford, 1967). Since this task is an adjusted version of Guilford's alternative uses task (1967), there are no reliability or validity measurements. See Appendix C for the instructions, Appendix D for an example of the AUT questions and items that musicians saw, and Appendix E for the items of the other domains.

Participants were asked to list as many creative and practical uses as possible for each item. They had two minutes to come up with this list per item. Participant responses were scored on fluency, flexibility, and originality. Fluency was scored as the total number of creative uses that are listed. Flexibility was scored as the number of categories that are created based on the uses the participant provides. Sovansky et al. (2016) provide an example to clarify the scoring procedure. They explain that a participant listing "folding into a hat" and "folding into a boat" as uses for newspaper would receive a fluency score of 2 (participant came up with 2 uses) but a flexibility score of 1 because both responses are in the origami/artwork category (Sovansky et al., 2016). Originality was scored in three different ways. The first step in assessing originality was to establish the relative frequency of each category and then to assign point values based on the relative frequencies. Categories with a relative frequency of 0.2 or more were assigned a value of 1, 0.1 – 0.2 were given 2 points, 0.05 – 0.1 were given 3 points, 0.02 – 0.05 were given 4 points, and less than 0.02 were given 5 points. The "rare response" category for each item was awarded 6 points. From these values, the maximum relative frequency,

average relative frequency, and sum of relative frequencies were calculated to give three different measures of originality.

The HEXACO Personality Inventory – Revised served as the personality measure. This instrument was shown to have moderately high internal-consistency reliability and low inter-scale correlations (Kibeom & Ashton, 2009). The HEXACO-PI-R measures six domains: honesty-humility, emotionality, extraversion, agreeableness, conscientiousness, and openness to experience, but for the purposes of this study only items pertaining to conscientiousness and openness to experience were used. Participants responded to items on a 5-point Likert Scale (strongly disagree, disagree, neutral, agree, and strongly agree). See Appendix F for the list of items. Those who score high on Conscientiousness are organized, disciplined in working towards goals, strive for accuracy and perfection, and make careful decisions. Those low in Conscientiousness are not concerned about order, avoid difficult and challenging goals, are content with errors in their work, and make impulsive decisions (Ashton & Lee, 2009). Those with high scores in Openness to Experience appreciate the beauty of nature and art, are curious about various domains, freely use their imagination, and are interested in the unusual. Those with low scores in Openness to Experience are not impressed by art, are not intellectually curious, avoid creative opportunities, and are not attracted to what is unusual.

Some participants in the music domain completed Gordon's Advanced Measures of Music Audiation (1989). This is a measure of an individual's potential to learn music rather than measuring what one already knows (Gordon, 1990). The Advanced Measures of Music Audiation, also known as the AMMA, required participants to listen to short

music phrases through headphones and respond to 30 question on these music phrases. Unlike the other measures, the AMMA was administered in a lab setting. For each test question, the participant listened to one musical statement and that is followed by another musical statement. After listening to the two statements, the participant had to first decide if the statements were the same or different. If they selected the statements were different, they had to decide if the difference was due to one or more rhythm changes or one or more tonal changes. No test question included both a rhythm and tonal change. A longitudinal study conducted by Gordon (1990) found strong predictive validity when comparing student performance to scores on the AMMA.

Procedure

The majority of the measures were on a survey administered through Qualtrics; therefore, participants were able to complete this survey in any location as long as they had a computer and internet access. Because the participants were assigned the alternative uses task items according to the domains in which they scored the highest and the lowest, they served as their own control and this allowed for both within-subjects and between-subjects analyses. This survey began by requiring participants to read and sign an online consent form to participate in this research. Once the consent form was signed, the participant continued through the study.

The online survey first had the participants complete a Biodata Questionnaire. Qualtrics immediately scored the responses of the Biodata Questionnaire to determine which domain items they will see for the AUT; participants saw items of the domain in which they received the highest score and the domain in which they received the lowest score. All participants saw the non-domain items, so in total participants saw six items.

Next, instructions appeared that described the alternative uses task. Once read, participants selected “Begin,” and they saw the image of the first item. They had two minutes to come up with as many creative and practical uses for this item as possible. After the two minutes were up, the survey forced them onto the next item. This process repeated for the other three domain-specific items and the two non-domain items. Lastly, participants had to complete a portion of the HEXECO-PI-R. The HEXACO-PI-R takes approximately five minutes to take, but participants had no time limit. Participants were then asked whether the researcher would be allowed to access their academic records to obtain an ACT score, and if they would be willing to complete a follow-up laboratory study if they qualified. If the participant gave permission, they were asked to provide an email address. Participants were then thanked for completing the survey and awarded research credit.

For participants that saw the items for the music domain and gave the researcher permission to contact them, the researcher extended an invitation to complete a second part of the study. They were asked to come into a lab for a 30-minute session. Participants were assigned to their own computer with headphones and, again, read and sign a consent form to take part in the study. Gordon’s Advanced Measures of Music Audiation was already prepared on each computer for the participants, and they had an answer sheet and pencil in front of them. The researcher instructed the participants that, once they were ready, they will need to put on the headphones and listen to the instructions provided. Once they were finished, participants were thanked for their time, debriefed, and awarded research credit.

CHAPTER THREE

RESULTS

Data Preparation

A total of 341 participants took the survey. 18 participants were removed for completing less than 10% of the survey, and 15 participants were removed for not completing the Alternative Uses Task for the domain in which they had experience. The necessary sample size for a domain to remain in analyses was 30 participants. Because only 24 participants completed the alternative uses task for the creative writing domain, creative writing was dropped from the rest of analyses. Music, Art, Dance, Soccer, and Baseball were analyzed (descriptive statistics provided below).

Out of 341 participants, 179 participants gave the researcher permission to access their ACT scores. However, ACT scores for only 154 participants were gathered because scores were either unavailable or the participant was unable to be uniquely identified. Considering the limited amount of data that would be distributed across domains, researchers dropped the proxy measure of intelligence from analyses.

Content coding was necessary in order to score the responses to the Alternative Uses Task (AUT). The researcher gathered 14 volunteers from the MTSU Psychology Department to participate in the coding process. Two teams of three people coded the responses to the music and baseball AUT items. Four teams of two people coded the responses to the art, dance, soccer, and non-domain items. Inter-rater agreement is provided in Table 1. Because participants responded to two items for each domain, the average of the two items was calculated for each creativity variable. For example, a

participant's fluency score for music was calculated by averaging the number of creative uses they come up with for a music stand (Item 1) and sheet music (Item 2). Z scores were created for all creativity variables so that analyses could be done across domains.

Paired sample t-tests were used to determine which creativity variables should be used to assess the research questions. For each domain, five t-tests were conducted to see if creativity differed for participants with experience in the domain compared to those with no experience. The five creativity variables include fluency, flexibility, average relative frequency, maximum relative frequency, and sum of the relative frequencies. Because five domains were under investigation, a total of 25 t-tests were conducted. At an alpha of .05, three of the 25 tests were significant. Creativity as measured through fluency was significantly different for those with music experience compared to those with no music experience, $t(45) = .050$. Creativity as measured through fluency was also significantly different for those with baseball experience compared to those with no baseball experience, $t(28) = .047$. Creativity as measured through flexibility was significantly different for those with dance experience compared to those with no dance experience, $t(29) = .024$. From these results, researchers decided to use fluency and flexibility as the creativity variables to assess the research questions. Since the three originality variables (average relative frequency, maximum relative frequency, and sum of the relative frequencies) showed no significant t-tests, these variables were dropped from the rest of analyses.

Table 1
Inter-rater agreement amongst coders of the Alternative Uses Task for each domain

	Item 1	Item 2
Music	92.05%	84.56%
Art	89.30%	90.00%
Dance	83.38%	83.76%
Soccer	89.20%	88.34%
Baseball	88.28%	86.90%

Descriptive Statistics

Table 2 below includes descriptive statistics for all domains. The descriptive statistics only explain the participants that had experience in the given domain and completed the Alternative Uses Task for that domain. Because of the way the survey was designed, this would be the domain that the participant had the most experience in out of the six original domains under investigation. Experience/expertise was defined by a combination of the number of years they have been involved in their domain, the number of years they have taken lessons/been coached, and whether they perform their domain in a structured setting. Production of novel work was defined by creating an original piece/work within their domain, adapting another's piece/work to create something new, and improvising. Scores for experience could range from 0 to 18 and scores for production of novel work could range from 0 – 15 (see Appendix B for the scoring guide). Table 3 breaks down the number of participants that completed the Alternative Uses Task for a specific domain that had experience in that domain and that did not have experience in that domain.

Table 2
Descriptive statistics for the domain in which participants had the most amount of experience

	<i>n</i>	Experience		Production of Novel Work	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Music	53	9.57	2.96	8.26	3.19
Art	73	7.22	3.52	9.05	2.85
Dance	40	10.93	4.72	9.58	2.68
Soccer	42	8.83	5.18	10.98	2.84
Baseball	43	10.05	4.35	8.63	3.63

Table 3
Sample size of participants who completed the Alternative Uses Task for each domain with experience and with no experience

	Domain Experience	No Domain Experience
Music	53	53
Art	73	52
Dance	40	53
Soccer	42	54
Baseball	43	54

Correlations

Correlations were then performed on all the variables to begin understanding the relationships of domain experience, production of novel work in the domain, creativity variables, and personality. In the following tables production of novel is represented through the word “create.”

At a .05 alpha level, music experience and the production of novel work in music were both significantly correlated to fluency and flexibility. While the tonal and rhythm scores of the AMMA were correlated to each other ($n = 22$), they were not correlated to any other music variables. As expected, openness to experience was significantly related

to music experience, production of novel work, and fluency, while conscientiousness was not related to any variables. See Table 4 for Pearson correlations.

At a .05 alpha level, the creativity variables were not significantly correlated to experience of production of novel work in the rest of the domains (art, dance, soccer, and baseball). For each domain, experience and production of novel work were correlated with each other and fluency and flexibility were correlated with each other. These correlations were expected and do not provide support for any of the research questions. Because of the lack of significance with experience and production of novel work to the creativity variables, regression analyses were not performed for these domains. See Table 5 for Pearson correlations in the art domain, Table 6 for Pearson correlations for the dance domain, Table 7 for Pearson correlations for the soccer domain, and Table 8 for Pearson correlations for the baseball domain.

Table 4
Pearson correlations for variables within the music domain

	2	3	4	5	6	7	8
Music - Experience	.31*	.40*	.40*	-.02	-.07	.29*	.06
Music - Create	-	.34*	.31*	.35	.35	.29*	-.09
Fluency	-	-	.87*	.14	.30	.40*	.21
Flexibility	-	-	-	.10	.16	.44	.11
AMMA - Tonal	-	-	-	-	.83*	-.08	.00
AMMA - Rhythm	-	-	-	-	-	-.08	-.03
Openness to Experience	-	-	-	-	-	-	.07
Conscientiousness	-	-	-	-	-	-	-

* $p < .05$

Table 5
Pearson correlations for variables within the art domain

	2	3	4	5	6
Art - Experience	.58*	.12	.18	.30*	-.05
Art - Create	-	.11	.09	.26*	-.02
Fluency	-	-	.85*	.23	-.14
Flexibility	-	-	-	.24*	-.14
Openness to Experience	-	-	-	-	.07
Conscientiousness	-	-	-	-	-

* $p < .05$

Table 6
Pearson correlations for variables within the dance domain

	2	3	4	5	6
Dance - Experience	.39*	-.03	.04	.13	.34*
Dance - Create	-	.03	.03	.04	.31*
Fluency	-	-	.91*	-.11	.07
Flexibility	-	-	-	-.07	.12
Openness to Experience	-	-	-	-	.07
Conscientiousness	-	-	-	-	-

* $p < .05$

Table 7
Pearson correlations for variables within the soccer domain

	2	3	4	5	6
Soccer - Experience	.51*	.22	.16	-.34*	-.02
Soccer - Create	-	.27	.21	-.17	.18
Fluency	-	-	.68*	-.21	.34*
Flexibility	-	-	-	-.03	.12
Openness to Experience	-	-	-	-	.07
Conscientiousness	-	-	-	-	-

* $p < .05$

Table 8
Pearson correlations for variables within the baseball/softball domain

	2	3	4	5	6
Baseball - Experience	.40*	-.08	.06	-.03	.18
Baseball - Create	-	.05	.07	-.05	.15
Fluency	-	-	.42*	-.01	-.07
Flexibility	-	-	-	-.05	-.12
Openness to Experience	-	-	-	-	.07
Conscientiousness	-	-	-	-	-

* $p < .05$

Regression Analyses

Research Question 1

Two linear regression analyses were conducted in order to determine the impact of music experience and expertise on creativity and answer the question “Does additional experience and expertise narrow your creativity or broaden it within your domain?”

Regression analyses were used because both experience and production of novel work were treated as continuous data so the participant’s actual score on these measures were directly used in analyses. Two regression analyses were used with music experience as a predictor of fluency and flexibility. The regression analysis for fluency of music items revealed a significant main effect for music experience ($B = .401, p = .003$). The regression analysis for flexibility of music items revealed a significant main effect for music experience ($B = .403, p = .004$). See Table 9 and Table 10.

Research Question 2

Four linear regression analyses were conducted in order to determine the impact of production of novel work on creativity and answer the question, “Does producing novel work in any of the domains predict better creativity test scores within and across

domains?” Two regression analyses were used with production of novel work in music as a predictor of fluency and flexibility for the music items. The regression analysis for fluency of music items revealed a significant main effect for production of novel work ($B = .337, p = .014$), and the regression analysis for flexibility of music items revealed a significant main effect for production of novel work in music ($B = .311, p = .025$).

Two additional regression analyses were used with the same predictor and dependent variable for the non-music items. The regression analysis for fluency of non-music items revealed a significant main effect for production of novel work ($B = .285, p = .043$), and the regression analysis for flexibility of non-music items revealed a significant main effect for production of novel work in music ($B = .311, p = .026$). See Table 9 and Table 10.

Table 9

Linear regression model for predicting music-item and non-music item fluency for music experience and the production of novel work

Predictor Variable	Music Item Fluency		Non-Music Item Fluency	
	B (B)	SE	B (B)	SE
Music - Experience	.136 (.401)*	.043	-	-
Music - Create	.109 (.337)*	.043	.078 (.285)*	.038

* $p < .05$

Table 10

Linear regression model for predicting music-item and non-music item flexibility for music experience and the production of novel work

Predictor Variable	Music Item Flexibility		Non-Music Item Flexibility	
	B (B)	SE	B (B)	SE
Music - Experience	.130 (.403)*	.041	-	-
Music - Create	.095 (.308)*	.041	.078 (.311)*	.034

* $p < .05$

Research Question 3

The third research question under analysis was “Does creative productivity generalize across domains?” In order to answer this question, the following variables were correlated: the fluency score for the domain that the participant had the most experience, the fluency score for the domain that the participant had no experience, and the fluency score for the non-domain items. Correlations found in Table 11. At an alpha of .05, all correlations were found to be significant in comparing the participants’ fluency score for the music items, the items for the domain in which the participants didn’t have experience, and the non-domain items (brick and paperclip). Table 11 is specific to participants who had experience in music, since the music domain was the only domain that was involved in extensive analyses. However, significant correlations were found across all domains showing that a fluency score for the domain in which a participant has experience in is related to the fluency score for the domain in which they do not have experience in as well as the brick and paperclip.

Table 11

Pearson correlations for fluency of music items, fluency of non-music items, and fluency of non-domain items

	2	3	4
Fluency_music items	.61*	.78*	.73*
Fluency_non-music items	-	.49*	.51*
Fluency_non-domain item 1	-	-	.68*
Fluency_non-domain Item 2	-	-	-

* $p < .05$

Research Question 4

The last research question under investigation assessing the relationship between experience and creativity as a function of personality. Because music was the only domain that had significant relationships between experience and creativity, music was the only domain involved in studying personality. As hypothesized and shown in Table 4, openness to experience was correlated to music experience, production of novel work, and fluency. Conscientiousness was not correlated to any of the variables.

The regression analysis for fluency of music items revealed a significant main effect for openness to experience ($B = .400, p = .003$). As mentioned in the analysis of Research Question 1 and in Table 9, the regression analysis for fluency of music items revealed a significant main effect for music experience ($B = .401, p = .003$). The hypothesized mediation models were then assessed, but neither music experience nor openness to experience predicted fluency when controlling for the other. Because of the strong relationship between the two variables, an interaction term was created for music experience and openness to experience. The regression analysis for fluency of music items revealed a significant interaction for music experience and openness to experience ($B = .464, p = .000$). See Table 12.

Table 12

Linear regression model for predicting fluency based on music experience, openness to experience, and the interaction between the two variables

Predictor Variable	Fluency	
	B (B)	SE
Music Experience	.136 (.401)*	.043
Openness to Experience	.716 (.400)*	.230
Music Experience x Openness to Experience	.035 (.464)*	.009

* $p < .05$

CHAPTER FOUR

DISCUSSION

Summary of Findings

The results of the Alternative Uses Task for the music domain reveals that music experience was a significant predictor of creativity as measured through fluency and flexibility. These findings are consistent to what was found by Sovansky et al. (2016). Production of novel work in music was also a significant predictor of creativity as measured through fluency and flexibility. These findings are consistent with the findings of Sovansky et al. (2016), Koutsoupidou and Hargreaves (2009), Kleinmintz et al. (2014), and Benedek et al. (2014). The other domains (art, dance, soccer, and baseball) showed no significant relationships between experience and creativity as well as production of novel work and creativity. This may be due to the exploratory nature of the domains other than music. The available research on those domains and creativity was very limited and inconsistent, so the items used to capture experience and production of novel work may not have been the best reflection of those variables.

Results showed no significant relationships between the Advanced Measure of Music Audiation (AMMA) and the fluency and flexibility of music item responses. While it was initially anticipated that a relationship would exist, this is understandable because the AMMA is focused on aptitude for music, but does not measure the experiences of an individual once they become involved in music. Expertise comes from the experience that an individual has in the domain over time, so having a general aptitude for music does not mean they have had the experience's necessary to truly

develop their skills or are involved in production of novel work. However, the small sample size may mean that the findings are not representative of the general population.

In assessing the third research question, results supported that creative productivity does generalize across domains. Participants (with music experience) that scored highly in the creative uses task for the music domain consistently scored highly in the creative uses task for the domain in which they lacked experience and the general items (brick and paperclip). These relationships were also demonstrated in other domains as well. Creativity seems to be a strong enough individual difference so that someone who has creativity in one domain can transfer their creative abilities over to other situations as well. This was a substantial finding because of the mixed research that has come out regarding creative generalizability. While the results of Sovansky et al (2016) found that creating in music only predicted creativity within the music domain, the results of this study are aligned with the findings of Sowden, Clements, Redich, and Lewis (2015) in that creativity is generalizable across domains.

The results showing creative generalizability in the music domain are broadly aligned with findings by Schellenberg and Weiss (2015), which state that music training tends to be a predictor of performance for a variety of cognitive tests. The tests were listening tasks, some musical and some not, and other tests were focused on visuospatial abilities, memory, and language. While this research is not focused on creativity, the findings of Schellenberg and Weiss (2013) and the present study both give evidence that music training can predict performance in some cognitive tasks, musical or otherwise.

The last research question analyzed was the effect that personality had on the relationship between experience and creativity. As expected, conscientiousness was not

correlated to music experience, production of novel work, fluency, or flexibility. Results found that openness to experience was significantly related to fluency and flexibility, which corresponds to the findings of Kaufman, Pumacahua, and Holt (2013).

Independently, openness to experience and music experience both predicted creativity as measured through fluency, but they did not predict creativity when controlling for the other. The interaction of both openness to experience and music experience was found to be the strongest predictor of fluency. This indicates that creativity is highest when an individual has both experience in music and has the personality characteristic “openness to experience.” Related to these results is a genetic study by Butkovic, Ullen, & Mosing (2016). They found that there is a significant association between openness to experience and music practice due to shared genetic influences. This common gene could possibly influence an individual’s practicing behavior, enhancing their musical experience, and traits that are related to interest in the arts. Therefore, this common gene may provide some explanation as to why the interaction of music experience and openness to experience was the strongest predictor of creativity, but additional research should be done to verify this proposition.

Limitations

While many of the results found in this study seem to be consistent with relevant research, certain limitations should be discussed. As mentioned in the introduction, creativity is a broad term that lacks a concrete definition. Creativity measures, such as the alternative uses task, aim to capture multiple components of creativity by assessing number of solutions, number of categories, and originality. The Alternative Uses Task is based on the concept of divergent thinking. Divergent thinking is only one definition of

creativity amongst many. It is possible that other findings may come out with the use of an alternative creativity measure.

It should also be noted that the results obtained from this study were based on a sample of undergraduate students. The amount of experience that the participants had was limited due to the amount of time they have been exposed to their domain. The extent to which these results will generalize is unknown.

Another limitation to the measure of creativity is that the researcher selected the items specific to each domain. While the Alternative Uses Task provides this flexibility in making domain-specific items, the items selected are not a part of Guilford's (1967) original measure. The study was exploratory in nature considering the limited research out there on creativity in other domains, so additional research should be done to better identify ways to measure experience and production of novel work in various artistic and athletic domains.

Future Directions

Future studies should look at other measures of creativity. While this study used the alternative uses task to measure divergent thinking, other measures could be used to analyze the various aspects of creativity. For example, the remote associations test is a measure that has been used for convergent thinking. A future study could also analyze the differences in creativity amongst various academic domains. Scientists have been hypothesized to have enhanced creativity due to designing experiments, so they may show similar results to a musician producing novel work.

Implications

The finding that more experienced musicians that are actively creating music demonstrated higher fluency and flexibility have implications for music education. These findings suggest that having kids involved early on in activities like composing, arranging, and improvisation may support their creativity later in life, and creativity will be strongest if the child also has the personality characteristic “openness to experience.”

The results also supported the idea of creativity generalizability, in that creative abilities developed in one domain can transfer over to other domains. Individuals with a high creative ability should seek opportunities to utilize their creative ability on various situations rather than solely focusing on the domain in which it was likely developed.

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APPENDICES

APPENDIX A: BIODATA QUESTIONNAIRE

Have you ever considered or do you currently consider yourself to be an instrumental or vocal musician? YES NO

Approximately how many years have you been a musician?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Approximately how many years have you had music lessons?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Are you currently making music in a structured setting (e.g., school/community ensemble, choir, jazz band)? YES NO

The following questions will ask you about your involvement with creating and arranging music. Each question is on a scale of “All of the Time” to “Never.” Please see below for a more detailed description of the scale.

Never – I have never performed this activity

Rarely – I have performed this activity in the past six months

Sometimes – I have performed this activity 2-6 times in the past six months

Often – I have performed this activity 6 – 10 times in the past six months

All of the Time – I have performed this activity more than 10 times in the past six months

How often do you compose an original musical work?

Never	Rarely	Sometimes	Often	All of the Time
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How often do you arrange or transcribe music?

Never	Rarely	Sometimes	Often	All of the Time
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How often do you improvise when performing music?

Never	Rarely	Sometimes	Often	All of the Tim
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Visual Artists

Have you ever created or do you currently create visual art (e.g., paintings, drawing, sculpting)? YES NO

Approximately how many years have you created art?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Approximately how many years have you taken art lessons?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Are you currently creating art in a structured setting (e.g., advanced art class, drawing club)? YES NO

The following questions will ask you about your experiences in creating art. Each question is on a scale of “All of the Time” to “Never.” Please see below for a more detailed description of the scale.

Never – I have never performed this activity

Rarely – I have performed this activity in the past six months

Sometimes – I have performed this activity 2-6 times in the past six months

Often – I have performed this activity 6 – 10 times in the past six months

All of the Time – I have performed this activity more than 10 times in the past six months

How often do you create an original piece of art?

Never	Rarely	Sometimes	Often	All of the Time
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How often do you use another artist’s style to create your own piece of work?

Never	Rarely	Sometimes	Often	All of the Time
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How often do you try to learn and apply a new artistic technique?

Never	Rarely	Sometimes	Often	All of the Time
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Creative Writing

Have you ever been or are you currently a writer (independent from school assignments)?
YES NO

Approximately how many years have you been a writer?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Approximately how many years have you received coaching for your writing?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Are you currently writing in a structured setting (e.g., advanced writing course, creative writing club)? YES NO

The following questions will ask you about your experiences as a writer. Each question is on a scale of “All of the Time” to “Never.” Please see below for a more detailed description of the scale.

Never – I have never performed this activity

Rarely – I have performed this activity in the past six months

Sometimes – I have performed this activity 2-6 times in the past six months

Often – I have performed this activity 6 – 10 times in the past six months

All of the Time – I have performed this activity more than 10 times in the past six months

How often do you write an original piece of work?

Never Rarely Sometimes Often All of the Time

How often do you write something based on someone else’s writing (e.g., fan fiction)?

Never Rarely Sometimes Often All of the Time

How often do you participate in a writing activity/competition that started with a prompt?

Never Rarely Sometimes Often All of the Time

Dance

Have you ever considered or do you currently consider yourself to be a dancer?

YES NO

Approximately how many years have you been a dancer?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Approximately how many years have you been coached by a dance instructor?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Are you currently dancing in a structured setting (e.g., member of a dance group)?

YES NO

The following questions will ask you about your experiences as a choreographer and performer. Each question is on a scale of “All of the Time” to “Never.” Please see below for a more detailed description of the scale.

Never – I have never performed this activity

Rarely – I have performed this activity in the past six months

Sometimes – I have performed this activity 2-6 times in the past six months

Often – I have performed this activity 6 – 10 times in the past six months

All of the Time – I have performed this activity more than 10 times in the past six months

How often do you choreograph an original dance?

Never Rarely Sometimes Often All of the Time

How often do you choreograph a dance based on someone else’s work?

Never Rarely Sometimes Often All of the Time

How often do you improvise while dancing?

Never Rarely Sometimes Often All of the Time

Soccer

Have you ever been or are you currently a soccer player? YES NO

Approximately how many years have you played soccer?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Approximately how many years have you been in a coached soccer setting?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Approximately how many years have you played on a competitive soccer team (i.e., travel team or school team)?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Are you currently playing soccer in a structured setting (e.g. school team, intramurals)?
YES NO

The following questions will ask you about your experiences as a soccer player. Each question is on a scale of “All of the Time” to “Never.” Please see below for a more detailed description of the scale.

Never – I have never performed this activity

Rarely – I have performed this activity in the past six months

Sometimes – I have performed this activity 2-6 times in the past six months

Often – I have performed this activity 6 – 10 times in the past six months

All of the Time – I have performed this activity more than 10 times in the past six months

How often do you try a new dribbling move in practice?

Never	Rarely	Sometimes	Often	All of the Time
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How often do you try something new that you have seen someone else do (e.g., a new dribbling move)?

Never	Rarely	Sometimes	Often	All of the Time
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How often do you change the way you’re playing based on the way the game is going?

Never	Rarely	Sometimes	Often	All of the Time
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Baseball/Softball

Have you ever been or are you currently a baseball or softball player? YES NO

Approximately how many years have you played baseball/softball?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Approximately how many years have you been in a coached baseball/softball setting?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Approximately how many years have you played on a competitive baseball/softball team (i.e., travel team or school team)?

0 – 2 years	3 – 4 years	5 – 6 years	7 – 8 years
9 – 10 years	11 – 12 years	13 – 14 years	15 or more years

Are you currently playing baseball/softball in a structured setting (school team, intramurals, etc.)? YES NO

The following questions will ask you about your experiences as a baseball/softball player. Each question is on a scale of “All of the Time” to “Never.” Please see below for a more detailed description of the scale.

Never – I have never performed this activity

Rarely – I have performed this activity in the past six months

Sometimes – I have performed this activity 2-6 times in the past six months

Often – I have performed this activity 6 – 10 times in the past six months

All of the Time – I have performed this activity more than 10 times in the past six months

How often do you critically think about and then create new plays?

Never	Rarely	Sometimes	Often	All of the Time
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How often do you think of a new play based on a previously known play?

Never	Rarely	Sometimes	Often	All of the Time
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How often do you change the way you’re playing based on the way the game is going?

Never	Rarely	Sometimes	Often	All of the Time
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APPENDIX C: ALTERNATIVE USES TASK (AUT) INSTRUCTIONS

Alternative Uses Task

Instructions

During this session, you will see pictures of four separate objects and your task will be to come up with various uses for the object. We are looking for uses that are plausible and are significantly different from the common use for the object (e.g., if you were shown a box of Kleenex tissues, a possible use for Kleenex tissues would be as stuffing for a package). Note that we are looking for uses that are specific to the object you see and that could not just be applied to any object (e.g., “throwing a box of tissues into the ocean” is a response that could be applied to any object).

Keep your responses short and use the infinitive form (“to do ___”).

You will have two minutes to come up with a list of uses for each item. Please write down as many plausible uses as possible within the two minute time frame.

These instructions were adapted from Dr. Evangelia G. Chrysikou’s Uses Task Instructions.

APPENDIX D: AUT ITEM EXAMPLE FOR THE MUSIC DOMAIN

Music | Item 1:

What is the name of this item? _____

Have you ever used an item like this before? YES NO

In the space below list as many creative uses as you can think of for this item:

Music | Item 2:

What is the name of this item? _____

Have you ever used an item like this before? YES NO

In the space below list as many creative uses as you can think of for this item:

Non-Domain/General | Item 1:



What is the name of this item? _____

Have you ever used an item like this before? YES NO

In the space below list as many creative uses as you can think of for this item:

Non-Domain/General | Item:



What is the name of this item? _____

Have you ever used an item like this before? YES NO

In the space below list as many creative uses as you can think of for this item:

APPENDIX E: AUT ITEMS FOR ALL OTHER DOMAINS

Items for other domains:

Visual arts: Paint palette and easel



Creative writing: Journal and pencil



Dance: (standalone) ballet bar and tap shoes



Soccer: Cone and soccer ball



Baseball/softball: helmet and cleats



APPENDIX F: SELECTED ITEMS FROM THE HEXACO-PI-R

HEXACO-PI-R

Scale: Strongly disagree, disagree, neutral, agree, and strongly agree

1. I would be quite bored by a visit to an art gallery.
2. I plan ahead and organize things, to avoid scrambling at the last minute.
3. I'm interested in learning about the history and politics of other countries.
4. I often push myself very hard when trying to achieve a goal.
5. I would enjoy creating a work of art, such as a novel, a song, or a painting.
6. When working on something, I don't pay much attention to small details.
7. I think that paying attention to radical ideas is a waste of time.
8. For quality assurance purposes, please select "agree."
9. I make decisions based on the feeling of the moment rather than on careful thought.
10. If I had the opportunity, I would like to attend a classical music concert.
11. When working, I sometimes have difficulties due to being disorganized.
12. I've never really enjoyed looking through an encyclopedia.
13. I do only the minimum amount of work needed to get by.
14. People have often told me that I have a good imagination.
15. I always try to be accurate in my work, even at the expense of time.
16. I like people who have unconventional views.
17. For quality assurance purposes, please select "strongly disagree."
18. I make a lot of mistakes because I don't think before I act.
19. I don't think of myself as the artistic or creative type.
20. People often call me a perfectionist.
21. I find it boring to discuss philosophy.
22. I prefer to do whatever comes to mind, rather than stick to a plan.

APPENDIX G – IRB APPROVAL LETTER

IRB
INSTITUTIONAL REVIEW BOARD
 Office of Research Compliance,
 010A Sam Ingram Building,
 2269 Middle Tennessee Blvd
 Murfreesboro, TN 37129



IRBN001 - EXPEDITED PROTOCOL APPROVAL NOTICE

Friday, September 30, 2016

Investigator(s): Katelyn J Class (PI), and Dr. Michael Hein (FA)
 Investigator(s') Email(s): kjc4y@mtmail.mtsu.edu
 Department: Psychology

Study Title: Who is more creative? Assessing the role that individual characteristics play in their relationship with creativity in various domains
 Protocol ID: 17-2035

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB) through the **EXPEDITED** mechanism under 45 CFR 46.110 and 21 CFR 56.110 within the category (7) *Research on individual or group characteristics or behavior*. A summary of the IRB action and other particulars in regard to this protocol application is tabulated as shown below:

IRB Action	APPROVED for one year from the date of this notification	
Date of expiration	9/29/2017	
Participant Size	180	
Participant Pool	MTSU Psychology Research Pool	
Exceptions	N/A	
Restrictions	N/A	
Comments	N/A	
Amendments	Date N/A	Post-approval Amendments None

This protocol can be continued for up to THREE years (9/29/2019) by obtaining a continuation approval prior to 9/29/2017. Refer to the following schedule to plan your annual project reports and be aware that you may not receive a separate reminder to complete your continuing reviews. Failure in obtaining an approval for continuation will automatically result in cancellation of this protocol. Moreover, the completion of this study MUST be notified to the Office of Compliance by filing a final report in order to close-out the protocol.

Continuing Review Schedule:

Reporting Period	Requisition Deadline	IRB Comments
First year report	9/29/2017	INCOMPLETE
Second year report	9/29/2018	INCOMPLETE
Final report	9/29/2019	INCOMPLETE

The investigator(s) indicated in this notification should read and abide by all of the post-approval conditions imposed with this approval. [Refer to the post-approval guidelines posted in the MTSU IRB's website](#). Any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918 within 48 hours of the incident. Amendments to this protocol must be approved by the IRB. Inclusion of new researchers must also be approved by the Office of Compliance before they begin to work on the project.

All of the research-related records, which include signed consent forms, investigator information and other documents related to the study, must be retained by the PI or the faculty advisor (if the PI is a student) at the secure location mentioned in the protocol application. The data storage must be maintained for at least three (3) years after study completion. Subsequently, the researcher may destroy the data in a manner that maintains confidentiality and anonymity. IRB reserves the right to modify, change or cancel the terms of this letter without prior notice. Be advised that IRB also reserves the right to inspect or audit your records if needed.

Sincerely,

Institutional Review Board
Middle Tennessee State University

Quick Links:

[Click here](#) for a detailed list of the post-approval responsibilities.
More information on expedited procedures can be found [here](#).