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Impacting openness, conscientiousness, and creative self-efficacy through group music making: A Quasi-experimental collaborative music based intervention study

Steven R. Finckle

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IMPACTING OPENNESS, CONSCIENTIOUSNESS, AND CREATIVE SELF-
EFFICACY THROUGH GROUP MUSIC MAKING: A QUASI-EXPERIMENTAL
COLLABORATIVE MUSIC BASED INTERVENTION STUDY

A DISSERTATION SUBMITTED TO THE FACULTY OF THE COLLEGE OF
EDUCATION, LEADERSHIP, AND COUNSELING OF THE UNIVERSITY OF
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By

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ABSTRACT

This quantitative, quasi-experimental study of 44 undergraduate entrepreneurship students employed a pre-post comparison group design to examine whether music-based interventions could impact the Big Five personality factors of Openness to Experience and its aspects of Intellect and Openness, and Conscientiousness and its aspects of Industriousness and Orderliness as well as Creative Self-Efficacy. The study further examined how participants in the experimental group processed and made sense of their experiences in the music-based interventions across three perspectives: Adult Learning, Constructive Developmental, and Creativity theory.

Openness to Experiences, Conscientiousness, and Creative Self-Efficacy were chosen as variables due to their relationship to creativity and creative output. Music was selected as the basis of the interventions based on the demonstrated clinical and evidence-based connection of music and personality, as well as its use in clinical contexts.

The findings revealed a significant decrease in the Industriousness aspect of Conscientiousness in the experimental group. In the control group, they revealed a significant increase in the Orderliness aspect of Conscientiousness. Neither Openness to Experiences and its aspects, nor Creative-Self Efficacy were affected with any significance by the music-making interventions. Though overall satisfaction with the music-making experiences was high, there was no evidence that participants in the experimental group thought differentially about the experience, or processed the experiences discretely from the Constructive

Developmental, Adult Learning, or Creativity perspectives. Findings provide evidence that music-based interventions have the potential to impact certain aspects of personality.

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Chapter I: Introduction

We live today in an environment that is defined by change and complexity. Whether described as the “Age of Acceleration” (Friedman, 2016), “VUCA”, Volatile, Unpredictable, Complex, and Ambiguous, or unpredictable, dynamic, and constantly changing (Sherehiy, Karwowski, & Layer, 2007), organizations are challenged to adapt to a world that is constantly changing, and often must cope with problems whether self-imposed or *force majeure* that they may not be well prepared for (Winter, 2003).

The issue of how to adapt to an age where organizations face a complex competitive landscape, and an environment that is changing at an increasingly accelerated rate has been a prevailing topic in the business and academic press for much of the last two decades (Sherehiy, et al., 2007). In order to remain competitive and take advantage of emerging market opportunities, organizations must possess the capacity to respond rapidly to change, and pivot quickly and in concert. However, this necessary adaptability is often compromised by patterns, routines, and competency traps. According to Lepine, Colquitt, and Erez (2000), an important consequence of this new environment characterized by rapid change, shorter product lifecycles, and the increased pace of product development is that “employees’ knowledge, skills, and abilities are subject to continual obsolescence and displacement” (p. 564). While one strategy may be to simply change the people in the organization and replace those with obsolete skills with those who possess the newly required ones, this approach requires constant turnover, high talent acquisition costs, and may compromise not only

moral and institutional bonds, but also the organization's institutional memory and stores of intellectual capital (Lepine, et al., 2000). Given the foregoing, it is in the interest of organizations to not only hire individuals who are able to work and thrive in a changing environment, but also to develop across the organization what Bernstein and Barrett (2011) term "adaptive capability", the deliberate bias toward breaking patterns of behavior that may have proven effective in the past, but may not be effective in the current organizational and environmental context. Lepine et al. (2000) note that adaptability is "operationalized most often in terms of learning or performance in a task that is complex, novel, or ill defined" (p. 566), but consistent with Bernstein and Barrett (2011), they stress the importance of learning and performance when there has been a "change in the task context that results in novelty and complexity...the difference being that in contrast to one simply learning a new or complex task in a static environment, this requires unlearning how to do the task [a break in a pattern or routine] and relearning how to do it in light of the change" (Lepine, et al., 2000, p. 566).

Notwithstanding, individuals often find it difficult to break personal inertia, opting instead to remain in the comfortable repetition of familiar patterns and routines. However, while proven routines may support current organizational competencies and assure stability and competitive advantage in the short run, there is a dark side. As an organization accumulates an increasing amount of experience and competence in familiar areas of knowledge and technology, they develop a tendency to apply dominant paradigmatic solutions to all problems, resulting in a reduction in the kinds of experimentation necessary for significant

future innovation, leaving the organization vulnerable (Levinthal & March, 1993). In an age marked by volatility, uncertainty, and ambiguity, these embedded routines seem “fiercely parochial in the vastness of an unfolding complexity” (Barrett, 2000, pp. 243-244).

Affinity for habits and routines are characteristics of what Dweck (2008) terms “fixed mindset” thinking. Much of this affinity stems from individuals’ bias toward validation and high sensitivity to making mistakes or being wrong. According to Dreyfus (2005), “one is less likely to develop expertise if the instinct is to assume a disinterested involvement and devise intricate rules to guard against future mistakes; expertise is more likely to develop if one stays involved and feels the impact of successes and failures” (p. 7).

Breaking Habits and Routines

Our daily lives are characterized by repetition and adherence to patterns and routines (Witt & Tam, 2005). Routines can be defined as “behavior that is learned, highly patterned, repetitious, or quasi-repetitious, founded in part in tacit knowledge, and the specificity of objective” (Winter, 2003, p. 24). In stable contexts, habits and repeated behaviors may not be reflected in people’s thoughts or reported intentions, thus repeated actions may be both deliberate and implicit (Wood, Quinn, & Kashy, 2002).

Simon (in Hodgson, 1997), introduces the concepts of “satisficing” and “bounded rationality” to understand adherence to patterns. According to Barrett and Nissen (2008), satisficing is the act of looking for quick solutions in the immediate when faced with large amounts of information, rather than searching

for the optimal solution. Faced with extensive, or large amounts of information, and a bias toward a satisfactory solution rather than an optimal one, individuals are likely to settle upon a small portfolio of solutions that they employ regularly, thus creating habits and patterns (Hodgson, 1997). A consequence of this action is that individuals deliberately restrict the use and acquisition of information relative to what is potentially available (Heiner, 1983). Heiner (1983) argues that often a gap exists between the difficulty of selecting preferred alternatives and an individual's competence to do so. This 'C-D gap' may result from "the burden of complex information placed upon an [individual] in making a decision (Hodgson, 1997, p. 670). Limited computational ability in the face of such complexity may serve to "cripple" the decision maker, thus enticing the individual to default to habits and rules (Hodgson, 1997). Gidden (in Barrett & Nissen, 2008), suggests that routines allow individuals to reduce complexity, and create "basic trust" and "ontological security"; "to lend a sense of stability to their relationships, especially in the face of postmodern complexity and diversity" (p. 5). In addition to stability and security, habits and patterns may also have implications for emotional experience, as illustrated in Frijda's (1988) laws of emotion, "continued pleasures wear off; continued hardships lose their poignancy" (p. 353), suggesting that individuals often adopt habits and patterns to reduce emotional intensity.

Competency traps are organization level patterns and routines and consist of three types of underlying elements: cognitive, organizational, and behavioral (Heracleous, Papachroni, Andriopoulos, & Gotsi, 2017; Srivastava & Gnyawali, 2011). At the cognitive level, competency traps occur when firms are unwilling

and unable to integrate knowledge from the external environment, opting instead to repeat patterns that have worked in the past, without critically evaluating their usefulness in the current environment. According to Ahuja and Lambert, (2001), established firms replicate routines that have achieved successful outcomes, and eliminate or modify those that have been associated with failure. Firms also tend to focus more on activities and knowledge acquisition in areas in which they are most competent than those areas where they are not, creating a self-perpetuating bias for the organization's current areas of focus.

In today's organizations, individuals are challenged to adapt to rapid changes in their external environment requiring them to explore, experiment, and stretch the perceived limits of their abilities. According to Bernstein and Barrett (2011), the implication is that "the focus for leaders has shifted away from development of a single set of perfect routines toward the development of dynamic capabilities, or higher-level routines, which operate to change existing static routines to address future novel challenges" (p. 55). Though much has been written about dynamic capabilities in the popular and academic press, little has been written about how these capabilities can be developed (Bernstein & Barrett, 2011). Bernstein and Barrett (2011) believe that individuals can learn *how* to build dynamic capabilities from modeling the habits of jazz musicians, and go so far as to suggest that in so doing, individuals can develop what they call a "Jazz Mindset" which embodies such practices as "provocative competency", the deliberate disruption of routines; use of improvisation; a bias for jumping into novel situations with an "openness to new opportunities and willingness to

respond to the world as it evolves” (p. 71); letting go and attempting new and unfamiliar actions; maximizing autonomy while operating with minimal constraints; and embracing “errors as a source of learning” (p. 78).

The Jazz Mindset and Personality

Aspects of the “Jazz Mindset” (Bernstein & Barrett, 2011) bear similarities to two of the Big Five personality traits (McCrae & Costa, 1992); most specifically Openness to Experiences and Conscientiousness, and much of the recent research supports this. According to Ziegler et al. (2012), a person open to experiences is “curious, imaginative, willing to deal with new themes, and eager to learn” (p. 174). One who is conscientious is described as having strength of purpose and will, dependable, reliable, self-controlled, and hard-working (McCrae & Costa, 1992). Elements of the “Jazz Mindset” seem well articulated with what Connelly et al. (2014) have identified as the underlying facets related to Openness to experience – “openness to sensations; non-traditional; aesthetics; introspection; fantasy; thrill seeking; variety seeking; openness to emotions; innovation; autonomy; tolerance” (p. 26).

Influencing Personality Through Interventions

McCrae and Costa’s (1996) theory of personality stated that traits were stable and unchangeable, especially after reaching early adulthood. However, subsequent research has shown that personality factors, including the Big Five, are not set like hard plaster, but may change during middle adulthood and are subject to a variety of developmental influences (Srivastava, John, Gosling, & Potter, 2003). While there have been many studies exploring the relationship of

Openness and Conscientiousness (both collectively and discretely) with constructs such as ego (Fitzgerald, 1966), intellect (De Young C. G., 2015), intelligence (Ziegler, Danay, Heene, Asendorpf, & Buhner, 2012), creativity (Amabile & Pratt, 2016; Feist, 1998; Hogan & Hogan, 1993), and adaptability (Lepine, Colquitt, & Erez, 2000), there have few studies that have endeavored to impact these traits through the introduction of an intervention (Federman, 2009; Jackson, Hill, Roberts, & Stein Morrow, Mühlig-Versen, Bowen, & Staudinger, 2012; Piedmont, 2001; Roberts, Hill, & Davis, 2017).

Mühlig-Versen et al. (2012) found that as a result of an intervention in the form of a special training program for volunteers, that participants with higher internal control beliefs increased significantly in Openness relative to control participants.

Piedmont (2001), attempted to evaluate the ability of an outpatient drug rehabilitation program to affect significant shifts on the five major dimensions of personality and found that from pretreatment to posttreatment, participants changed significantly on all five personality domains.

Jackson, Hill, Roberts, and Stein-Morrow (2012) investigated whether cognitive training in older adults could impact Openness by using a 16-week inductive reasoning training program supplemented by weekly crossword and Sudoku puzzles. This study was the first to demonstrate that a cognitive training intervention had the capacity to change a personality trait (Jackson, et al., 2012, p. 290). Their results showed that the intervention affected levels of Openness in the participants and stated that “the finding that older adults changed their

personality as a consequence of a relatively modest intervention has broad implications for our understanding of the plasticity of personality” (Jackson, et al., 2012, p. 290).

Roberts, et al., (2017) proposed the Sociogenomic Trait Intervention Model (STIM) as informative to the development of interventions impacting Conscientiousness. The STIM, though untested, provides ingredients for interventions that challenge individuals to “achieve changes outside of their normal range of typical behaviors and be given the opportunities to practice these changes long enough to achieve automaticity” (Roberts, et al., 2017, p. 203).

Federman (2009), hypothesized that an increase in kinesthetic ability is correlated with an increase in Openness, and that both would increase after a program in Dance Movement Therapy (DMT). It was further hypothesized that “emphasis on movement promotes a sense of self-security within one’s body, which in turn fosters openness to experience” (Federman, 2009, p. 32). The results of the study revealed a significant change in Openness to Experience among the Dance Movement Therapy students, while no significant change occurred in the control groups.

The introduction of a Dance Movement Therapy intervention (Federman, 2009) is intriguing, and raises the question of whether other collaborative arts-based interventions might impact personality traits. Music as a metaphor has often been used in the context of individual and group agility, improvisation, and creativity (Weick, 1998; Bernstein & Barrett, 2011), but there appears to be an

absence of any study inquiring into whether an intervention involving music can impact personality traits.

Music based intervention is the focus of the field of Music Therapy. According to the American Music Therapy Association, Music Therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional to address physical, emotional, cognitive, and social needs of individuals (American Music Therapy Association, 1997). Music has been shown to be “unique in its ability to allow groups to communicate without speech or direct interaction due to its ability to transmit social information across distance to a number of people” (Loersch & Arbuckle, 2013, p. 791). Further, musical reactivity (a measure of individuals’ emotional reactions to music) has been shown to be causally related to in-group bias and social belonging behavior (Loersch & Arbuckle, 2013). Roederer (1984) wrote that music’s role in superstitious or sexual rites, religion, ideological proselytism, and military arousal clearly demonstrated the value of music as a means of establishing behavioral coherency in masses of people. Building on this concept, Tarr, Luanay, and Dunbar (2014) explored the relationship between music, synchronization (making a similar movement to another individual), and social bonding. Their proposition builds on the idea that active participation in music making with others creates shared rhythms, movement, and human agency attributed to musical sound, all of which influence synchronization. According to Tarr et al. (2014), synchronization, is an important mechanism by which social bonding occurs. In

the same discussion, Tarr et al. (2014) have suggested a causal relationship between the endorphins released during synchronized exertive activity, and the “neuro hormonal underpinnings of social bonding during group musical activities” (p. 2). Beyond music’s relationship to communication, group processes, and social bonding, engagement in music activity has been linked to increased positive affect (Dunbar & MacDonald, 2012), increased empathy (Rabinowitch, Cross, & Burnard, 2012), reduced burnout and improved mood states (Bittman, et al., 2004), and enhanced trust and cooperative behaviors (Anshel & Kipper, 1988).

Research has shown that there exists a relationship between certain of the Big Five personality factors and both preference for world music, as well as individuals’ willingness to allow music to draw them into an emotional experience as measured by the Absorption in Music Scale (AIMS), a self-report measure designed to measure this inclination (Yoo, Kang, & Fung, 2017). Specifically, they found significant relationships between subjects’ preference for world music and Openness to Experience and Agreeableness.

To date, it appears research has produced primarily anecdotal evidence that music-based intervention can impact Openness (Bensimon, Amir, & Wolf, 2008). However, Moreno et al. (2011), in their study of cognitive benefits of music, found that even after a short term musical training program (20 days) children displayed improved performance in executive function, which Banich (2009) defines as the cognitive processes that allows one to stay focused on means and goals, and to willfully alter behaviors in response to changes in the

environment. Further, this plasticity in Executive Function was related to “improvements in behavioral measures of intelligence” in 90% of participants (Moreno, et al., 2011, p. 1429).

The findings of Moreno et al. (2011) that short term music intervention can impact cognitive function, the findings of Jackson et al. (2012) that cognitive training has the ability to impact Openness, and the Sociogenomic Trait Intervention Model provide further support for inquiring into whether a music based intervention can impact personality traits.

Purpose and Significance of the Study

The study sought to understand whether music-based interventions have the ability to impact Big Five personality factors of Openness to Experience and Conscientiousness, as well as Creative Self-Efficacy. It further endeavored to understand how participants make sense of their experiences in the music-based interventions. This study is significant as it provided the first quantitative study that attempted to establish a connection between music-based interventions, personality, and creativity.

Research Questions

Creativity and adaptive capabilities at the individual and organizational levels are critical to long-term effectiveness (Bernstein & Barrett, 2011), and there exists a personality-creativity relationship where Openness and Conscientiousness stand out as the clearest personality factors differentiating the creative from the non-creative (Feist, 1998). The present study seeks to influence these personality factors through two music-based interventions. As

Creative-Self Efficacy (the degree of personal belief in ones' abilities to produce creative outcomes) has been shown to be a strong predictor of creative behavior (Beghetto, Kaufman, & Baxter, 2011), it is further important to investigate whether music-based interventions can impact Creative Self-Efficacy. Finally, this study aims to investigate how participants make sense of the interventions, and what processes individuals use to negotiate meaning as pertains to the music-based interventions. The primary research hypotheses to be addressed by this study are:

1. Can music-based interventions significantly increase participants' scores on a measure of the Big Five factor of Openness to Experience, and its aspects of Intellect and Openness?
2. Can music-based interventions significantly decrease participants' scores on a measure of the Big Five factor of Conscientiousness, and its aspects of Industriousness and Orderliness?
3. Can music-based inventions stimulate significant increases in participants' scores on a measure of Creative Self-Efficacy?
4. Will participants show evidence that they have processed the experiences significantly differentially from the Constructive Developmental, Adult Learning, and Creativity perspectives?

Chapter II: Literature Review

Openness to Experience

The Big Five personality factors, Openness to Experience (O), Conscientiousness (C), Extraversion (E), Agreeableness (A), and Neuroticism (N) are the result of Costa and McCrae's (1985) finding while undertaking analysis of the Sixteen Personality Factor Questionnaire (16PF), that scales indicating imagination, intelligence, openness to change, and emotional and aesthetic sensitivity varied together (De Young C. G., 2015, p. 370). The Big Five dimensions of Openness and Conscientiousness have shown to be most closely linked to creativity (Amabile & Pratt, 2016; Feist, 1998; Silvia, Nusbaum, Berg, Martin, & O'Connor, 2009; DeYoung, 2015), divergent thinking (McCrae & Costa, 1987; Silvia, Nusbaum, Berg, Martin, & O'Connor, 2009; Feist, 1998), ego strength (Fitzgerald, 1966; McCrae & Costa, 1980), and understanding of the artistic temperament (Kris, 1952; McCrae & Costa, 1997). These qualities are similarly hypothesized to correlate negatively with ones' propensity to adopt patterns, and adhere to routines.

According to Fitzgerald (1966) Openness was defined by Schachtel as "a loosening of fixed anticipations and sets so that one approaches the objects of his experience in different ways, from different angles" (p. 656). Fitzgerald (1966), was among the first to measure the full domain of Openness, and associated it with, "originality, the ability to shift from more to less regulated thinking with facility, and the disposition to greet novel and unusual experiences without undue anxiety and without repression and with strength of ego" (p. 656).

Further, Fitzgerald (1966) described a person who is truly open to experience as one who does not “regress to primitive modes of thought and behavior [and] progresses and encounters experience with all its subtle nuances” (p. 656). Costa and McCrae defined openness as a “willingness to take in different facets of experience” (McCrae & Costa, 1980), and as “seen in the breadth, depth, and permeability of consciousness, and in the recurrent need to enlarge and examine experience” (McCrae & Costa, 1997). They further described open individuals as having “curiosity, an intrinsic wish for knowledge, and the ability to assimilate novel ideas” (McCrae & Costa, 1992). Feist (1998) described open people as “more fascinated with the open-ended, creative, problem-solving tasks”, having “cognitive skills associated with creative and divergent thinking, namely, flexibility and fluidity of thought”, and as taking “an interest in sensation seeking and more varied experiences” (p. 303). According to DeYoung (2015), Openness is associated with sensation and perception, fantasy, and artistic creativity. Individuals who score high on this trait are more “welcoming of change, more likely to approach situations judged to be novel, and more apt to seek new experiences, whereas people low in openness tend to be more conforming in their beliefs and behavior and prefer patterns and familiar routines to new experiences” (Mühlig-Versen, et al., 2012, p. 855). Individuals with high Openness scores also tend to possess a greater need for variety, more broad interests, and not only tolerance for the unfamiliar, but also the active pursuit of the unknown (McCrae & Costa, 1980).

Although the five-factor model is widely accepted, and its use and application have significantly advanced personality research, it also has certain limitations. It describes a higher-order structure of personality and as such, can obscure or confuse issues that could be better understood by a measuring a greater number of personality variables that are more specific or discrete (Hough & Oswald, 2000). Within the Openness domain there exist a set of lower level traits that according to Connelley, Ones, Davies, and Birkland (2014), “govern a narrower set of feelings, thoughts, and behaviors” (p. 17). While there does not yet exist a broadly accepted set of sub-traits, an analysis of the range of existing facet taxonomies reveal six traits that appear to be uniquely associated with Openness (Connelly, Ones, & Chernyshenko, 2014):

- Intellectual efficiency: The ability to process complex information.
- Nontraditionalism: Individuals’ tendencies toward liberal political attitudes and unconventional moral values.
- Curiosity: Individuals’ interests in exploring and understanding novel information.
- Introspection/depth: Self-reflection on philosophy, the causes of one’s behavior, and personal growth.
- Aesthetics: Interest and responsiveness to art and natural beauty.
- Openness to sensations: Appreciation for a variety of sensory experiences.

Connelley et al. (2014) sought to further refine the sub-scale traits associated with the Big Five trait of Openness. In their study of 85 different

Openness scales, they identified 11 distinct traits that they found to not only be theoretically linked to Openness, but also empirically linked: aesthetics, fantasy, innovation, introspection, openness to emotions, openness to sensations, variety-seeking, autonomy, non-traditionalism, tolerance, and thrill-seeking. Through additional analysis, Connelley et al. (2014) were able to further separate compound traits (those traits that were highly related to other Big Five categories), and true Openness facet traits (those distinct facets that are not contingent on other Big Five traits). The four distinct facets they found were aestheticism, openness to sensations, nontraditionalism, and introspection, while fantasy, thrill seeking, variety seeking, openness to emotions, innovation, autonomy, and tolerance emerged as compound facets (Connelly, et al., 2014). This taxonomy of sub-facets can be helpful not only in understanding Openness as a broad trait or dimension of personality, but also for understanding how a broad range of phenomenon may impact specific component(s) of Openness (Connelly, et al., 2014).

Openness and Intelligence

The following definition is among the most widely endorsed by experts in the study of intelligence and related fields (De Young C. G., 2015):

Intelligence is a very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience. It is not merely book learning, a narrow academic skill, or test taking smarts. Rather it reflects a broader and deeper

capability for comprehending our surroundings— “catching on,”
“making sense” of things, or “figuring out” what to do (p. 374).

DeYoung (2015), found strong evidence that intelligence is correlated with the big Five aspect of Openness/Intellect. However, DeYoung (2015) provided evidence that general Openness/Intellect scores are associated more strongly with crystallized intelligence – reasoning due to learning rather than genetic predisposition, than fluid intelligence – innate reasoning ability not affected by learning or experience, and that while both Intellect and Openness are associated with crystallized intelligence, only Intellect is associated with fluid intelligence.

Ziegler, Danay, Heene, Asendorpf, and Buhner (2012), expanded the inquiry into the relationship between Openness and intelligence by further parsing general intelligence into components of fluid intelligence (G_f) defined as “the use of deliberate and controlled mental operations to solve novel problems that cannot be performed automatically”, and crystallized intelligence (G_c), “the knowledge of the culture that is incorporated by individuals through a process of acculturation, a person’s breadth and depth of acquired knowledge of the language, information and concepts of a specific culture” (p. 173). Ziegler et al. (2012) conducted two studies. The first focused on elucidating possible interaction effects between distinct facets of Openness (i.e., fantasy, aesthetics, ideas, and values) and G_f in predicting G_c . They hypothesized that all four facets of Openness would be associated with G_c , but only ideas and values would be related to G_f . The NEO-PI-R (McCrae & Costa, 1992) was used to measure

Openness. G_f was measured using the Intelligence Structure Test 2000 R (Amthauer, Brocke, Liepmann, & Beauducel, 2000), and G_c was measured using the G_c , the Lexical Knowledge Test (Wagner-Menghin, 1998).

The second study explored the longitudinal influence of not only Openness on G_f , but also G_f on Openness. It further sought to test Cattell's (1943) Investment Theory, which predicted that G_f results in a faster and broader accumulation of G_c . The data used for the second study was originally gathered by Schneider (2009) in the LOGIC Project, which according to Ziegler et al. (2012) "was designed to investigate the long-term development of individual competencies with an emphasis on cognitive aspects" (p. 178). In the LOGIC study, various assessments of intelligence and personality were conducted in waves beginning when the subjects were approximately 4 years of age ($N=172$) and continued into the years that the subjects became eligible to attend school, at which time measures of scholastic achievement were included. Using this longitudinal data, Ziegler et al. (2012) were able to model changes in Openness, G_f , and G_c , regress change in Openness and G_f on the other's baseline scores while controlling for both initial overlap, and influence of initial G_c . They were also able to regress change in G_c on Openness and G_f at time 1, and, test its indirect effects (Ziegler, et al., 2012).

The results of study 1 showed that G_c was significantly related to G_f . Further, significant relationships with G_f , G_c , or both occurred for the Openness facets of fantasy, action, ideas, and values (Ziegler, et al., 2012). The results of study 1 confirmed findings of DeYoung, Peterson, & Higgins (2005), and

supported the hypothesis that Openness facets of fantasy, ideas, actions, and values are related to cognitive abilities.

Study 2 showed that Openness positively affected changes in G_f . The study also provided further support for Investment Theory (Cattell, 1943), as the results showed that individual differences in subjects' G_f at the age of 17 positively predict G_c at the age of 23 (Ziegler, et al., 2012).

Openness and Internal-External Locus of Control

Locus of control has to do with the degree to which an individual attributes reward, gratification, or reinforcement as following from, or contingent upon his or her own behavior (Rotter, 1966). Mühlig-Versen, et al., (2012), using a slight variation in nomenclature (internal-external control beliefs), defined the foregoing as the extent to which “a person’s conviction that his or her ability to perform certain tasks or achieve certain outcomes depends on his or her own behavior, skill, effort, or personal characteristics” (p. 856). They predicted that individuals with higher internal control beliefs would be more likely to increase their Openness through training that supported increased self-efficacy. Mühlig-Versen et al. (2012) hypothesized that training aimed at empowering individuals to master a challenging or novel situation would result in increased Openness, especially in those who had higher internal control beliefs due to their “increased likelihood of approaching a novel situation as a challenge as opposed to a threat; exerting more control over the situation and acting proactively with behaviors appropriate to the situation; and attributing the positive outcomes that result to their own actions” (Mühlig-Versen, et al., 2012, p. 857).

To test their hypotheses, Mühlig-Versen et al. (2012) initiated a quasi-experimental, longitudinal study of the plasticity of Openness using 148 applicants to a special training program for volunteers in Germany. All of the applicants had prior experience in volunteer projects. The control group was comprised of 92 individuals who were on the waiting list for training, but who had prior experience in volunteering. The experimental group was comprised of 148 individuals with prior volunteering experience who were willing to participate in the study, and who would receive both training aimed at building competencies relevant for volunteering activities, as well as support for initiating their own personal volunteering project(s) in their neighborhood or community. The training involved critical reflection on strengths, weaknesses, and expectations, as well as the development of a new role identity as pertains to civic engagement (Mühlig-Versen, et al., 2012).

Openness was assessed at three measurement points (prior to training, after the completion of training, one year after training) with the German version of the NEO-Five Factor Inventory (McCrae & Costa, 1992). Internal control beliefs were assessed prior to training with the IPC scale, a German version of Levenson's (1981) Locus of Control Scale. As described earlier, there is evidence of a relationship between fluid and crystallized intelligence, and Openness to Experience (Ziegler, et al., 2012). In this study both fluid and crystallized intelligence were assessed prior to training and after the completion of training. Fluid intelligence (intelligence not related to experience or learning) was assessed using scores on a German version of the Wechsler Adult

Intelligence Scale, and scores on the Mehrfachwahl-Wortschatz-Intelligenztest-B, also referred to as the Spot-A-Word Test was used as an indicator of crystallized intelligence (intelligence gained as a result of experience/learning). The results of the study demonstrated that any positive effect on Openness of the training for volunteers with higher internal control beliefs emerged only after significant time had passed (Mühlig-Versen, et al., 2012). Although there were differences between the change in Openness prior to training and after training between the test and control groups based on internal control beliefs, increases in Openness for the members of the experimental group with higher internal control beliefs became significant only after training and one year after training, suggesting that the actual application of learned skills over time may be important for increasing Openness to Experience.

Piedmont (2001), attempted to evaluate the ability of an outpatient drug rehabilitation program to affect significant shifts on the five major dimensions of personality. A sample of 82 men and 50 women entering a six-week program were assessed at admission, and the 99 who completed the program were measured at program completion. Thirty participants were further measured an average of 15 months later. The results of the experiment showed that from pretreatment to posttreatment, participants changed significantly on all five NEO PI-R domains. Openness significantly increased $F(1, 97) 13.71, p .001, \eta^2 .12$. Consistent with the findings of Mühlig-Versen et al. (2012), Piedmont (2001) noted that participants experienced an enhanced sense of self-esteem and coping ability (i.e., declines in Neuroticism) as well as an increased sense of

personal responsibility and control (i.e., increases in Conscientiousness) as the result of the intervention. While Piedmont (2001) did not discuss this relationship specifically, the increased sense of personal responsibility and control that the treatment program created among the participants may provide insight into the similarly positive changes in Openness that the participants experienced from pretreatment to end of treatment.

Openness and Kinesthetic Ability

Federman (2009), hypothesized that an increase in kinesthetic ability is correlated with an increase in Openness, and that both would increase after a program in Dance Movement Therapy (DMT). It was further hypothesized that “emphasis on movement promotes a sense of self-security within one’s body, which in turn fosters Openness to Experience” (Federman, 2009, p. 32). The study involved the 62 graduate students, ten men and 52 women. The students ranged from 24 to 50 years of age. A group of 22 graduate students enrolled in a DMT training program comprised the experimental group. A comparison group of students enrolled in an Art Therapy program was also evaluated. DMT and Art Therapy groups were assessed using the Laban Movement Analysis Scale (Laban, 1960) which is comprised of four domains: body attitude, use of space, use of shape, and use of effort. Researchers videotaped participants in a free dance for movement, both individually and in pairs. The NEO-Five-Factor Inventory (1985) was used to assess participants’ levels of Openness. Openness to Experience did not differ significantly among the groups at the beginning of the study.

The results of the study revealed a significant change in Openness to Experience among the DMT students, while no significant change occurred in the Art Therapy comparison group. According to the researchers, DMT students body image as pertained to differentiation of body parts increased during the training, and “overall opening of the posture was evidenced” (Federman, 2009, p. 32). While significant correlations were shown between Openness and all four aspects of the Laban Movement Analysis Scale (Laban, 1960), change in use of space and change in use of shape showed the strongest correlations with change in Openness (Federman, 2009).

Openness and Creativity

According to Feist (1998), “the essence of a creative person is the uniqueness of his or her ideas and behavior” and “creative thought or behavior must be both novel-original and useful-adaptive” (p. 290) Consistent with Feist (1998), Amabile and Pratt (2016) defined creativity as the “production of novel and useful ideas by an individual or small group of individuals working together” (p. 158). Scratchly and Hakstian (2001) define managerial creativity as “the production by a manager of new concepts, ideas, methods, directions, and modes of operation that are useful to the organization” (p. 367).

Several studies have linked the Big Five personality dimension of Openness to creativity (Kaufman, Quilty, Grazioplene, Hirsh, Gray, Peterson, & DeYoung, 2014; Feist, 1998; George & Zhou, 2001; McCrae, 1987; Scratchley & Hakstian, 2001; Taggar, 2002).

McCrae (1987) correlated two measures of creativity, the Creative Personality Scale (Gough, 1979) and six divergent thinking tests; Associational Fluency (Christensen & Guilford, 1957a); Expressional Fluency (Christensen & Guilford, 1958a), Ideational Fluency (Christensen & Guilford, 1957b); Word Fluency (Christensen & Guilford, Word Fluency, Form A, 1958b), and Consequences (Christensen, Merrifield, & Guilford, Consequences, Form A-II, 1958), with personality traits as measured by the NEO-PI (McCrae & Costa, 1985). He found the dimension of Openness to Experience to be most strongly and consistently related to the Creative Personality Scale suggesting that “creative people are adjusted, sociable, and productive as well as open”, and that divergent thinking ability was consistently related to Openness, “supporting the hypotheses that creativity is uniquely related to Openness to Experience (p. 1263).

Scratchly and Hakstian (2001) found similar results when assessing creative management performance for 221 managers from a variety of organizations. Study results showed significant correlations between both Openness to Experience and Divergent Thinking with creative management criterion.

In four samples totaling 1,035 participants, Kaufman, et al. (2014) assessed the relations between Openness to Experience, Intellect, and creative achievement in the arts and sciences. Creative achievement was measured using the Creative Achievement Questionnaire (Carson, Peterson, & Higgins, 2005), and Openness/Intellect was measured using the Big Five Aspect Scale

(BFAS) (De Young, et al., 2007). Openness/Intellect emerged as “the most robust and consistent Big Five predictor of creative achievement across the arts and sciences” (p. 254). The facet of Openness to Experience independently predicted creative achievement in the arts, but not the sciences. Intellect, however, predicted creative achievement in the sciences, but not the arts.

To understand how Openness to Experience and Conscientiousness are related to creative behavior in the workplace George and Zhou (2001) studied 149 office employees in the US petroleum drilling equipment industry. Openness and Conscientiousness were measured using the NEO-Five Factor Inventory (McCrae & Costa, 1989), and creative behavior was measured by a scale consisting of 13 items developed by the researchers. George and Zhou (2001) found that Openness to Experience served to encourage creative behavior when individuals who were high on Openness to Experience received positive feedback and had unclear ends on their jobs (results that were ambiguous and not clear-cut), and when individuals who were high on Openness to Experience received positive feedback and had unclear means on their jobs (lacking a clear cut algorithm to be followed for the accomplishment of a task).

In a meta-analytical review of 83 studies comparing personality dimensions of scientists to nonscientists, creative scientists to less creative scientists and artists to nonartists, Feist (1998) found that Openness to Experience was the Big Five factor with the most empirical support in relation to creativity. In fact, the study showed that “creative scientists are more aesthetically oriented, ambitious, confident, deviant, dominant, expressive,

flexible, intelligent, and open to new experiences than their less creative peers” (pp. 297-298). Feist (1998) also suggested that open people may be more interested in open-ended, creative problem solving tasks, and may have developed cognitive skills associated with divergent thinking and fluid thought. He also suggests that open people may seek more varied experiences that may “serve as the foundation for flexibility and fluency of thinking” (p. 303).

Taggar (2002) confirmed these findings in a study of 480 undergraduate business students in a Canadian university’s organizational behavior/human resources management courses. The study compared individual differences as measured by the NEO Personality Inventory (1992), with factors that according to Amabile’s (1983) componential theory of creativity, influence both individual and group-level creative output:

- Task-motivation - Variables that influence an individual’s approach to a given task such as their attitude toward the task, intrinsic motivation, and ability to cognitively minimize extrinsic constraints.
- Domain-relevant skills - factual knowledge, technical skills, and special talents in the domain in question.
- Creativity-relevant processes - The cognitive and perceptual styles, as well as thinking skills that are conducive to taking new perspectives on problems.

The study found that the domain of Openness to Experiences correlated significantly with both individual creativity, as well as creativity-

relevant processes, and that “Openness to Experience and Conscientiousness proved to be predictive of individual creative behavior on the tasks employed in the study” (Taggar, 2002, p. 326).

Conscientiousness

Conscientiousness refers to individual differences in impulse control, conformity, organization, and determination (McCrae & Costa, 1992). Individuals who score high on Conscientiousness have a strong sense of purpose and will; are dependable, reliable, and self-controlled; work hard to achieve their goals; obey rules and conform to norms; desire to achieve; and are responsible and scrupulous (McCrae & Costa, 1992). Conscientiousness has also been described as having both “proactive and inhibitive aspects” (De Young, et al., 2007, p. 881). Proactive aspects include need for achievement and commitment to work, and inhibitive aspects include moral scrupulousness and cautiousness (De Young, et al., 2007). Connelley et al. (2014) found Conscientiousness was negatively related to compound traits such as thrill seeking, non-traditionalism, fantasy, risk taking, and autonomy (p. 25). Other researchers found, high levels of Conscientiousness have been linked to positive social and individual outcomes such as job success, college retention, marital stability, healthy lifestyle behaviors, and longevity (Roberts, Bogg, Walton, Chernyshenko, & Stark, 2004).

Roberts et al. (2004), believed that understanding the underlying, and lower order structures of the trait of Conscientiousness to be important in researchers’ abilities to better predict behavioral outcomes, and undertook to evaluate several studies’ lexical derived trait adjectives in order to identify

replicated factors and unique facets. The factors replicated by Roberts, et al. (2004) were:

- Orderliness – reflects characteristics of being neat and tidy.
- Reliability – reflects the pro-social component of Conscientiousness.
- Industriousness – reflects ones' propensity to be hard working and not lazy.
- Impulse Control – reflects ones' ability to be propensity to be careful and controlled.
- Decisiveness-Consistency - reflects the propensity to behave in a firm and consistent fashion.

Conscientiousness & Creativity

Empirical studies of Conscientiousness and its relationship to creativity have yielded mixed results. McCrae (1987), in a study comparing of 268 men correlated two measures of creativity, the Creative Personality Scale (Gough, 1979) and six divergent thinking tests; Associational Fluency (Christensen & Guilford, 1957a); Expressional Fluency (Christensen & Guilford, 1958a), Ideational Fluency (Christensen & Guilford, 1957b); Word Fluency (Christensen & Guilford, Word Fluency, Form A, 1958b), and Consequences (Christensen, Merrifield, & Guilford, Consequences, Form A-II, 1958), with personality traits as measured by the NEO-PI (McCrae & Costa, 1985) found Conscientiousness to be positively related to measures of creativity. However, when replicating the experiment with a sample of female participants in the Baltimore Longitudinal

Study of Aging, among women, none of the correlations between Conscientiousness and measures of creativity reached significance (McCrae, 1987).

Furnham and Zhang (2006) explored the differences in the relationships of personality to creativity between self-reported and psychometric measures of creativity. In a 3-year longitudinal study of psychology students from University College London, they measured Big Five personality traits using the NEO-PI-R Personality Inventory (1992), and creativity using both the Self-Estimates of Creativity Questionnaire (2000), and the Barron-Welsh Art Scale (1952). They found Conscientiousness to be a negative predictor of psychometric creativity, and self-estimates of creativity to have high predictive power of creativity scores. They also found a positive relationship between Conscientiousness and self-estimates of creativity suggesting that self-confidence may contribute to higher self-evaluated measures.

Reiter-Palmon, Illies, and Kobe-Cross (2009) found no correlation between the full Conscientiousness factor as measured by the Five-Factor Model, the Revised NEO Personality Inventory (McCrae & Costa, 1992), and creativity as measured by the Creative Activities Checklist (Runco & Okuda, 1988). When examining compound facets of Conscientiousness, achievement (comprised of competence, achievement striving, and self-discipline), and dependability (comprised of order, dutifulness, and deliberation), they found neither correlated significantly with creativity. According to Reiter-Palmon et al. (2009) "The achievement and dependability components of Conscientiousness

will show a cooperative suppression effect when used to predict creativity such that the Conscientiousness factor and the two components will produce small or zero bivariate correlations with creativity” (p. 31). However, when both the components were entered together in a regression equation, they found that the compound facet of achievement was positively related to creativity, whereas dependability was negatively related.

Feist (1998) found that high Conscientiousness may inhibit one’s creativity. He found that artists “were less cautious, conscientious, controlled, orderly, and reliable; they were more aesthetic, creative, curious, imaginative, open to experience, sensitive, and original; and finally, they were less conventional, rigid, and socialized” (p. 298). Feist (1998) determined that artists were roughly one-half standard deviation higher on Openness and one-half standard deviation lower on Conscientiousness than non-artists. Further, Feist (1998) argued that less creative scientists, compared with the effect sizes of their more creative peers in science and in art, were more conscientious, conventional, and closed-minded. This suggests not only a positive relationship between Conscientiousness and scientific performance and a negative relationship between Conscientiousness and artistic performance, but also that high Conscientiousness may actually suppress creative behavior.

George and Zhou (2001) linked Conscientiousness to job performance across jobs and occupations. In fact, they reported that of the Five-Factor dimensions, Conscientiousness appeared to show the strongest and most consistent relationship with job performance. However, they also found in a

study of one hundred forty-nine office employees in the US petroleum drilling equipment industry, that high Conscientiousness may serve to inhibit creative behavior when the situation “supports the conformist and controlled tendencies of employees who score high on Conscientiousness” (p. 521). According to George and Zhou (2001), “conforming, controlling one's impulses, following rules, and striving to achieve predetermined goals all may go against seeking to change the status quo and coming up with new and better ways of doing things” (p. 515). This condition is further amplified when factors exist that serve to support this condition such as close monitoring by supervisors, and unsupportive coworkers (George & Zhou, 2001).

Hogan and Hogan (1993) suggested that not only does the relationship between Conscientiousness and job performance vary by job type, but also that Conscientiousness would have a negative relationship to job performance in job roles where creativity is important. Lepine et al. (2000) in a study examining the effect of cognitive ability and the Big Five traits of Openness, and Conscientiousness on decision making performance prior to, and after unforeseen changes in task context, found a relationship between adaptability, cognitive ability, Conscientiousness, and Openness.

Our results support the notion that adaptability may be a function of cognitive ability, Conscientiousness, and Openness. We found that although cognitive ability predicted pre-change decision making performance, the strength of this relationship increased significantly after the first and second changes. In addition, although the

personality factors did not predict pre-change decision-making performance, they became as important as cognitive ability in predicting decision making performance after the changes (p. 585).

Lepine et al. (2000) found that not only were both Conscientiousness and Openness important predictors of adaptability, but also that while those high in Openness made better decisions after changes in task context, higher levels of Conscientiousness appeared to detract from decision making performance after similar changes. In other words, higher levels of Openness and lower levels of Conscientiousness are powerful predictors of adaptability.

Wolfradt and Pretz (2001) investigated the relationship between creativity and personality among college students using measures of creativity that included ratings of written stories, lists of personal hobbies, as well as scores on the Creative Personality Scale (Gough, 1979), and the NEO-Five Factor Inventory (1985) to assess personality. They found that the factors predicting creative writing skills were high scores on Openness to Experience and low scores on Conscientiousness.

Creative Self Efficacy

Self-Efficacy is the basic human drive toward seeing oneself as capable of carrying out activities required to achieve desired goals (Amabile & Pratt, 2016). According to Bandura (1997), Self-Efficacy is a necessary condition for productivity and the discovery of new knowledge. Tierney and Farmer (2002) define Self-Efficacy in the creative context as the degree of confidence individuals have in their capacity to be creative, or self-judgment of one's

imaginative ability and perceived competence in generating novel and adaptive ideas, solutions, and behaviors. Creative Self-Efficacy has been shown to be a strong predictor of creative behavior. In a study of 306 elementary school students, Beghetto et al. (2011), found that students' Creative Self-Efficacy beliefs in science and math predicted teachers' ratings of creative expression. However, the amount of variation in teachers' ratings accounted for by students' Creative Self-Efficacy beliefs was rather small (Beghetto, et al., 2011).

Tierney and Farmer (2002) found Creative Self-Efficacy to hold promise for understanding creative action in organizational contexts. They studied a sample of 584 permanent, full-time, primarily blue-collar employees in the manufacturing division of a large consumer products manufacturer, and 158 primarily white-collar employees of the operations division of a high-tech firm. The researchers measured Creative-Self Efficacy using a scale developed for the study, and Job Self-Efficacy using a scale developed by Spreitzer (1995). Supervisor behavior was measured using a scale developed by Tierney et al. (2002), and Job Complexity was measured using the Dictionary of Occupational Titles substantive complexity scores (Roos, 1980). Creativity was assessed using ratings from six creativity performance items from Tierney et al. (2002). Though Tierney et al. (2002) found that "employees believe they have creative capability when they work with supervisors who build their confidence through verbal persuasion and serve as models for activities core to creative performance" (p. 1145). They further found that Creative Self-Efficacy was "positively and significantly related to creative performance" (p. 1144), and that

core levels of job capability were the strongest predictors of Creative Self-Efficacy. This suggests that training and experience opportunities that establish a sense of job mastery are important antecedents to Creative Self-Efficacy. Additionally, the highest levels of Creative Self-Efficacy were found when both job tenure, and job complexity were highest, suggesting that jobs designed to be both multi-faceted as well as requiring flexibility and experimentation are more likely to promote stronger Self-Efficacy beliefs in the creative domain. Job tenure was also a factor in Creative Self-Efficacy, however, in the case of the blue-collar workers, increased job tenure was associated with increased Creative Self-Efficacy only when employees held complex jobs. In fact, the researchers found that more experience performing routine, simple tasks may actually diminish Creative Self-Efficacy (Tierney & Farmer, 2002).

Mathisen and Bronnick (2009) examined the effects of creative training on Creative Self-Efficacy using a creativity course based on Social Cognitive Theory. Two groups of individuals; students, and municipal employees attended a five-day creativity course, and one group consisting of special education teachers attended a one-day course. Creative Self-Efficacy was measured using a three-item questionnaire developed by Tierney and Farmer (2002). Creative performance was measured by evaluating a set of tasks developed by the researchers. They found that Creative Self-Efficacy improved significantly for participants in both the five-day and the one-day courses, while the control group showed no changes in Creative Self-Efficacy.

Tan, Li, and Rotgans (2011) studied 545 students from 6 secondary institutions in Shanghai to explore whether Creative Self-Efficacy was a predictor of classroom behavior. Creative Self-Efficacy was measured using the Multidimensional Creative Self-Efficacy Scale (Tan, 2007), which consists of five subscales: (a) Idea generation, (b) Concentration, (c) Tolerance of ambiguity, (d) Independence, and (e) Working style. Construct validity was established by means of confirmatory factor analysis, and the reliability was established using Hancock's coefficient. Both analyses produced values indicative of adequate reliability and validity of the measures. Classroom behaviors were measured using the What Is Happening In Class (WIHIC) scale (Aldridge & Fraser, 2000). With the exception of the subscale of idea generation, all other subscales of Creative Self-Efficacy predicted classroom behavior. They found the result was consistent with Tierney and Farmer's (2002) finding that Creative Self-Efficacy predicted job performance and outcome behavior.

Choi (2004) explored how the psychological processes of Creative Self-Efficacy and creativity intention might mediate the effects of individual factors (motivation, personality, and ability), and contextual factors (social influence of leaders and peers) on the creative performance of 430 undergraduate students in 14 sections of an organizational behavior course. Intrinsic and extrinsic motivation was measured using two scales in the Work Preference Inventory (Amabile, Hill, Hennessey, & Tighe, 1994). Creative and cautious personality was measured using the Creative Personality Scale (Gough, 1979). Creative Ability, Supportive Leadership, Open Group Climate, Creative Self-Efficacy,

creativity intention, and Creative Performance were measured using scales developed by the researchers. They found that not only did Creative Self-Efficacy and Creativity Intention directly influence creative performance, but also that they mediated effects of the seven individual and contextual variables examined (extrinsic motivation, intrinsic motivation, creative personality, cautious personality, creative ability, supportive leadership, open group climate). They further found that individual characteristics of extrinsic and intrinsic motivation had opposite effects on creative intention with extrinsic motivation having a positive effect and intrinsic motivation having a negative effect showing that extrinsic motivation may increase creative performance. Creative personality showed significant effect on creative intention, but not on Creative Self-Efficacy. Interestingly, cautious personality showed significant effects on both Creative-Self Efficacy and creativity intention suggesting that group settings may impose barriers to individual creativity due to “evaluation apprehension experienced by members” (Choi, 2004, p. 197).

Sensemaking

Constructive-Developmental Theory (Kegan, 1980; McCauley, Drath, Palus, & O’Connor, 2006) focuses on the development of individuals’ meaning-making processes across their life span. It is considered *constructive* in the sense that it deals with an individual’s constructions and interpretations of an experience – the meaning one makes of an experience. It is *developmental* in the sense that is concerned with how constructions and interpretations of experience grow more complex over time (McCauley, Drath, Palus, O’Connor, &

Baker, 2006). According to this theory, development unfolds in a series of invariant and increasingly complex stages. Movement from one stage to the next is driven by limitations in an individual's current way of making meaning of their experience, forcing them to fashion a more complex way of understanding themselves and the world. This occurs through a gradually increasing awareness of the adequacy (or inadequacy) of the organizing principles or methods used to interpret and make sense of experience. If upon reflection, an individual can make sense out of their experience, their current way of thinking is confirmed. If an experience disconfirms or challenges one's current way of thinking (sense-making); newer, more complex, and more adequate ways of thinking evolve.

The Adult Learning Perspective emphasizes that the way in which adults learn differs from the way individuals learn during their time in formal classroom education (Knowles, Holton, & Swanson, 2005; Merriam & Clark, 2006). Significant learning in adulthood is most likely to occur through making sense of life experiences. Taking on new social roles, such as parent, spouse, or employee; and other transitions encountered as one moves through the life span are sources for learning for adults – provided the experience is reflected on, attended to, and made sense of (vs. dismissed or disregarded). If an adult learner is sufficiently engaged in an experience, changes to the self should be associated. Reflection is the critical and fundamental process for learning – without it, adults would be simply be unable to make sense out of any of the numerous experiences they are bombarded with. Mezirow (1990, 2000) is

prominent among those who have focused on understanding how people (adults) create meaning from their experience and how learning can be “transformative”.

Research into all aspects of Creativity has flourished over the last 30 years. Hennessey and Amabile (2010) provided a comprehensive review, including a review of the role of affect, cognition, training, and other factors such as the influence of the group, environment, and social system on creativity. Briefly, their review supported some general observations such as: a) positive affect (i.e., positive, upbeat mood) is more conducive to creativity than negative affect, b) training interventions can positively impact creative performance, c) group work tends to improve results on measures of creativity – especially when the team or group encourages a greater degree of help seeking behavior, help giving behavior, reflective reframing, and reinforcing. This is similar to the finding of Edmonson and Mogelof (2006) that psychological safety is crucial for creativity in groups and organizations, since creativity involves risk-taking, experimentation, and the likelihood of frequent failure.

Chapter III: Methodology

This study employed a quasi-experimental, pre–post comparison group design with two groups. Two music centered interventions; one with group guitar and another with Javanese Gamelan were designed and implemented as the intervention for the experimental group. Measures of Creative Self-Efficacy, Openness and its aspects of Openness and Intellect, Conscientiousness and aspects its of Orderliness and Industriousness were administered to both groups at the beginning and end of the Spring 2018 semester. A self-reported questionnaire to evaluate the intervention experiences was administered to the experimental group following the music intervention.

Participants

A group of undergraduate entrepreneurship students in a foundational entrepreneurship course comprised the experimental group. One comparison group was also studied, undergraduate students enrolled in a similar intermediate level entrepreneurship course. Fifty-eight students were in enrolled in these two courses, however 11 students elected not to participate. Thus, the sample consisted of 47 undergraduates (22 females and 25 males).

Sample Characteristics

Forty-four of the participants ranged in age between 19 and 22 years of age, with three over the age of 23. The experimental group was comprised of 26 students (12 females and 14 males). Twenty-four of the students in the experimental group indicated their major as Entrepreneurship. The control group was comprised of 21 students (10 females and 11 males). Twenty of the

students in the control group indicated their major as Entrepreneurship. Table 1 presents the students' background variables by group. Inspection of Table 1 shows that the control group was, as expected, about one year older and one year further in school.

Table 1
Sample Characteristics

Characteristic	Experimental Group (<i>n</i> = 26)	Control Group (<i>n</i> = 21)*
Age		
19 years	12 (46%)	1 (5%)
20 years	8 (31%)	11 (52%)
21 years	3 (12%)	6 (28%)
22 years	0	2 (10%)
23+ years	3 (12%)	0
Gender		
Female	12 (46%)	10 (48%)
Male	14 (54%)	11 (52%)
Year in School		
Freshman	2 (8%)	0
Sophomore	16 (62%)	2 (10%)
Junior	6 (23%)	14 (67%)
Senior	2 (8%)	4 (24%)
Major		
Entrepreneurship	24 (92%)	20 (95%)
Other	2 (8%)	1(5%)

Note. *One subject in the control group failed to report age information.

Measures

Conscientiousness and Openness. These personality variables and their respective aspects were assessed at both measurement points (pre-test, post-test) in both the experimental group and the control group using the Big Five Aspect Scale (BFAS) (De Young, et al., 2007). The BFAS was developed to assess the Big Five factors of Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, as well as measure two distinct, but correlated,

meso-level aspect traits located within each of the Big Five factors.

Understanding aspects within a Big Five domain can provide a finer or clearer picture of the personality dynamics at play in a given situation.

DeYoung, et al. (2007) determined through Factor analyses of 75 facet scales from 2 major Big Five inventories, that there exist “two distinct yet correlated aspects within each of the Big Five” (De Young, et al., 2007, p. 880). With regard to Openness, DeYoung et al. (2007) established the facets as *Intellect* (“I am quick to understand things”, “I like to solve complex problems”) and *Openness* (“I enjoy the beauty of nature”, “I get deeply immersed in music”). In the case of Conscientiousness, DeYoung et al. (2007) determined the facets to be *Orderliness* (“I like order”, “I keep things tidy”) and *Industriousness* (“I carry out my plans”, “I finish what I start”).

The BFAS is reliable and well validated (Kaufman, et al., 2014). De Young et al., (2007) reported good internal consistencies (Cronbach’s alpha) for the five main domain scales and ten aspect scales (Range of $\alpha = .72$ to $.89$) in various samples and good convergence with other standard measures of the Big Five, including the NEO Personality Inventory-Revised (NEO-P-I-R) (McCrae & Costa, 1989) and the Big Five Inventory (McCrae & Costa, 1992). The BFAS is the only empirically-derived measure of the Big Five substructure; other inventories use facets that have typically been derived rationally rather than empirically (Kaufman, et al., 2014).

The BFAS is a 100-item questionnaire with 20 items for each factor comprised of 10 items for each aspect. Items are rated on a five-point Likert

scale ranging from “strongly disagree” to “strongly agree”. However, only the 40 items assessing Conscientiousness and Openness factors, and their two associated aspects, were used in the present study.

Creative Self-Efficacy. Creativity Self-Efficacy is understood as the underlying psychological process that influences an individual's level of self-confidence in working towards novel and appropriate ideas or behaviors (Choi, 2004). Creative Self-Efficacy was assessed at both measurement points in both the experimental group and the control group using the Creative Self-Efficacy measure developed by Carmeli and Schaubroeck (2007). Creative Self-Efficacy measures the degree of personal belief in ones' abilities to produce creative outcomes or products, and is based on literature involving both self-efficacy (Bandura, 1997), and creativity (Amabile & Pratt, 2016; Woodman, Sawyer, & Griffin, 1993). Bandura's (1997) Social Learning Theory proposed self-efficacy as a central concept. Self-efficacy is defined as having beliefs or being confident in one's self-justification towards self-expression in different circumstances (Sangsuk & Siriparpb, 2015). The Creative Self-Efficacy measure (Carmeli & Schaubroeck, 2007) is based upon the eight-item scale of general self-efficacy developed and validated by Chen, Gully and Eden (2001), and has high internal consistency ($\alpha = .92$). According to Sangusk and Siriparpb (2015), “the validity testing results for the Creative Self-Efficacy measurement model shows that the model itself contains construct validity and is workable as its measurement goes along with empirical data” (p. 1343).

The Creative Self-Efficacy measure (Carmeli & Schaubroeck, 2007) consists of eight questions measured by a six-point Likert type scale ranging from “strongly agree” to “strongly disagree”. Sample items are “compared to other people, I can do most tasks quite creatively”; and “I will be able to successfully overcome many creative challenges.” See Appendix A for the full 8-item measure.

Sensemaking and satisfaction with the intervention. Weick (1995) described Sensemaking as “a recipe that provides both a way to interpret the environment and a guide to action”. According to Weick (1995), Sensemaking is “understood as a process that is (1) grounded in identity construction, (2) retrospective, (3) enactive of sensible environments, (4) social, (5) ongoing, (6) focused on and by extracted cues, (7) driven by plausibility rather than accuracy.” (p. 17). According to Maitlis and Christianson, (2014), other definitions have “position(ed) Sensemaking as a social process that occurs between people, as meaning is negotiated, contested, and mutually co-constructed” (p. 66). Weick (1995) elaborated by seeing Sensemaking as “unfolding in a social context with other actors” (p. 409). Interestingly, Weick (1998) draws parallels to Jazz and improvisation where musicians “act in order to think, which imparts a flavor of retrospective Sensemaking” (p. 547). Thus Sensemaking describes a process of identity construction whereby individuals “project their identities into an environment and see their identities reflected back. Through this process they come to understand what is meaningful in their own identities” (Turlow, 2012, p. 2).

To measure Sensemaking in the aforementioned theoretical frameworks a set of items abstracted from the published literature was created that was indicative of Sensemaking in these content domains. The resulting questionnaire consisted of 23 items measured on a five-point Likert-type scale ranging from “strongly disagree” to “strongly agree”. Table 2 presents the scales and their associated items and descriptive statistics (i.e., means, standard deviations, item-total correlations, and internal consistencies [i.e., Cronbach’s alpha]).

The Constructive Developmental perspective was comprised of six items. Examples of questions include: *“I was able to quickly understand what to do in the music-making experience”* or: *“The music-making experience helped me adopt a new perspective on how to interact with others”*. In the current study, the internal consistency for the Constructive Developmental perspective was fairly low ($\alpha = .52$). The Adult Learning perspective was comprised of 5 items. Examples of questions include: “The music-making experience made me think about myself in new ways” or: “The music-making experience helped me gain some confidence in new ways of doing things”. In the current study, after removing one item with low item-total correlations, the internal consistency for the Adult Learning perspective measure was good ($\alpha = .83$). The Creativity perspective was comprised of 5 items. Examples of questions include: “The music-making experience helped me realize I could be creative if I was given the opportunity.” or: “During the music-making experience, working as a group helped me feel more creative”. In the current study, the internal consistency for

the Creativity perspective was acceptable ($\alpha = .77$). Overall satisfaction with the music-making experiences was measured with 7 questions focused on assessing the value, reward, and positive feelings associated with the intervention.

Examples include: “The music making experience was rewarding” or: “Overall, I have positive feelings about the music making experience”. In the current study, the internal consistency for overall satisfaction was very strong $\alpha = .94$. Finally, the internal consistency for the full 23-item questionnaire was high ($\alpha = .90$).

Descriptive statistics and reliabilities for the Music Experience scales are shown in Table 2.

Method

The baseline measurement (pre-test) took place during the first week of two 14-week courses in entrepreneurship. At this time, participants in both the experimental and control groups completed the Openness and Conscientiousness questionnaires from the Big Five Aspects Scale (De Young, et al., 2007), and the Creative Self-Efficacy questionnaire (Carmeli & Schaubroeck, 2007). The questionnaires were administered by the researcher at the beginning of regularly scheduled class sessions in the Spring semester of 2018.

Table 2
 Descriptive Statistics and Reliabilities for Music Experience Scales (N = 26)

Scale/Item	M	SD	Item-Total Correlation	Cronbach's Alpha
Constructive-Developmental Perspective	3.13	.40		.52
I was able to quickly understand what to do in the music-making experience.	2.10	.62	.32	
Learning how to make music with others was more or less a familiar experience for me.	2.40	.87	.28	
Prior to the music-making experiences, I was apprehensive about it.	2.79	.71	.08	
The music-making experience was new and exciting for me.	3.92	.80	.27	
The music-making experience helped me adopt a new perspective on how to interact with others.	3.73	.74	.40	
The music-making experience made me think about things in ways I had not previously considered.	3.81	.66	.30	
Adult Learning Perspective	3.78	.51		.83
The music-making experience made me think about myself in new ways.	3.29	.79	.63	
The music-making experience caused me to examine my assumptions about how I work with others.	3.52	.81	.54	
The music-making experience allowed me to try out new roles.	4.06	.54	.61	
The music-making experience helped me gain some confidence in new ways of doing things.	4.04	.47	.73	
The music-making experience provided me with a new and useful way of learning.	4.00	.65	.79	
Creativity Perspective	4.08	.42		.77
During the music-making experience, working as a group helped me feel more creative.	3.98	.66	.57	
Playing music with others required me to be more flexible.	4.04	.58	.38	
Over the course of the music-making experience I was able to see and understand some new or different patterns of how to do things with others.	4.06	.59	.62	
The music-making experience helped me realize I could be creative if I was given the opportunity.	3.88	.50	.65	
During the music-making experience, I felt it was OK to make mistakes.	4.44	.57	.51	
Satisfaction	4.48	.46		.94
I felt positive and upbeat during the music-making experience.	4.44	.57	.75	
The music-making experience was fun.	4.65	.52	.90	
The music making experience was rewarding.	4.29	.49	.70	
Time seemed to go quickly during the music-making sessions.	4.42	.66	.71	
Overall, I found the music making experiences valuable.	4.35	.56	.80	
Overall, I have positive feelings about the music making experience.	4.50	.51	.86	
I enjoyed the music making experience.	4.67	.47	.87	
Music Experience Overall	3.98	.35		.90

Six weeks later, at the approximate mid-point of the course, students in the experimental group participated in two 90-minute group music making experiences. The first music making experience was based on traditional western music and involved the 6-string acoustic guitar. In this intervention, students entered a room where individual guitars were placed in open cases on chairs. This was done deliberately, so as to require the students to have the instrument in hand prior to taking their seat. Students were encouraged to explore the instrument individually for several minutes prior to the formal portion of the session. After initial individual exploration, a specialist in guitar performance and pedagogy instructed students on the tonal structure of the instrument, correct finger positions, and basic technique. Soon after, the instructor commenced to teach the group to play a simple piece of music based upon the blues scale (five notes of the major pentatonic scale with the addition of the diminished 5 degree of the scale). Two distinct parts of the song were learned by all students, melody and accompaniment. By the end of the 90-minute session, the groups successfully performed the piece of music with students alternating between both accompanying and melodic roles.

The second music making experience involved a non-western musical tradition and involved the Javanese gamelan. Students entered a room equipped with a wide diversity of percussion and mallet instruments comprising the gamelan ensemble and were encouraged to position themselves in front of an instrument of their choice. Similar to the guitar experience, they were

encouraged to explore the instrument individually prior to formal instruction, after which a master gamelan performer, composer, and teacher lead the group through the basic techniques, forms, structures, and musical nomenclature of the gamelan. By the end of the 90-minute session, the groups successfully performed a traditional Javanese composition for gamelan ensemble.

Due to the limited number of instruments available, the experimental group was divided into two equal subgroups. On the first day of the interventions, half of the students participated in group guitar, and the other Javanese gamelan. On the second day, the groups alternated. At the end of each intervention, students completed the 23-item music making experience questionnaire, with each student submitting both a guitar and gamelan music making experience questionnaire.

The interventions were designed to incorporate both western and non-western musical traditions. It was assumed that the guitar was likely familiar to most, as was the genre of music (blues) that was taught and performed. However, it was clear upon observation that many students in the experimental group were unfamiliar with the Javanese gamelan instruments, or the musical genre.

During the last week of the course, both the control group and experimental group again completed the Openness and Conscientiousness questionnaires from the Big Five Aspects Scale (De Young, et al., 2007), and the Creative Self-Efficacy questionnaire (Carmeli & Schaubroeck, 2007).

Analyses

First, to test whether the control and experimental groups were equivalent, it was necessary to compare group means on the constructs of interest. Namely, the six personality variables and Creative Self-Efficacy. To do so, an independent samples *t*-test was used to test for any significant differences between groups.

Second, to test whether any significant changes were observed in the constructs of interest during the course of the semester for either the control or experimental groups, it was necessary to compare groups' pre-test and post-test mean scores.

To do so, a repeated measures *t*-test was used to test for any significant differences between pre-test and post-test within each group. Third, to understand the evaluation of the music making intervention by members of the experimental group, the interrelations were examined between the three music making experience scales and the satisfaction measure. Finally, to understand the interrelations between pre-test and post-test measures of personality and Creative Self-Efficacy and the music making experience scales, correlation coefficients were computed between all variables for the experimental group.

Chapter IV: Results

Impact of Music Experience

Changes in Openness to Experience. Table 3 presents the means and standard deviations for Openness to Experiences and its aspects by group and time. Neither overall Openness to Experience nor the aspects of Openness or Intellect differed between the control and experimental groups at the beginning of the study. These results were not confirming of the hypothesis that music-based interventions would significantly increase participants' scores of Openness to Experience and its aspects of Intellect and Openness.

Table 3
Means and Standard Deviations for Openness to Experience Scales by Group and Time

Variable	Experimental Group (n = 26)					Control Group (n = 21)					
	Pre-Test		Post-Test		t	Pre-Test		Post-Test		t	
	M	SD	M	SD		M	SD	M	SD		
Openness to Experience											
Intellect Aspect	3.39	.60	3.37	.48	.34	3.63	.55	3.69	.47	-.54	
Openness Aspect	3.81	.54	3.74	.47	1.61	3.64	.47	3.73	.56	-1.04	
Openness Overall	3.60	.45	3.55	.39	1.12	3.64	.38	3.71	.41	-.92	

Note. Degrees of freedom (*df*) for Experimental Group = 26, and for Control Group = 20.
* $p < .05$, ** $p < .01$.

Changes in Conscientiousness. Table 4 presents means and standard deviations for Conscientiousness and its aspects by group and time. Neither Overall Conscientiousness nor aspects of Industriousness or Orderliness differed between the control and experimental groups at the beginning of the study. No significant change was observed in the experimental group in overall Conscientiousness or the aspect of Orderliness; however, a statistically significant decrease in the aspect of Industriousness was observed between pre-

test and post-test for the experimental group, lending some support for the hypothesis that music-based interventions would significantly decrease participants' scores of Conscientiousness, and its aspects of Industriousness and Orderliness. The control group showed no significant change between pre-test and post-test in the aspect of Industriousness, however an unexpected and significant increase in the aspect of Orderliness was observed. Change in overall Conscientiousness approached significance in the control group, likely as a result of the order of significance of the change in the Orderliness aspect.

Table 4
Means and Standard Deviations for Conscientiousness Scales by Group and Time

Variable	Experimental Group (n = 26)					Control Group (n = 21)					
	Pre-Test		Post-Test		t	Pre-Test		Post-Test		t	
	M	SD	M	SD		M	SD	M	SD		
Conscientiousness											
Industriousness Aspect	3.37	.44	3.16	.45	2.82**	3.36	.52	3.39	.62	-.32	
Orderliness Aspect	3.54	.46	3.52	.44	.44	3.35	.49	3.57	.62	-2.73**	
Conscientiousness Overall	3.46	.40	3.34	.39	1.99	3.35	.43	3.48	.52	-2.12*	

Note. Degrees of freedom (*df*) for Experimental Group = 26, and for Control Group = 20.

* $p < .05$, ** $p < .01$.

Changes in Creative Self-Efficacy. Table 5 presents means and standard deviations for Creative Self-Efficacy by group and time. Creative Self-Efficacy did not differ between the control and experimental groups at the beginning of the study. No significant change in Creative Self-Efficacy was observed in the control group or the experimental group from pre-test to post-test. These results were not confirming of the hypothesis that music-based interventions would significantly increase participants' scores of Creative Self-Efficacy.

Table 5
Means and Standard Deviations for Creative Self-Efficacy Scales by Group and Time

Variable	Experimental Group (n = 26)					Control Group (n = 21)				
	Pre-Test		Post-Test		t	Pre-Test		Post-Test		t
	M	SD	M	SD		M	SD	M	SD	
Creative Self-Efficacy	4.41	.59	4.55	.80	-1.13	4.37	.54	4.52	.57	-1.48

Note. Degrees of freedom (*df*) for Experimental Group = 26, and for Control Group = 20.
* $p < .05$, ** $p < .01$.

Reactions to the Music Making Experience

Table 6 shows Correlations between Music Experience Scales.

Satisfaction with the music making experience was high ($M = 4.48$), and while the relationships between Satisfaction and the Constructive Developmental and Adult Learning perspectives were non-significant, the relationship between Satisfaction and the Creativity perspective reached significance ($p < .01$).

However, as Table 6 shows, there was significant intercorrelation among the Constructive Developmental, Adult Learning, and Creativity perspectives. This result does not confirm the hypothesis that participants in the experimental group would process significantly differentially from the Constructive Developmental, Adult Learning, and Creativity perspectives. However, the significant correlation between Satisfaction and the Creativity perspective suggests that participants who made sense of the experiences through the Creativity perspective were more likely to be satisfied with the experience overall.

Table 6
Correlations between Music Experience Scales

Scale	No. of items	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Constructive-Developmental Perspective	6	3.13	.40	<i>.52</i>				
2. Adult Learning Perspective	5	3.78	.51	<i>.66**</i>	<i>.83</i>			
3. Creativity Perspective	5	4.08	.42	<i>.60**</i>	<i>.74**</i>	<i>.77</i>		
4. Satisfaction	7	4.48	.46	<i>.31</i>	<i>.38</i>	<i>.59**</i>	<i>.94</i>	
5. Music Experience Overall	23	3.98	.35	<i>.67**</i>	<i>.81**</i>	<i>.89**</i>	<i>.77**</i>	<i>.90</i>

Note. $n = 26$. Internal consistency reliabilities (i.e., Cronbach's alpha) reported along the diagonal in italics.

** $p < .01$.

Intercorrelations Between Study Variables

Correlations between Openness to Experience, Conscientiousness, Creative Self-Efficacy, and Reactions to the Music Experience are shown in Table 7. The pattern of correlations between Openness to Experiences and its aspects, and Conscientiousness and its aspects in the experimental group at both pre-test and post-test support the findings of DeYoung et al. (2007) that Openness to Experience is significantly correlated with its aspects of Openness and Intellect, and that Conscientiousness is significantly correlated with its aspects of Orderliness and Industriousness. Further, both Openness to Experience and its aspects, and Conscientiousness and its aspects pre-test were inter-correlated with post-test Openness to Experience and its aspects and Conscientiousness and its aspects.

Creative Self-Efficacy was positively correlated with the Openness aspect of Openness to Experiences, and approaches significance with overall Openness to Experiences ($p < .05$) pre-test. Further, at pre-test, Creative Self-Efficacy was negatively correlated ($p < .01$) with the Orderliness aspect of Conscientiousness,

and with Overall Conscientiousness ($p > .05$), and positively correlated with Openness to Experiences ($p < .05$) and the aspect of Openness ($p < .01$). It is important to note, that at post-test, Creative Self-Efficacy remains positively correlated with both overall Openness to Experiences ($p < .05$) and the aspect of Openness ($p < .01$), but is not significantly correlated with Orderliness or overall Conscientiousness.

Inspection of the correlations between Openness to Experiences, Conscientiousness, Creative Self-Efficacy and reactions to the music experience reveal no significant correlations with the Constructive Developmental, Adult Learning, and Creativity perspectives. However, the Satisfaction scale is positively correlated with pre-test Openness aspect of Openness to Experience, pre-test Creative Self-Efficacy, and was correlated with post-test overall Openness to Experiences and post-test Creative Self-Efficacy suggesting that the higher a participant scored in Openness pre-test, the more likely they were to indicate higher scores in their overall satisfaction with the music making experience. Similarly, the data suggests that the higher the degree of confidence one has in producing creative outcomes pre-test, the more likely they are to be satisfied with the music making experience.

Table 7

Correlations Between Openness to Experience, Conscientiousness, Creative Self-Efficacy, and Music Experience Scales

Time/Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Pre-Test																			
1. Intellect Aspect	<i>.82</i>																		
2. Openness Aspect	<i>.24</i>	<i>.72</i>																	
3. Openness Overall	.81*	.76**	<i>.77</i>																
4. Industriousness Aspect	<i>.34</i>	<i>-.39</i>	<i>-.01</i>	<i>.74</i>															
5. Orderliness Aspect	<i>.17</i>	<i>-.03</i>	<i>.10</i>	.54**	<i>.71</i>														
6. Conscientiousness Overall	<i>.29</i>	<i>-.23</i>	<i>.05</i>	.87**	.88**	<i>.80</i>													
7. Creative Self-Efficacy	<i>.25</i>	.53**	.49*	<i>-.28</i>	-.42**	-.40*	<i>.85</i>												
Post-Test																			
8. Intellect Aspect	.82*	<i>.31</i>	.73**	.39*	.44*	.48*	<i>.27</i>	<i>.76</i>											
9. Openness Aspect	<i>.25</i>	.92**	.72**	<i>-.26</i>	<i>.18</i>	<i>-.04</i>	.42*	<i>.34</i>	<i>.74</i>										
10. Openness Overall	.65*	.74**	.88**	<i>.09</i>	<i>.38</i>	<i>.27</i>	.42*	.82**	.81**	<i>.79</i>									
11. Industriousness Aspect	<i>.37</i>	<i>-.39</i>	<i>.01</i>	.65**	.42*	.61**	<i>-.20</i>	.47*	<i>-.26</i>	.56**	<i>.80</i>								
12. Orderliness Aspect	<i>.22</i>	<i>-.07</i>	<i>.10</i>	<i>.36</i>	.81**	.67**	<i>-.31</i>	.43*	<i>.17</i>	<i>.36</i>	.56**	<i>.79</i>							
13. Conscientiousness Overall	<i>.33</i>	<i>-.26</i>	<i>.06</i>	.57**	.69**	.72**	<i>-.29</i>	.51**	<i>-.06</i>	<i>.28</i>	.89**	.88**	<i>.85</i>						
14. Creative Self-Efficacy	<i>.10</i>	.59**	.42*	<i>-.35</i>	<i>.03</i>	<i>-.18</i>	.60**	<i>.27</i>	.67**	.57**	<i>-.14</i>	<i>.04</i>	<i>-.06</i>	<i>.93</i>					
Music Experience Scales																			
15. Constructive-Developmental	<i>-.27</i>	<i>-.25</i>	<i>-.33</i>	<i>.18</i>	<i>.10</i>	<i>.16</i>	<i>-.13</i>	<i>.07</i>	<i>-.32</i>	<i>-.15</i>	<i>.04</i>	<i>.03</i>	<i>.04</i>	<i>-.32</i>	<i>.52</i>				
16. Adult Learning Perspective	<i>.00</i>	<i>.30</i>	<i>.18</i>	<i>.11</i>	<i>.10</i>	<i>.12</i>	<i>.19</i>	<i>.22</i>	<i>.19</i>	<i>.25</i>	<i>-.24</i>	<i>-.02</i>	<i>-.15</i>	<i>-.09</i>	.66**	<i>.83</i>			
17. Creativity Perspective	<i>-.04</i>	<i>.22</i>	<i>.11</i>	<i>.10</i>	<i>.21</i>	<i>.17</i>	<i>.38</i>	<i>.28</i>	<i>.19</i>	<i>.29</i>	<i>-.10</i>	<i>.04</i>	<i>-.03</i>	<i>.22</i>	.60**	.74**	<i>.77</i>		
18. Satisfaction	<i>.08</i>	.39**	<i>.29</i>	<i>-.20</i>	<i>.12</i>	<i>-.04</i>	.41*	<i>.25</i>	<i>.38</i>	.39*	<i>-.16</i>	<i>.10</i>	<i>-.04</i>	.40*	<i>.31</i>	<i>.38</i>	.57**	<i>.94</i>	
19. Music Experience Overall	<i>-.09</i>	<i>.25</i>	<i>.09</i>	<i>-.03</i>	<i>.13</i>	<i>.06</i>	<i>.36</i>	<i>.21</i>	<i>.18</i>	<i>.24</i>	<i>-.21</i>	<i>.02</i>	<i>-.11</i>	<i>.16</i>	.67**	.81**	.89**	.77**	<i>.90</i>

Note. $N = 26$. Internal consistency reliabilities (i.e., Cronbach's alpha) reported along the diagonal in italics. Statistically significant values bolded for emphasis. * $p < .05$, ** $p < .01$.

Chapter V: Discussion

In an age that is defined by frequent and accelerated change in markets, the economy, and the environment, it is in the interest of organizations to not only hire individuals who are able to work and thrive in a changing environment, but also to develop within them creative, agile, and adaptive capabilities. A desire to understand and develop interventions to affect positive change in these skills and abilities was the inspiration for the study, as well as the framework that informed the specific measures selected for analysis.

The Big Five Big Five factors of Openness to Experiences and Conscientiousness were chosen due to their demonstrated correlation with creativity (Amabile & Pratt, 2016; Lepine, Colquitt, & Erez, 2000; Feist, 1998; George & Zhou, 2001), intrinsic motivation and continuous learning (Watanabe, Tareq, & Kanazawa, 2011), knowledge acquisition and training effectiveness (Martocchio & Judge, 1997; Ferguson, et al., 2014), and learning agility (De Meuse, 2017). Creative Self-Efficacy was chosen as a measure due to its relationship with creative involvement at work (Carmeli & Schaubroeck, 2007), motivation and performance across multiple work contexts, effective adaptation to novel and adverse work contexts (Chen, Gully, & Eden, 2001), intrinsic motivation and creativity goal setting (Tierney & Farmer, 2002), and overall creative performance over time (Tierney & Farmer, 2011).

Music was selected as the basis of the interventions based on demonstrated clinical and evidence-based connection of music and personality (Yoo, Kang, & Fung, 2017; Bensimon, Amir, & Wolf, 2008), communication, in-

group bias and social belonging behaviors (Loersch & Arbuckle, 2013), social bond (Tarr, Launay, & Dunbar, 2014), empathy (Rabinowitch, Cross, & Burnard, 2012), trust and cooperative behaviors (Anshel & Kipper, 1988), positive affect (Dunbar & MacDonald, 2012), intellect and executive function (Moreno, et al., 2011), as well as its use in clinical contexts (American Music Therapy Association, 1997).

This study sought to understand whether a series of group music making interventions could impact the personality traits of Openness to Experiences and its aspects of Openness and Intellect, Conscientiousness and its aspects of Industriousness and Orderliness, as well as Creative Self-Efficacy. The study also sought to understand how participants in the experimental group processed and made sense of their experiences and assessed this across three perspectives: Adult Learning, Constructive Developmental, and Creativity theory.

As stated previously, and contrary to the initial hypotheses, the music-based intervention produced no significant change in Openness or any of its aspects, and no significant change in Creative Self-Efficacy. However, partially confirming the initial hypothesis that predicted a decrease in Conscientiousness and its aspects, there was a significant decrease in the Industriousness aspect of Conscientiousness in the experimental group from pre-test to post-test. Surprisingly, however, there was an increase in both overall Conscientiousness and its aspect of Orderliness in the control group (it is likely that the significant increase in the Orderliness aspect accounted for the observed increase in the overall Conscientiousness factor). Further, a significant intercorrelation between

the three perspectives of Adult Learning, Constructive Developmental, and Creativity theory suggest that, contrary to our initial hypothesis, participants did not think about, or process their experiences in the music making intervention discretely, or through any discernable lens related to the aforementioned theories and perspectives.

Personality Traits and Plasticity

Many traditional models of personality assume that the biological systems underlying personality traits are causal and immutable, and that personality is relatively unchangeable due to its biological and heritable nature (Roberts & Jackson, 2008). Costa and McCray (1992) provided data, as the result of a longitudinal study that indicated strong stability in personality traits with 25-year retest coefficients of .80, supporting a conclusion of over a century ago by William James that by the age of 30, personality has “set like plaster and will never soften again” (James, cited in Piedmont, 2001, p. 501). Notwithstanding, environmental factors and interventions have been shown to play a role in impacting personality traits (Federman, 2009; Roberts, Hill, & Davis, 2017; Mühlig-Versen, Bowen, & Staudinger, 2012; Srivastava, John, Gosling, & Potter, 2003).

Dance Movement Therapy has been shown to impact the Big Five personality factor of Openness to Experiences (Federman, 2009), as has targeted training programs (Mühlig-Versen, Bowen, & Staudinger, 2012) and drug rehabilitation programs (Piedmont, 2001). More recent research indicates that traits do not reflect perfect or absolute consistency with respect to behavior

in a particular situation (Roberts, et al., 2017). Instead, most recent accounts of personality consider the role of the environment on underlying behavioral manifestations of the personality traits. For example, the sociogenomic approach to personality suggests that personality traits are simply “a specific pattern found in frequent assessment of [behavioral] states” and that “states are simply the moment-to-moment fluctuations in thoughts, feelings, and behaviors” (Roberts, et al., 2017, p. 200). Consequently, because researchers have discovered clear and specific behavioral states associated with certain personality traits (Roberts, et al., 2017), it is reasonable to conclude that one could impact a personality trait by designing interventions focused on impacting and enhancing certain known behavioral states associated with certain traits “in such a way that ensures that the change is enduring” (Roberts, et al., 2017, p. 200).

Openness

Neither Openness to Experiences, nor any of its aspects were significantly changed by the music making intervention. One explanation for this could simply involve the sample size. The experimental group consisted of only 26 participants, thus limiting the power of the analysis to discover effects that are genuinely true. Another explanation could involve the frequency and intensity of the intervention. Changes in individual traits are possible only if behavioral states become “extended, internalized, and automatic”, therefore interventions introduced to affect change in a personality trait must be designed to ensure that change is enduring (Roberts, et al., 2017, pp. 200-201). The interventions in the current study were infrequent (only two were administered) and were not

significantly intense, as they did not include any time for critical self-reflection, or contextualized discussion. It is therefore likely that the lack of frequency and intensity of the interventions were not sufficient to motivate individuals to act consistently in ways reflective of increased behavioral states of Openness.

Another explanation for the lack of change in Openness could involve the selection and motives of the participants. In the Dance Movement Therapy study (Federman, 2009), changes in Openness were significant only in the experimental group, which was comprised of students that voluntarily enrolled in a Dance Movement Therapy training program. There was no significant change in the control groups which were comprised of students enrolled in Art Therapy and Social Sciences courses. It is likely that those participants in the Dance Movement Therapy study (Federman, 2009), by virtue of their choosing to enroll in a Dance Movement Therapy training program, had a higher mean level of curiosity and willingness to pursue novel challenges. According to Moutafi, Furnham, and Crump (2006), those who are intellectually curious tend to actively pursue intellectual interests and have a willingness to consider new and unconventional ideas. These individuals likely find it rewarding to pursue novel challenges and undertake intellectually stimulating tasks, which may affect the development of Openness over time. While the music-based interventions did present new and novel challenges, it is likely that the selection of study participants based on enrollment in entrepreneurship courses rather than their intellectual curiosity about how music-based interventions may be developed for

organization development contributed to the lack of impact of the interventions on Openness.

Conscientiousness

Conscientiousness was affected in both the experimental and control groups. In the experimental group, a significant decrease in the aspect of Industriousness was observed between pre-test and post-test. This is partially confirming of the hypothesis that music-based interventions would impact Conscientiousness. In the control group, the increase in overall Conscientiousness was significant as was the increase in its aspect of Orderliness. However, there was no significant change in the Conscientiousness aspect of Industriousness.

One explanation for the observed changes in Conscientiousness and its aspects could simply be random error, however other factors may be at play that may lend some insight into how the aspects of the Conscientiousness may have been affected in the experimental and control groups.

A possible explanation for both the decrease in the Conscientiousness aspect of Industriousness in the experimental group, and the increase in Conscientiousness and its aspect of Orderliness in the control group involves the adaptive nature of Conscientiousness and its relationship to fluid intelligence.

Moutafi, et al. (2006) found there is a consistent and significant negative correlation between Conscientiousness and fluid intelligence (one's ability to react and think quickly, see relationships, and cope more efficiently with novel experiences and intellectually stimulating tasks), and that this can be explained

by their findings that Conscientiousness is both adaptive and compensating. They suggest that in highly competitive environments such as school or work filled with highly (fluid) intelligent people, the comparatively less (fluid) intelligent may “become more Conscientious to cope with their comparative disadvantage...by working harder, by being well-organized, or by having the self-discipline to carry out the tasks assigned to them, i.e. by becoming more Conscientious” (Moutafi, et al., 2006, p. 40). They also suggest that individuals with lower fluid intelligence have a disadvantage dealing with novel situations and challenges, and that this disadvantage becomes more pronounced in a competitive environment.

Entrepreneurship courses not only require students to take on novel challenges, but also introduce a standard of entrepreneurial behavior that promotes risk taking, openness, and making decisions on gut or impulse (Envick & Langford, 2000). The combination of novel challenges, and the expectations of students to adopt new and perhaps unfamiliar behaviors are two elements that may bring to the conscious mind, assumptions about ones’ own fluid intelligence that heretofore existed in the unconscious mind.

As stated previously, group music making has been shown to foster positive affect (Dunbar & MacDonald, 2012), enhanced trust and cooperative behaviors (Anshel & Kipper, 1988), as well as group and self-other bonding behaviors (Loersch & Arbuckle, 2013; Tarr, Launay, & Dunbar, 2014). Anecdotal evidence from the current study was consistent with prior research in that several

students expressed their elevated mood, optimism, and feelings of closer bonds with other students as a result of the music-based interventions.

It is therefore plausible, given the foregoing, that the music-making experiences created higher levels of social bonding, trust, and increased affect in the experimental group. This could have produced a moderating effect on the environment such that participants felt less competitive pressure, were less conscious of perceived differentials in their own fluid intelligence, and were more comfortable adopting aspects of entrepreneurial behavior. In fact, Enrick and Langford (2000) found that entrepreneurs scored significantly lower in Conscientiousness relative to managers (non-entrepreneurs), which may suggest that in order to adopt behaviors consistent with entrepreneurship and fluid intelligence, one must first reduce measured, deliberate, and ordered behaviors associated with Conscientiousness. This may explain the significant reduction in the Industriousness aspect of Conscientiousness in the experimental group.

As for the control group, the increase in Conscientiousness and its aspect of Orderliness could be explained by the absence of an intervention to moderate the proclivity of participants to become more Conscientious in order to cope with perceived differentials in fluid intelligence, made more perceptible by the challenging and competitive nature of the environment.

Creative Self-Efficacy

Creativity Self-Efficacy, the underlying psychological variable that influences an individual's level of self-confidence in working towards novel ideas or behaviors (Choi, 2004), was unchanged from pre-test to post-test in the

experimental group. Again, one likely explanation involves the nature of the intervention. According to Bandura (1997), higher levels of performance (progress in mastering a task) lead to increased self-efficacy. Given this relationship, two 90-minute music-based interventions involving two distinct musical genres using vastly different musical instruments may not have been sufficient to allow participants to feel as though they were *progressing in mastering* their tasks.

Interestingly, Vancouver and Kendall (2006) found that contrary to widely held beliefs about self-efficacy's role as a key mediator of motivation and performance (Bandura, 1997), higher levels of self-efficacy may play a negative role in cognitive resource allocation when planning (preparing for an exam, planning for projects, etc.) was the primary process. This may ultimately lead to adverse effects on performance. However, when goal setting was the primary process, self-efficacy was found to have an important and positive role in motivation and performance (Vancouver & Kendall, 2006). Amabile and Pratt (2016), stated that "self-efficacy is the mechanism by which progress on a task increases intrinsic motivation. Moreover, intrinsic motivation has positive effects on creativity" (p. 167). Consequently, self-efficacy is an integral part of what Amabile and Pratt (2016) call the "progress loop" whereby "intrinsic motivation and progress in creative work fuel each other" (p. 167). This supports the supposition that the short duration and relatively low frequency and intensity of the interventions were not sufficient for participants to experience levels of

progress in creative work that would be necessary to impact Creative Self-Efficacy.

According to Choi (2004), while stable personal dispositions (motivation, personality, and ability) “tend to determine the overall likelihood of a person's being creative across situations, Creative Self-Efficacy is oriented toward the specific situation and task at hand and therefore may serve to mediate the effects of more general personal dispositions on creative performance” (p. 190). In the current study, post-test Creative Self-Efficacy was measured six weeks after the interventions. Given its task specific nature, measuring Creative Self-Efficacy immediately after the interventions may have provided a more accurate portrayal of changes in the variable.

Sensemaking

Overall satisfaction with the music-making interventions was high, and the Creativity perspective correlated significantly with overall satisfaction suggesting that participants who indicated higher scores in the Creativity sensemaking perspective were more likely to be satisfied with the interventions.

Notwithstanding, significant intercorrelation among the scales intended to measure Constructive Developmental, Adult Learning, and Creativity perspectives, suggested that participants in the experimental group did not think differentially about the experience, or process the music making experiences discretely from the various different perspectives.

One explanation for this lack of discrete Sensemaking along specific theoretical lines may simply be related to the specific questions asked, and their

ability to accurately measure Sensemaking across distinct processes that operate, for the most part, outside of immediate consciousness. Another may relate to the length, novelty, and intensity of the intervention. All three sensemaking perspectives (Adult Learning, Constructive Developmental, and Creativity), require critical self-reflection if one is to experience transformation (Mezirow, 1990) or move from one order of consciousness to another (Kegan, 2000). The interventions were relatively short in duration (90 minutes), occurred only twice, and there was no time allocated for reflection or facilitated discussion.

Another potential influence on the results from this study relates to the relatively young age of the participants, and the time required for constructive development. Kegan's (1994) Constructive Development Theory is based on one's transformation to different stages of meaning making. As Berger (2007) stated, "transformation is about changing the very *form* of the meaning-making system—making it more complex, more able to deal with multiple demands and uncertainty. Transformation occurs when someone is newly able to step back and reflect on something and make decisions about it" (p. 1). Further, and of vital importance to Kegan's Constructive Developmental Theory is the concept of *Subject* and *Object*. According to Kegan (2000), "that which is *Object* we can look at, take responsibility for, reflect upon, exercise control over, integrate with some other way of knowing. That which is *Subject*, we are run by, identified with, fused with, at the effect of," (p. 53). People's core belief systems, unquestioned assumptions, and ways of looking at the world are held as *Subject* by them (Berger, 2007). Conversely, that which is *Object* are "those elements of our

knowing or organizing that we can reflect on, handle, look at, be responsible for, relate to each other, take control of, internalize, assimilate, or otherwise operate upon” (Kegan, 1994, p. 31). Sensemaking from *Subject* to *Object* occurs gradually over time, and it is this shift that gives form to Kegan’s (2000) five orders of mind: Childhood, Self-Sovereign, Socialized, Self-Authored, and Self-Transforming (Berger, 2007). Development along these orders of mind, and the subsequent transformations of that which is *Subject* to that which is *Object*, is slow and often takes years or decades (Berger, 2007). Given the foregoing, and also by virtue of the relatively young age of the participants in the experimental group, it is not surprising that they did not exhibit the critical self-reflection on assumptions indicative of higher orders of development that would indicate discrete sensemaking through the Constructive Developmental perspective.

Becoming critically reflective of one’s own assumptions is the “key to transforming one’s taken-for granted frame of reference (broad, abstract, orienting, habitual ways of thinking, feeling, and acting influenced by assumptions that constitute a set of codes), an indispensable dimension of learning for adapting to change” (Mezirow, 1997, p. 9). A key element to one becoming critically reflective is an activating or disorienting event that “exposes a discrepancy between what a person has always assumed to be true and what has just been experienced ,heard, or read” (Cranton, 2002, p. 66). While the music-making experiences were intended to “disrupt” students’ routines and engage them in an activity that many would find unfamiliar, the experience may not have been sufficiently disorienting so as to bring to the surface unconscious

assumptions that students may have formed uncritically in the past for questioning and examination. It is therefore plausible to suggest that this lack of a sufficiently disorienting dilemma contributed to the absence of students' sensemaking in the adult learning perspective.

According to Amabile and Pratt (2016), creativity is “the production of novel and useful ideas by an individual or small group of individuals working together” (p. 158). The dynamic componential model of creativity and innovation (Amabile & Pratt, 2016) introduces four central constructs that they propose as necessary for creativity at both individual and organizational levels: (a) a sense of progress in creative idea development; (b) the meaningfulness of the work to those carrying it out; (c) affect; and (d) synergistic extrinsic motivation (p. 157). It appears clear that the music based interventions did not sufficiently address all of the aforementioned elements.

The short duration and relatively low frequency and intensity of the interventions may not have been sufficient for participants to experience levels of *progress in creative work or idea development*. Further, while the music-based interventions represented a new and novel challenge for many, students were not selected to participate based on their interest in music, or how music-based interventions may be created to impact antecedents and correlates of individual and organizational creativity and innovation. In other words, there was likely wide variation in both the *meaningfulness* of the interventions to the participants undertaking them, as well as the participants' levels of intrinsic motivation. According to Amabile and Pratt (2016), synergistic extrinsic motivators are those

“which give people information that confirms or allows them to build their competence or confirms the value of their work” (p. 176). This is consistent with Tierney and Farmer (2002) who found that employees’ self-perceptions of their own creative capability is impacted by supervisors who “build their confidence through verbal persuasion and serve as models for activities core to creative performance” (p. 1144). While the facilitators of the music-based interventions were encouraging, and offered positive reinforcement aimed at building participants’ creative confidence, the short and infrequent nature of the interventions were not sufficient so as to create the holding environment necessary to facilitate *extrinsic motivators* that would impact value, meaning, and competence. However, anecdotal evidence, as well as the high levels of satisfaction with the music-making experiences suggested that participants’ *affect* was high.

Limitations and Suggestions for Further Research

The current study used a sample of 47 undergraduates selected based upon their enrolment in introductory and intermediate entrepreneurship courses. A larger sample size would have likely increased the chances of finding a significant difference in the pre-test to post-test measures for the experimental group, and could provide greater confidence in experimental-control group comparisons.

In addition, the participants were chosen strictly based upon their enrollment in introductory and intermediate entrepreneurship courses rather than their motivation to explore music and how music-based interventions might

impact personality. Participants with a proclivity for exploring these variables may have higher motivation to enter new contexts and therefore may have responded to the interventions with more intensity.

The study was conducted over one 15-week semester, comparing pre- and post-scores. A longer period between measurements, combined with a third measurement six to twelve months after the post-test may have revealed more evidence of changes in measures of Sensemaking, Openness, and Conscientiousness that may require a longer developmental period. Conversely, given the situational nature of the variable, Creative Self-Efficacy should likely have been measured immediately after the interventions rather than several weeks after the interventions.

Finally, the interventions could be enhanced in at least three ways. First, Sociogenomic theory (Roberts & Jackson, 2008) suggests that “interventions introduced to affect change in a personality trait must be designed to ensure that change is enduring, [and that for individuals to] achieve changes outside of their normal range of typical behaviors [they should] be given the opportunities to practice these changes long enough to achieve automaticity” (Roberts, Hill, & Davis, 2017, pp. 201-203). The interventions did not provide opportunities for participants to engage frequently and consistently in the necessary behavioral states reflective of Openness or Conscientiousness for those behaviors to become “extended, internalized, automatic, and enduring” (Roberts, Hill, & Davis, 2017, p. 201). Second, with regard to impacting Creative-Self Efficacy, researchers have found that progress in creative work to be a critical factor

(Bandura, 1997; Amabile & Pratt, 2016). The lack of frequency of the interventions limited their abilities to provide the necessary progress toward creative work required to have impact on Creative Self-Efficacy. Finally, as pertains to Sensemaking, reflection is critical for adults to be able to make sense out of the multitude of experiences they are encounter in everyday life. The interventions did not provide adequate time for contextual discussion to encourage reflexivity.

The current study's limitations provide insight for future studies that might include more frequent and varied interventions occurring over a longer period of time that allow participants to experience behavioral states consistent with creativity and Openness that include ample opportunity for reflection and contextual discussion. Future interventions might be designed such that participants are able to experience clear and significant progress toward achieving a creative goal. As Creative Self-Efficacy has been shown to directly influence creative performance (Choi, 2004), it is important that future studies include more robust measures that explore its multiple dimensions. For example, the Multiple Dimension Creative Self-Efficacy Scale (Tan, 2007) is a longer, more precise measure that could help researchers to better understand the underlying determinants of overall Creative Self-Efficacy and how they might be impacted by music-based interventions. Finally, while Openness and Conscientiousness stand out as the clearest personality factors differentiating the creative from the non-creative (Feist, 1998), organizations are likely more interested in how they might more directly impact and measure creativity and creative performance.

Consequently, future studies might include measures of divergent thinking, creativity, and creative performance such as the Creative Achievement Questionnaire (Carson, Peterson, & Higgins, 2005) or the Creative Personality Scale (Gough, 1979) to better understand both the personality-creativity connection as well as how aspects of one's individual self-confidence in working towards novel and useful behaviors and outcomes might impact creative outcomes. Future studies might also incorporate post-test measures that incorporate external reporting of observed changes in creative and agile behaviors such as 360-degree feedback in combination with self-report and psychometric measures to assess how behavioral changes manifest in participants' performance at work. Finally, it has been suggested that interventions based in group music-making may foster an environment of enhanced trust and cooperation (Anshel & Kipper, 1988), positive affect (Dunbar & MacDonald, 2012), and group and self-other bonding (Loersch & Arbuckle, 2013; Tarr, Launay, & Dunbar, 2014) that may encourage individuals feel safe in reducing Conscientiousness behaviors in order to adopt behaviors consistent with not only creativity, agility and entrepreneurship, but also Openness. The suggestion that such an environment may promote decreased Conscientiousness, and that decreased Conscientiousness is a necessary antecedent to Openness is untested, and should be investigated further as it may provide valuable insight into the processes and order of behaviors required for individuals to become more adaptive, creative and dynamically capable.

Conclusion

This study was inspired by the researcher's lifelong journey as a musician, but it was an article in the *New York Times* by Joanne Lipman (2013) entitled "Is music the key to success" in which numerous successful individuals including Alan Greenspan, Paul Allen, Chuck Todd, Roger McNamee, and James D. Wolfensohn made connections between their music training and their professional achievements, that motivated the investigation into whether there truly exists a relationship between music-making and behaviors commonly associated with successful and creative individuals.

The resulting study is first known attempt to connect music-making to these personality traits through a quantitative study, and provides evidence that music-based interventions may impact certain aspects of personality that are related to creativity, agility, and dynamic capability. Though many of the initial hypothesis in the study were unconfirmed or only partially confirmed, the findings provide a solid basis for exciting possibilities for future research into how music can be utilized as an effective tool to develop individual creativity, adaptability, and agility. Is music the key to success? This study puts us one step closer to answering that question.

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Appendix A

Pre/Post-Test Questionnaire Used to Measure Conscientiousness, Openness, and Creative-Self Efficacy

Entrepreneurship Study Pre-Course Questionnaire

Name: _____ **Age:** ____ **Major:** _____ **Year in School:** _____

Gender: Female Male Prefer to self-describe _____ Prefer not to say

Below are a number of statements that you may or may agree not describe you. For example, do you agree that you seldom feel blue, compared to most other people? Please fill in the number that best indicates the extent to which you agree or disagree with each statement listed below. Be as honest as possible, but rely on your initial feeling and do not think too much about each item.

		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	Scale	1	2	3	4	5
1	I see beauty in things that others might not notice					
2	I want every detail taken care of.					
3	I formulate ideas clearly.					
4	I am easily distracted.					
5	I seldom daydream.					
6	I see that rules are observed.					
7	I learn things slowly.					
8	I postpone decisions.					
9	I seldom get lost in thought.					
10	I dislike routine.					
11	I think quickly.					
12	I always know what I am doing.					
13	I need a creative outlet.					
14	I am not bothered by disorder.					
15	I have a rich vocabulary.					
16	I get things done quickly.					
17	I seldom notice the emotional aspects of paintings and pictures.					
18	I want everything to be "just right."					
19	I avoid difficult reading material.					
20	I don't put my mind on the task at hand.					
21	I do not like poetry.					
22	I am not bothered by messy people.					
23	I avoid philosophical discussions.					
24	I finish what I start.					

		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	Scale	1	2	3	4	5
25	I get deeply immersed in music.					
26	I follow a schedule.					
27	I like to solve complex problems.					
28	I mess things up.					
29	I love to reflect on things.					
30	I keep things tidy.					
31	I can handle a lot of information.					
32	I find it difficult to get down to work.					
33	I believe in the importance of art.					
34	I like order.					
35	I have difficulty understanding abstract ideas.					
36	I waste my time.					
37	I enjoy the beauty of nature.					
38	I leave my belongings around.					
39	I am quick to understand things.					
40	I carry out my plans.					

	<i>Please note: the final 8 items use a 6-point rating scale:</i>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
		1	2	3	4	5	6
1	I will be able to achieve most of the goals that I have set for myself in a creative way						
2	When facing difficult tasks, I am certain that I will accomplish them creatively						
3	In general, I think that I can obtain outcomes that are important to me in a creative way						
4	I believe I can succeed at most any creative endeavor to which I set my mind						
5	I will be able to overcome many challenges creatively						
6	I am confident that I can perform creatively on many different tasks						
7	Compared to other people, I can do most tasks very creatively						
8	Even when things are tough, I can perform quite creatively						

Thank you for completing the questionnaire

Appendix B

Questionnaire Used to Measure Sensemaking and Satisfaction with the Music- Based Experience

Entrepreneurship Study Music Experience Questionnaire

Name: _____ **Age:** _____ **Major:** _____ **Year in School:** _____

Gender: Female Male Prefer not to say Prefer to self-describe _____

Below are a number of statements that you may or may not agree describe you. Please fill in the number that best indicates the extent to which you agree or disagree with each statement listed below. Be as honest as possible, but rely on your initial feeling and do not think too much about each item.

		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	Scale	1	2	3	4	5
1	I was able to quickly understand what to do in the music-making experience.					
2	Learning how to make music with others was more or less a familiar experience for me.					
3	Prior to the music-making experiences, I was apprehensive about it.					
4	The music-making experience was new and exciting for me.					
5	The music-making experience helped me adopt a new perspective on how to interact with others.					
6	The music-making experience made me think about things in ways I had not previously considered.					
7	The music-making experience was unfamiliar to me, at least at first.					
8	The music-making experience made me think about myself in new ways.					
9	The music-making experience caused me to examine my assumptions about how I work with others.					
10	The music-making experience allowed me to try out new roles.					
11	The music-making experience helped me gain some confidence in new ways of doing things.					
12	The music-making experience provided me with a new and useful way of learning.					
13	I felt positive and upbeat during the music-making experience.					
14	During the music-making experience, working as a group helped me feel more creative.					
15	Playing music with others required me to be more flexible.					
16	Over the course of the music-making experience, I was able to see and understand some new or different patterns of how to do things with others.					
17	The music-making experience helped me realize I could be creative if I was given the opportunity.					
18	During the music-making experience, I felt it was OK to make mistakes.					
19	The music-making experience was fun.					

		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	Scale	1	2	3	4	5
20	The music making experience was rewarding (satisfying).					
21	Time seemed to go quickly during the music-making sessions.					
22	Overall, I found the music making experiences valuable.					
23	Overall, I have positive feelings about the music making experience.					
24	I enjoyed the music making experience.					

Thank you for completing the questionnaire