ROLE OF COGNITIVE FLEXIBILITY IN BILINGUALISM AND CREATIVITY

by

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(Under the Direction of Mark Runco)

ABSTRACT

The present study examined the role of cognitive flexibility as a mediator of the relationship between bilingualism and creativity. Other variables, such as cultural orientation (i.e., individualism vs. collectivism), multicultural experience, and second language acquisition age, were also included to comprehensively understand their associations with creativity. Cognitive flexibility received particular attention due to its mediating roles as a facilitator of the effects of bilingualism, cultural orientation, and multicultural experience on creativity. The mediation effect of cognitive flexibility was analyzed using a bootstrap method on a sample of 89 Korean-English bilingual college students (55 females and 34 males) in South Korea through an online survey. Findings suggest that bilingualism was not statistically associated with creativity but that cognitive flexibility had a mediation effect in the relationship between bilingualism and creativity (i.e., fluency, originality, and flexibility), indicating that the degree of bilingualism was significantly associated with creativity through cognitive flexibility. Also, cognitive flexibility played an important role in describing the relationship between multicultural experience and creativity (i.e., fluency and flexibility, but not originality). Bilingualism was the most predictive variable for cognitive flexibility. The role of bilingual ability on the development

of creativity was discussed. Findings of this study provide teachers and educators with useful insights for encouraging bilingual abilities and multicultural experiences to nurture creative potential of students.

INDEX WORDS: Bilingualism, Creativity, Divergent Thinking, Cognitive Flexibility, Cultural Orientation, Multicultural Experience.

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CHAPTER 1

INTRODUCTION

Statement of the Problem

Creativity is the process of recognizing knowledge, whether general or specific. The process includes the way that knowledge is articulated to produce ideas or objects that people can understand. The definition of creativity can vary based on the factors that are emphasized (Getzels & Csikszentmihalyi, 1976; Lubart, 2010; Sternberg & Lubart, 1995). Therefore, defining the concept of creativity with a direct, concise statement is difficult. Creativity is a very complex idea, and a diverse range of factors influence creativity, including intellectual ability, knowledge, thinking styles, personality, motivation, and environment. Rhodes (1961) pointed out that creativity cannot be explained using a unidimensional component; instead, he addressed its complexity based on the four Ps of creativity: person (i.e., personality, intellect, temperament, habits, and attitude), process (i.e., motivation, perception, learning, thinking, and communicating), press (i.e., diverse ecological environment), and product.

As technology and communication systems have developed, interest in environment, including cultures, has increased. Today, people have more opportunities to experience other cultures, such as learning a language, visiting or staying in other countries, and communicating with people abroad. Environments include the social and cultural values and norms that can be constructive or destructive influences on creativity. Some environments can foster creativity, while others might diminish creative potential. Researchers and educators also believe that favorable educational environments can foster and develop children's creative potential

(Cramond, 2005; Starko, 1995; Sternberg & Williams, 1996; Torrance, 1983). And the use of creative potential, such as original thinking, can be taught by learning creativity strategies (Cramond, 2005; Csikszentmihalyi, 1988; Rhodes, 1961, 1987). While teaching someone to be creative is impossible, individuals can learn how to use the creativity he or she possesses. With appropriate strategies and a favorable environment, creative thinking can be effectively stimulated.

Creativity is not unidimensional and is subject to be influenced by various environmental factors. The current study reviewed the roles and effects of a particular sociocultural factor, bilingualism, on the enhancement of creative potential. This study explored how the sociocultural factors of bilingualism and immersion in diverse cultures shape creative potential on a variety of levels. Along with cultural experiences, specifically bilingualism, the role of cognitive flexibility was also explored. When people are faced with various problems, they tend to search for alternative solutions. Cognitive flexibility refers to the ability of a person to change his or her behavior according to situational factors. Therefore, cognitive flexibility is useful in creative thinking because it discourages rigidity and encourages new mental processes. In other words, individuals will consider alternative choices for solving problems if they are cognitively flexible. This ability allows them to select and engage in creative processes for problem finding and problem solving.

Purpose of the Study

Many studies have argued that bilingual and bicultural (or multicultural) experience can help an individual become more cognitively flexible. Furthermore, such experiences and language competencies might have positive effects on creativity. Bilingual individuals use two language codes simultaneously or switch from one to the other with ease. This cognitive

mechanism might lead to cognitive flexibility and facilitate creative potential such as divergent thinking (Kharkhurin, 2007; Lopez et al., 1993).

Over the last few decades, studies in creativity have found that bilingualism tends to influence not only the development of language ability but also cognitive development (Bialystok, 2009; Cummins, 1976; Kharkhurin, 2007; Leikin, 2014). According to Kharkhurin (2007), the cognitive effects of bilingual experiences can be attributed to language proficiency in both languages and to a person's age during second language acquisition. Cummins (1976) also pointed out that early experiences with another language allow bilingual speakers to advance cognitively through the acquisition of multiple linguistic symbols for objects for which monolingual speakers might only have one or two. In addition, learning another language involves experiencing another culture. The definition of culture concerns a variety of areas: behaviors, beliefs, values, and symbols (e.g., language). Therefore, bilingual individuals might be benefiting on two levels: developing language ability and exposure to bi-cultural or multi-cultural codes. Kharkhurin (2007) explained that cross-cultural experiences might result from bilingual experiences.

Several recent studies have shown that bicultural or multicultural experience is positively associated with creativity (Leung, Maddux, Galinsky, & Chiu, 2008; Maddux & Galinsky, 2009; Saad et al., 2012). Kharkhurin (2007) pointed out that the mixed findings of previous studies regarding the effects of bilingualism on creativity might have resulted from a failure to control for the cross-cultural experiences of bilinguals. Most studies that Ricciardelli (1992b) reviewed were conducted with immigrants who were supposed to have had numerous bicultural experiences, but, again, many did not control for cross-cultural experience. Indeed, the positive effect of bilingualism on creativity is possibly mediated by other variables such as cross-cultural

interaction with different sociocultural values. In addition, bilingualism is more likely to have an indirect effect rather than a direct effect on creativity because of cognitive flexibility, which bilinguals are likely to develop to a greater extent than monolinguals (Cummins, 1976; Kharkhurin, 2007; Lopez et al., 1993).

Therefore, the current study explored the role of cognitive flexibility in bilingualism and creativity and the interaction among these three variables in Korean students who (a) were attending college in Korea and (b) spoke both Korean and English. Unlike many extant bilingualism studies, the current study was conducted using adult samples. Ricciardelli (1992b) reported that all bilingual studies from 1965 to 1992, except one, had been conducted using child populations. Only Lemmon and Goggin (1989) used adult samples (i.e., college students) to examine the effect of bilingualism on creativity. Afterward, Kharkhurin (2007, 2009, 2011) completed several experimental studies using adult samples, but the total number of studies of this kind is still low. In addition, the current study examined how different sociocultural values (i.e., collectivism vs. individualism), multicultural experience, and the age of second language acquisition influence cognitive flexibility and creativity in order to investigate the indirect effect that bilingualism might have on creativity.

One primary contribution of this study is the examination of how cognitive flexibility mediates the relationship between bilingualism and creativity, between multicultural experience and creativity, and between second language acquisition age and creativity. The results revealed that cognitive flexibility played a significant role among the variables (i.e., bilingualism, cultural orientation, multicultural experience, and second language acquisition age). Many studies about the relationship between bilingualism and creativity have used group comparison (e.g., bilingual group vs. monolingual group) to measure the effect of bilingualism on creativity. However, the

current study conducted regression analyses based on individual differences rather than group differences. Furthermore, this study sheds light on language education and creativity, makes parents and educators aware of the benefits of second language education, and identifies a method for fostering creative potential.

Research Questions

The following research questions were investigated in this study:

RQ1: Is the degree of bilingualism associated with creativity?

RQ2: Is the degree of bilingualism associated with cognitive flexibility?

RQ3: Is cognitive flexibility associated with creativity?

RQ4: Does cognitive flexibility mediate the relationship between the degree of bilingualism and creativity?

RQ5: Is cultural orientation (collectivism vs. individualism) associated with creativity?

RQ6: Is cultural orientation (collectivism vs. individualism) associated with cognitive flexibility?

RQ7: Does cognitive flexibility mediate the relationship between cultural orientation (collectivism vs. individualism) and creativity?

RQ8: Is multicultural experience associated with creativity?

RQ9: Is multicultural experience associated with cognitive flexibility?

RQ10: Does cognitive flexibility mediate the relationship between multicultural experience and creativity?

RQ11: Is second language acquisition age associated with creativity?

RQ12: Is second language acquisition age associated with cognitive flexibility?

RQ13: Does cognitive flexibility mediate the relationship between second language acquisition age and creativity?

RQ14: Which variable (bilingualism, cultural orientation, multicultural experience, or second language acquisition age) best predicts cognitive flexibility?

CHAPTER 2

LITERATURE REVIEW

What Is Creativity?

Creativity is the ability to produce original, novel, and appropriate work (Sternberg & Lubart, 1995, 1999). According to Rhodes (1961, 1987), creativity is the process of recognizing knowledge in ways associated with flexible thinking and learning. The creative process also includes forms of articulation that produce ideas and objects that people can understand.

Sternberg and Lubart (1999) described creativity according to two different levels of significance: individual and societal. Creativity, at the individual level, is relevant. In other words, for individuals, creativity is a way to solve problems that can happen in daily life, such as finding a job. At the societal level, creativity can lead to social movements based on new scientific findings, new social programs, or new interventions and innovations. Sternberg and Lubart (1999) presented the concept of creativity through several paradigms: mystical, pragmatic, psychodynamic, psychometric, and social-personality. According to the mystical approach creativity is a spiritual process, an idea that scientists are not inclined to believe. The pragmatic approach primarily views creativity from the perspective of development and understanding. The psychodynamic approach defines creativity as a concept between unconscious drivers and conscious reality, later introducing the concept of adaptive regression and elaboration.

Although the psychodynamic approach views creativity as a function of insight, it does not refer to creativity according to the standards of psychological science. Experimental studies

based on scientific views of creativity have been psychometric approach, which introduced creativity as a cognitive process. Lastly, Sternberg and Lubart (1999) described creativity through a social-personality paradigm, which considers individual personality, motivation, and socio-cultural environment as variables that influence creativity. This approach has focused more on personality traits such as self-confidence, independence of judgment, attraction to complexity, and risk taking.

The definition of creativity varies depending on which circumstances are emphasized. Rhodes (1961, 1987) pointed out that creativity cannot be explained using a unidimensional component but should instead be explained using multiple components. Rhodes explained its complexity based on the four Ps of creativity: person, process, press, and products. In the following literature review, the definition of creativity is closely examined based on Rhodes' four Ps of creativity.

Person

According to Rhodes (1961, 1987), the term "person" includes personality, intellect, temperament, physique, traits, habits, attitudes, self-concept, value systems, defense mechanisms, and behavior. Researchers understand and widely accept that personal characteristics greatly influence creativity (Amabile et al., 1996; Oldham & Cummings, 1996). Guilford (1957) characterized creativity as sensitivity to problems, fluency of ideas, mental flexibility, and divergent thinking. Simonton (2000) stated that the distinctive characteristics of a creative person are strongly associated with creativity. In particular, a creative person can be characterized as independent, nonconforming, unconventional, risk-taking, open-minded, skilled in working with ideas, and inclined to look for new ways to do things (Davis, 2003). Creative people are more likely to possess personal characteristics that enhance creative thinking.

Process

Rhodes (1961, 1987) defined "process" as being engaged with motivation, perception, learning, thinking, and communicating. Graham Wallas (1926) designated the four stages of the creative process: preparation, incubation, inspiration, and verification. Preparation includes observing, asking, collecting, comparing, contrasting, analyzing, and relating all information so that thinking about relationships and reasoning can be followed in the incubation step. After incubation, inspiration releases tension to allow creative work. The last stage, called verification, is the process of producing an object (Rhodes, 1961, 1987). Guilford (1967) also pointed out that the creative process involves two different types of thinking: divergent and convergent thinking. Divergent thinking is the ability to generate various original alternative answers, while convergent thinking refers to the ability to arrive at one solution from all possible alternatives. According to Guilford (1967), these two contrasting types of thinking are the major components of the creative process.

Therefore, the creative process is an important defining dimension of creativity, and it is generally associated with diverse types of thinking to generate original ideas or objects. Moreover, although the issue is still controversial, an important educational view suggested by some scholars is that all of the components of the creative process can be taught (de Bono, 1990; Rhodes, 1961, 1987), that people are able to learn how to facilitate effective strategies for engaging in the creative process.

Press

The term "press" refers to an ecological environment that is related to human beings (Rhodes, 1961, 1987). There are different types of environments in which human beings operate. For example, environments can be physical settings, but they can also be abstract settings, such

as cultural or societal values. Individuals have unique ways of understanding and engaging with their environment. The same environment might positively influence some people but discourage others. Therefore, an individual's point of view can lead to a positive or negative match with a particular environment.

Products

Lastly, according to Rhodes (1961, 1987), the term "product" refers to a tangible form converted from an idea. That is, creative products are artifacts of thought. However, there is no systematically developed classification for creative products; the scope of an idea's potential value or originality is too wide. A creative product might be valued in one culture but not in another, depending on the norms that govern those cultures.

Extant studies have developed assessment instruments to evaluate various creative products. For example, the Consensual Assessment Technique (CAT), one of the most highly regarded assessment tools, has been used to assess creative products (Kaufman, Baer, Cole, & Sexton, 2008). The underlying idea of this approach is that if many people agree that a particular product is the most creative among a set, it will more likely be a highly creative work. Reliability (i.e., consensus) plays an important role in measuring creativity according to CAT. However, the level of agreement can vary depending on different norms and social values. Therefore, creativity ratings might differ across groups of people from contrasting societies.

Cultural Influences on Creativity

Many researchers have attempted to define the components of creativity. Because its development is very complex, creativity cannot be adequately explained by one simple construct. As Rhodes (1961) described, creativity can be explained using four factors: person, process, press, and product. However, in recent decades, research has focused on understanding the

interaction among the various factors rather than studying individual factors separately. Namely, creativity is not unidimensional and is prone to be influenced by, and interact with, various environmental factors. One of these environmental influences is "culture." Different social and cultural values and norms might affect the development and use of creative potential. Some environments are more favorable while others are more challenging. Cultural differences also play an important role in generating or evaluating the creative process and creative products.

Some studies have examined the influence of culture on creativity, more specifically how Eastern and Western cultures influence creativity differently (Kim, 2009; Leung, Au, & Leung, 2004; Lubart, 1999; Niu & Sternberg, 2002; Niu & Sternberg, 2006; Rudowicz, 2003). People tend to differentiate the concepts and expressions that characterize Eastern and Western creativity. However, this differentiation must take into account the different cultural values and norms of the respective societies, for culture influences perception, language, social cognitive systems, and belief systems.

Philosophical Roots

In general, differences in the concept, development, and use of creativity between the East and West can be explained in two ways. One approach is to examine philosophical roots. Niu and Sternberg (2006) stated that Western cultures tend to view creativity as divinely inspired and individualistic, while Eastern cultures are more likely to view creativity as a natural phenomenon. These conceptual differences seem to originate from the Western idea of divine creation (i.e., Biblical ideas and Greek myths) and Eastern idea of Confucianism (Niu & Sternberg, 2006). People of the ancient West believed that creativity and the creative process derived from divine power rather than education. In particular, Plato emphasized the importance of "inspiration" as the external source of the creative poetic process. Calling this inspiration

"divine madness," Plato explained that the creator is out of his senses during the creative processes. In his view, a creative human being is a tool or a medium inspired by divine power (Rothenberg & Hausman, 1976).

According to the book of Genesis, God created the universe from nothing, not from something that already existed. This type of creation, characterized as totally new and novel, formed the philosophical background for the Western concept of creativity: novelty, originality, and imagination that lead to a break with tradition (Kristeller, 1983; Lubart, 1999). The Western pursuit of creativity is more likely to value new things that dramatically differ from existing ones (Leung, Au, & Leung, 2004). As Niu and Sternberg (2006) asserted, the Western idea of creativity in the ancient period emphasized divine inspiration, and people believed that creativity was expressed only in the field of poetry by a limited number of people. However, the modern concept of creativity in the West has changed to emphasize the power of individual creativity rather than divine inspiration. This shift means that creativity is accessible to anyone, not an inspired elect (Finke, Ward, & Smith, 1992; Martindale, 1999; Martindale, Hines, Mitchell, & Covello, 1984). Thus, the modern Western concept of creativity is individualistic and characterized by novelty and usefulness.

On the other hand, the Eastern concept of creativity tends to emphasize social and moral values that derive from Confucianism (Niu & Sternberg, 2002). Confucianism is an ethical system that favors education, family, hierarchical relationships, and benevolence (Chen & Chung, 1994; Kim, 2009). These ideologies and ideas have helped establish the cultural norms of various Eastern nations, including conformity, harmony, obedience, and gender role inequality. According to Confucianism, moral goodness is necessary for creativity, whereas the Western concept of creativity values individualism above morality (Niu & Sternberg, 2006).

Creativity in ancient Chinese society was considered natural, originating from the ultimate force of a supernatural moral authority. “Novelty” matters less in this view because natural creativity is a mixture of old and new, of the natural world and the “human” (Niu & Sternberg, 2006). Creative expression can be perceived as a renovation of something that already exists. However, the modern concept of creativity in the East (particularly in China) has shifted to individualism due to the influence of Western values. The role of the human mind (e.g., meditation and practice) has become more important in pursuing a high level of creativity (Niu & Sternberg, 2002; Niu & Sternberg, 2006).

Explicit and Implicit Theories

Another approach to conceptualizing creativity is through explicit and implicit theories. Explicit theories are constructions of social scientists based on theoretically or empirically derived hypotheses (Amabile, 1996; Sternberg & Lubart, 1995), while implicit theories are constructions derived from individuals’ belief systems (Dweck et al., 1995; Leung, Au, & Leung, 2004; Rudowicz, 2003; Runco & Bahleda, 1987). In social psychology, implicit theories help researchers understand and investigate the values people place on a variety of domains, including creativity, because implicit theories are influenced by the cultural traditions of a given society. People evaluate and judge not only other peoples’ behaviors but also their own behaviors based on their beliefs and preferences. Thus, implicit theories play a role in social information processing (Rudowicz, 2004; Runco & Johnson, 2002), and this approach is useful in examining cross-cultural perceptions of creativity.

Studies about implicit theories of creativity have suggested that people in the West are more likely to associate creativity with imagination, intrinsic motivation, independence, risk taking, having a wide range of interests, intelligence, high levels of activity, a sense of humor,

and aesthetic taste (Niu & Sternberg, 2002). Some of these characteristics are not associated with Eastern conceptions of creativity. For instance, a sense of humor and aesthetic taste are less valued in Eastern culture (Rudowicz & Hui, 1997; Rudowicz & Yue, 2000), whereas the moral component is highly valued (Liu, Wang, & Wu, 1994; Yang & Sternberg, 1997b). These differences largely arise from the collectivistic and individualistic values of the East and West, respectively.

Even in identical or similar cultures, variations in the implicit theories of creativity persist. Spiel and von Korff (1998) found extreme variations in the implicit theories of scientists, artists, teachers, and politicians in Germany and Austria. This finding confirms that implicit theories can vary among people based on individual standards, values, and beliefs, even when they otherwise share cultural norms. Because implicit theories of creativity can vary across cultures and across people in similar cultures, cross-cultural analysis should examine the interaction among individual personality traits and environments, not merely compare groups based on larger trends (e.g., Eastern-Western cultural variation based on collectivism and individualism). Runco (2007) stated that "Any one aspect of a culture (e.g., harmony, individualism) may not characterize every individual within that culture. Even if one of those aspects of culture does characterize a particular individual, he or she may not have the predicted reaction to it" (p. 276).

Cross-Cultural Study on Creativity

The concept of creativity varies across time and across cultures. Its conceptualization has evolved over time in the West and the East. In addition, according to implicit theories, conceptions of creativity vary based on personal beliefs. Culture and socio-historical context have influenced ideas about creativity, including its domains, process, and expressions. Namely,

the development of creativity varies depending on cultural values and social propriety. For instance, in Hong Kong, financial and political accomplishments are valued as creative achievements more than aesthetic or artistic accomplishments (Rudowicz & Hui, 1998).

Other countries in the East such as China and Taiwan also consider politicians, scientists, or inventors to be more creative than artists and writers (Yue & Rudowicz, 2002). When products or ideas are evaluated as creative in a given society, they are assessed based on the cultural values and norms of that society. Thus, cultural values determine what creativity is and how the creative process or creative behaviors are evaluated.

Bilingualism and Creativity

Creativity can occur at various times and various places in the human experience. Creativity can be nurtured and evaluated based on various sociocultural values and norms, as well as language use (Ivcevic, 2009). Cultural differences expressed in language could play an important role in generating or evaluating the creative process and its products.

One possible cultural influence is bilingualism. Bilingualism is concerned with ability in two languages (Baker, 2011). Ianco-Worrall (1972) defined bilingualism as a dual-language acquisition in one person. The National Association for Language Development in the Curriculum (2011) also described bilingualism as the ability to use two languages. However, bilingualism encompasses a wide range of definitions in terms of different contexts and various linguistic proficiencies (Baker, 2011; NALDIC, 2011). A bilingual could be a person who is native speaker in one language and has learned another language, but is less fluent in that other language than in the native language. On the other hand, some bilinguals are fluent in both languages. Also, bilingual abilities can vary in the different language skills (writing, reading, listing, and speaking). Baker (2011) suggested eight dimensions of bilingualism: ability

(productive competence), use (the domains or contexts), balance of two languages, language acquisition age, developmental degree in both languages, bilinguals' bi- or multi-cultural experience, cultural contexts, and elective bilingualism (classroom learning vs immigrants).

Cross-linguistic experiences provide cross-cultural experiences because language itself is a cultural phenomenon (González, 2001). Bialystok (1988) demonstrated that bilinguals are more engaged than monolinguals in controlling those aspects of linguistic processing that select and integrate information. These skills could help bilinguals outperform monolinguals on creative tasks, which essentially involve this type of processing. Performance on divergent thinking tests, which require generating a large number of ideas or solutions, should be enhanced by this type of processing as well.

Ricciardelli (1992b) reviewed a number of studies conducted between 1965 and 1992 to investigate the relationship between creativity and bilingualism. More than 20 of the 24 studies reviewed found that bilinguals outperformed monolinguals on measures of creativity. Several other studies about the influence of bilingualism on creativity since 1992 (Konaka, 1997; Lasagabaster, 2000; Lee & Kim, 2010; Stone, 1993) strongly support bilingual superiority on creativity tests. Table 2.1 shows additional findings about the influence of bilingualism on creativity. All studies were conducted between 1992 and 2014 using various populations across cultures.

However, not all studies support general bilingual superiority on creativity tasks. According to Ricciardelli's (1992b) literature review, some studies showed no bilingual advantage and sometimes even monolingual superiority on creative ability tests. This discrepancy might be explained by two factors: the degree of bilingualism and bicultural experiences.

Table 2.1

Summary of Studies about the Bilingual Influence on Creativity

Authors	Participants	Instrument	Findings
Stone, S. (1993)	Bilinguals and monolinguals (elementary school students)	The Torrance Test of Creative Thinking (TTCT)	Bilinguals performed at a level equal to or higher than monolinguals on flexibility.
Konaka, K. (1997)	Japanese and English bilinguals in grades 6 and 7	The Torrance Test of Creative Thinking (TTCT)	Bilinguals performed better than monolinguals.
Lasagabaster, D. (2000)	Spanish and Basque bilinguals and Spanish or Basque monolinguals in Basque (grade 5 and 10)	The Torrance Test of Creative Thinking (TTCT) Verbal Form A	Bilinguals performed better than monolinguals.
Fleith, D. S., Renzulli, J. S., & Westberg, K. L. (2002)	English and Portuguese bilingual Brazilian elementary students and English monolinguals in New England	The Torrance Test of Creative Thinking (TTCT)	No findings supporting the higher performance of bilinguals
Kharkhurin, A. V. (2007)	Russian and English bilinguals and English monolingual students in America	Abbreviated Torrance Test for Adults (ATTA)	Bilinguals outperformed monolinguals on fluency, flexibility, and elaboration, but not originality.
Kharkhurin, A. V. (2009)	Farsi-English bilinguals living in the UAE and Farsi monolinguals living in Iran	Fair Intelligence Test battery, the Abbreviated Torrance Test for Adults (ATTA), and structured imagination test (Invented Alien Creatures task)	Bilinguals performed better than monolinguals.

Table 2.1 *(continued)*

Authors	Participants	Instrument	Findings
Kharkhurin, A. V. (2011)	English bilingual students at American University of Sharjah (UAE)	Abbreviated Torrance Test for Adults (ATTA), Stroop Test, and Fluid Intelligence Test (CFIT)	The high English proficiency group showed significantly better performance than the moderate-proficiency group on the divergent thinking test.
Leikin, M., Tovli, E., & Malykh S. (2014)	Russian/Hebrew bilinguals and Hebrew-speaking monolinguals in kindergarten	The Torrance Test of Creative Thinking (TTCT) Figural Form A, Pictorial Multiple Solution Task, Creating Equal Number Task	Bilinguals performed better than monolinguals on figural creativity and mathematical creativity.

For example, Torrance, Gowan, Wu, and Aliotti (1970) found that monolinguals received higher scores in the fluency section of the Torrance Test of Creative Thinking-Figural (TTCT-F). Participants were Chinese monolingual and Chinese and Malayan bilingual students in the third to fifth grades attending Singaporean schools. In another study, Gowan and Torrance (1965) examined Chinese-English, Malay-English, and Tamil-English bilingual and Malay, Tamil, and English monolingual elementary school students. The results indicated monolingual superiority on TTCT-F. Lasagabaster (2000) pointed out that an earlier study by Gowan and Torrance (1965) was flawed, because the participants' bilingual competence in both languages was not controlled. Fleith, Renzulli, and Westberg (2002) conducted a group comparison study between Portuguese bilingual Brazilian students and American monolingual third, fourth, and fifth grade students in

New England. They found no bilingual superiority on the TTCT and discussed the wide range in the degree of bilingualism as a possible explanation for this result.

As Lasagabaster (2000) described and Fleith, Renzulli, and Westberg (2002) argued, one possible reason for the mixed research findings is the degree of bilingualism. The studies mentioned above seem to have overlooked the fact that the degree of bilingualism (i.e., the level of competence in the two languages) might exert an influence on creativity. The study by Torrance, Gowan, Wu, and Aliotti (1970) did not consider children's varying bilingual abilities. They selected participants independently from monolingual and bilingual groups and conducted group comparison analysis based only on scores on TTCT-F. Fleith, Renzulli, and Westberg (2002) also failed to allow for different degrees of bilingualism as a possible significant factor. They chose participants from an English monolingual group and a Portuguese/English bilingual group. In the bilingual group, however, the range of language competence in the two languages was very wide. Some students were Brazilian immigrants who had just moved to America, while others had lived in America for a long time. Thus, the English competence of the bilingual group varied considerably.

The second possible reason for the diversity of findings is the bicultural (or multicultural) experiences of the participants. The bicultural backgrounds of the participants were not controlled in any of the studies listed. In Torrance, Gowan, Wu, and Aliotti (1970), the two sets of data for Chinese speaking monolinguals and Malayan speaking monolinguals in Singapore were combined to form the dataset of the monolingual group. Also, in Fleith, Renzulli, and Westberg (2002), some Brazilian immigrants were moved to a monolingual classroom when their English ability was considered high enough for the English-only classroom. As these studies did

not control for either bilingualism or bicultural experiences, they were unable to investigate how these variables might have influenced creativity.

Inconsistency in the research on bilingualism and creativity might also be explained by the bilingual threshold theory Ricciardelli (1992b). This theory maintains that a threshold of language proficiency must be crossed in order for a bilingual speaker to have bilingual advantages in areas such as creativity. In other words, bilinguals need to achieve high levels of linguistic proficiency in both languages to avoid a cognitive deficit. Otherwise, they might not be able to reap the cognitive benefits from both languages. Therefore, some studies have used group comparison methods among bilinguals (i.e., high language proficiency group vs. low language proficiency group or balanced bilinguals vs. non-balanced bilinguals) instead of comparing a bilingual group with a monolingual group to find significant effects of bilingualism on creative performance (Lee & Kim, 2010; Leikin, Tovli, & Malykh, 2014).

Cultural Orientation (Individualism vs. Collectivism) and Creativity

In the current study, individualism and collectivism were examined to determine how this cultural orientation is associated with creative potential. Hofstede (1984, 2001) suggested five independent dimensions in describing national culture differences: power distance, uncertainty avoidance, individualism versus collectivism, masculinity versus femininity, and long-term versus short-term orientation (Hofstede, 2001, p. 29):

1. "Power distance" refers to different solutions to the basic problem of human inequality.
2. "Uncertainty avoidance" refers to the level of stress in a society in the face of an unknown future.
3. "Individualism and collectivism" refers to the integration of individuals into a primary group.
4. "Masculinity and femininity" refers to the division of emotional roles between men and women.
5. "Long-term and short-term orientation" refers to goal scope of people's efforts (future benefit or immediate benefit).

The first edition of Individualism Index Values (IDV) for 50 countries and three regions was published in 1980 by Hofstede. IDV indicates the degree of societal values, beliefs, and behaviors that prevailed in the relationships between individuals and a given society (Hofstede, 1984, 2001). Thus, IDV could reflect societal norms and behaviors, such as nuclear family patterns, role differentiation, and educational systems. The 50 countries and three regions are ranked respectively by IDV. The United States ranked first as the most individualistic country (i.e., highest IDV score) among the ten that valued individualism the most: The United States (91), Australia (90), Great Britain (89), Canada (80), Netherlands (80), New Zealand (79), Italy (76), Belgium (75), Denmark (74), and Sweden (71). On the contrary, Guatemala (6) ranked 53rd as the most collectivistic country. Ecuador (8), Panama (11), Venezuela (12), Colombia (13), Indonesia (14), Pakistan (14), Costa Rica (15), Peru (16), and Taiwan (17) were the other collectivistic countries with low IDV scores. South Korea ranked 43rd with an IDV value of 18, indicating that collectivistic societal norms, beliefs, and behaviors were more likely to be valued. According to the results of Hofstede's survey (2001), people from more individualistic countries (i.e., high IDV scores) tended to uphold the following values: employees' personal lives (time), freedom and challenge in jobs, individualistic decisions, identity based more on the individual than the social system, emotional independence of individuals from institutions or organizations, nuclear or non-parent families, earlier independence of children, less conformity behavior, and treatment of pupils as individuals. Many researchers have examined the relationship between cultural orientation (e.g., individualism and collectivism) and creativity. They have focused in particular on exploring how these cultural environments might influence creative potential and why individualistic characteristics have been widely found to be more favorable in developing

creativity (Jack & Barry, 2005; Kharkhurin & Motalleebi, 2008; Lubart & Georgsdottir, 2004; Ng & Smith, 2004; Zha, Walczyk, Griffith-Ross, Tobacyk, & Walczyk, 2006).

Kharkhurin and Motalleebi (2008) examined the impact of sociocultural environments on creative potential among American, Russian, and Iranian college students. The three different countries were selected based on their distinctively different sociocultural environments: The United States was a typical individualistic country (i.e., where a person's unique qualities and achievement seem to be valued); Iran was perceived as a collectivistic country (i.e., where group values and membership are more likely to be favored); Russia was an intermediate country, including both individualistic and collectivistic characteristics. The findings indicate that the average scores of the Russian and American groups were higher than the Iranian group on creativity tasks, including the divergent thinking index, and on the norm-referenced Abbreviated Torrance Test for Adults (ATTA) (fluency and originality). Although this study did not explain why the Russian group showed higher scores than the American and Iranian students, it demonstrated that individualism might be more influential on creative potential than collectivism (Kharkhurin & Motalleebi, 2008).

Zha, Walczyk, Griffith-Ross, Tobacyk, and Walczyk, (2006) also found that American students scored significantly higher on creativity tasks (fluency, originality, elaboration, and titles) than Chinese students, strongly supporting the idea that cultural norm differences between the West (individualistic) and the East (collectivistic) can account for differences in creative potential. However, there was no significant relationship between creative potential and cultural orientation within each culture. In each group (i.e., American and Chinese), only one correlation (out of fifteen) was significant between the creativity test scores (five creativity factors) and the individualism-collectivism test scores (three factors). Therefore, the study confirmed that there

were significant cultural influences on creative potential (i.e., people from individualistic countries tended to show greater creative potential) but not within a cultural group (Zha et al., 2006).

Ng and Smith (2004) examined the relationships among cultural orientation (individualism vs. collectivism), teachers' attitude toward their students, and students' tendency to exhibit creative behavior. In this study, they compared teachers' attitudes toward their students in classrooms from two different countries: Singapore (collectivistic country) and Australia (individualistic country). The findings indicate that liberal-democratic teaching attitudes were significantly correlated to the values of individualism, whereas autocratic-conservative teaching attitudes were positively correlated to the characteristics of collectivism. The study results suggest that cultural orientation had a positive impact on liberal-democratic teaching attitudes and promoted creative but undesirable behaviors in the classroom. On the other hand, cultural orientation negatively influenced autocratic-conservative teaching attitudes and encouraging desirable but non-creative behaviors in the classroom. Ng and Smith (2004) also confirmed that the values of individualism were positively associated with promoting creativity.

Therefore, cultural orientation can influence creative potential and the development of creativity, but the impact of cultural orientation can vary depending on the grouping method (e.g., cross-cultural groups or same cultural groups). Triandis (2001) pointed out that individual differences can persist within the same culture:

> It should not be assumed that everybody in individualist cultures has all the characteristics of these cultures, and that everyone in collectivist cultures has the characteristics of those cultures. Rather, people sample from both the individualist and collectivist cognitive structures, depending on the situation. (p. 3)

The Role of Cognitive Flexibility in Creativity

According to Martin and Rubin (1995), *cognitive flexibility* refers to the way a person chooses how to behave. It consists of three conceptual components: awareness, willingness, and self-efficacy. Cognitively flexible people are aware of alternative behavioral paths in any given situation (*awareness*), and they are willing to be flexible in order to adapt to the situation (*willingness)*. Finally, they have *self-efficacy* in being flexible (Martin & Rubin, 1995). When such people are faced with various dilemmas, they tend to look for alternative solutions to their problems and feel that the strategies they employ are successful.

Cognitive flexibility is very useful in creative thinking because it helps an individual avoid rigid thinking. In other words, cognitively flexible individuals will consider alternative choices when they are solving problems. This ability will lead them to select and engage in creative processes when identifying problems and solving them (Isen, 2002; Russo, 2004; Silver, 1997; Treffinger, 1995).

The creativity theories proposed by Guilford (1987) and Runco (1991) mentioned the role of flexibility in creative ideation. Guilford (1987) explained individual differences in creative ability based on the following factors: sensitivity to problems, ideational fluency, flexibility of set, ideational novelty, synthesizing ability, analyzing ability, and evaluation ability. *Flexibility* (the opposite of rigidity) refers to the ability to consider new channels of thought. Regarding flexibility, Guilford (1987) included divergent production and transformations as primary categories in the Structure-of-Intellect Model for creative thinking. Divergent production is often required for open-ended problems (i.e., ones with multiple possible solutions). Transformations are necessary in response to changes in information and production, so they have special significance for creativity (Guilford, 1987).

Runco (2007) stated that creative people are more likely to be flexible because flexible individuals consider alternative options and solutions when solving problems. Thus, flexibility might play a role when individuals experiment with alternative ideas and new things (often unconventional ideas) in order to generate initiatives to find and solve various problems.

In addition, Torrance (1966) pointed out that flexibility, the ability to produce a number of different categories implied by ideas, is an important factor in assessing creative potential. When TTCT-F was initially developed in 1966, the test was scored using four indices: fluency, originality, flexibility, and elaboration. Flexibility was removed from TTCT-F because it correlated too highly with fluency (Ball & Torrance, 1984; Hébert et al., 2002; Torrance, 1990). The Torrance Test of Creative Thinking-Verbal Forms (TTCT-V) also measures fluency, originality, and flexibility.

The Role of Cognitive Flexibility in Bilingualism

Kharkhurin (2007) found that bilinguals tend to produce or create more elaborate cognitive structures. By contributing to their conceptual network in this way, bilinguals tend to be better at establishing distant associations (i.e., connecting concepts from distant categories). This process should make bilingual individuals better at creative tasks, such as divergent thinking tests, than monolingual speakers.

Kharkhurin (2007) also mentioned that bilinguals performed better than monolinguals on creative tasks based on cross-linguistic and cross-cultural experiences. Proficiency in both languages and early-age acquisition of both languages are essential for greater success in establishing distant associations. Early acquisition of both languages contributes to changes in bilingual memory, and this cognitive mechanism might facilitate divergent thinking.

The significant role of proficiency in both languages (cross-linguistic experiences) on bilinguals' higher attainment on creative tasks has been pointed out in several studies (Bialystok, 1988; Ianco-Worrall, 1972; Lambert, 1977; Peal & Lambert, 1962; Ricciardelli, 1992). Bilinguals are more likely to experience two cultures, unlike monolinguals, who are typically exposed to a single culture. The cross-cultural experiences of bilinguals cultivate cognitive advantages, such as mental flexibility (Peal & Lambert, 1962). This flexibility plays an important role in concept formation, which might lead to creative abilities. Ianco-Worrall (1972) also argued that greater metalinguistic awareness might facilitate cognitive flexibility.

CHAPTER 3

METHOD

Research Questions

Many researchers have noted the superiority of bilinguals on creative tasks (Kharkhurin, 2007, 2009; Konaka, 1997; Lasagabaster, 2000; Lee & Kim, 2010; Stone, 1993). Additionally, studies of bilingualism have revealed that bilinguals tend to have more advanced cognitive development than monolinguals (Bialystok et al., 2004; Kharkhurin, 2007; Ricciardelli, 1992).

Some studies have asserted that bilinguals perform better on creative tasks and cognitive tasks because they have greater mental flexibility. Peal and Lambert (1962) pointed out that bilinguals performed better on both verbal and non-verbal intelligence tests because they had greater mental flexibility than monolinguals. Bialystok (1988) found that bilinguals' cognitive flexibility could be attributed to their meta-linguistic awareness, enabling them to perform better on meta-linguistic tasks.

In other studies (Kharkhurin, 2007; Lee & Kim, 2010), language proficiency in two languages and age of language acquisition were considered important factors that might facilitate divergent thinking abilities. Lee and Kim (2010) found positive relationships between bilingual proficiency and creative abilities. More balanced bilinguals tended to do better on creative tasks than monolinguals or non-balanced bilinguals. Balanced bilingual individuals showed a high level of competence in two languages, while non-balanced bilingual individuals showed a high level of competence in only one of their two languages (Lee & Kim, 2010; Ricciardelli, 1992).

While some scholars have focused on bilingualism, others have studied the influence of cultural orientation (e.g., individualism vs. collectivism) on creativity. Several studies have shown that people from individualistic societies performed better on divergent thinking ability tests than people from collectivistic societies (Jack & Barry, 2005; Kharkhurin & Motalleebi, 2008; Ng & Smith, 2004; Zha, Walczyk, Griffith-Ross, Tobacyk, & Walczyk, 2006).

However, previous studies focused on bilingualism or cultural orientation to examine how they influence creative and cognitive abilities. The current study, in contrast, examined the relationships between creativity and both variables: (a) the degree of bilingualism, including multicultural experience, and (b) cultural orientation (i.e., collectivism vs. individualism). In addition, the current study determined whether cognitive flexibility, which might be facilitated by bilingualism, directly or indirectly mediates these relationships.

The following research questions were investigated in this study:

RQ1: Is the degree of bilingualism associated with creativity?

RQ2: Is the degree of bilingualism associated with cognitive flexibility?

RQ3: Is cognitive flexibility associated with creativity?

RQ4: Does cognitive flexibility mediate the relationship between the degree of bilingualism and creativity?

RQ5: Is cultural orientation (collectivism vs. individualism) associated with creativity?

RQ6: Is cultural orientation (collectivism vs. individualism) associated with cognitive flexibility?

RQ7: Does cognitive flexibility mediate the relationship between cultural orientation (collectivism vs. individualism) and creativity?

RQ8: Is multicultural experience associated with creativity?

RQ9: Is multicultural experience associated with cognitive flexibility?

RQ10: Does cognitive flexibility mediate the relationship between multicultural experience and creativity?

RQ11: Is second language acquisition age associated with creativity?

RQ12: Is second language acquisition age associated with cognitive flexibility?

RQ13: Does cognitive flexibility mediate the relationship between second language acquisition age and creativity?

RQ14: Which variable best predicts cognitive flexibility?

Figure 3.1 explains the overview of the research questions. Each independent variable (bilingualism, multicultural experience, second language acquisition age, and cultural orientation) was separately analyzed.

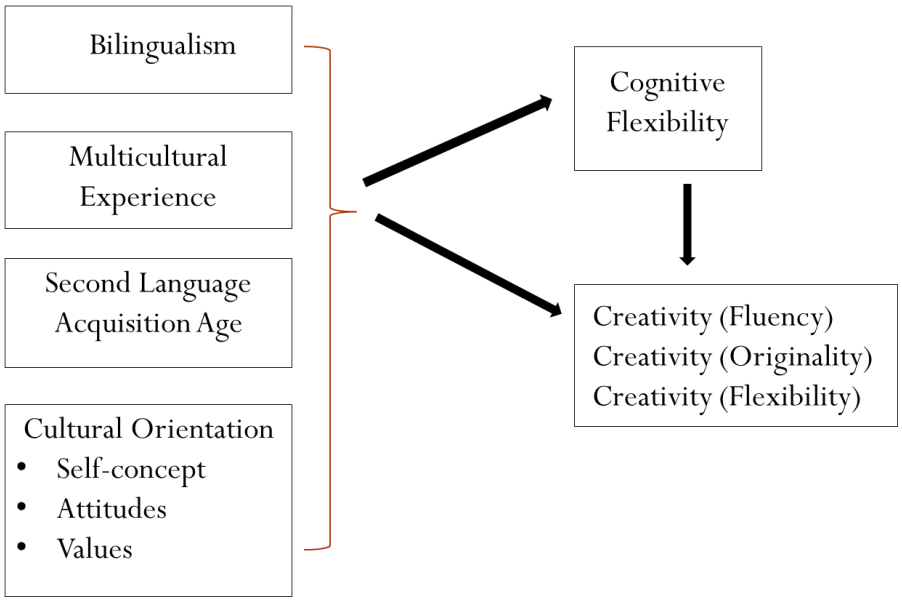

Figure 3.1. Overview of the research questions.

Participants

The target population included college students who spoke both Korean and English. Recruitment was conducted at the three universities in South Korea. Any college student in

South Korea was eligible to participate in this study because Korean students typically start learning English as a second language by middle school, if not earlier. At present, students in Korea begin learning English at an even younger age because of the high educational goals their parents have for them.

Although the age at which they begin learning English varies, all Korean students have opportunities to acquire English as a second language from a young age. Therefore, all Korean college students were good candidates for this study in terms of their ability to reveal different levels of bilingual proficiency in Korean and English. The wide range of bilingual abilities in this pool of students was considered an effective way to generate inquiry about any possible relationships among the variables. The sample included 89 participants aged 19 to 47 years (M = 23.89, SD = 4.11); approximately 60% of the participants were women (n = 55).

To facilitate data collection, a recruitment letter was sent to undergraduate and graduate students using their school email addresses, with the permission of faculty members at the three universities located in Kwangju and Seoul in South Korea. The recruitment letter included a brief explanation of the survey, including participant eligibility, identity confidentiality, and voluntary participation. Once students agreed to participate in this survey, they were granted access to the online survey.

Data collection was accomplished by means of online surveys to avoid the time and cost of traveling to and living in South Korea for the duration of the study and to provide a more comfortable environment for the participants. The online survey method has become a highly valued tool, allowing researchers to obtain large data sets, even when respondents live in distant places around the world (Evans & Mathur, 2005; Scholl, Mulders, & Drent, 2002). Evans and Mathur (2005) pointed out that “speed and timeliness” and “convenience” are the major

strengths of online surveys, along with "global reach," "low administration cost," and "technological innovations." In a similar vein, Wallach and Kogan (1965) emphasized two important processing features while they were assessing children's creativity: "freedom from time pressure" and "a game-like rather than examination or test setting" (p. 20). Wallach and Kogan (1965) used surveys to avoid having to administer a test to a large number of students in a classroom setting and having to impose a time limit. In light of these precedents, online surveys were considered an adequate method to collect data from people living abroad, and their administration outside a classroom setting and without imposed time limits made them a better assessment of creative ability.

The participation consent script, attached to the first page of the survey, detailed the survey contents, survey length, and possible insecurity of Internet communication. Participants were asked to click "YES" if they agreed to the conditions and wished to participate in the study and "NO" if they did not agree to the conditions and did not wish to participate. The online survey began only if the participant agreed with the consent script. If a participant disagreed, he or she was asked to close the window and exit the survey. This survey took place during a single online session and took approximately 45 minutes to complete.

Instruments

The variables included in the survey were degree of bilingualism, cognitive flexibility, cultural orientation (individualism vs. collectivism), creativity, and demographic and personal information (gender, age, length of time visiting foreign countries, and age of second language acquisition). All participants were asked to complete the Word Association Test (WAT), which measured their levels of bilingual proficiency. The study did not have any treatment conditions or control groups. Participants also completed the Divergent Thinking Test (DT) and the

Individualism-Collectivism Test (I-CT), which measured their creative potential and cultural orientation, respectively. The five measurements and self-report used in this study are detailed in the following sections.

Runco Ideational Behavior Scale—Flexibility Version (RIBS)

This instrument is a short version of the Runco Ideational Behavior Scale (Runco, Plucker, & Lim, 2001). The original version of the RIBS consists of 93 items on a five-point Likert-type response scale that measures different kinds of ideational behaviors. The RIBS was initially created by Runco (2001) to examine individual ideational skills (e.g., use of ideas, appreciation of ideas) in more depth. The Cronbach's alpha was reported as .91. The discriminant validity of the RIBS was demonstrated using the Basadur scales (Runco & Basadur, 1993). The Basadur scales, which contain 14 self-report items, measure attitudes toward openness to divergence (eight items) and tendencies toward premature closure (six items), both of which facilitate creative thought. The correlations were reported as .32 (p = .003) and .34 (p = .001) between RIBS and the Premature Closure Scale and between RIBS and the Openness to Divergence Scale, respectively. More importantly, the shared variance of the RIBS and the Basadur scales was identified as 10-12%.

The short version of the RIBS includes 28 items on a response scale ranging from 0 to 4 (0 = never, 1 = approximately once a year, 2 = once or twice each month, 3 = once or twice each week, and 4 = just about every day and sometimes more than once each day). The items included statements such as I am faced with a problem and take my time exploring various options and alternative solutions; I work out new ways to solve a problem; I have ideas for arranging or rearranging the furniture at home, etc. Six out of the twenty-eight items are reverse-coded items (e.g., I have problems thinking of gifts for my family and friends; When making things, I stick to

plans; I do not improvise if someone has prepared plans; and Someone tells me how to do something, but I think of different ways to get it done.).

In the current study, all 28 items from the short version of RIBS were used to measure cognitive flexibility. Among the 28 items, scores from 22 non-reverse-coded items out of 28 were analyzed because participants failed to respond to the six reverse-coded items consistently. The coefficient alpha of the RIBS with 22 items was .80. The cognitive flexibility scores were calculated by averaging the item scores, a higher average score indicating more cognitive flexibility.

The Word Association Test (WAT)

One of the most widely used tool to determine degrees of bilingualism, WAT measures the level of language proficiency in two languages through word association (Lambert, 1956; Lee & Kim, 2010; Peal & Lambert, 1962). Sixteen English words were drawn from Lambert's list, and sixteen Korean words were chosen based on the Korean frequency report (Lee & Kim, 2010; National Korean Research Institute, 2005).

Adequate inter-rater reliability was reported in the literature as ranging from .68 to .82 (Wiig, Semel, & Secord, 1992). Lambert (1956) attempted to attain construct validity, which refers to the degree to which a test or scale is considered an appropriate operational definition of the construct. He demonstrated how WAT was adequately constructed to assess the developmental aspects of second language acquisition by collecting the associational responses to stimulus words given in two languages. Moreover, he asserted that this method would assess the more spontaneous and active aspects of language that can be used to measure degrees of bilingualism. WAT was created in order to measure people's developmental stages in two languages: English and French (Lambert, 1956). Sixteen words (eight nouns and eight adjectives)

from each language were chosen as the stimuli to assess word association ability. The nouns were categorized into "concrete" or "abstract." If the object a word represented was tangible, it was classified as concrete. If not, it was classified as abstract. One minute was given per stimulus.

In the current study, WAT consisted of two language tests (English and Korean) using a total of 32 words. The coefficient alpha of WAT with 32 words was .95. Each language test measured proficiency in its respective language by providing 16 stimuli. The stimuli were composed of two different parts: eight nouns and eight adjectives. Therefore, participants were provided with eight English nouns, eight English adjectives, eight Korean nouns, and eight Korean adjectives. The eight English nouns and eight Korean nouns included four concrete words and four abstract words each. The allowed interval between each stimulus was 1 minute; thus, participants were given 16 minutes to write down their associative responses for each English word and another 16 minutes to do the same for each Korean word. Participants were asked to think of as many words as they could that were associated with the given words (see Table 3.1).

Table 3.1

Word Association Test (WAT) Word List

	English (16 words)	Korean (16 words)
Nouns		
Concrete	Garden, Food, Child, House	사람 (People), 집 (House), 학교 (School), 어머니 (Mother)
Abstract	Thought, Honor, Peace, Idea	마음 (Mind), 생각 (Thought), 시간 (Time), 사랑 (Love)
Adjectives		
	Happy, Large, Little, Sad, Rich, Strong, Bad, Dear	좋은 (Good), 새로운 (New), 큰 (Big), 중요한 (Important), 어려운 (Difficult), 쉬운 (Easy), 높은 (High), 작은 (Small)

First, the English and Korean scores were calculated by adding up the number of correctly associated words listed by each participant. To determine a participant's degree of bilingualism in the two languages used in WAT, the following equation model, modified by Peal and Lambert (1962), was used:

$$\text{Balance} = \frac{Sum\ of\ English - Sum\ of\ Korean}{Sum\ of\ English + Sum\ of\ Korean} \times 100$$

A positive balance score meant that the subject was English dominant, a negative balance score meant that the subject was Korean dominant, and a zero score indicated a perfect balance between English and Korean. Therefore, a smaller absolute balance score represented a greater degree of bilingualism in Korean and English. In other words, people with smaller absolute balance score tend to be more balanced bilinguals. Some scholars have divided WAT scores into several groups to distinguish participants' bilingual abilities. For instance, Peal and Lambert (1962) classified participants into two groups based on the criterion scores. If a balanced score were greater than |75|, the subject was in the monolingual group. Monolinguals included subjects who had scores greater than +75 (English dominant) and subjects who had scores less than -75 (Korean dominant). A bilingual group was indicated by a balanced score from 0 to |30|. The criteria for denoting a balanced score were based on professional judgments (Peal & Lambert, 1962). Lee and Kim (2010) modified these criterion scores by dividing them into three groups: monolinguals, non-balanced bilinguals, and balanced bilinguals. Balanced bilingual scores were in the range of 0 to |20|, the score range for non-balanced bilinguals was |20| to |75|, and scores above |75| indicated that the participants were monolinguals.

In the current study, WAT scores were arranged as a continuum, rather than divided into discrete groups, such as balanced bilinguals or nonbalanced bilinguals. Accordingly, a smaller absolute WAT score indicated a higher level of bilingualism. Moreover, data were analyzed

using linear regression instead of group comparison, the latter of which has been pervasively used in bilingualism studies.

The Divergent Thinking Test

DT includes open-ended questions for which there are multiple answers and solutions. Wallach and Kogan (1965) used several divergent thinking items to assess children's creative potential, including instances, alternate uses, similarities, and line meanings. The instances, alternate uses, and similarities are verbal divergent thinking items, and line meanings are figural items. Instances might include "Name all the round things you can think of" and "Name all the things you can think of that will make a noise"; Alternate uses might include "Tell me all the different ways you could use a newspaper," "Tell me all the different ways you could use a shoe," and "Tell me all the different ways you could use an automobile tire—either the tube or the outer part"; and Similarities might include "Tell me all the ways in which a potato and a carrot are alike," "Tell me all the ways in which a grocery store and a restaurant are alike," and "Tell me all the ways in which a cat and a mouse are alike."

Open-ended tasks, such as DT (Wallach & Kogan, 1965), have shown relatively high inter-item reliability (typically > .60) and inter-rater reliability (typically > .80) (Runco, 1991; Runco, Dow, & Smith, 2006). In addition, the social validity of DT was demonstrated by Runco (1984); specifically, the DT scores were significantly related to teachers' evaluations of student creativity. The predictive validity of the test has also been examined in several studies (e.g., Kogan & Pankove, 1972, 1974; Wallach & Wing, 1969). For example, Kogan and Pankove (1972) showed that DT scores correlated with students' extracurricular activities and achievements in their 5-year follow-up study.

In the current study, three DT questions from the Wallach and Kogan Instances Test (1965) were used to measure creative potential: (a) “List as many things as you can think of that are square,” (b) “List as many things as you can think of that are strong,” and (c) “List as many things as you can think of that move on wheels.” Each question produced scores for three indicators of creativity (fluency, originality, and flexibility). The average score for the three DT questions of each indicator was used. The coefficient alphas for the three DT questions were .77 (fluency), .62 (originality), and .60 (flexibility).

In the current study, the fluency score was the number of relevant ideas. Originality was the number of unique or unusual responses. Flexibility was the number of different categories represented. For instance, if a subject responded to a question as follows, the fluency score for Question 1 would be “8.”

(Example) Question 1: List as many things as you can think of that are square.

Responses: dice, cheese, clock, CD case, QR code, paper, cushion, and tile

The composite fluency score was the average fluency score of the three DT questions (instances of things that are square, are strong, and move on wheels).

For originality, the method of assigning originality scores for unusual ideas was used (Milgram & Milgram, 1976). “Unusual idea” was defined as a response provided by only one or two participants (i.e., less than 3% of the entire sample $N = 89$). Participants received one point for each response given by only one or two participants. The composite originality score was the average originality score of the three DT questions.

Various alternative methods for originality scoring on DT tests have been used in previous research. Some scholars assigned one originality point for responses answered by only one person (statistically unique ideas), while others determined the originality of ideas based on

the judgments of a few raters (Christensen, Guilford, & Wilson, 1957; Wilson et al., 1953; Grohman, Wodniecka, & Klusak, 2006; Harington, 1975). When a sample size was very small, fairly typical ideas would sometimes count as original if the researchers assigned originality scores to unique ideas or unusual ideas. In contrast, an original idea might not be considered original in a large group if the researchers only counted statistically unique ideas. In both cases, originality scores depended on sample size (Silvia et al., 2008).

In the previous example (Question 1: instances of things that are square), "QR code" was only provided by one or two of the participants in this study. Several people suggested dice, cheese, clock, CD case, paper, cushion, or tile as things that are square, so these objects were not counted as original responses. Thus, the originality score of this example response was "1." In other example responses to "things that are square," "board game" was unusual, while "box" was not; "boxing ring" was unusual, while "cube sugar" was not; "jello" was unusual, while "frame" was not. In response to "things that move on wheels," "moving dolly" was unusual, while "bus" was not; "flower pot" was unusual, while "bicycle" was not; "piano" was unusual, while "wagon" was not. Lastly, in response to "things that are strong," "shark" was unusual, while "tiger" was not; "dictator" was unusual, while "myself" was not; "mother's instinctive love" was unusual, while "willpower" was not.

The flexibility score was determined by the absolute number of categories or themes represented in a participant's responses. In other words, it indicated the tendency to generate ideas from a variety of categories (Runco, 1986; Runco & Okuda, 1991). If a participant's answers included things like "cheese, a cube of sugar, toast, and cracker" for "things that are square," the flexibility score would be "1." All of the responses from that participant would be from one category: food. The flexibility score of the previous example (Question 1: instances of

things that are square) was “5” because the responses fell into five different categories: toys and games (dice), food (cheese), home improvement (clock, cushion, tile), technology (CD case, QR code), and office supplies (paper). In the current study, 12 categories for question 1 (things that are square), 8 categories for question 2 (things that move on wheels), and 10 categories for question 3 (things that are strong) emerged from the participants’ responses (see Table 3.2). A higher number of categories in a subject’s responses received a higher creative flexibility score. The composite flexibility score of each participant was determined by the average flexibility score of the three DT questions.

Table 3.2

Divergent Thinking Test Categories for Flexibility Scores

DT Questions	Categories
Q1 (List as many things as you can think of that are square)	apparel/jewelry, education, electronics, food, furniture, home improvement, humans, office supplies, places, signs/symbols, technology, and toys/games
Q2 (List as many things as you can think of that move on wheels)	automobiles, electronics, entertainment, furniture, non-mechanical transportation, toys/tools, vehicles (for construction), vehicles (for passengers), and weapons
Q3 (List as many things as you can think of that are strong)	animals, entertainment, food/drugs, human body, human emotions, man-made, nature (not animals), social processes, superheroes, and weapons

The Individualism/Collectivism Test

The I-CT consists of three sub-tests: (a) Self-Concept, (b) Attitudes, and (c) Values (Triandis, 1995). The Self-Concept subtest includes one question—"Who am I?"—which is designed to elicit 20 answers of the type "I am _____." The answers are typically analyzed according to two categories: social responses and nonsocial responses. A higher number of social responses imply greater collectivism. The Attitude Test is a 9-point Likert scale consisting of 14 items, such as "I would help within my means if a relative told me that he or she is in financial difficulties," "One of the pleasures of life is to be related interdependently with others," and "When faced with difficult personal problems, one should consult one's friends and relatives widely." Participants choose one of the numbers on the scale based on the extent to which they agree or disagree with each item (1 = disagree or false; 9 = agree or true). The Value Test is a self-evaluation questionnaire consisting of 10 items rated on a nine-point Likert scale. Participants were asked to rate how much they value items such as national security (protection of my nation from enemies), freedom (my own freedom of action and thought), and honoring parents and elders (showing respect) (1 = not at all important; 9 = supremely important).

The reliability coefficients for internal consistency reported in previous studies were as follows: Self-Concept (.93), Attitudes (.74), and Values (.85) (Zha et al., 2006). Zha et al. (2006) also ascertained that American graduate students received higher scores for individualism than Chinese graduate students did on all three subscales. This result is consistent with Hofstede's (2001) country index, according to which the United States had an individualism index score of 91 and China had a score of 20. This consistency appears to confirm I-CT's criterion-related validity.

In the current study, the I-CT scores came from three different subtests (i.e., Self-Concept, Attitudes, and Values). Participants were asked to write down 20 different responses to the

question “Who am I?” for the Self-Concept subtest. Responses about personal appearance and personality were considered nonsocial, while responses related to culture, education, career, and communication were considered social. For instance, responses such as “I am 175 cm tall,” “I am 22 years old,” “I am artistic,” “I am generous,” and “I am a girl” were categorized as nonsocial (i.e., representing individualism). Responses such as “I am a son,” “I am a student,” “I am Korean,” “I am a friend,” “I am a basketball player,” and “I am a smart phone user,” all of which imply relationship to others, were categorized as social (i.e., representing collectivism). After the 20 items were identified as social or nonsocial, each response received one point for is respective category. The individualistic score was the sum of nonsocial responses, and the collectivistic score was the sum of social responses.

Both the Attitudes subtest (14 items) and the Values subtests (10 items) each used nine-point Likert scales. Participants were asked to rate each item (1 = disagree; 9 = agree) based on their values and conceptual beliefs. Even-numbered items on each subtest were related to collectivism, and odd-numbered items were related to individualism. Therefore, the collectivistic score was obtained by adding up the ratings for the even-numbered items, and the individualistic score was obtained by adding up the ratings for the odd-numbered items. Each subscale (Self-Concept, Attitudes, and Values) consisted of both individualistic scores and collectivistic scores, so the following formula was used to obtain a ratio for each scale, representing a subject’s tendency toward on cultural orientation or the other. One point was added to each score to avoid having a numerator or denominator of zero. If a ratio was greater than 1, the participant was considered more likely to be individualistic. A ratio less than 1 represented a collectivistic tendency.

Self-Concept = (Individualistic Self-Concept +1)/(Collectivistic Self-Concept +1)

Attitude = (Individualistic Attitude +1)/(Collectivistic Attitude +1)

Values = (Individualistic Value +1)/(Collectivistic Value +1)

The Self-Report

This measurement asked participants to indicate when they started learning a second language and provide some information about other multicultural experience (e.g., "Have you ever been to a foreign country?" "How long have you stayed in foreign countries?" and "How long have you been learning your second language?"). It generally included questions about age, gender, living experiences in a foreign country, number of countries visited, and length of stay, and fluency level in English.

Data Analyses

In the current study, several statistical procedures were used to address the research questions. First, reliability was checked using the coefficient alpha. Internal consistency, using the coefficient alpha, was assessed in the items from each instrument (i.e., RIBS, WAT, and DT). The greater the consistency in the item responses, the higher the coefficient alpha was (between 0 and 1).

Before internal consistency estimates of reliability were conducted, an attempt was made to determine whether all items used the same metric and whether some of the items needed to be reverse-coded. In RIBS, six items (6, 15, 20, 21, 24, and 26) were reverse-codes before the coefficient alpha was computed. Also, descriptive statistics were checked to confirm that the data had no major anomalies. The reliability of RIBS (coefficient alpha = .70) was relatively low considering the number of items (28) in the scale. Item-Total statistics (i.e., Coefficient alpha if item deleted) were checked to determine any potentially problematic items that might lower reliability. The results showed that six reverse-coded items lowered reliability. This finding is

reasonable because some respondents might have not paid much attention to the reverse–coded items, responding to them as if they were non-reverse-coded items. The reliability of RIBS improved to .80 after the six reverse-coded items were removed.

The data in the current study were analyzed using a regression model in order to investigate, primarily, the effects of bilingualism on creativity and, secondarily, the effects of cultural orientation, multicultural experience, and second language acquisition age. The role of cognitive flexibility as a mediator of the relationship between the degree of bilingualism and creativity (fluency, originality, and flexibility), between cultural orientation (individualism vs. collectivism) and creativity, and between second language acquisition age and creativity was also examined. The mediator variable hypothesis is generally conducted when variables A (i.e., independent variable: IV) and B (i.e., dependent variable: DV) are causally related through a mediator variable (MV). In the current study, three mediation analyses were assessed: bilingualism (IV), creativity (DV), and cognitive flexibility (MV); multicultural experience (IV), creativity (DV), and cognitive flexibility (MV); and second language acquisition age (IV), creativity (DV), and cognitive flexibility (MV). (Mallinckrodt, Abraham, Wei, & Russell, 2006; Preacher & Hayes, 2004)

The bootstrapping method was selected to evaluate the mediation effect, rather than structural equation modeling (SEM). Though SEM might be a more rigorous method, it requires a large sample size (Savalei & Bentler, 2010), which this study lacks. Because the sample size of this study was only 89, SEM was not feasible. Bootstrapping is useful for a small sample (Preacher & Hayes, 2004) because it allows for and creates a large number of datasets by re-sampling multiple times. This technique can also be applied to non-normal data in order to reduce sampling errors. Because 5,000 bootstrap samplings and a 95% confidence interval are

commonly recommended analysis criteria (Preacher & Hayes, 2004), the current study fulfilled both to examine the mediation effect of cognitive flexibility. The bootstrap results show the direct and total effects among the variables, as well as the indirect effects (i.e., mediation).

CHAPTER 4

RESULTS

Descriptive Statistics

In the current study, the total number of participants was 89, including 34 males and 55 females. The descriptive demographic information of the participants is reported in Table 4.1.

Table 4.1

Self-Reported Descriptive Statistics

	Min	Max	*M*	*SD*	Number of Respondents
Age	19	47	23.89	4.11	89
Length of time abroad (in weeks)	0	1152	33.13	133.96	89
Number of countries visited	0	7	1.12	1.55	89
Age of the second language acquisition (English)	3	15	9.59	2.75	85
Fluency in English (1 = very basic, 5 = native level)	1	5	2.77	0.91	84

The mean age of the participants was 23.89 years (*SD* = 4.11). The average length of the time abroad of the participants was 33.13 weeks (*SD* = 133.96) in an average of 1.12 (*SD* = 1.55) different countries, including the United States, Canada, China, Turkey, Japan, Singapore, Iran, Spain, France, England, and others. Eighty-five participants reported that they had learned

English as a second language. The earliest reported age at which a participant started learning English was three years old. The average age was 9.59 years old (*SD* = 2.75). Eighty-four participants also described their fluency level in English, and the average level was 2.77 out of 5 (1 = very basic skills; 5 = very fluent). Because of the missing data for four participants for the question regarding the second language acquisition age and for five participants for the question regarding fluency in English, their data were removed from the dataset. This listwise deletion was acceptable because the missing data seemed to be random, and the effect of the change in sample size on the statistical power was considered to be very minimal.

The variables used to test the research questions were bilingualism, cognitive flexibility, creativity (fluency, originality, and flexibility), cultural orientation (individualism vs. collectivism), multicultural experience, and second language acquisition age. Descriptive statistics of the main variables are shown in Table 4.2

Table 4.2

Descriptive Statistics of Main Variables

Variable	*N*	Min.	Max.	*M*	*SD*
Degree of bilingualism (WAT)	89	0.00	100.00	26.38	18.94
Cognitive flexibility (RIBS)	89	2.05	4.18	3.13	0.43
Creativity (DT)					
Fluency	89	3.00	23.67	7.51	4.08
Square things	89	1.00	35.00	6.25	5.80
Things that move on wheels	89	3.00	25.00	8.58	3.96
Strong things	89	1.00	30.00	7.70	4.80

Table 4.2 *(continued)*

Variable	*N*	Min.	Max.	*M*	*SD*
Originality	89	0.00	8.00	1.21	1.40
Square things	89	0.00	15.00	1.60	2.66
Things that move on wheels	89	0.00	4.00	0.55	0.97
Strong things	89	0.00	8.00	1.46	1.55
Flexibility	89	2.33	8.00	3.98	1.21
Square things	89	1.00	10.00	3.65	1.97
Things that move on wheels	89	2.00	9.00	4.43	1.35
Strong things	89	1.00	7.00	3.87	1.53
Individualism/Collectivism (I-CT)					
Self-concept	88	0.47	21.00	3.45	4.41
Attitude	89	0.33	2.22	0.91	0.31
Values	89	0.78	5.00	1.15	0.44
Multicultural experience	89	0.00	2304.00	57.90	256.51
Second Language Acquisition age	85	3.00	15.00	9.59	2.75

Note. WAT = The Word Association Test, RIBS = Runco Ideational Behavior Scale-Flexibility version, DT = The Divergent Thinking Test, I-CT = The Individualism/Collectivism Test.

The mean score reported for WAT was 26.38, with a range of 0 to 100. The degree of bilingualism was based on the absolute score on WAT. The smaller the WAT score, the more balance the bilingualism was between Korean and English. Cognitive flexibility was measured using RIBS, which yielded a mean score of 3.13 on a 5-point Likert-type scale. Higher scores indicated greater cognitive flexibility. Creative potential was estimated using the three scores

obtained from DT (i.e., fluency, originality, and flexibility). Each criterion was determined by the average score of the three DT questions (square things, strong things, and things that move on wheels). The mean score for fluency was 7.51, with a range of 3 to 23.67 (*SD* = 4.08). The mean score for originality was 1.21 (*SD* = 1.40), and the mean score for flexibility was 3.98 (*SD* = 1.21). Cultural orientation (individualism vs. collectivism) was measured using three different subscales (Self-Concept, Attitude, and Values). According to the mean scores, the participants showed an individualistic tendency on Self-Concept (*M* = 3.45) and Values (*M* = 1.15) but a collectivistic tendency on Attitudes (*M* = .91). The score for multicultural experience was calculated by multiplying the total time spent abroad and the number of foreign countries visited. The average was 57.90, with a range of 0 to 2,304 (*SD* = 256.51). A reliability coefficient of measures was estimated using a coefficient alpha, which is one type of internal consistency estimate. The coefficient alpha was .80 for RIBS and .95 for WAT. The DT alphas for the three questions (square things, things that move on wheels, and strong things) were.77 for Fluency, .62 for Originality, and .60 for Flexibility. All of the coefficient alphas suggest that the scale scores were reasonably reliable. After the coefficient alphas were estimated, research questions 1 to 14 were analyzed one by one.

Results

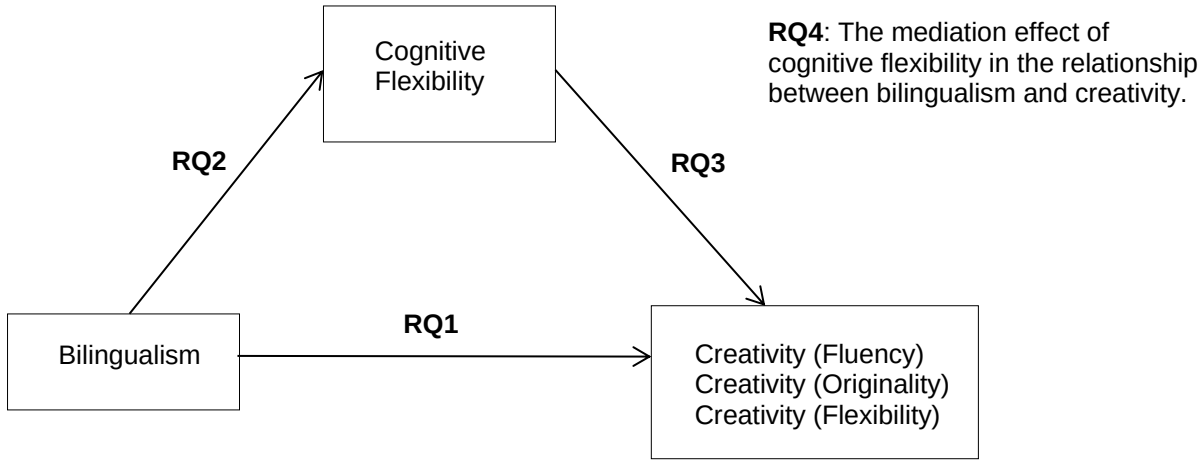

Figure 4.1. Research Questions 1-4: The relationships among bilingualism, cognitive flexibility, and creativity.

RQ1: Is the degree of bilingualism associated with creativity?

The regression results show that the degree of bilingualism was not significantly associated with any of the indicators of creativity (β = .10, *p* = .34 for fluency; β = .03, *p* = .75 for originality; and β = .06, *p* = .57 for flexibility; see Table 4.3), measured by DT.

Table 4.3

Simple Linear Regression Analyses Predicting Creativity (Fluency, Originality, and Flexibility, respectively) from Bilingualism

IV	DV	β	*t*	*p*
Bilingualism	Creativity (Fluency)	.10	.96	.338
Bilingualism	Creativity (Originality)	.03	.32	.751
Bilingualism	Creativity (Flexibility)	.06	.58	.566

Note. IV = Independent Variable, DV = Dependent Variable

RQ2: Is the degree of bilingualism associated with cognitive flexibility?

A linear regression analysis was conducted to evaluate the prediction of cognitive flexibility from bilingual ability. The WAT score was using the following formula as explained:

$$\text{Balance} = \frac{Sum\ of\ English - Sum\ of\ Korean}{Sum\ of\ English + Sum\ of\ Korean} \times 100$$

A positive WAT score means higher score for English than Korean. A negative WAT score means a higher score for Korean than English. This formula shows the balance of the two languages; therefore, the closer the WAT score is to zero, the more bilingually balanced the person is between English and Korean (i.e., smaller absolute WAT score = more balanced

bilingualism). The results show a significant negative relationship between the absolute WAT score and cognitive flexibility (β=-.27, $p < .05$; see Table 4.4).

Table 4.4

Simple Linear Regression Analysis Predicting Cognitive Flexibility from Bilingualism

IV	DV	β	*t*	*p*
Bilingualism	Cognitive Flexibility	-.27	-2.60	.011*

Note. $R^2 = .072$.
*$p < .05$.

The negative coefficient indicates a positive relationship between bilingualism and cognitive flexibility. The participants who were highly balanced bilinguals tended to have higher cognitive flexibility. This result suggests that approximately 7.2% of the variance in cognitive flexibility was accounted for by its linear relationship with the degree of bilingualism.

RQ3: Is cognitive flexibility associated with creativity?

A linear regression was conducted to examine how cognitive flexibility is associated with creativity. The regression analyses investigated the predictive power of each indicator of creativity (fluency, originality, and flexibility) independent of cognitive flexibility. The regression results indicate that cognitive flexibility was significantly associated with each criteria (β = .26, $p < .05$ for fluency; β = .24, $p < .05$ for originality; and β = .30, $p < .01$ for flexibility; see Table 4.5). A person who was more cognitively flexible tended to have higher scores in creative fluency, creative originality, or creative flexibility on the DT tests. The results suggest that approximately 6.7% of the variance in creative fluency, 5.8% of the variance in creative originality, and 9% of the variance in creative flexibility were explained by its linear relationship with cognitive flexibility.

Table 4.5

Simple Linear Regression Analyses Predicting Creativity (Fluency, Originality, and Flexibility) from Cognitive Flexibility

IV	DV	β	*t*	*p*
Cognitive Flexibility	Creativity (Fluency)	.26	2.49	.015*
Cognitive Flexibility	Creativity (Originality)	.24	2.32	.022*
Cognitive Flexibility	Creativity (Flexibility)	.30	2.93	.004**

Note. $R^2 = .067$ (Fluency); $R^2 = .058$ (Originality); $R^2 = .090$ (Flexibility).
*$p < .05$, **$p < .01$

RQ4: Does cognitive flexibility mediate the relationship between the degree of bilingualism and creativity?

Multiple regression analyses were conducted to assess how well the linear combination of the degree of bilingualism and cognitive flexibility in the regression analysis predicted each of indicators of creativity (fluency, originality, and flexibility).

Table 4.6

Multiple Regression Analyses Predicting Creativity (Fluency) from Bilingualism and Cognitive Flexibility

IV	DV	β	*t*	*p*
Bilingualism	Creativity (Fluency)	.19	1.75	.085
Cognitive Flexibility	Creativity (Fluency)	.31	2.92	.005**

Note. $R^2 = .099$, IV = Independent Variable, DV = Dependent Variable.
*$p < .05$, **$p < .01$.

The results show that the standardized regression coefficient between bilingualism and creative fluency was not statistically significant ($\beta = .19$, $p = .09$), controlling for cognitive

flexibility, but the degree of bilingualism did statistically predict cognitive flexibility (β = -.27, *p* < .05). Also, cognitive flexibility was positively associated with creative fluency (β = .31, *p* < .01) when controlling for the degree of bilingualism (see Table 4.6).

Table 4.7

Results of Bootstrap Method to Test Significance of Mediation Effects of Cognitive Flexibility on the Relationship between Bilingualism and Creativity (Fluency)

Path/Effect	*b*	*SE*	*P*	95% CI
Bilingualism → Creativity (Fluency)	.0399	.0229	.0845	
Bilingualism → Cognitive Flexibility	-.0061	.0024	.0109*	
Cognitive Flexibility → Creativity (Fluency)	2.9036	1.0020	.0048**	
Indirect Effect	-.0178	.0094	< .05	[-.0375, -.0006]

Note. *SE* = Standard Error, CI = Confidence Interval.
*$p < .05$, **$p < .01$.

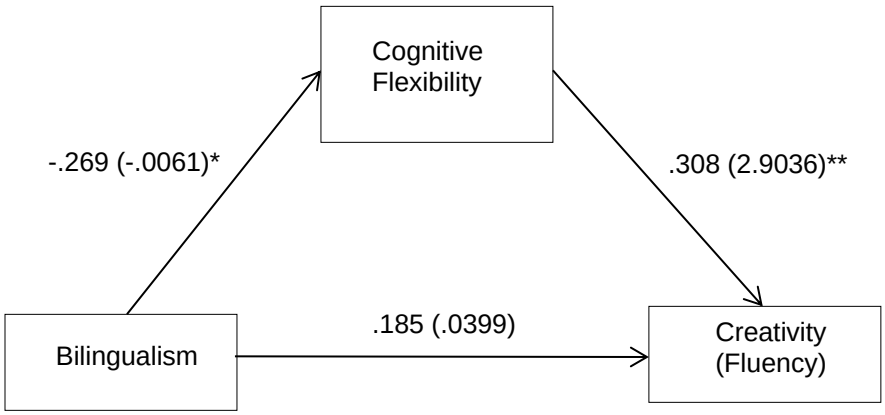

Figure 4.2. Mediation model with cognitive flexibility as a mediator between bilingualism and creativity (fluency). *N* = 89, Standardized coefficients are shown with corresponding unstandardized coefficients in parentheses.

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

Because of the significant association between degree of bilingualism and cognitive flexibility, and between cognitive flexibility and creative fluency, the bootstrapping method was used to investigate cognitive flexibility as a mediator, further describing the association between bilingualism and creativity. In other words, the statistical significance of the indirect effect of cognitive flexibility on the relationship between bilingualism and creativity (fluency) was tested.

The results of bootstrapping with unstandardized coefficients, shown in Table 4.7, indicate a full mediation effect based on the significant indirect effect ($\beta = -.08$, $p < .05$) and the non-significant direct effect ($\beta = .19$, $p = .09$); the standardized indirect effect was $(-.269) \times (.308) = -.08$ (see Figure 4.2). The confidence interval did not include 0, so the indirect effect was considered significant, and the mediation effect was significant. That is, the degree of bilingualism did not directly predict creative fluency when controlling for cognitive flexibility; however, bilingualism did significantly influence creative fluency through cognitive flexibility.

Table 4.8

Multiple Regression Analysis Predicting Creativity (Originality) from Bilingualism and Cognitive Flexibility

IV	DV	β	*t*	*p*
Bilingualism	Creativity (Originality)	.11	.99	.325
Cognitive Flexibility	Creativity (Originality)	.27	2.50	.014*

Note. $R^2 = .069$, IV = Independent Variable, DV = Dependent Variable.
*$p < .05$.

For creative originality, the results show that the degree of bilingualism was not significantly associated with creative originality ($\beta = .11$, $p = .33$) but that cognitive flexibility

statistically predicted creative originality (β = .27, $p < .05$) when controlling for the degree of bilingualism (see Table 4.8).

Table 4.9

Results of Bootstrap Method to Test Significance of Mediation Effects of Cognitive Flexibility on the Relationship between Bilingualism and Creativity (Originality)

Path/Effect	*b*	*SE*	*p*	95% CI
Bilingualism → Creativity (Originality)	.0081	.0082	.3252	
Bilingualism → Cognitive Flexibility	-.0061	.0024	.0109*	
Cognitive Flexibility → Creativity (Originality)	.8954	.3576	.0142*	
Indirect Effect	-.0055	.0033	< .05	[-.0127, -.0001]

Note. *SE* = Standard Error, CI = Confidence Interval.
*$p < .05$.

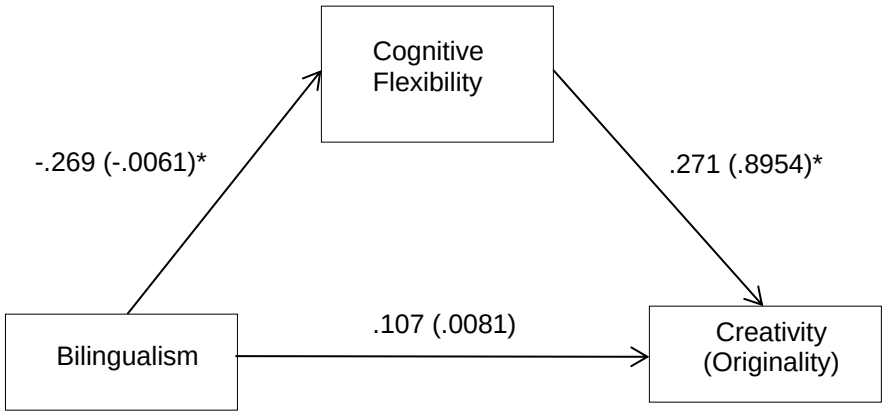

Figure 4.3. Mediation model with cognitive flexibility as a mediator between bilingualism and creativity (originality). *N* = 89, Standardized coefficients are shown with corresponding unstandardized coefficients in parentheses.

*$p < .05$.

The bootstrapping method was also used to test the significance of this indirect effect of cognitive flexibility as a mediator (5,000 bootstrapped samples and a 95% confidence interval). The results of bootstrapping with unstandardized coefficients for each path, shown in Table 4.9, demonstrate that the direct effect of the degree of bilingualism on creative originality, controlling for cognitive flexibility, was not statistically significant (β = .11, p = .33), but the indirect effect was significant (β = -.07, p < .05); the standardized indirect effect was (-.269) × (.271) = -.07 (see Figure 4.3). The results show a full mediation effect, which includes a significant indirect effect and a non-significant direct effect, so cognitive flexibility was shown to mediate the influence of bilingualism on creative originality.

Table 4.10

Multiple Regression Analyses Predicting Creativity (Flexibility) from Bilingualism and Cognitive Flexibility

IV	DV	β	*t*	*p*
Bilingualism	Creativity (Flexibility)	.15	1.45	.150
Cognitive Flexibility	Creativity (Flexibility)	.34	3.23	.002**

Note. R^2 = .122, IV = Independent Variable, DV = Dependent Variable.
*p < .05, **p < .01.

Last, regression analysis was conducted to determine the mediation effect of cognitive flexibility between degree of bilingualism and creative flexibility. The results indicate that bilingualism was not a significant predictor of creative flexibility (β = .15, p = .15) when controlling for cognitive flexibility. The degree of bilingualism was significantly associated with cognitive flexibility (β = -.27, p < .05), and cognitive flexibility was a significant predictor of creative flexibility when controlling for the degree of bilingualism (β = .34, p < .01; see Table

4.10). This indirect effect was investigated to determine the mediating role of cognitive flexibility.

Table 4.11

Results of Bootstrap Method to Test Significance of Mediation Effects of Cognitive Flexibility on the Relationship between Bilingualism and Creativity (Flexibility)

Path/Effect	*b*	*SE*	*p*	95% CI
Bilingualism → Creativity (Flexibility)	.0098	.0068	.1499	
Bilingualism → Cognitive Flexibility	-.0061	.0024	.0109*	
Cognitive Flexibility → Creativity (Flexibility)	.9572	.2962	.0017**	
Indirect Effect	-.0059	.0032	< .05	[-.0127, -.0002]

Note. *SE* = Standard Error, CI = Confidence Interval.
*$p < .05$, **$p < .01$.

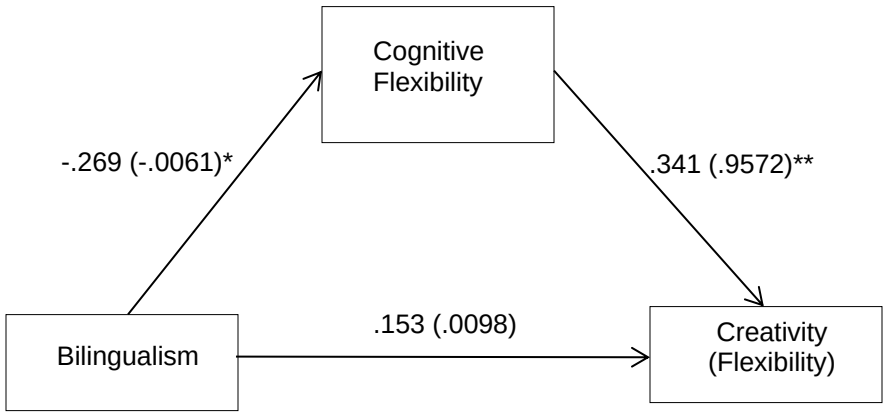

Figure 4.4. Mediation model with cognitive flexibility as a mediator between bilingualism and creativity (flexibility). *N* = 89. Standardized coefficients are shown with corresponding unstandardized coefficients in parentheses.

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

The results of bootstrapping with unstandardized coefficients for each path, shown in Table 4.11, show a full mediation effect with a significant indirect effect (β = -.09, $p < .05$) and a non-significant direct effect (β = .15, $p = .15$); the standardized indirect effect was (-.269) × (.341) = -.09 (see Figure 4.4). Therefore, cognitive flexibility mediated the prediction of creative flexibility by the degree of bilingualism.

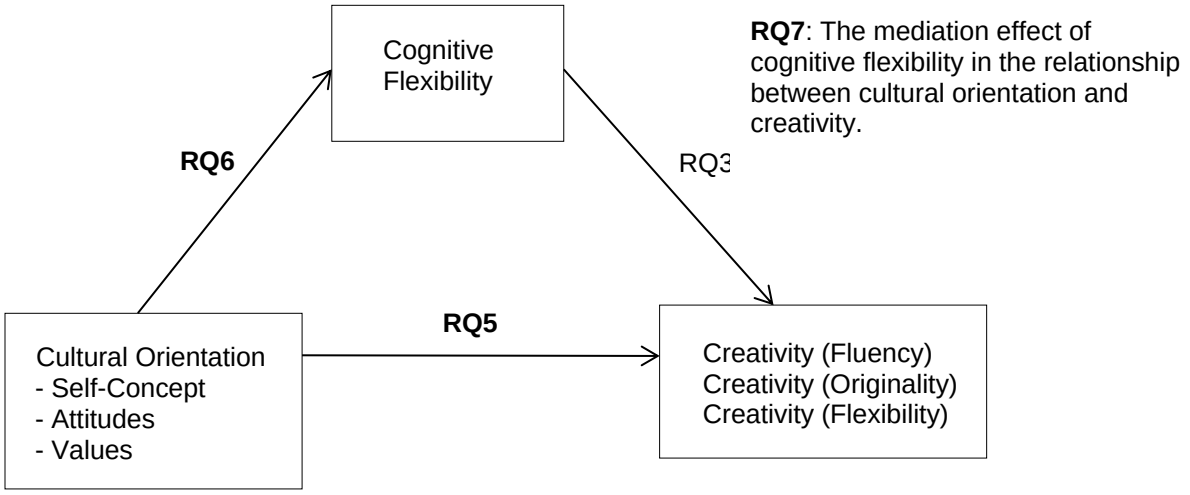

Figure 4.5. Research Questions 5-7: The relationships among cultural orientation, cognitive flexibility, and creativity.

RQ5: Is cultural orientation (collectivism vs. individualism) associated with creativity?

Linear regression analyses were conducted to investigate the relationship between cultural orientation (individualism vs. collectivism) and creativity. Three subtests (Self-Concept, Attitudes, and Values) were used to measure the degree of individualism or collectivism, and three criteria of DT (fluency, originality, and flexibility) were used to predict creative potential. Therefore, regression analyses were conducted to predict each criterion from each subtest. The results show that there was no significant relationship between self-concept and fluency (β = .07, $p = .53$), self-concept and originality (β = .04, $p = .73$), self-concept and flexibility (β = .11, $p = .29$), attitude and fluency (β = -.15, $p = .15$), attitude and originality (β = -.16, $p = .13$), attitude

and flexibility (β = -.17, *p* = .12), values and fluency (β = -.04, *p* = .68), values and originality (β = -.07, *p* = .53), or values and flexibility (β = -.01, *p* = .97). The results indicate that cultural orientation was not significantly associated with creativity (see Table 4.12).

Table 4.12

Simple Linear Regression Analyses Predicting Creativity (Fluency, Originality, and Flexibility) from Cultural Orientation of Collectivism and Individualism

IV	DV	β	*t*	*p*
Self-Concept	Creativity (Fluency)	.07	.63	.53
Self-Concept	Creativity (Originality)	.04	.35	.73
Self-Concept	Creativity (Flexibility)	.11	.06	.29
Attitudes	Creativity (Fluency)	-.15	-.44	.15
Attitudes	Creativity (Originality)	-.16	-.54	.13
Attitudes	Creativity (Flexibility)	-.17	-.57	.12
Values	Creativity (Fluency)	-.04	-.41	.68
Values	Creativity (Originality)	-.07	-.63	.53
Values	Creativity (Flexibility)	-.01	-.04	.97

Note. N = 89, IV = Independent Variable, DV = Dependent Variable.

RQ6: Is cultural orientation (collectivism vs. individualism) associated with cognitive flexibility?

Linear regression analyses were conducted to evaluate the relationship between cultural orientation (individualism vs. collectivism) and cognitive flexibility: self-concept and cognitive flexibility (β = .50, *p* = .64), attitude and cognitive flexibility (β = - .17, *p* = .12), and values and

cognitive flexibility (β = -.06, *p* = .58). The results indicate that cultural orientation was not statistically associated with cognitive flexibility (see Table 4.13).

Table 4.13

Simple Linear Regression Analyses Predicting Cognitive Flexibility from Cultural Orientation of Collectivism and Individualism

IV	DV	β	*t*	*p*
Self-Concept	Cognitive Flexibility	.05	.47	.64
Attitude	Cognitive Flexibility	-.17	-1.59	.12
Values	Cognitive Flexibility	-.06	-.55	.58

Note. N = 89, IV = Independent Variable, DV = Dependent Variable.

RQ7: Does cognitive flexibility mediate the relationship between cultural orientation (collectivism vs. individualism) and creativity?

Examining the mediation effect of cognitive flexibility was not necessary based on the findings for RQ5 and RQ6.

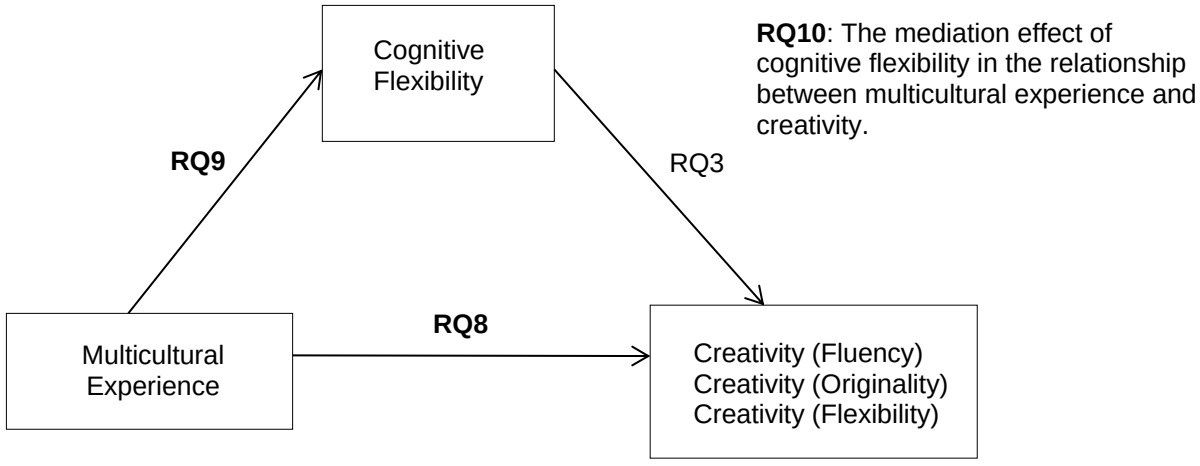

Figure 4.6. Research Questions 8-10: The relationships among multicultural experience, cognitive flexibility, and creativity.

RQ8: Is multicultural experience associated with creativity?

Linear regression analyses were conducted to determine whether multicultural experience predicted creativity. The results show that multicultural experience, defined as the number of foreign countries visited multiplied by the total time spent abroad, was statistically associated with the three indicators of creativity ($\beta = .27$, $p < .05$ for fluency; $\beta = .29$, $p < .01$ for originality; and $\beta = .27$, $p < .05$ for flexibility; see Table 4.14). These results indicate that creativity was significantly associated with an individual's multicultural experience. A person who had a great deal of multicultural experience was more likely to show higher creativity potential. Approximately 7.1% of the variance in fluency, 8.5% of the variance in originality, and 7.3% of the variance in flexibility was accounted for by multicultural experience.

Table 4.14

Simple Linear Regression Analyses Predicting Creativity (Fluency, Originality, and Flexibility) from Multicultural Experience

IV	DV	β	*t*	*p*
Multicultural Experience	Creativity (Fluency)	.27	2.56	.012*
Multicultural Experience	Creativity (Originality)	.29	2.83	.006**
Multicultural Experience	Creativity (Flexibility)	.27	2.61	.011*

Note. $R^2 = .071$ (Fluency); $R^2 = .085$ (Originality); $R^2 = .073$ (Flexibility), IV = Independent Variable, DV = Dependent Variable.
*$p < .05$, **$p < .01$.

RQ9: Is multicultural experience associated with cognitive flexibility?

The results of the regression analysis showed that multicultural experience was positively associated with cognitive flexibility ($\beta = .30$, $p < .01$). Approximately 8.8% of the variance in cognitive flexibility was explained by its linear relationship with multicultural experience. The

results suggest that a person who had a great deal of multicultural experience tended to show more cognitive flexibility (see Table 4.15).

Table 4.15

Simple Linear Regression Analysis Predicting Cognitive Flexibility from Multicultural Experience

IV	DV	β	*t*	*p*
Multicultural Experience	Cognitive Flexibility	.30	2.89	.005*

Note. $R^2 = .088$, IV = Independent Variable, DV = Dependent Variable.
*$p < .05$.

RQ10: Does cognitive flexibility mediate the relationship between multicultural experience and creativity?

According to multiple regression analyses, the combination of multicultural experience and cognitive flexibility predicted creativity (fluency, originality, and flexibility). The results indicate that multicultural experience was positively associated with cognitive flexibility (β = .30, $p < .01$). Multicultural experience was not significantly associated creative fluency (β = .20, $p = .05$) when controlling for cognitive flexibility. However, it was marginally significant at $p = .10$. Cognitive flexibility was not statistically associated with creative fluency (β = .21, $p = .05$) at the .05 level, but it was marginally significant at the .10 level when controlling for multicultural experience (see Table 4.16).

Statistically significant associations emerged between multicultural experience and cognitive flexibility and between cognitive flexibility and creative fluency (marginally significant). Therefore, bootstrapping was conducted to examine the role of cognitive flexibility

as a mediator between multicultural experience and creative fluency (95% confidence interval and 5000 bootstrap samples).

Table 4.16

Multiple Regression Analysis Predicting Creativity (Fluency) from Multicultural Experience and Cognitive Flexibility

IV	DV	β	*t*	*p*
Multicultural Experience	Creativity (Fluency)	.20	1.90	.061
Cognitive Flexibility	Creativity (Fluency)	.21	1.97	.052

Note. IV = Independent Variable, DV = Dependent Variable.

Table 4.17

Results of Bootstrap Method to Test Significance of Mediation Effects of Cognitive Flexibility on the Relationship between Multicultural Experience and Creativity (Fluency)

Path/Effect	*b*	*SE*	*p*	95% CI
Multicultural Experience → Creativity (Fluency)	.0032	.0017	.0608	
Multicultural Experience → Cognitive Flexibility	.0005	.0002	.0049**	
Cognitive Flexibility → Creativity (Fluency)	1.9914	1.0116	.0523	
Indirect Effect	.0010	.0008	< .05	[.0001, .0031]

Note. *SE* = Standard Error, CI = Confidence Interval.
*$p < .05$, **$p < .01$.

The results of bootstrapping with unstandardized coefficients, shown in Table 4.17, show a full mediation effect based on the significant indirect effect (β = .06, $p < .05$) and the non-

significant direct effect (β = .20, p = .061), indicating the influence of multicultural experience on creative fluency through cognitive flexibility. According to the results for RQ8, multicultural experience significantly influenced creative fluency. However, it was only marginally significant at the .05 level when controlling for cognitive flexibility. Therefore, the significant indirect effect without a significant direct effect indicates that multicultural experience influenced fluency through cognitive flexibility (see Figure 4.7).

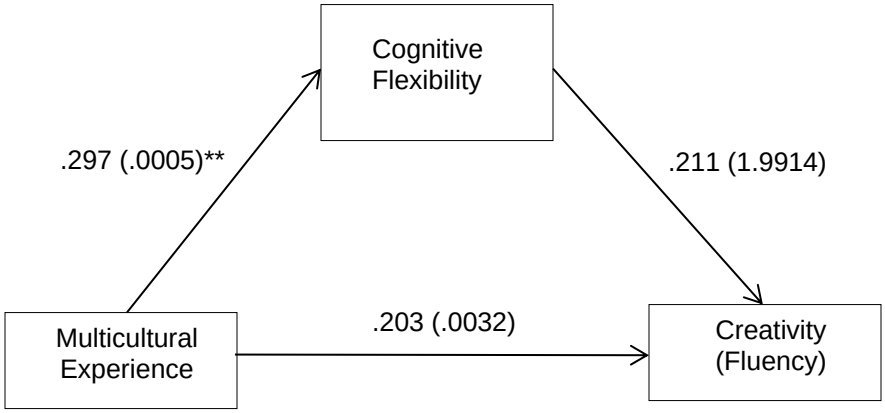

Figure 4.7. Mediation model with cognitive flexibility as a mediator between multicultural experience and creativity (fluency). N = 89, Standardized coefficients are shown with corresponding unstandardized coefficients in parentheses.

*p < .05. **p < .01.

For creative originality, multiple regression analyses were also conducted to investigate the relationship among multicultural experience, cognitive flexibility, and creative originality. The results indicate that multicultural experience was significantly associated with creative originality (β = .24, p < .05) when controlling for cognitive flexibility, but cognitive flexibility was not significantly associated with creative originality (β = .18, p = .10) when controlling for multicultural experience (see Table 4.18). Therefore, the bootstrapping method was not necessary

to investigate the indirect effect of cognitive flexibility as a mediator due to the non-significant influence of cognitive flexibility on creative originality.

Table 4.18

Multiple Regression Analysis Predicting Creativity (Originality) from Multicultural Experience and Cognitive Flexibility

IV	DV	β	*t*	*p*
Multicultural Experience	Creativity (Originality)	.24	2.24	.028*
Cognitive Flexibility	Creativity (Originality)	.18	1.65	.103

Note. IV = Independent Variable, DV = Dependent Variable.
*$p < .05$.

Creative flexibility was examined along with multicultural experience and cognitive flexibility. The results indicated that multicultural experience was, at the .05 level, only marginally associated with creative flexibility (β= .20, $p = .07$) when controlling for cognitive flexibility. Also, cognitive flexibility was significantly associated with creative flexibility (β = .25, $p < .05$) when controlling for multicultural experience (see Table 4.19).

Table 4.19

Multiple Regression Analysis Predicting Creativity (Flexibility) from Multicultural Experience and Cognitive Flexibility

IV	DV	β	*t*	*p*
Multicultural Experience	Creativity (Flexibility)	.20	1.86	.066
Cognitive Flexibility	Creativity (Flexibility)	.25	2.33	.022*

Note. IV = Independent Variable, DV = Dependent Variable.
*$p < .05$.

Table 4.20

Results of Bootstrap Method to Test Significance of Mediation Effects of Cognitive Flexibility on the Relationship between Multicultural Experience and Creativity (Flexibility)

Path/Effect	*b*	*SE*	*p*	95% CI
Multicultural Experience → Creativity Flexibility	.0009	.0005	.0659	
Multicultural Experience → Cognitive Flexibility	.0005	.0002	.0049**	
Cognitive Flexibility → Creativity (Flexibility)	.6964	.2994	.0224*	
Indirect Effect	.0003	.0003	< .05	[.0001, .0013]

Note. *SE* = Standard Error, CI = Confidence Interval.
*$p < .05$, **$p < .01$.

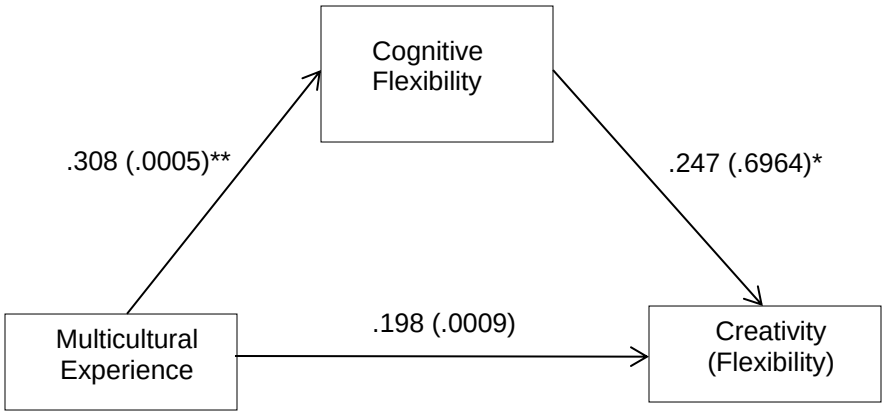

Figure 4.8. The mediation model with cognitive flexibility as a mediator between multicultural experience and creativity (flexibility). *N* = 89, Standardized coefficients are shown with corresponding unstandardized coefficients in parentheses.

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

A bootstrapping analysis was conducted to investigate the role of cognitive flexibility as a mediator between creative flexibility and multicultural experience. The results of bootstrapping with unstandardized coefficients, shown in Table 4.20, show that the indirect effect was

significant (β = .08, $p < .05$). Therefore, the full mediation of cognitive flexibility between multicultural experience and creative flexibility was confirmed.

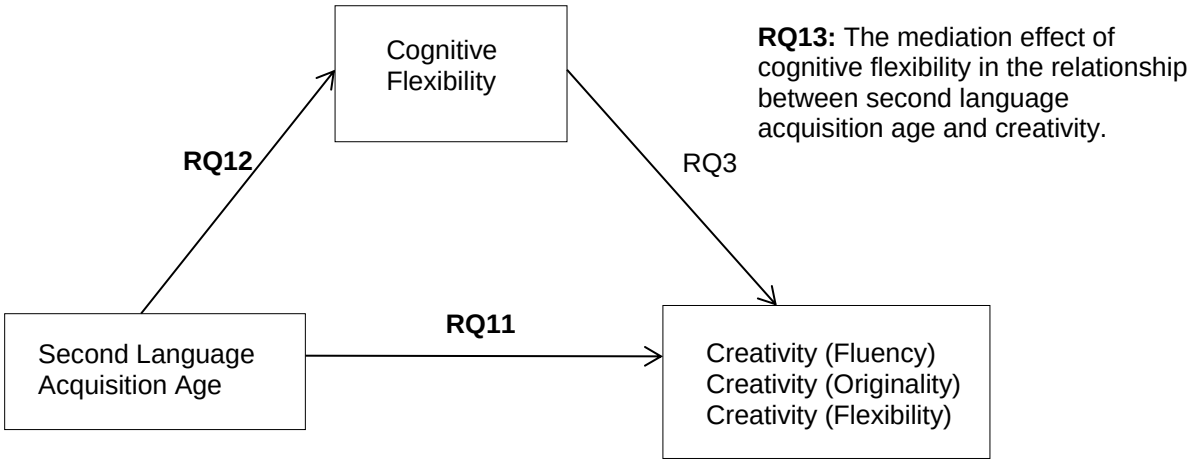

Figure 4.9. Research Questions 11-13: The relationships among second language acquisition age, cognitive flexibility, and creativity.

RQ11: Is second language acquisition age associated with creativity?

Table 4.21

Simple Linear Regression Analyses Predicting Creativity (Fluency, Originality, and Flexibility) from Second Language Acquisition Age

IV	DV	β	*t*	*p*
Second Language Acquisition Age	Creativity (Fluency)	.07	.66	.51
Second Language Acquisition Age	Creativity (Originality)	.13	1.21	.23
Second Language Acquisition Age	Creativity (Flexibility)	.07	.60	.55

Note. IV = Independent Variable, DV = Dependent Variable.

According to linear regression analyses, the second language acquisition age was not associated with any of the three indicators of creativity (β = .07, $p = .51$ for creative fluency; β = .13, $p = .23$ for creative originality; and β = .07, $p = .55$ for creative flexibility; see Table 4.21).

The age at which a person started learning a second language (English in the current study) was not significantly associated with creativity.

RQ12: Is second language acquisition age associated with cognitive flexibility?

Second language acquisition age was statistically associated with cognitive flexibility based on the regression results ($\beta = -.22$, $p < .05$). The negative standardized coefficient indicated that, as second language acquisition age increased, cognitive flexibility decreased. In other words, how early a person started learning a second language (the degree of earliness) was significantly associated with cognitive flexibility. Approximately 7.2% of the variance in cognitive flexibility was accounted for by its linear relationship with second language acquisition age (see Table 4.22).

Table 4.22

Simple Linear Regression Analysis Predicting Cognitive Flexibility from Second Language Acquisition Age

IV	DV	β	*t*	*p*
Second Language Acquisition Age	Cognitive Flexibility	-.22	-2.08	.04*

Note. $R^2 = .049$, IV = Independent Variable, DV = Dependent Variable.
*$p < .05$.

RQ13: Does cognitive flexibility mediate the relationship between second language acquisition age and creativity?

The indirect effect was investigated to see whether cognitive flexibility mediated the relationship between second language acquisition age and creativity (fluency, originality, and flexibility). A bootstrapping analysis was conducted, and the results indicated that there were no

statistically significant indirect effects of second language acquisition age on fluency, originality, or flexibility.

RQ14: Which variable best predicts cognitive flexibility?

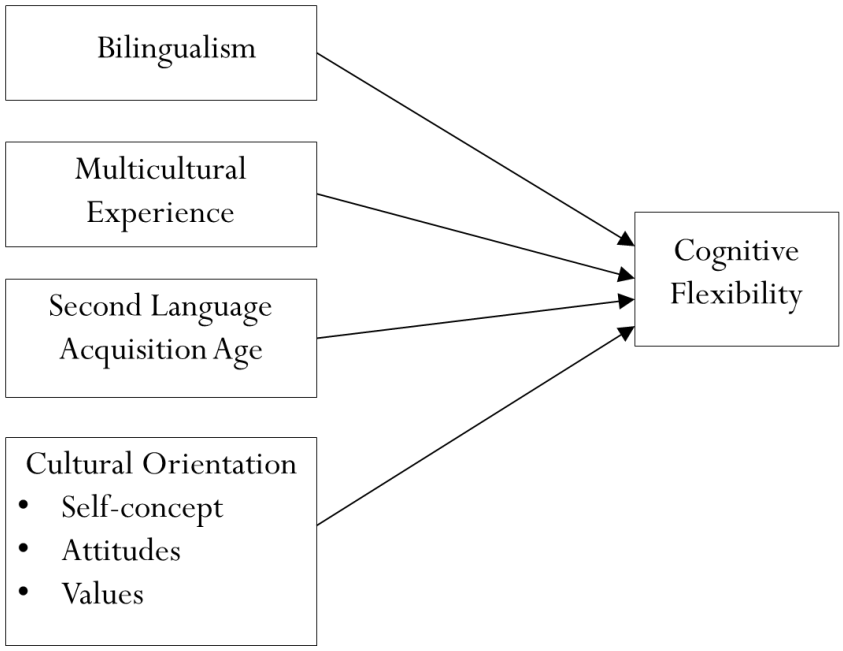

Figure 4.10. Research Question 14: The multiple regression analyses predicting cognitive flexibility

Several variables were used in the current study to investigate their relationships with creativity (fluency, originality, and flexibility). The role of cognitive flexibility as mediator was specifically examined to describe the relationships among the variables more fully. Multiple regression analyses were performed to evaluate how well the variables predicted cognitive flexibility and, therefore, how significantly it mediated their relationships with creativity (fluency, originality, and flexibility).

According to the results, the linear combination of predictors (bilingualism, multicultural experience, second language acquisition age, and cultural orientation, including self-concept, attitudes, and values) were significantly related to cognitive flexibility (R^2 = .24, F (6, 78) =

4.14, $p < .01$). Approximately 24% of the variance in cognitive flexibility was accounted for by the linear combination of the predictors. The results indicate that bilingualism, multicultural experience, second language acquisition age, and attitudes were significantly associated with cognitive flexibility: $\beta = -.28$, $p < .01$ for bilingualism; $\beta = .23$, $p < .05$ for multicultural experience; $\beta = -.23$, $p < .05$ for second language acquisition age; and $\beta = -.24$, $p < .05$ for the attitudes subtest of cultural orientation. Bilingualism and second language acquisition age showed negative standardized coefficients in their relationship with cognitive flexibility. As explained in the RQ2 section, the degree of bilingualism was determined by the absolute value of the WAT score (higher value = higher monolingual dominance). That is, the negative coefficient indicates a positive relationship between bilingualism and cognitive flexibility. A person with a higher absolute WAT score was more likely to show lower cognitive flexibility. In other words, people with a higher degree of bilingualism tended to show greater cognitive flexibility. In the same vein, the negative relationship between second language acquisition age and cognitive flexibility indicates that people who started to learn a second language at an earlier age were more likely to show greater cognitive flexibility.

One of the subtests of cultural orientation, attitudes, was also negatively associated with cognitive flexibility ($\beta = -.24$, $p < .05$). Individuals who showed more collectivistic tendencies were more likely to show greater cognitive flexibility. This result conflicts with previous findings. Many studies about the impact of cultural orientation on creativity have found that individualism is possibly related to creativity. Individuals from a society or a country where individualistic tendencies are more valued tend to show more creative potential. However, the results of the current study indicate that the score on the Attitudes subtest was negatively associated with cognitive flexibility, which was proposed as a mediator in the relationship

between cultural orientation and creativity, when controlling for bilingualism, multicultural experience, second language acquisition age, self-concept, and values.

As shown in Table 4.23, the prediction equation for the standardized variables is:

$$Z_{\text{Predicted CogFlx}} = -.28\ Z_{\text{Bilingsm}} + .23\ Z_{\text{MultiExp}} - .23\ Z_{\text{SLA age}} + .05\ Z_{\text{SC}} - .24\ Z_{\text{Attitude}} + .08\ Z_{\text{Value}}$$

Among the standardized weights associated with the regression equation of the four significant variables (bilingualism, multicultural experience, second language acquisition age, and attitude), the standardized coefficient of bilingualism ($\beta = -.28$, $p < .01$) was relatively greater than the other Beta values. Therefore, bilingualism had the strongest relationship with cognitive flexibility among the six independent variables.

Table 4.23

Multiple Regression Analyses Predicting Cognitive Flexibility

IV	β	*t*	*p*
Bilingualism	-.28	-2.76	.007**
Multicultural Experience	.23	2.21	.030*
Second Language Acquisition Age	-.23	-2.29	.025*
Self-Concept	.05	0.53	.599
Attitude	-.24	-2.02	.046*
Values	.08	0.67	.503

Note. IV = Independent Variable.
*$p < .05$, **$p < .01$.

CHAPTER 5

DISCUSSION

Bilingualism and Creativity

In the current study, the role of cognitive flexibility in creativity was examined to discover possible reasons why bilinguals are more likely to perform better on creativity tasks than monolinguals. Many studies have confirmed the effect of bilingualism on creativity (Kharkhurin, 2007; Kharkhurin, 2009; Konaka, 1997; Lasagabaster, 2000; Lee & Kim, 2010; Stone, 1993); however, none have investigated the mediation effect of cognitive flexibility on the relationship between bilingualism and creativity. In addition, cultural orientation (individualism vs. collectivism), multicultural experience, and second language acquisition age were included as variables along with the degree of bilingualism, all of which might help describe the mediating role of cognitive flexibility.

WAT scores were used to define the degree of bilingualism, and DT scores were used to measure the indicators of creativity (i.e., fluency, originality, and flexibility). According to the results, bilingualism was not directly associated with creativity to a significant degree. Participants who showed higher bilingualism (i.e., lower absolute WAT score) did not tend to perform better on DT tasks. However, cognitive flexibility had a mediation effect on the relationship between bilingualism and creativity. In other words, the degree of bilingualism was significantly associated with creativity through cognitive flexibility. This finding applied to all three indicators of creativity: fluency, originality, and flexibility. A full mediation effect was found based on the significant indirect effect ($\beta = -.083$, $p < .05$) and nonsignificant direct effect

(β = .185, p = .085) for creative fluency, the significant indirect effect (β = -.073, p < .05) and non-significant direct effect (β = .107, p = .989) for creative originality, and the significant indirect effect (β = -.092, p < .05) and non-significant direct effect (β = .153, p = .150) for creative flexibility. A higher absolute WAT score meant lower bilingual ability; therefore, the WAT score, which was used to measure the degree of bilingualism, was negatively related to creativity as mediated by cognitive flexibility. These findings are meaningful because they suggest a pathway for determining how bilingual abilities might be related to creativity. In addition, bilingualism (β = -.28, p < .01) was the most influential predictor of cognitive flexibility, along with multicultural experience (β = .23, p < .05) and second language acquisition age (β = -.23, p < .05). Therefore, developing bilingual abilities at an earlier age will likely provide people with the opportunity to improve their cognitive flexibility, indirectly benefiting their creative potential as well.

Cultural Orientation and Creativity

Much research on creativity with cultural orientation (individualism vs. collectivism) takes the form of cross-cultural comparative studies (Goncalo & Staw, 2006; Grimm, Church, Katigbak, & Reyes, 1999; Jack & Barry, 2005; Kharkhurin & Motalleebi, 2008; Lubart & Georgsdottir, 2004; Ng & Smith, 2004). Some researchers have examined two different countries in order to compare creativity across different cultures. Typically, one country has been selected from the West, and one has been selected from the East for a distinct comparison (Grimm, Church, Katigbak, & Reyes, 1999; Kharkhurin & Motalleebi, 2008; Ng & Smith, 2004). In the current study, cultural orientation was examined within a particular country, South Korea.

Although South Korea is generally classified as a country with a strong collectivistic culture (Hofstede, 1991, 2004), individual variations persist within groups. Each participant, to

some extent, showed a different level of collectivistic (or individualistic) tendencies. The ratio of individualistic scores to collectivistic scores on the three subtests (Self-Concept, Attitudes, and Values) was used to calculate participants' individualistic or collectivistic tendencies, and the three subtests were also used to determine how those tendencies related to creativity and cognitive flexibility.

The results show that there were no significant relationships among the variables: self-concept on creative fluency (β = .068, p = .529), self-concept on creative originality (β = .038, p = .727), self-concept on creative flexibility (β = .114, p = .292), attitudes on creative fluency (β = -.153, p = .153), attitudes on creative originality (β = -.163, p = .127), attitudes on creative flexibility (β = -.166, p = .120), values on creative fluency (β = -.044, p = .682), values on creative originality (β = -.068, p = .528), and values on creative flexibility (β = -.005, p = .966). As the findings indicate, cultural orientation likely was not associated with creativity or cognitive flexibility. Many studies have supported the claim that people from individualistic societies tend to perform better on divergent thinking tasks than people from collectivistic societies because individualistic social values more positively affect divergent thinking, which is needed to generate unique and original ideas (Kharkhurin & Motalleebi, 2008; Zha et al., 2006). However, this idea was not statistically supported in the current study, perhaps because of the homogeneous sample (i.e., South Koreans). In addition, the small sample size (N = 89) could have limited this study and produced different results.

As seen in the descriptive statistics in Table 4.6, the mean scores for self-concept and values were greater than 1, but the mean score for attitudes was less than 1. These values were calculated using the ratio of individualistic to collectivistic responses. Participants showed more individualistic tendencies for self-concept and values even though South Korea is typically

classified as a collectivistic country (Hofstede, 1980, 2001). This interesting finding could be the result of the limited sample (i.e. college students with a mean age of 23.89 years). The gender ratio was unbalanced as well (i.e., 34 males and 55 females). This sample might have contained different tendencies from the South Korean group in Hofstede (1980, 2001), or the finding might suggest cultural changes over time. Hofstede collected data from almost 70 countries between 1967 and 1969. He extended this collection to more countries between 1971 and 1973, when South Korea was added. Over the subsequent 40 years, individualistic-collectivistic tendencies in South Korea might have changed, particularly in younger age groups such as college students. Shim, Kim, and Martin (2008), authors of the book *Changing Korea: Understanding Culture and Communication*, stated that successful transition from a military government to a civilian government in South Korea has resulted in fast economic growth and that this growth and globalization have led to societal changes. Thus, a new balance between traditional collectivism and the individualism of the West might have emerged in South Korea. Therefore, future studies should consider using larger samples representing a wide range of ages, a variety of occupations, and a balanced gender ratio.

Multicultural Experience and Creativity

In the relationship between multicultural experience and creativity, cognitive flexibility played a role as a mediator between multicultural experience and creative fluency and between multicultural experience and creative flexibility, but not between multicultural experience and creative originality. Based on a simple linear regression, the effect of multicultural experience significantly predicted the three indicators of creativity: fluency ($\beta = .266$, $p < .05$), originality ($\beta = .292$, $p < .01$), and flexibility ($\beta = .271$, $p < .05$). When cognitive flexibility was included in this analysis as a proposed mediator, the indirect effect of multicultural experience and cognitive

flexibility on creative fluency was significant (β= .063, $p < .05$), but the direct effect of multicultural experience on creative fluency was no longer significant at the .05 level. The indirect effect on creative flexibility was significant (β = .076, $p < .05$), but the direct effect on creative flexibility was not. These results suggest a full mediation effect of cognitive flexibility between multicultural experience and creative fluency and between multicultural experience and creative flexibility.

In line with many recent studies (Kim, 2009; Leung, Au, & Leung, 2004; Leung, Maddux, Galinsky, & Chiu, 2008; Lubart, 1999; Niu & Sternberg, 2002; Niu & Sternberg, 2006; Rudowicz, 2003; Saad, Benet-Martinez, Moons, & Robins, 2012), the findings support the claim that multicultural experience significantly predicted creativity (fluency, originality, and flexibility). In addition, cognitive flexibility was shown to mediate the relationship between multicultural experience and creative fluency and between multicultural experience and creative flexibility. However, cognitive flexibility did not mediate the effect of multicultural experience on creative originality. The association of bi- or multicultural experience with creativity has been demonstrated in the literature, and this mediation model is theoretically reasonable; however, the results were only partially significant, perhaps because of the small sample size. Another possibility could be that multicultural experience played a great part in the relationship between cognitive flexibility and originality; therefore, cognitive flexibility did not account for originality when multicultural experience was controlled. For further research, other variables that might enhance creativity need to be investigated in depth to seek the connection between multicultural experience and creative originality.

Multicultural experience could be limited by socioeconomic status. In the current study, multicultural experience was calculated by multiplying the total time spent abroad and the

number of foreign countries visited. Forty-four of eight-nine participants reported that they had visited or stayed in at least one foreign country: one country (20), two countries (7), three countries (8), four countries (5), five countries (3), and seven countries (1). The average multicultural experience index was 57.90 with a range of 0 to 2,304 (*SD* = 256.51). These experiences included travelling, studying abroad, and living in foreign countries because of a parent's job. Most multicultural experience could accompany a high level of SES, but SES was not controlled in the current study.

Second Language Acquisition Age and Creativity

Second language acquisition age was not significantly associated with creativity (fluency, originality, and flexibility). Similarly, cognitive flexibility did not mediate the relationship between second language acquisition age and creativity. However, second language acquisition age was significantly related to cognitive flexibility ($\beta = -.220$, $p < .05$). Those who started to learn the second language (i.e., English) at an earlier age tended to show higher cognitive flexibility. Therefore, learning a second language at an earlier age might help develop cognitive flexibility, indirectly impacting creative potential.

Bootstrapping Method

Bootstrapping is one of the methods used pervasively in mediation analysis and is effective with a small sample size. The bootstrapping method was used to examine the mediation effect of cognitive flexibility between bilingualism and creativity (fluency, originality, and flexibility), between cultural orientation (individualism vs. collectivism) and creativity, and between second language acquisition age and creativity. As discussed earlier, the role of cognitive flexibility as a mediator was confirmed in the following relationships with creativity:

bilingualism and fluency, bilingualism and originality, bilingualism and flexibility, multicultural experience and fluency, and multicultural experience and flexibility.

Bootstrapping was the main method for analyzing mediation effect in the current study; however, the "Incremental *F*-test" was applied as well. The incremental *F*-test is a theoretically more traditional method in terms of measuring the incremental portion of variance when one more variable (mediator) is included in a given model. The incremental *F*-test was conducted to confirm whether the bootstrap method was appropriately used in this study to examine the mediation effect. The results were similar to those obtained through bootstrapping.

The incremental *F*-test involves testing the increment in the proportion of variance accounted for by the mediator variable (i.e., cognitive flexibility). It was tested using the following formula:

$$F = \frac{(R^2_{y.12\ldots k_1} - R^2_{y.12\ldots k_2})/(k_1 - k_2)}{(1 - R^2_{Y.12\ldots k_1})/(N - k_1 - 1)} = \frac{(R^2_{y.12} - R^2_{y.1})/(2 - 1)}{(1 - R^2_{Y.12})/(N - 2 - 1)}$$

For fluency, X_1 = bilingualism, X_2 = cognitive flexibility (mediator), and Y = fluency. X_1(bilingualism) accounted for about 1.1% of the variance of Y (fluency), and X_2 (cognitive flexibility) accounted for about 6.7% of the variance of Y (fluency). The two variables, X_1(bilingualism) and X_2 (cognitive flexibility), accounted for about 9.9% of the variance of Y (fluency). The formula below tested the increment due to X_2 (cognitive flexibility). Therefore, the increment in variance due to X_2 (cognitive flexibility) was about 8.8% with *df* 1 and 86, $p < .01$:

$$F = \frac{(.099 - .011)/(2 - 1)}{(1 - .099)/(89 - 2 - 1)} = \frac{(.088)}{(.901)/(86)} = \frac{.088}{.0105} = 8.3810$$

For originality, X_1 = bilingualism, X_2 = cognitive flexibility (mediator), and Y = originality. X_1(bilingualism) accounted for about 0.1% of the variance of Y (originality), and X_2 (cognitive

flexibility) accounted for about 5.8% of the variance of Y (originality). The two variables, X_1(bilingualism) and X_2 (cognitive flexibility), accounted for about 6.9% of the variance of Y (originality). The increment in variance due to X_2 (cognitive flexibility) was about 6.8% with *df* 1 and 86, $p < .05$:

$$F = \frac{(.069 - .001)/(2 - 1)}{(1 - .069)/(89 - 2 - 1)} = \frac{(.068)}{(.931)/(86)} = \frac{.068}{.0108} = 6.2963$$

For flexibility, X_1 = bilingualism, X_2 = cognitive flexibility (mediator), and Y = flexibility. X_1(bilingualism) accounted for about 0.4% of the variance of Y (originality), and X_2 (cognitive flexibility) accounted for about 9% of the variance of Y (flexibility). X_1 (bilingualism) and X_2 (cognitive flexibility) accounted for about 11.2% of the variance of Y (flexibility). The increment due to X_2 (cognitive flexibility) was about 10.8% with *df* 1 and 86, $p < .01$:

$$F = \frac{(.112 - .004)/(2 - 1)}{(1 - .112)/(89 - 2 - 1)} = \frac{(.108)}{(.888)/(86)} = \frac{.108}{.0103} = 10.4854$$

The role of cognitive flexibility as a mediator was found to be significant in the relationship between bilingualism and creativity (for all three indicators, respectively: fluency, originality, and flexibility) using the incremental *F*-test and the bootstrapping method.

In the mediation effect analysis of cognitive flexibility between multicultural experience and creativity, for fluency, X_1 = multicultural experience, X_2 = cognitive flexibility (mediator), and Y = fluency. X_1 (multicultural experience) accounted for about 7.1% of the variance of Y (fluency), and X_2 (cognitive flexibility) accounted for about 6.7% of the variance of Y (fluency). The two variables X_1(multicultural experience) and X_2 (cognitive flexibility) accounted for about 11.1% of the variance of Y (fluency). The following formula tested the increment due to X_2 (cognitive flexibility) and was found to be about 4.0% with *df* 1 and 86, $p = .052$:

$$F = \frac{(.111 - .071)/(2 - 1)}{(1 - .111)/(89 - 2 - 1)} = \frac{(.04)}{(.889)/(86)} = \frac{.04}{.0103} = 3.8835$$

For originality, X_1 = multicultural experience, X_2 = cognitive flexibility (mediator), and Y = originality. X_1 (multicultural experience) accounted for about 8.5% of the variance of Y (originality), and X_2 (cognitive flexibility) accounted for about 6.7% of the variance of Y (fluency). The two variables X_1 (multicultural experience) and X_2 (cognitive flexibility) accounted for about 11.3% of the variance of Y (originality). To test the increment to the accounting of variance due to X_2 (cognitive flexibility), the following formula was used, and the increment was about 2.8% with *df* 1 and 86, $p = .1028$:

$$F = \frac{(.113 - .085)/(2 - 1)}{(1 - .113)/(89 - 2 - 1)} = \frac{(.028)}{(.887)/(86)} = \frac{.028}{.0103} = 2.7184$$

For flexibility, X_1 = multicultural experience, X_2 = cognitive flexibility (mediator), and Y = flexibility. X_1 (multicultural experience) accounted for about 7.3% of the variance of Y (flexibility), and X_2 (cognitive flexibility) accounted for about 6.7% of the variance of Y (fluency). The two variables X_1 (multicultural experience) and X_2 (cognitive flexibility) accounted for about 12.9% of the variance of Y (flexibility). The following formula tested the increment due to X_2 (cognitive flexibility), about 5.6% with *df* 1 and 86, $p < .05$:

$$F = \frac{(.129 - .073)/(2 - 1)}{(1 - .129)/(89 - 2 - 1)} = \frac{(.056)}{(.871)/(86)} = \frac{.056}{.0101} = 5.5446$$

The mediation effect of cognitive flexibility between multicultural experience and fluency was not significant at the .05 level ($p = .052$) with the incremental *F*-test, while the indirect effect was found to be significant with the bootstrapping method ($p < .05$). The mediation effect of cognitive flexibility between multicultural experience and creative flexibility was the same using the two methods—significant at the .05 level. As with the bootstrapping method, cognitive flexibility did not mediate the relationship between multicultural experience and originality with

the incremental *F*-test. The bootstrapping method and the incremental *F*-test yielded the same or similar results for mediation effect in the current study.

Limitations and Future Research

The present study focused on the relationship between bilingualism and creativity. The WAT was used to measure participants' bilingual abilities with regard to Korean and English. All participants were native Koreans, and they all reported their first language as Korean. They also reported that they had learned English as a second language. However, fifty-two participants reported that they can speak more than three languages, including Korean and English. Their multilingual abilities were not controlled in the present study, and this could have affected the measurement of participants' bilingual abilities. In addition, the WAT measures only vocabulary abilities, although there are four different language skills: reading, writing, listening, and speaking. The WAT may not have been sufficient to measure bilingual abilities. For future study, the use of different instruments is recommended to measure the other language skills.

The present study was conducted using a homogeneous group (i.e., college students in South Korea). This homogeneity might account for the insignificant impact of cultural orientation on creativity. Although there were individual variances in the individualistic-collectivistic tendency among the participants, they might not have been statistically significant enough to determine the effects. For future research, sampling from different cultural groups should be considered. In other words, studies about cultural orientation might be more effective with cross-cultural groups (e.g., individualistic countries vs. collectivistic countries).

From the Individualism/Collectivism Test (Triandis, 1995), one interesting fact emerged. The participants' responses were determined by social responses and nonsocial responses on the self-concept subtest. Personal appearance and personality were considered nonsocial responses,

and responses related to culture, education, career, and communication were categorized as social. The category to which most responses belonged was clear: I am 20 years old (nonsocial); I am male (nonsocial); I am kind (nonsocial); I am a daughter (social); I am a student (social); and I am a smart phone user (social). There were several items that were difficult to classify as either social responses or nonsocial responses. For instance, some students described themselves metaphorically as elements of "nature," such as wind, salt, light, flowers, clouds, and rocks. Words representing nature were categorized as nonsocial responses because they did not seem to emphasize any social relationship. Rather, they were related to personality or appearance, which were categorized as nonsocial. Future research might examine East-West differences in responses to the self-concept question "Who am I?" Future studies should compare not only the ratio of individualistic responses to collectivistic responses but also the classification of responses between the two particular groups (i.e., affective responses). Analyzing responses expressed frequently by a specific group of people would be helpful in understanding how cultural environments and societal values influence personal conceptualization.

Another area of future research in connection with the current study is biculturalism and creativity. There are many studies about biculturalism or multiculturalism, and scholars have suggested many ways of describing and identifying the constructs of biculturalism. For example, Redfield, Linton, and Herskovits (1936) described biculturalism as two constructs: acculturation and enculturation. Acculturation can be described as adapting to the norms of the dominant group and enculturation as maintaining the norms of the indigenous group. When immigrants come to the United States, they and their descendants go through the process of adopting American cultural traits and values. This process or the result of this process is considered

acculturation. Enculturation occurs when immigrants and their descendants retain and value their native culture, although their dominant culture might be different.

Berry, Kim, Power, Young, and Bujaki (1989) further specified this idea through the articulation of four different states: integration, assimilation, separation, and marginalization. For example, when Korean Americans value American culture while retaining their Korean culture, the result is integration. Assimilation occurs when Korean Americans value only American culture while rejecting Korean culture. In contrast, separation occurs when Korean Americans want only to retain Korean culture without trying to learn or acquire the dominant cultural values that constitute American culture. If Korean Americans reject or have no interest in either Korean or American culture, marginalization takes place. Kim and Omizo (2005) stated that the process of integration could be considered biculturalism, which refers to being culturally confident between two cultures. LaFromboise, Coleman, and Gerton (1993) also suggested several models of second-culture acquisition in order to describe the development of biculturalism, which is associated with psychological processes, social experiences, and individual challenges: assimilation, acculturation, alternation, multicultural, and fusion.

Similar to other scholars, LaFromboise, Coleman, and Gerton (1993) described assimilation as the process by which an individual develops an identity in a new culture. Individuals tend to feel stressed when they undergo assimilation because they need to learn and acquire new cultural values and behavior. In this psychological state, individuals gradually lose their original cultural values as they go through the process of acquiring the cultural values of the majority group. In acculturation, an individual experiences the acquisition of new cultural values from the dominant group. However, unlike assimilation, an individual tries to retain the values and cultural behavior of the culture of origin when he or she undergoes acculturation. Therefore,

an individual experiences interactions of some kind between two cultures, causing acculturation stress.

LaFromboise, Coleman, and Gerton (1993) emphasized that individuals who undergo alternation understand the cultural values and know the behaviors that are socially appropriate and acceptable. These individuals are also able to alter their behavior based on the social contexts, leading to biculturalism (LaFromboise, Coleman, & Gerton, 1993; Matute-Bianchi, 1986). The last two models of second-culture acquisition (LaFromboise, Coleman, & Gerton, 1993) are the multicultural model and the fusion model. The multicultural model expands the concept of biculturalism into two or more cultures, while the fusion model represents the assumption that shared cultures will fuse together, producing a new cultural form.

Future studies could examine biculturalism as the psychological state of integration (Berry et al., 1989; Kim & Omizo, 2005) or alternation (LaFromboise, Coleman, & Gerton, 1993). The cognitive process and social-emotional development of immigrants and their descendants who live within two cultures might depend on the psychological states they have in terms of adapting to the majority culture. Individuals who are bicultural will be culturally confident between two cultures. This bicultural competence might benefit those who live within two cultures by helping them choose and adapt behaviors to fit various social contexts (LaFromboise, Coleman, & Gerton, 1993; Ogbu, 1979). In addition, those with cultural competence might show higher cognitive functioning and mental health than people who are assimilated or acculturated (Garcia, 1983; Kim & Omizo, 2005; Rashid, 1984; Rogler, Cortes, & Malgady, 1991). Bicultural competence might be related to self-efficacy, cognitive flexibility, and creativity, for someone with competence in both cultures could be cognitively flexible rather than rigid. Therefore, examining the relationship between bicultural competence and creativity,

along with cognitive flexibility and self-efficacy, would be a meaningful extension of the current study.

Conclusion

Why do children need to learn a second language? Why might learning a second language and experiencing other cultures nurture and facilitate creativity?

The literature strongly shows that bilinguals perform better than monolinguals on creativity tests in terms of selecting and integrating information through linguistic processing. Therefore, learning a second language is recommended for children as an important and effective way to develop and foster creativity. Creativity allows children to think from different points of view and to use their minds in new ways. Creativity is associated with more flexible thinking and learning. This cognitive flexibility helps children take advantage of selecting and connecting resources when utilizing their intellectual abilities to achieve goals in various domains.

In the current study, cognitive flexibility was found to play an important mediating role in the influence of bilingualism and multicultural experience on creative potential. Although a direct relationship between bilingualism and creativity was not found in this study, more bilingual individuals tended to show higher creative potential, a connection explained in part by cognitive flexibility. Cognitive flexibility mediated the relationship between bilingualism and creativity (fluency, originality, and flexibility). The impact of multicultural experience on creativity (fluency and flexibility) was also explained through cognitive flexibility. The results of simple linear regression revealed a positive relationship between multicultural experience and creativity (fluency, originality, and flexibility).

Several variables, including bilingualism, multicultural experience, and second language acquisition age, were found to be significantly associated with cognitive flexibility. These

findings might provide teachers and educators with useful guidelines for designing and implementing adequate curricula related to building, at an earlier age, the bilingual abilities and multicultural experience that become significant and effective in enhancing creativity.

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Appendix A

Runco ideational behavior scale (Flexibility version)

Directions: Use the 1-5 scale (given below) to indicate how often each of the phrases describes your thinking and behavior. You may need to approximate. Please indicate how you really think and behave, not how you would like to. Remember--no names are used. Your responses are confidential.

Again, you may need to approximate. For each item, circle the response option that is THE CLOSEST to being accurate. Here are the options:

0 = Never
1 = approximately once a year
2 = once or twice each month (approximately)
3 = once or twice each week (approximately)
4 = Just about every day, and sometimes more than once each day.

1. I am faced with a problem and take my time exploring various options and alternative solutions.

0	1	2	3	4
never	yearly	Monthly	weekly	daily

2. I consider alternative careers (or career changes).

0	1	2	3	4
never	yearly	Monthly	weekly	daily

3. When reading books or stories I have ideas of better endings.

0	1	2	3	4
never	yearly	monthly	weekly	Daily

4. When faced with a problem I do not just accept the first solution. I make sure to think of several options.

0	1	2	3	4
never	yearly	Monthly	weekly	daily

5. People wonder if I am scatter-brained or absent-minded because I think about different things all at once.

0	1	2	3	4
never	yearly	Monthly	weekly	daily

6. I have thoughts which can block out all other thoughts--it is like I am stuck in a rut.

0	1	2	3	4
never	yearly	monthly	weekly	daily

7. I work out new ways to solve a problem.

0	1	2	3	4
never	yearly	monthly	weekly	daily

8. I see better ways of doing routine things.

0	1	2	3	4
never	yearly	monthly	weekly	daily

9. I have an idea about a new route between home and school (or work).

0	1	2	3	4
never	yearly	monthly	weekly	daily

10. I see a cloud and have several ideas about what the shape or figure could be.

0	1	2	3	4
never	yearly	monthly	Weekly	Daily

11. I observe people and think about alternative interpretations of their behavior.

0	1	2	3	4
Never	yearly	monthly	Weekly	Daily

12. I look at a problem from more than one point of view.

0	1	2	3	4
Never	yearly	monthly	weekly	Daily

13. I realize that it is easy for me to understand other people's ideas.

0	1	2	3	4
Never	yearly	monthly	weekly	Daily

14. I have different thoughts about careers that would be fun for me.

0	1	2	3	4
never	yearly	monthly	weekly	daily

15. When making things, I stick to plans and do not consider changing the plans.

0	1	2	3	4
never	yearly	monthly	weekly	daily

16. When I need a new username or password, it is easy for me to think of good options.

0	1	2	3	4
never	yearly	monthly	weekly	daily

17. When I get a new pet, or when someone I know gets one, it is easy for me to think of good names for it.

0	1	2	3	4
never	yearly	monthly	weekly	daily

18. I see a pattern (on the sidewalk, or anywhere outside) and see things in the shape.

0	1	2	3	4
never	yearly	monthly	weekly	Daily

19. I consider many options and alternatives when solving a problem.

0	1	2	3	4
never	yearly	monthly	weekly	Daily

20. I have problems thinking of gifts for my family and friends..

0	1	2	3	4
never	yearly	monthly	weekly	Daily

21. When making things, I stick to plans. I do not improvise if someone has prepared plans.

0	1	2	3	4
never	yearly	monthly	weekly	Daily

22. I have ideas for arranging or rearranging the furniture at home.

0	1	2	3	4
never	yearly	monthly	weekly	Daily

23. I read something (written by someone else) and realize there are alternative perspectives on

life.

0	1	2	3	4
never	yearly	monthly	weekly	Daily

24. I make plans (e.g., going to a particular restaurant or movie), but something ruins those plans and I can't think of what to do instead.

0	1	2	3	4
never	yearly	monthly	weekly	Daily

25. I see a shadow or some other natural pattern and have an idea for what it represents.

0	1	2	3	4
never	Yearly	monthly	Weekly	Daily

26. When doing math (e.g., balancing my checkbook) I am tempted to follow my own ideas about how to solve a math problem.

0	1	2	3	4
never	Yearly	monthly	Weekly	Daily

27. Someone tells me how to do something, but I think of different ways to get it done.

0	1	2	3	4
never	Yearly	monthly	Weekly	Daily

28. When reading, I think of alternative titles for the book.

0	1	2	3	4
never	Yearly	monthly	Weekly	Daily

Appendix B

Word Association Test (Lambert, 1956; Lee & Kim, 2010)

English

In this test, if the word is a noun, you will be asked to think of as many words as you can that **associate with the given word**. In other words, you will be asked to write down as many words as you can think of, in the language of the stimulus (English), which seem to go with or belong with that word. For example, if the word were family (noun), you would write at least some of the words written below **(Noun → Associated words)**

(Example) Family: children brother sister grandmother grandfather mother father household

If the word is an adjective, you will be asked to write as many words as you can which have the **same meaning or similar meaning** to the given word **(Adjective → Same or similar words)**

(Example) Fine: good beautiful attractive excellent polished refine nice choice

You will have 16 minutes for 16 English words. Don't spend too much time on single word. Your score will be the number of correct words that you write

1. Garden

_____

_____

2. Food

_____

_____

3. Child

_____

_____

4. House

_____

_____

5. Thought

_____

_____

6. Honor

_____

_____

7. Peace

_____

_____

8. Idea

_____

_____

9. Happy

_____

_____

10. Large

_____

_____

11. Little

_____

_____

12. Sad

_____

_____

13. Rich

_____

_____

14. Strong

_____

_____

15. Bad

_____

_____

16. Dear

_____

_____

Korean

In this test, you will be asked to think of as many words as you can that associate with the given word. In other words, you will be asked to write down as many words as you can think of, in the language of the stimulus (Korean), which seems to go with or belong with that word, For example, if the word were 가족, you would write at least some of the words written below.

(example) 가족: 나 어머니 아버지 집
사랑 동생 할머니 할아버지

If the word is an adjective you may be asked to write as many words as you can that associated with given word or to write as many compounds as you can. For example, if the word were 아름다운, you would write at least some of the words written below.

(example) 아름다운: 꽃(associated with) 아름다운 나라 (compound),
아름다운 옷 (compound) 아름다운 집 (compound)

You must spend 16 minutes for 16 Korean words. Don't spend too much time on one word. Your score will be the number of correct words that you write

1. 사람

2. 집

3. 학교

4. 어머니

5. 마음

6. 생각

7. 시간

8. 사랑

9. 좋은(좋다)

10. 새로운(새롭다)

11. 큰(크다)

12. 중요한(중요하다)

13. 어렵다(어려운)

14. 높다(높은)

15. 작다(작은)

16. 쉽다(쉬운)

Appendix C

Wallach and Kogan's Instances Test (Wallach & Kogan, 1965)

1. List as many things you can think of that are SQUARE.

2. List as many things as you can think of that MOVE ON WHEELS.

3. List as many STRONG THINGS as you can think of.

Appendix D

Individualism-Collectivism Test (Triandis, 1995)

Direction: In the spaces below please complete the twenty sentences. Answer the question: Who am I? As if giving the answers to yourself, not to someone else. Write your answer in the order in which they occur to you. Do not worry about importance or logic. Go fairly fast.

1. I am _____
2. I am _____
3. I am _____
4. I am _____
5. I am _____
6. I am _____
7. I am _____
8. I am _____
9. I am _____
10. I am _____
11. I am _____
12. I am _____
13. I am _____
14. I am _____
15. I am _____
16. I am _____
17. I am _____
18. I am _____
19. I am _____

20. I am _____

Direction: Please use a scale from 1=disagree (false) to 9 =agree (true) to indicate your agreement or disagreement with the following statements. Circle one.

1. I would help within my means if a relative told me that he or she is in financial difficulties.
   False 1 2 3 4 5 6 7 8 9 True

2. When faced with a difficult personal problem, it is better to decide what to do yourself, rather than follow the advice of others.
   False 1 2 3 4 5 6 7 8 9 True

3. I like to live close to my good friends.
   False 1 2 3 4 5 6 7 8 9 True

4. It does not matter to me how my country is viewed in the eyes of other nations.
   False 1 2 3 4 5 6 7 8 9 True

5. One of the pleasures of life is to be related interdependently with others.
   False 1 2 3 4 5 6 7 8 9 True

6. What happens to me is my own doing.
   False 1 2 3 4 5 6 7 8 9 True

7. What I look for in a job is a friendly group of coworkers.
   False 1 2 3 4 5 6 7 8 9 True

8. I would rather struggle through a personal problem by myself than discuss it with my friends.
   False 1 2 3 4 5 6 7 8 9 True

9. Aging parents should live at home with their children.
   False 1 2 3 4 5 6 7 8 9 True

10. The most important thing in my life is to make myself happy.
    False 1 2 3 4 5 6 7 8 9 True

11. When faced with a difficult personal problem, one should consult one's friends and relatives

widely.

False 1 2 3 4 5 6 7 8 9 True

12. One should live one's life independently of others as much as possible.

False 1 2 3 4 5 6 7 8 9 True

13. One of the pleasures of life is to feel being part of a larger group of people.

False 1 2 3 4 5 6 7 8 9 True

14. I tend to do my own things, and most people in my family do the same.

False 1 2 3 4 5 6 7 8 9 True

Direction: In the questionnaire below, you are to ask yourself: "What values are important to me as guiding principles in my life, and what values are less important to me?" Rate the values on a scale from –1 to 7, where –1 means you reject the value, zero (0) indicates a value that is not at all important, and 7 means that the value is of supreme importance. You can use a rating of 7 only once. Begin by reading all the values.* Decide (a) if you want to reject one or two of them and (b) to which value you are going to give a 7. Then, in the blanks below, fill in your low and your high scores (1, 2, and 5, 6, 7) and finally your 3, 4 responses.

1. _____ National security (protection of my nation from enemies)
2. _____ Freedom (my own freedom of action and thought)
3. _____ Family security (safety for loved ones)
4. _____ An exciting life (stimulating experiences)
5. _____ Honoring parents and elders (showing respect)
6. _____ A varied life (enjoyment of variety)
7. _____ Obedient (dutiful, meeting obligations)
8. _____ Choosing own goals (self-direction)
9. _____ Self-disciplined (self-restraint, resistance to temptation)
10. _____ Independent (doing my own thing)

Appendix E

Self-Report

Direction: Please read carefully and answer all the questions.

1. What is your gender?

Male _____ Female _____

2. What is your age? _____

3. What is your major?

4. Have you ever been to foreign countries?

( ) Yes, and I have been to the following countries.

( ) No, I have never been to a foreign country.

If yes, please list them and answer the questions below.

Country	Length of visit or stay	How old were you?

5. Please list all languages you can speak in the table below and mark your fluency level.

Language	Fluency
	(Very basic) 1 2 3 4 5 (Native level)
	(Very basic) 1 2 3 4 5 (Native level)
	(Very basic) 1 2 3 4 5 (Native level)
	(Very basic) 1 2 3 4 5 (Native level)

6. What is your first language?

7. How old were you when you started to learn the second language?

8. Do you have any family members who speak other languages? If yes, please describe the

person and his/her fluency level of the language.

9. Based on the experiences listed in the table blow, please estimate the contribution of each experience to the second language using the following scale.

1=none
2=a small contribution
3=moderate
4=a large contribution
5=a very large

Experience	Contribution
Work environments	(none) 1 2 3 4 5 (a very large)
Native speaker tutoring	(none) 1 2 3 4 5 (a very large)
Non-native speaker tutoring	(none) 1 2 3 4 5 (a very large)
Taking a class in a language institute	(none) 1 2 3 4 5 (a very large)
Conversation partner	(none) 1 2 3 4 5 (a very large)
Watching T.V. or movies	(none) 1 2 3 4 5 (a very large)
Reading English books, newspapers, and magazines	(none) 1 2 3 4 5 (a very large)
Listening music	(none) 1 2 3 4 5 (a very large)
Surfing Internet sites	(none) 1 2 3 4 5 (a very large)

If you have any other experiences, please describe them and estimate their contributions to the second language.

10. Please use the following scale to answer each question:

1 = never
2 = rarely—a few times a year at most
3 = occasionally—every month or two
4 = sometimes—at least once a month
5 = frequently

How often do you write letters to other people in Korean?	(never) 1 2 3 4 5 (frequently)
How often do you write emails, Facebook, or Twitter in Korean?	(never) 1 2 3 4 5 (frequently)
How often do you write poetry in Korean?	(never) 1 2 3 4 5 (frequently)
How often do you write lyrics to a song in Korean?	(never) 1 2 3 4 5 (frequently)
How often do you write a short story or other fiction in Korean?	(never) 1 2 3 4 5 (frequently)
How often do you write something humorous, such as jokes,	(never) 1 2 3 4 5 (frequently)

limericks, satire, etc., in Korean?	
How often do you make lists or make notes in Korean?	(never) 1 2 3 4 5 (frequently)
How often do you converse with a friend or family member in Korean?	(never) 1 2 3 4 5 (frequently)