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교육학석사학위논문

The Moderating Effect of
Creative Metacognition on the
Relationship Between Risk Taking
and Creative Performance

위험감수가 창의적 메타인지 수준에 따라
창의적 수행에 미치는 영향

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서울대학교 대학원
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Abstract

The theory and limited research demonstrated that creative metacognition and risk-taking play a crucial role in creativity, but little empirical research was examined how creative metacognition and risk-taking work in creative performance in educational practice. It has been discussed that creative metacognition not only demonstrates a positive influence on teacher and peer's perceptions of creative students but also positively affects an individual's creative performance. The purpose of the present study was to investigate the moderating effects of high and low creative metacognition on the relationships between different risk-taking types (i.e., propensity for taking a risk, willingness to take a risk) and creative performance (i.e., general creativity, originality, usefulness) illustrated with a specific context. Data were obtained from 350 middle school students stemming from three different schools in South Korea. After eliminating the incomplete data, 319 students were selected as the final sample. A hierarchical regression analysis was used to conduct data analysis.

Results from the analysis confirmed that different types of risk-taking interacted with creative metacognition differently on subfactors of creative performance. Moderating effects of creative metacognition were statistically significant with the relationships between willingness to take a risk and originality and usefulness. It was found that propensity for taking a risk and willingness to take a risk served as direct predictors of originality, and the effect became stronger when creative metacognition was higher. The result indicated that creative metacognition consolidated the positive effect of risk-taking on

originality. In addition, results demonstrated that creative metacognition is served as a direct predictor of usefulness and a moderator of the relationship between willingness to take a risk and usefulness. In particular, with a low level of creative metacognition, the higher the risk-taking, the lower the usefulness. The results indicated that high creative metacognition alleviated the negative effect of risk-taking on usefulness, while low creative metacognition exhibited the negative effect of risk-taking on usefulness.

This study added to the existing body of literature by empirically examining whether and how different creative metacognition levels affect the relationships between different types of risk-taking and subfactors of creative performance within the middle school context. These results demonstrated the possibilities of creative metacognition's contribution to the middle school curriculum based on creative performance. In the end, practical implication on the scoop of education, limitations, and recommendations for future research were discussed.

Key words: Creative metacognition, risk-taking, willingness to take a risk, propensity for taking a risk, creative performance

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Chapter 1. Introduction

1.1. Purpose of Research

The interest in creativity has been increased ever since we were in an era of uncertainty and hasty changes. The attention on creativity is premised on the assumption that creativity is required expertise for people nowadays. At present, we face complex and unexpected problems on a daily basis, and creativity became an essential ability for us to adapt to the environment and solve problems we face with an effective and leading attitude (Carroll, 1993; Chan & Yuen, 2014; Davies et al., 2013; Hargrove, 2013; Runco, 1994; Scott et al., 2004). Hence, the 2015 revised curriculum of Korea recognized the importance of creativity and emphasized various creative learning strategies to develop students' creative convergence talent (Ministry of Education, 2015).

Creativity has been studied in various fields, but how to define creativity has remained debatable (Kaufman, 2009). However, the complexity of reaching a consensus on a definition of creativity has not resulted from a scarcity of academic definitions. Plucker and colleagues (2004) adopted various previous studies on creativity and defined creativity as an interaction of the ability, process, and environment of individuals or groups to produce original and useful products within the context of their society, which is the most commonly used academic definitions of creativity at present. As the nature of creativity, an evaluation of one's creativity is greatly influenced by the climate of the society

and environment that one belongs (Amabile, 1996; Csikszentmihalyi, 2016; Lee, 2014). Particularly in school, teachers play a significant role in evaluating students' creativity. They are the gatekeepers to assess students' creative ideas and performances and decide what to value or not in the school context (Csikszentmihalyi, 2016). Further, teachers' evaluations of students' creative ideas and performances are pivotal in recognizing and developing students' creative potential, highlighting the importance of teachers' impartial judgment on students and creativity (Kim & VanTassel-Baska, 2010).

The concept of creativity is quite similar to risk-taking (Tyagi et al., 2017). As we discussed earlier, creativity always carries certain risks since creativity entails originality and usefulness. Originality can be risky depending on the environment because it may interrupt daily routines, organized relationships, and balances (Albrecht & Hall, 1991). Thus, individuals often encounter possibilities of failure or loss while pursuing creative ideas or attempting to produce creative outcomes (Brockhaus, 1980; Janssen & Van Yperen, 2004; Kahneman & Tversky, 1979; Zhou & George, 2003). Further, disparate degrees of risks have an impact on individuals' creativity (Amabile, 1988).

Creative people exhibit risk-taking tendencies (Farley, 1991; Sternberg & Lubart, 1992), and people who are better at tolerating risk-taking situations tend to depict creativity attributes as well (Charyton & Snelbecker, 2007). Creative students tend to take risks, be impulsive, and be hyperactive (Brandau et al., 2007). In school, teachers tend to recognize certain types of personality unwillingness. Such characteristics are risk-taking, impulsiveness, hyperactivity,

and seeking new stimuli in the classroom, which are the list of characteristics often mentioned as the notable characteristics of creative people (Aljughaiman & Mowrer-Reynolds, 2005). Among those characteristics, the propensity for taking a risk is a typical characteristic of creative students that teachers perceive negatively. Although teachers at educational sites acknowledge the importance of creativity and creativity in education, they do not prefer creative students (Westby & Dawson, 1995). Teachers do agree that creativity is an essential ability for students to wisely adapt to an uncertain and complex future society (Craft, 2005), but believe that there should be a time and place for creativity (Kaufman & Beghetto, 2013b). Also, teachers often think students' creative ideas are good in theory but not helpful in real-world classrooms requiring efficient management of a wide variety of students (Runco, 2017). Teachers even think that students with high creativity levels disrupt the classroom climate by interrupting other students' learning (Scott, 1999). As a matter of fact, creative students' behavioral problems, along with the educational curriculum's limitations, are the actual problems teachers face in the current educational scene (Sung et al., 2008). A huge part of the problems is students with creative personality traits who tend to act out of the context during class and learning activities (i.e., not following instructions, outrageous pranks that are not relevant to the class, quickly losing focus on uninterested things, and overexcitement on specific mundane routine, etc.) (Yahn & Kauffman, 2016).

Furthermore, teachers' negative perceptions of students' creative characteristics can negatively affect students' creativity development as teachers play a critical role in evaluating students' creative potential in school. As

teachers consider creative students are more likely to interfere with the class and learning activities, teachers deliberately or inadvertently reduce their effort to develop students' creativity in schools (Beghetto & Kauffman, 2014). Besides, it has been reported that many teachers are aware of the importance of creativity but do not make specific efforts to promote their students' creativity (Scharter et al., 2006).

Creative characteristics that are expressed without an accurate understanding of various contexts in the classrooms not only disadvantages teacher's perception of creativity in school but also causing misconceptions about the relationship between creativity and learning (Beghetto, 2007) and the relationship between creativity and leadership (Mueller et al., 2011). Researchers discovered that students seem better at developing their creative potential when they are not in school (Runco et al., 2016). However, it is still important for students to learn how to be creative within specific environmental constraints since creativity evaluations are dependent on environmental contexts and constraints.

In this regard, understanding the importance of producing creative performances and products within one's context and constraints is necessary. Teachers' job is to educationally support students to demonstrate their creative potential in the school context. Above all, extra attention is needed to difficulties that high risk-taking students go through when they perform their creative potentials within a school context. We need to precisely identify the reasons why high risk-taking students specifically go through such difficulties. Also, we need to consider educational supports that we can provide to further enhance high

risk-taking students' creative potential and make up for the weak points they may have while developing creative potentials. In particular, early adolescence is the period of the highest risk-taking propensity (Crone & Dahl, 2012; Somerville et al., 2010; Steinberg, 2008). In terms of their tolerance for unclear conditions and consequences, the importance of developing creative abilities in a particular context of early adolescence is emphasized (Tymula et al., 2012).

Therefore, Kaufman and Beghetto (2013b) introduced the concept of Creative metacognition (CMC). According to Kaufman and Beghetto (2013b, p. 160), creative metacognition is a combination of "creative self-knowledge (knowing one's own creative strengths and limitations, both within a domain and as a general trait) and contextual knowledge (knowing when, where, how, and why to be creative)." Creative metacognition helps students managing how to express their creativity in desirable contexts and ways (Kaufman & Beghetto, 2013b). Students with high creative metacognition are able to understand the context and why creativity is needed. They express their creative ideas with sensible methods without regard to their risk-taking levels, and hence high levels of creative metacognition allow students to produce creative performance and products by refining their original and divergent thinking to fit in the context. On the other hand, students with low creative metacognition may have difficulty elicit creative results from their original ideas, especially when creative tasks are linked to a context even if their ideas are original. Therefore, the present study suggests the potential role of creative metacognition in educational sites to complement the difficulties students with high risk-taking levels have and help their creative potentials be expressed as a creative output in the school context.

The main aim of the present study was to widen understandings of creative metacognition and creative performance in the middle school context by including the different types of risk-taking. In particular, this study examined the moderating effect of creative metacognition on the relationship between risk-taking and creative performance, illustrated with a specific context. To reach the study's research goals, we first reviewed the relevant theoretical and empirical studies on risk-taking, metacognition, and creativity within the educational perspective. Then, we addressed the results of the moderating effect of creative metacognition on the relationship between risk-taking and creative performance on middle school students. Last, we discussed the findings from the study and draw conclusions.

1.2. Research Questions and Hypotheses

Considering the different effects of a high and low level of creative metacognition on the different types of risk-taking and creative performance subfactors, the aims of the present study were twofold. The first aim was to examine whether and how high and low creative metacognition moderates the relationships between the two different types of risk-taking and creative performance subfactors. The second aim was to examine how the moderation of creative metacognition differ by risk-taking types. The specific research questions and hypotheses of the study are as followed:

Research Question 1. How does high creative metacognition moderate the relationships between risk-taking and creative performance (general creativity, originality, and usefulness)?

Research Hypothesis 1a: With high creative metacognition, the higher the risk-taking, the higher the creative performance (general creativity).

Research Hypothesis 1b: With high creative metacognition, the higher the risk-taking, the higher creative performance (originality)

Research Hypothesis 1c: High creative metacognition does not moderate the relationship between risk-taking and creative performance (usefulness).

Research Question 2. How does low creative metacognition moderate the relationships between risk-taking and creative performance (general creativity, originality, and usefulness)?

Research Hypothesis 2a: With low creative metacognition, the lower the risk-taking, the higher the creative performance (general creativity).

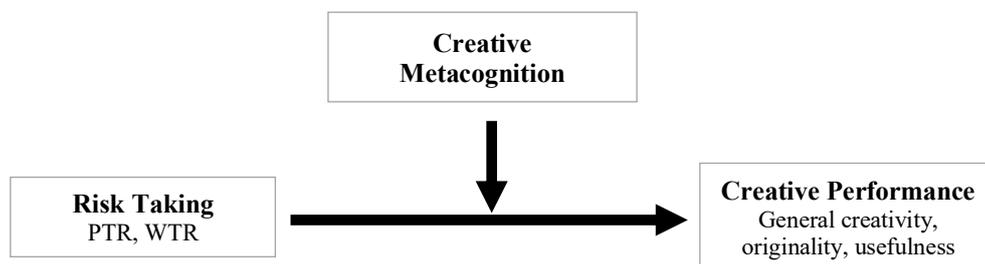
Research Hypothesis 2b: With low creative metacognition, the higher the risk-taking, the higher the creative performance (originality).

Research Hypothesis 2c: With low creative metacognition, the lower the risk-taking, the higher the creative performance (usefulness).

The research model of the study, according to research questions, is illustrated in Figure 1.

Figure 1

Research Model of the Study



1.2. Definition of Terminology

1.3.1. Risk Taking

Kahneman and Tversky (1979) addressed risk in terms of perceived gains and losses. Risk-taking can be defined as an individual choosing the option with the highest outcome variability, that is, an action that may lead individuals to greater benefits but may also lead individuals to negative outcomes at the expense of certainty (Defoe et al., 2015). Risk-taking is neither a unitary phenomenon nor a single trait. It is more than a single factor concept, and different levels of risk-taking can be assessed in various domains and categorized by perceptual and attitudinal reasons (Weber, 2010). The present study focused on middle school students' two different risk-taking types in a creativity domain.

1.3.2. Propensity for Taking a Risk (PTR)

Sitkin and Pablo (1992) addressed risk taking propensity as an individual's dispositional risk-taking tendencies. In this study, risk taking propensity refers to an individual's dispositional tendencies to take or avoid risks.

1.3.3. Willingness to Take a Risk (WTR)

Several scholars have conceptually noted the role of one's willingness to engage risks in order to promote creativity or improve creative behaviors (Amabile, 1983; Schein, 1993). According to Dewett (2006), willingness to take a risk type is a risk-taking state rather than a trait, which includes considerations

of the particular context and potential negative outcomes. In this study, the willingness to take a risk refers to a degree of willingness to take potential creative risks in the context of creative tasks in school. Willingness to take a risk is based on the specific information of possible risks rather than an unconditional chasing of inordinate outputs without calculating potential risks.

1.3.4. Creative Metacognition (CMC)

Creative metacognition is defined as "a combination of creative self-knowledge (knowing one's own creative strengths and limitations, both within a domain and as a general trait) and contextual knowledge (knowing when, where, how, and why to be creative)" (Kaufman & Beghetto, 2013b, p. 160), which is consistent with the larger concept of metacognition focusing on how people recognize and monitor their intellectual abilities (Flavell, 1979; Pintrich, Wolters, & Baxter, 2000). In this study, creative metacognition is defined as an individual's understandings of their creative strengths, limitations, and contexts to be creative, including monitoring abilities during creative tasks.

1.3.5. Creative performance

Creative performance can be explained as a part of creative output (Cropley, 2000), and many researchers defined creativity as a cognitive ability to produce original and useful outputs (Amabile, 1982; Csikszentmihalyi, 2016; Plucker & Beghetto, 2004; Runco & Jaeger, 2012). The present study used creative outputs as an indicator of students' creative performance, which allowed

us to identify students' creativity within originality, usefulness, and general creative perspectives.

General Creativity. Creativity is a multidisciplinary concept that cannot be defined as a single ability. According to the integrated approach of creativity research, general creativity is more than a simple sum of creativity subfactors, a complex and integrated process of various components. Consequently, one's creativity has to be evaluated in an integrated manner from a macroscopic perspective (Collins & Amabile, 1999). The present study defined general creativity as a generally and comprehensively evaluated value of how creatively a creative performance was done.

Originality. Originality is a unique idea that only a few people can think of (Carroll, 1993; Chan & Yuen, 2014; Runco & Jaeger, 2012). The present study defined originality as an evaluated value of how originally a creative performance was done, compared to others from a homogeneous group.

Usefulness. Usefulness is a relevant, effective, feasible, practical, and contextualized idea evaluated by society's value (Amabile, 1996; Csikszentmihalyi, 2016; Lee, 2014). The present study defined usefulness as an evaluated value of how creative performance demonstrated its usefulness and met the presented context.

Chapter 2. Literature Review

2.1. Risk Taking

2.1.1. *Exploring Risk in Creativity*

2.1.1.1. Risk and Creativity.

People often face risks when they pursue creativity (Zhou & George, 2003). As a nature of creativity, being creative always coincide with some level of uniqueness. Unique ideas can be risky since uniqueness often entails disturbances in routines and balances that people are not comfortable with (Albrecht & Hall, 1991). According to McGrath and associates (1992), risk and creativity are closely related. The researchers claimed that the ability to take risks one of the key components of creative entrepreneurs. Amabile (1988) also demonstrated that different levels of contextual risks have the potential to influence individuals' creativity. Therefore, individuals encountering risk while pursuing creative performances and outputs are linked to a natural probability of failure (Brockhaus, 1980; Kahneman & Tversky, 1979; Perry-Smith, 2006). As creative ideas and individuals who create those ideas are hard to separate, offering ideas frequently leads individuals to be at risk (Albrecht & Hall, 1991).

As the relationship between risk and creativity is reviewed, various researchers claimed that risk-taking, in particular, is integral to creativity (Cummings, 1965; Ettlie, 1983; Ekvall, 1983; Kanter, 1983; Mumford & Gustafson, 1988; Woodman et al., 1993; Zhou, 2003; Tuand Lu, 2012). One of

the huge aspects of creativity is risk-taking (Agarwal & Kumari, 1982; Eisenman, 1987; Runco, 2015; Sternberg & Lubart, 1995; Sulloway, 1996), and some researchers even referred the pursuing creativity as a risk (Haefele, 1962). By taking risks, one may have a greater chance to achieve creativity than others who adhere to more conventional and safe procedures. As widely documented, the positive relationship between risk-taking and creativity has been supported in both theoretical (Koberg & Chusmir, 1987; Amabile & Conti, 1997; McLean, 2005; Parzefall et al., 2008) and empirical ways (Fidler & Johnson, 1984; Zhou & George, 2001). Scholars have conceptually noted the essential role of one's willingness to take risks to promote creativity or improvement-related behaviors (Amabile, 1983; Tesluk, et al., 1997).

2.1.1.2. Risk Taking and Creative Personality.

Historically, creativity research was originated from the individual level (Hennessey & Amabile, 2010; Hernández-Torrano & Ibrayeva, 2020). Part of the creativity literature considered creativity as individuals who have a creative personality or propensity (Amabile, 1988; Gough, 1979). Mackinnon (1965) considered one's creative personality as a link between creative potential creative achievement. Given the impact of personality on theoretical and empirical literature on creativity (Rawlings et al., 1998), it appeared to be adequate to explore creativity as a creative personality (DeYoung, 2010). The personality aspects of creativity are still considered important, and a wide range of creative personality factors is reviewed in various recent studies and differentiate a creative person from others. Creative individuals are more likely

to share particular characteristics such as risk-taking (Farley, 1991; Sternberg & Lubart, 1991), Openness to Experience and Extraversion from the Five Factor Model (McCrae & Costa, 1987; Ashton & Lee, 2008), flexibility (Dellas & Gaier 1970), etc. Among various characteristics, risk-taking is considered one of the most relatable personality factors to creativity. If one is not able to confront certain risks or likely to surmount certain risks, it is impossible for him or her to produce a long-term creative output (Sternberg & Lubart, 1993). Risk-taking is part of being creative, and some people are delighted by taking risks while others averse to such pursuits. Sitkin and Pablo (1992) addressed propensity for taking a risk as an individual's dispositional tendencies, which is the temperamental type to take or avoid risks they are born with.

Many researchers claimed that propensity for taking a risk and creative personality traits share a lot in common. The relationships between the propensity for taking a risk and creative personality traits have been analyzed manifoldly. It has been stated that people with high-risk tolerance are more likely to exhibit creative attributes and vice versa (Sternberg, 2001; Sternberg & Lubart, 1992). Creative people are more likely to be original, adventurous, open to new experiences, pursue challenging but unique ideas, and prefer unconventional pathways, and those creative characteristics are often facilitated by greater risk propensity (Salvi & Bowden, 2020). Likewise, previous research affirmed that personality traits like risk-taking, openness to new experiences, and flexibility are the traits creative people share (Lee & Park, 2006). Regarding the characteristics of creative people, Sternberg and Lubart (1991) stated openness to new experiences, patience with ambiguity, confidence, risk-taking; Dellas and

Gaier (1970) stated flexibility, introversion, and openness to new experiences. Mueller and colleagues (2012) also illustrated that people who are more tolerant of ambiguity are more likely to be creative than those who do not.

Since propensity for taking a risk is a huge part of creative personality traits, the William Test of Creative Propensity, a renowned creative personality inventory, include risk-taking as a subfactor of the scale (Williams, 1980). It represents the close relationships between risk-taking and creativity and its aspects as a personality. Charyton and colleagues (2013) also supported the idea with the experimental results that risk tolerance is positively correlated with creative personality traits. The researchers utilized two different self-report measures, the Cognitive Risk Tolerance Scale (CRT) and the Creative Personality Scale (CPS), to measure creative personality and risk tolerance, respectively. Deming (1986) demonstrated that people with higher risk-taking are better at comprehending changes and more willing to take a creative risk.

Besides, students in early adolescence are the increasing period of risk-taking tendency (Crone & Dahl, 2012; Somerville et al., 2010) with a high tolerance for unclear conditions and consequences (Tymula et al., 2012). These early adolescents' characteristics are also closely related to creative personalities (Sternberg & Lubart, 1991). In particular, high risk-taking tendencies have been reported to be highly correlated with creativity and creative personality trait (Jeong & Park, 2006; Zibarras et al., 2008). In a relevant investigation of risk-taking and creativity, Pfeffer and Sutton (2000) emphasized the importance of risk-taking attitudes in an organization's creativity since the fear of changes or risk-takings encourages individuals to contemplate the expected cost more than

the benefits of creative ideas. In organizations, ignoring the importance of creative risk-taking or the benefits of creative ideas can hinder individuals from solving problems creatively and prevent the organization's improvement.

2.1.1.3. Risk Taking and Creative Environment.

Enhancing and fostering creativity are essential goals for 21st-century learning. Along with the learning goal, educational supports through providing creativity friendly climate have come to the fore. Individuals are more likely to be creative when they are in an environment that accepts and enthusiastically fosters their creative ideas. Amabile and associates (1996) highlighted the positive relationships between creativity and the environmental factors that affect creativity at different levels, including autonomy, freedom, creativity encouragement, various work pressures, etc. Runco et al. (2016) conducted an experiment about a 'creative class' and its environment. Researchers recruited about 3000 participants from all over the states through Mechanical Turk. From the study, 'creative class' is defined as an expert group of those who professionally demonstrated their creative potential. The population density and specific characteristics of each community were considered in the study. The study found that a community's climate on creativity was positively associated with the community's allocation of 'creative class.' The study illustrated that the community's encouraging and supportive climate of creativity made a positive and crucial contribution to the development and demonstrations of the professional levels of creativity by community members (Runco, 2017; Runco et al., 2016).

As widely documented, an adequate climate for creativity is essential to develop and facilitate an individual's creativity (Amabile, 1988; Oldham & Cummings, 1996; Woodman et al., 1993). Creating an appropriate environment can encourage individuals to engage in creative activities, especially when they experience dissatisfaction in belonged organizations (Zhou & George, 2001). Many researchers also stated that the adequate environmental context of a corporation could provide a huge positive impact on enhancing employee's creativity (Amabile, 1988; Scott & Bruce, 1994; Shalley, 1995). However, in reality, schools often do not favor creativity. As a matter of fact, many schools view creativity as something that departures from the norms and break the existed balances, and schools even restrain creativity intentionally and unintentionally (Stemnberg & Lubart, 1991). There is no such thing as one and only definite criterion for creativity. Individual's work can be viewed as creative in one environment and not in other environments (Lubart, 1990). It is the school's job to appreciate and support students' creativity as well as suggest guidelines when students need to take risks and not to take risks to be creative.

Some researchers even claimed that providing a no-pressure or creativity-friendly environment may not enough for people to take risks and be creative. According to Ford (1996), individuals tend not to take risks and more likely to maintain the status quo with a so-called "creativity-friendly" environment. However, Individuals must take some risks to perform creativity since taking risks is a preceding step to perform creativity. Therefore, people who are challenged with creative tasks often suffer from the burden of a possible failure as risk-taking (even the reasonable risk-taking) always accompanies some

possibilities of failure. According to Bull and his associates (1995), individuals tend to search for creative outcomes when they felt they were allowed to make mistakes and be creative. The work of Sripirabaa and Maheswari (2015) stated that there is a huge gap between ‘what individuals know’ and ‘what they do’ in organizations, the so-called “knowledge-doing gap.” Researchers found out that among multiple obstacles that stop people from taking risks and solving problems (doing what they know), fear of taking risks is the most crucial obstacle. Yet, researchers emphasized the importance of an acceptable and low-burden environment for individuals to take risks and pursue creativity in many different fields. Besides, Amabile and Pratt (2016) stated the acceptable and even encouraging climate of errors and mistakes as the key to the effective development of creative potentials. An acceptable and encouraging climate for errors and mistakes helps individuals not be psychologically daunted even if they experience them. Under the psychologically stable condition, individuals can continue pursuing creativity even when they experience negative outcomes. Thus, an encouraging and supportive atmosphere that allows one to fail is significant in the process of complex creative thinking that accompanying various errors and mistakes (Amabile & Pratt, 2016).

Further, Simmons and Ren (2009) claimed the positive effects of obligating students to take risks on creative performance. Research from Simmons and Ren (2009) discovered a correlation between risk-taking and creativity (the in-basket task was used to assess creativity) among 120 undergraduate students. Students were asked to be creative (original and useful) during the experiment to solve the virtual problems of different situations.

Students who were asked to be creative showed higher levels of creative problem-solving. Researchers found that students were more likely to demonstrate creative performance in high-risk situations across the board. The types of goal orientation moderate the relationships (e.g., other approach orientation, task avoidance orientation). Students with low avoidance orientation were much more likely to show creative performance when they were in the high-risk situation. In contrast, students with high avoidance orientations responded more negatively due to the lack of motivation or enthusiastic attitude to demonstrate their risky situations. Therefore, it is important to provide an environment that not only allows individuals the possible failures from risks but also requires individuals to take risks to encourage creativity. As many researchers stress the importance of providing an appropriate environment for fostering creativity, the relationship between risk-taking and creativity from an environmental perspective needs to be explored.

A critical question that can grow out of the risk-taking research is whether risk-taking is affected by individual differences or environmental conditions. From the perspective of both creative personality and creative environment research on risk-taking, as reviewed, risk-taking is not a single concept and can be affected by one's personality and environmental condition (Casey et al., 2008). According to Harden and Tucker-Drob (2011), even adolescence is a period of high risk-taking, not every adolescent likes to take high risks, and adolescents do not always take risks. Therefore, both personality aspects of risk-taking and environments that tolerate risk-taking affect one's creativity.

2.2. Creative Metacognition

2.1.1. Creative metacognition and Creativity

The process of creative performance entails a cognitive process, and therefore the output of the creative process is influenced by one's cognition (Glover et al., 2010). Recent literature on creativity as a cognitive process discerned that this stream of literature has especially diverse perspectives. In particular, the Korean Journal of Thinking and Problem Solving devoted volume 18 to provide diverse theoretical and experimental perspectives on cognitive process of creativity (Hennessey & Amabile, 2010).

Metacognition is the concept that executive the cognitive process by supervising the cognitive activities (Flavell, 1979). As given the huge positive impact of metacognition on the literature of learning in both theoretical and empirical ways (Azevedo, 2009; Knight & Galletly, 2005; McCormick, 2003; Rickey & Stacy, 2000), researchers started to explore the relationship between metacognition and another high cognitive process, creativity. A significant number of researchers claimed that metacognition is worthwhile researching in creativity as various functions perform during the creative thinking process require metacognition (Feldhusen, 1995; Mokhtari & Reichard, 2002; Sternberg & Williams, 1996). The creativity researchers proclaimed the potential of metacognition for better understandings of creative processes and outputs (Kaufman & Beghetto, 2013b).

The relationship between creativity and metacognition has been of huge curiosity to creativity researchers. The correlations between metacognition and the creative thinking process can also be found in the four stages of Wallas' model. The model consists of four stages of creativity: Preparation, Incubation, Illumination, and Verification (Wallas, 1970). Feldhusen (1995) also demonstrated that metacognition is an essential factor constitute creativity. Yet, the model has limitations considering that the model could not capture the interactive process of creativity (Armbruster, 1989). In recent years, a growing number of studies have conducted empirical studies to analyze the relationship between creativity and meta-recognition as well (Kaufman & Beghetto, 2013b; Kauffman, Evans, & Baer, 2010).

On the other hand, the concept of creative metacognition has not been consistently conceptualized or operationalized for research up until now (Tarricone, 2011). While Bruch (1988) and Pesut (1990) tried to delineate the concept of creative metacognition from general metacognition, Kauffman and Beghetto (2013b) newly suggested the concept of creative metacognition based on the concept of commonly used metacognition. At this time, creative metacognition (CMC) is defined as “a combination of creative self-knowledge (knowing one's own creative strengths and limitations, both within a domain and as a general trait) and contextual knowledge (knowing when, where, how, and why to be creative)” (Kaufman & Beghetto, 2013b, p. 160).

As a creative subject, individuals' outputs should be recognized and accepted by the field to be creative (Csikszentmihalyi, 1990). Individuals must possess a particular ability that allows them to make their way in the right

direction to be creative. This particular ability is known as creative metacognition. Creativity is a unique ability as only humans are able to create unique and useful ideas and products that fit right in a context (Jia et al., 2019), and creative metacognition definitely plays an important role. According to Sternberg & Williams (1996), creative metacognition is one of the crucial elements of creativity, which allows an individual's creativity to be properly expressed in a certain context.

A number of previous studies have indicated that those who are considered 'creative' can be creative through their creative metacognitions (Baer & Kaufman, 2006; Fasko, 2001; Feldhusen, 1995; Glover et al., 2010; Runco & Chand, 1995). Creativity self-knowledge is a huge part of creative metacognition as it allows individuals to objectively understand their own limitations and strengths in the creativity field. In education field, self-confidence has been treated as a critical factor for a student's achievement in school. Hence, Kaufman and associates (2010) revealed that significant relationship between student's creative self-beliefs and creative performance does not exist. Recent research also noted that excessive self-confidence may cause narcissism, which can make themselves blind to own failings (Goncalo et al., 2010). According to Furnham and associates (2013), overconfident individuals who failed objective self-evaluation may overvalue their ideas and waste their limited time and effort, and it may as well lead them to miss the right chance. One having objective self-evaluation knowledge is pivotal as it is related to understand what one can do and achieve. It has been knowingly stated that being able to objectively self-evaluate one's own ability positively influences not only on self-perception but

also on one's performance (Ackerman et al., 2011; Putwain et al., 2012). For instance, an individual's self-evaluation leads him or her to decide what tasks he or she will attempt to work on and how much time and effort he or she will spend (Haimovitz et al., 2011). Along the same line, an individual's self-evaluation affects when and on what level he or she would take risks. Therefore, objective self-evaluation allows individuals to efficiently make appropriate decisions on when, where, and how to put their time and effort.

According to the investment theory of creativity (Sternberg & Lubart, 1996), creativity is about buying low and selling high, which is individuals demonstrating unique ideas and developing ideas as something that would also be convincing to others. Sternberg and Lubart (1991) addressed that individual's ideas must be balanced between originality and meeting the existing context to be creative. Being creative is about suggesting unique but convincing ideas rather than just being different. That being so, the investment theory emphasized an individual's attitude on taking sensible risks while producing creative outputs (Sternberg & Lubart, 1992; 1996). In this perspective, having objective self-evaluation knowledge in creativity is critical.

The question is when and how students can be objective on their creative abilities. In this manner, Kaufman et al. (2016) claimed that even elementary school students demonstrated some levels of creative metacognition. This result supports the idea of educating creative metacognition in middle school. In the same spirit, Kaufman (2006) conducted a study of self-rated creativity to college students and community members. In this study, he was particularly focused on the differences in creative self-knowledge in each domain. The participants were

asked to evaluate their creativity in various domains that can be classified into five categories (i.e., verbal art, visual art, science, social, sports, and sports). The study showed gender differences. While males rated their creativity higher than females in science and sports categories, females rated their creativity higher than males in visual arts and social areas categories. Further research is needed to investigate the pattern of gender differences in self-evaluation.

Then, how does self-evaluation of creativity influence individuals and their creativity? Many raised some questions on the validity of self-evaluation on creativity. However, many previous studies claimed that self-evaluation on creativity has acceptable validity (Furnham et al., 2005). In addition, Batey and Furnham (2008) discovered that self-evaluated creativity is significantly correlated with various creativity scale (Batey, 2007; Gough, 1979). Researchers also revalued the positive relationships between self-evaluated creativity and creative factors (i.e., impulsive, unusual experiences, and nonconformity) from the schizotype measure (Batey & Furnham, 2008). Moreover, self-rated creativity also demonstrated positive influences on divergent thinking (Furnham et al., 2008) and entrepreneurial attitudes (Ames & Runco, 2005). Putwain and colleagues (2012) tested the relationships between self-reported creativity scores and achievement. Researchers resulted that self-reported creativity was able to predict an individual's achievement and academic motivation even after control intelligence variable. Reviewing the literature on self-report creativity proved the critical role of objective self-evaluation in education as well as real-world performance, and it also allowed us to understand the close link between creative metacognition and creativity. As mentioned earlier, the context of creativity also

plays a crucial role since it evaluates the concept of original and useful in creativity (Csikszentmihalyi 2016; Guilford, 1950; Plucker et al., 2004), which will be discussed soon.

2.2.2. Creative metacognition in School

One of the continued interests in creative literature is the role of creativity in school. The underlying theme of this literature review is to have better understandings of the role of creative metacognition in school. Recent reviews on creativity stated that there is a growing interest in the field of creativity (Dietrich & Haider, 2017; Vartanian et al., 2013). The United Nations Educational Scientific and Cultural Organization (UNESCO) (VanderDussen Toukan, 2017) specifically mentioned creative and innovative thinking as one of the key skills and competencies that students should learn in order to assimilate into the future. PISA, in 2012, also started measuring creative problem-solving skills due to the growing demand for creative adults. In the same vein, Sanz de Acedo Lizarraga and Sanz de Acedo Baquedano (2015) addressed in their study that creativity and metacognition should be explicitly suggested since it is essential in higher education in order to stimulate their potential as future creative professionals.

Although it is widely acknowledged that creativity is an important strength that helps students navigate a fast-changing future and solve unexpected problems (Craft, 2012), many people often think that there is an adequate time and place for creativity (Kaufman & Beghetto, 2013b). For example, in the art field, the standard between originality and usefulness is partial towards

originality (Beghetto et al., 2015). On the other hand, the standard between originality and usefulness is often partial towards the usefulness according to the teacher's perception of creative students and creativity in a classroom context. In a school context, teachers tend to think that creative ideas only make sense in theory and disruptive in a real-world classroom context (e.g., while performing tasks, during lessons, during group activities, etc.) (Johnson & Hatch, 1990; Runco, 2007). Educators tend to claim that they value creativity, but they still possess implicit bias against the creative students. Scott (1999) stated that teachers even consider highly creative students as a disruptive student. In particular, Aytakin and colleagues (2017) suggested that impulsivity, one of the representative traits of creativity, is perceived as a negative factor for visual and verbal creativity in a specific context.

Furthermore, teachers tend to favor smart students over creative students as they perceive creative students as more high-risk, impulsive, and disruptive (Torrance, 1963). Researchers found out that while there was no significant achievement difference on standard tests between the high IQ group and high creativity, teachers evaluated students the high IQ group more desirable in the classroom. (Getzels & Jackson, 1960; Torrance, 1962). In addition, other researchers also revealed that teachers tend to evaluate creative students as more disruptive than the average since teachers were often less tolerable on unique ways of solving problems and answers (Scott, 1999; Beghetto, 2007). According to Bachtold (1976), an individual's perception of creativity is not accurate that there were discrepancies between how they describe the concept of creativity and creativity in real-life. It may, therefore, be stated that a creative student is not a

synonym for a good one in the teacher's eyes. According to Yahn and Kaufman (2016), whether a student is accepted by his or her peers is also somehow related to his or her creativity and how he or she utilizes creativity. Moreover, a study discovered that female students who were found to be creative were often not accepted by their peers. The study indicated that creativity often plays a negative prediction in peer acceptance in school (Kurtzman, 1967).

Kaufman and Beghetto (2013b) emphasized the role of creative metacognition on the school context creativity, especially to students with creative personalities like high risk-taking that teachers often perceive controversially. Despite the strong relationships between high risk-taking and creativity, there were several mixed results in the relationships when individuals were required to consider specific contexts or meet constraints. Middle school students' creative metacognition needed to be more focused on as early adolescences' creative metacognition can be promoted by well-constructed school lessons (Joseph, 2009). Further, early adolescence is a period of active development of thinking ability and imagination, which allows flexible thinking, abstract thinking, and as well as concrete thinking with the awareness of realistic external constraints. The middle school period, also called the golden age of creativity, is the best time to develop creative ability (Gajda et al., 2017; Gong, 2019). Further, it is necessary to investigate how risk-taking affect the creative performance under the school context and its moderating effect of creative metacognition level, given that the importance of developing the creativity of middle school students is largely emphasized in the 2015 revised curriculum of Korea (Ministry of Education, 2015).

2.3. Creative Performance

2.3.1. Creativity and Creative Performance

While we face the world with complexity and unexpected problems, creativity has become an essential skill. In recent decades, the interest in creativity has increased in many different fields (Carroll, 1993; Chan & Yuen, 2014; Davies et al., 2013; Hargrove, 2013; Runco, 1994; Scott et al., 2004), and the education site is no exception (Huang et al., 2019). The increase in creativity and creativity education is due to the positive contribution of creativity to academic, cultural, social, and economic achievements that have been steadily studied and reported (Fanchini et al., 2019; Gajda et al., 2017; Hansenne & Legrand, 2012; Hernández-Torrano & Ibrayeva, 2020). Creative thinking styles became essential in various fields. On that account, the 2015 revised curriculum of Korea emphasized the creativity in learning to cultivate students of the future (Ministry of Education, 2015).

Creativity is considered an essential component of human behavior. Extensive studies have identified diverse factors consist creativity, and now there is a broad consensus that creativity is defined as the of original and useful ideas (Boden, 2003; Mumford, 2003). Plucker and colleagues (2004) defined creativity as the interaction of one's ability, process, and environment to produce original and useful outputs within the context of their society, and it is the most commonly used academic definitions of creativity at present. Batey and Furnham

(2008) suggested creativity as the original and useful outputs that resulted from the unconventional problem-solving process. According to Cropley (2000), creative performance is one form of creative output. Creative performance can be explained as a part of creative output (Cropley, 2000), and many researchers define creativity as a cognitive ability to produce original and useful outputs (Amabile, 1982; Csikszentmihalyi, 2016; Plucker & Beghetto, 2004; Runco, 2004; Runco & Jaeger, 2012).

2.3.2. Risk-taking and Creative Performance

In early studies of the relationships between risk-taking and creative performance, many researchers focused on the personality aspects of risk-taking and considered risk-taking as a unitary concept. Merrifield and associates (1961) discovered a significant correlation between an individual's adventurousness level, which is a component of risk-taking, and associational fluency. The associational fluency was measured as a creativity assessment of divergent thinking.

There were some empirical research about the relationships between personality aspects of risk-taking and cognitive aspects of creativity in various forms. Kurtzman (1967) examined the relationships among creative personality, attitudes towards school, peer acceptance, and adolescents' creativity. The researcher employed the Junior-Senior High School Personality Questionnaire (HSPQ) (Cattell & Cattell, 1969) to measure creative personality and several assessments (i.e., Apparatus, Controlled Associations, Thing Categories, Gestalt Transformation, Word Beginnings and Endings, Word Arrangements and

Utility) from the Kit of Reference Tests for Cognitive Factors (1963) to measure creativity. The study concluded that adolescents who are more likely to be adventurous, tolerate ambiguity, and confident show greater creative thinking abilities than adolescents with less adventurousness and ambiguity tolerance. Especially, the result of the study presented the strong positive correlations between adventurous trait and creative thinking among female students. There was a constant tendency of adventurousness' positive effect on creative thinking among male students as well, even though it was not statistically significant. Shen and colleagues (2018) showed that the relationships between the propensity for taking a risk and creativity differ depending on the types of creative tasks. Results demonstrated a positive correlation between self-rated risk and divergent thinking (measured by the Alternate Uses Task) (Guilford, 1967). At the same time, El-Murad and West (2003) reported that risk-taking and creativity demonstrated positive and significant relationships regardless of the sample and creative performance tasks.

On the other hand, a number of researchers focused on the domain specificity of risk-taking. According to Figner and Weber (2011), the concept of risk-taking has been studied within different domains and contexts since it is not a single factor concept. Initial studies of domain-specific risk-taking measured an individual's creativity with different types of gambling tasks, such as the Roulette Betting Task (RBT). The gambling task was able to measure the degrees of monetary risk-taking, but it was not assured if it can be used more generally or to measure other types of risk-taking (Slovic, 2000). Along with Solvic's study, other researchers developed measures that can be used risk in

more than one domain of taking tendencies. In particular, Weber and colleagues (2002) identified five domains of risk-taking (Health/Safety, Ethical, Recreational, Social, Gambling) and developed a self-report questionnaire called Domain Specific Risk Taking Questionnaire (DOSPERT) based on several studies.

Many researchers explained the benefits of the Domain Specific Risk Taking Questionnaire (DOSPERT). DOSPERT helps to understand risk-taking as a multidisciplinary concept since the scale identified different risk-taking levels in six domains rather than treating risk-taking as a single, trait-like factor. The scale was replicated with many different samples and environments so it can be generalized. Uy and Galvan (2017) even conducted a study while utilizing DOESPRT to adolescents. In addition, Harrison and researchers (2005) recommended the DOSPERT as it can be utilized in various domains and contexts (Weber, 2010). Sternberg (1997) claimed that social risk-taking as “Disagreeing with an authority figure on a major issue” is particularly related to creativity among subcomponents of risk-taking. Presenting or suggesting one’s creative ideas or outcomes requires a high level of social risk, as it can be disregarded or rejected by others during the process of evaluation.

Tyagi and colleagues (2017) claimed that risk-taking is a domain-specific concept since social risk-taking mainly predicted creative personality, behaviors, and achievements from the study. The literature on risk-taking has been focused on gambling and financial risk-taking, assuming that gambling and financial risk-taking are able to explain the overall area of risk-taking. However, in this study, creativity character, creative behavior, and creative achievement

(measured with the Creative Personality Scale, the Runco Ideational Behavioral Scale, the Creative Achievement Questionnaire, respectively) only showed a distinct relationship with self-reported risk-taking in social domains. This supports the claim that the relationship between risk-taking and creativity is domain-specific (Tyagi et al., 2017). Further, Tyagi and colleagues (2017) found that individuals who tend to have a conservative political perspective in the United States tend to show a low level of creativity and social risk-taking. The negative relationships between creativity and morality of social risk-taking, which was revealed in the preceding study, was not shown (Gino & Ariely, 2012).

Along with the research on domain risk-taking and creativity, multiple researchers employed different creativity components to assess the relationships between risk-taking and creativity. Eisenman (1987) conducted a study on a middle-class white man from the United States and found positive relationships between risk-taking and three separate creativity indicators (i.e., creative attitude, divergent thinking, and originality). The creative attitude was measured by the personal opinion survey, and originality was measured through the participant's unusual use of certain objects.

With the relationships between risk-taking and creativity in domain-general and specific perspectives, the relationships between risk-taking and creative outputs also have some empirically established precedents. In particular, many researchers focused on a correlation between risk-taking and divergent thinking, as risk-taking characteristics promote individuals to reach the expended thinking process. Pankove and Kogan (1968) demonstrated the relationships

between risk-taking on a creative task and divergent thinking. Researchers investigated the relationships between risk-taking (measured by behavioral tasks) and creativity (measured by divergent thinking tasks with open-ended questions). Results of the study demonstrated significant correlations between risk-taking and creative performance when one of the creative tasks was utilized as a risk-taking behavioral task. This research could be the clue of some mixed results on risk-taking and creative outputs. One of the reasons for the mixed results is the variety of measuring tools of risk-taking and creativity (Strum, 1971). In addition, Agarwal and Kumari (1982) categorized risk-taking in different categories to assess relationships between risk-taking and creative performance. The study was conducted on graduate students. For the creative performance task, researchers utilized a verbal test of creative thinking. Findings demonstrated a correlation between total risk-taking and different categories of risk-taking and creativity, indicating that risk-taking also increases with creativity. However, although males took more risks than females, the creativity scores of both genders showed no significant difference.

Some researchers focused on the differences in the relationships between risk-taking and creative types. Kwon and colleagues (2019) demonstrated that an individual's risk-taking positively influenced their creativity (measured by an individual's supervisor). Individual's risk-taking was measured with a self-report questionnaire of risk-taking (Neves & Eisenberger, 2014; Smith, 1996). However, an individual's risk-taking negatively affected team creativity (which is measured by an individual's team supervisor) as properties of risk-taking cause troubles while working as a team. In other words, an individual's risk-

taking has a negative impact on creative outputs within a particular context. The result from the stud indicated that people with high risks tend to explore new ideas rather than considering specific contexts.

On the other hand, several researchers who focused on different creativity components reported empirical results on negative correlations between risk-taking and creativity. Shen and colleagues (2018) conducted two studies about the relationships between risk-taking and creativity. A total of 127 undergraduates from China participated in study 1. Study 1 demonstrated that risk-taking and convergent thinking are negatively related. The measurement of risk-taking preference was a self-reported questionnaire; the Risk Preference Inventory and convergent thinking was cRAT. This finding was consistent with several previous studies on convergent thinking (e.g., Pizarro et al., 2011). However, the study results were not aligned with previous research (Tyagi et al., 2017). As the study was conducted with Chinese undergraduates, cultural differences have to be considered.

Therefore, researchers conducted another study on risk-taking and convergent thinking with more diverse samples from online. One hundred and ninety-eight Chinese undergraduates from various regions of China participated in Study 2. The study resulted that both risk-taking (measured by Risk Preference Inventory) and adventurous personality showed negative correlations with convergent thinking (measured by cRAT). Also, there were no statistically significant gender differences in the relationships between risk-taking and convergent thinking. The study showed disparate results from the majority of other studies about risk-taking and creativity. It is because that the study was

focused on the relationships between risk-taking and convergent thinking rather than divergent thinking (Shen et al., 2018). The research allowed us to understand the possible positive influence of risk-taking characteristics in creativity fields consider ways to complement the weakness that characteristics of risk-taking have. The research also guided us to explore the relationships between risk-taking and creativity in more comprehensive ways with domain-specific perspectives.

However, some researchers reported results that did not significantly support any relationships between risk-taking and creativity. For example, Nicolay (1966) showed a lack of statistically significant relationships between risk-taking and creativity on female undergraduates. AUT measured creativity – considering originality, fluency, and flexibility and the Consequence test – considering originality and fluency. A domain-specific self-report type questionnaire measured Risk-taking. Also, Erbas and Bas (2015) conducted a study on Grade 9, and researchers could not report significant correlations between academic risk-taking and creative ability.

According to Strum (1971), there are several reasons for mixed results on the relationships between risk-taking and creativity. Although there have been significant quantities of studies on risk-taking and creativity, each researcher used different creativity and risk-taking measures. Further, both risk-taking and creativity have been renowned as challenging to be defined. Therefore, the definition of risk-taking and creativity may vary by each researcher's perspectives on those concepts. Research participant's cultural, demographic, and age differences are one of the possible reasons as well (Strum, 1971).

Meanwhile, many researchers started to highlight the cognitive aspects of risk-taking. According to preceding studies, cognitive risk-taking has been studied as a component of creativity, which also has a positive effect on challenging schoolwork, resilience, and health. Features related to creativity – unconventional, insightful, confident, inventive, reflective, and broad interests positively predict cognitive risk-taking, yet features that are not related to creativity predicted cognitive risk-taking negatively (Charyton, 2008). Charyton and colleagues (2013) demonstrated the differences in risk-taking depend on the student's major. Undergraduate students who are majoring in social studies (e.g., history, psychology, politics) and art (e.g., visual art, architecture) showed a higher level of cognitive risk-taking than students who are majoring in engineers, music, business, and medicine. Also, the older students and minority race students tend to show higher levels of cognitive risk-taking.

According to Dewett (2006), individual's willingness to take risk significantly affect one's creativity and moderate the encouragement and creativity. Encouragement supported individuals to take perceived risks that have potential possibilities of loss readily. This creative and innovative risk-taking allowed individuals to pursue creativity by extending their boundaries from the comfort zone. Participant's creativity was measured through participant supervisors' evaluation, highlighted the originality and usefulness of creativity. Cummings and Mize (1968) claimed that generating more creative ideas is positively correlated with one's willingness to take a risk and tolerance for vagueness. Moreover, various researchers claimed that taking sensible risks is an essential step to generate creative outputs (Dewett, 2006; Sternberg & Lubart,

1992; Sternberg et al., 1997; Zhou & George, 2001). Amabile (1988) conducted qualitative research and showed a positive relationship between risk-taking orientation and creative performance among the R&D scientists.

2.3.3. Metacognition and Creative Performance

Research on metacognition has been studied for a while from cognitive psychology literature (Flavell, 1979). Early studies of creativity and metacognition began in the 1980s, but studies from this period remained in conceptual reasoning and general intuitive understanding of the relationship between creativity and metacognition (Bruch, 1988; Feldhusen, 1995; Glover et al., 2010; Pesut, 1990). Sanz de Acedo Lizarraga and Sanz de Acedo Baquedano (2015) found that self-evaluated creative metacognition is significantly correlated with divergent thinking. Hong and associates (2016) conducted a study on Grade 10 students and discovered the positive relationships between explicit instructions and metacognition and originality from the creative performance.

While preceding literature reported the positive impact of creative metacognition on creativity, there is a lack of empirical studies to support the claim. Although the associations between creativity and metacognition have been suspected in previous literature, such a connection has yet to be discovered because certain stages of the creative process are detached from reflection. Also, there is a lack of research on how each subcomponent of creative metacognition (e.g., creative self-knowledge, creative context knowledge, and creative self-regulation) affects creativity's detailed subfactors (e.g., general creativity,

originality, and usefulness). Therefore, the present study planned to explore how the middle school student's risk-taking affects the creative performance in the actual school context and how the mixed effects of risk-taking on the creative performance may vary depending on each middle school student's creative metacognition level.

Chapter 3. Method

3.1. Participants

A sample of 350 participants was volunteered for this study. The sample consisted of Grade 7 and 8 middle school students from three middle schools located in South Korea. Out of 350 participants, 31 samples were removed due to incompleteness and some technical issues on the online services at one site. Therefore, the final sample size was reduced to $N = 319$ students. Over half of the students reported their gender as female (63%) from the final sample size. A total of 196 participants was in Grade 7 (61.4%), and 123 students (38.3%) were in Grade 8. The number of participating students, the percentages of female and male students, and the percentages of Grade 7 and Grade 8 students are listed in Table 1.

Table 1

Participants

Gender	1 st grade		2 nd grade		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Male	49	25.0	65	52.8	114	35.7
Female	147	75.0	58	47.1	205	64.3
Total	196	61.4	123	38.3	319	100

Middle school students were selected as the object of the study due to the following reasons. Early adolescence is the period of the highest risk-taking propensity (Crone & Dahl, 2012; Somerville et al., 2010; Steinberg, 2008). In terms of their tolerance for unclear conditions and consequences, the importance of developing creative abilities in a particular context of early adolescence is emphasized (Tymula et al., 2012). According to Sternberg and Lubert (1991), demonstrated characteristics of adolescence are also closely related to creative personalities.

Moreover, early adolescence is also the period of active development of thinking ability. Students from this period are not only able to start thinking logically, flexibly, and abstractly, but also able to start recognizing the substantial external constraints. In this respect, it is widely stated that the middle school period is momentous for creative development since it is the best time to develop creative ability (Gajda et al., 2017; Gong, 2019).

Last, previous literature confirmed that middle school student's metacognition could be promoted in school by well-constructed lessons and an iterative process of feedback (Joseph, 2009). It is noteworthy that metacognition can be learned through adequate lessons during the middle school period. The study considered the practical effect of creative metacognition in educational sites while selecting the object. Therefore, this study was specifically targeted middle school students to examine the moderating effect of creative metacognition on the relationship between risk-taking and creative performance in school.

3.2. Procedures

The experiment was conducted in October of 2020 after the Institutional Review Board (IRB) from Seoul National University approved the research plan.

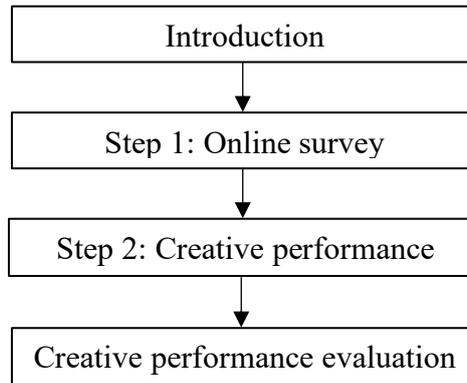
Prior to the main study, a pilot study was conducted in October of 2020 with middle school students to refine the developed scales used in the study and grasp the time needed to conduct the main study. The sample of the pilot study was not included in the main study. A total of 63 students (28 boys and 35 girls) from a middle school located in Seoul, Korea, have participated. Based on the pilot study result, the creative metacognition questionnaire was revised to more adolescent-friendly and precise words so that middle school students can easily understand the context and the meaning of each item. For example, “I know the domain that I can be more creative” was revised to “I know the subject that I can think of more creative ideas.” The revised item’s validity was examined by two current middle school teachers and four experts from the educational psychology field. The WTR questionnaire was also revised to more adolescent-friendly and precise words, and an item was edited out due to the internal reliability issue. For example, “I take possible risks of being a failure when I think of a better way to complete my task” was revised to “I take risks regardless of the results when I think of a better way to complete my work in school.” The revised questionnaires' validity was examined by two experts in educational psychology who also have at least eight years of teaching experience in middle schools.

The recruitment of the main study sample was progressed through the notice of recruitment. After obtaining the IRB approval on the research plan, four middle schools across the country were selected, and we got permission from each principal to conduct the study. Considering the situation of COVID-19, all the recruitment documents and activity sheets were delivered to students through classroom teachers. Explicit explanations of the study, including purpose, procedure, and possible benefits, are provided to each classroom teacher in both verbal and written ways. Every participant in the experiment was explicitly guided before the experiment that they should be voluntarily participated in the experiment and were able to quit anytime during the experiment by free will without any disadvantages. Also, it was emphasized that the state of being anonymous of study participation was guaranteed, and what they have provided during the study could be terminated at any point during and after the experiment.

The main study took about 50 minutes – 5 minutes for the introduction, 20 minutes for the preliminary survey, and 25 minutes for the creative performance task. The total time of the experiment varied depending on how quickly individual student answers the survey. This experiment was conducted in a student's classroom, and each participant needed to use an electronic device to complete the survey. A flowchart of the procedure is illustrated in Figure 2.

Figure 2.

Experiment Procedure



Introduction

Before students received the activity sheet, the classroom teacher read out the study's introduction provided by the researchers beforehand. Students were briefly informed about the study and the researcher's affiliation, and teachers provided a certain amount of time for students to ask questions freely. Then, students received the activity sheet individually. The activity sheet was composed of two steps: an online survey and a creative performance task. All participants completed both steps. Once the study started, they were not allowed to share their ideas with their friends until they finished the whole procedure unless they quit the whole process.

Step 1: Online survey

Students individually entered the online survey by scanning the provided QR code illustrated on the activity sheet's first page. After reading the brief

explanations about the experiment, students provided minimum demographic information for the study, such as school, grade, class, and gender. Then, students answered every item in a list of questionnaires. The questionnaires were constructed to measure the independent variables (i.e., PTR, WTR), the moderating variable (i.e., creative metacognition), and the controlled variable (i.e., background knowledge) (see Appendix A).

Step 2: Creative performance task

After finishing answering the online survey, students were invited to complete a creative performance task. A written explanation about the creative performance task was also provided at the end of the online survey. The creative performance task designed for the study, *Designing a new classroom after COVID-19*, was constructed based on the current revised middle school curriculum of Health Education and Technology Education (Ministry of Education, 2015). It was designed to evaluate middle school students' general creativity, originality, and usefulness in the school context. While designing the new classroom for the creative performance task, students had to meet the following two conditions: classroom design has to be effective in preventing COVID-19, classroom design has to be physically and emotionally safe for students and teachers while it is efficient for learning. On the second page of the activity sheet provided early, students were asked to draw their ideas and explain with words if needed. Students were instructed that creative ideas' quality is more important than drawing itself in this creative performance task.

Creative performance Evaluation

The creative performance was evaluated based on the Consensual Assessment Technique (CAT) (Amabile, 1982) – the technique that many creativity researchers have been extensively used to evaluate creative performance tasks (Bear et al., 2004; Kaufman et al., 2008). CAT entails a comparative evaluation method within the evaluation group, not an absolute evaluation (Amabile, 1982; 1996). Considering the task and performer's characteristics (i.e., middle school curriculum-based creative performance task and the middle school students), three current middle school teachers were selected as evaluators. All three middle school teachers had at least five years of teaching experiences in middle schools and various experiences in teaching creative art classes in middle school. Prior to assessing students' creative performance tasks, evaluators fully understood the concept of creativity as the researcher defined in the study. The creative performance task was evaluated in three categories: general creativity (i.e., overall and from an integrated perspective, how creative the idea is), originality (i.e., among overall responses, how rare and unique the response is), and usefulness (i.e., whether and on what level the response adopted the required constraints). It was evaluated with a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*).

Inter-rater reliability of CAT is a degree of agreement on creative performance evaluation among raters. According to the preceding literature, a degree of .70 or higher is acceptable for the evaluator's inter-rater reliability (Amabile & Pillemer, 2012). The inter-rater reliability for every category (i.e.,

general creativity, originality, usefulness) from the creative performance task was acceptable (.78, .87, and .92, respectively).

3.3. Measures

Demographic questionnaire

A demographic questionnaire was conducted. Participants were asked to answer the minimum demographic information needed for the study, including age, gender, class, and school.

Propensity for Taking a Risk (PTR)

Part of the 15-item creative personality scale from i+3C (Lee et al., 2018) was adopted to measure middle school student's propensity for taking a risk. The creative personality scale was composed of five dimensions of creative personality: imagination (3 items), humor (3 items), originality (3 items), risk-taking (3 items), and unconventional (3 items). This study adopted the risk-taking dimension from the scale, which was designed to measure the everyday risk-taking propensity of adolescents in the general context. The risk-taking dimension consisted of a total of three items, including the following examples: "I am adventurous" and "I want to try something new rather than something I already experienced." A 5-point Likert scale (1= *strongly disagree* to 5 = *strongly agree*) was applied. Cronbach's alpha for the PTR scale from this study

was .83. An example of the scale utilized in the study is demonstrated in Appendix B.

Willingness to Take a Risk (WTR)

The Willingness to Take a Risk (WTR; Dewett, 2006) scale was designed to measure an individual's cognitive willingness to engage in a risk that is intended to be productive within a specific context (Dewett, 2006). The scale was originally examined within an organizational environment (e.g., "I will take informed risks at work in order to get the best results, even though my efforts might fail" and "I will take a risk and try something new if I have an idea that might improve my work, regardless of how I might be evaluated") (Dewett, 2006, p. 40). In this study, a minor adaptation was made to implement the scale in school the context. The scale was translated and modified to measure Korean middle school students' willingness to take creative risks in the context of creative tasks in school. The scale was translated by two experts in the field of educational psychology who are also proficient in English and Korean. Three experts in the educational psychology field modified the scale, and two of them also had at least eight years of teaching experiences in middle schools.

The WTR scale from this study consisted of a total of eight items, including the following examples: "I will take informed risks at school in order to get the best results, even though my efforts might fail" and "I will take a risk and try something new if I have an idea that might improve my tasks in school, regardless of how I might be evaluated." Students responded to each item on a 5-point Likert scale (1= *strongly disagree* to 5 = *strongly agree*). The WTR scale

from this study was found to be highly reliable ($\alpha = .91$). An example of the scale utilized in the study is illustrated in Appendix C.

Table 2

Creative Metacognition Scale Construction and Reliability

Subfactors of CMC	Item number	Number of items	Cronbach's alpha (α)
Creative self-knowledge	1, 4, 7	3	.91
Creative context knowledge	2, 5, 6	3	
Creative regulation knowledge	3, 6, 9, 10	4	
Total		10	

Creative Metacognition (CMC)

Three components were considered to measure creative metacognition with an integrated perspective: creative self-knowledge, creative context knowledge, and creative self-regulation knowledge. The creative metacognition scale utilized in the study was constructed after reviewing various literature on creativity, metacognition, and creative metacognition (Huh, 2011; Sanz de Acedo Lizarraga & Sanz de Acedo Baquedano, 2015; Flavell, 1979; Kaufman & Beghetto, 2013b; Sperling et al., 2002). The scale was revised with two current middle school teachers and four professionals from the educational psychology field a total of three times. After finishing revising the scale, validity was

confirmed with two experts in the educational psychology field who also had eight years of teaching experiences in middle schools. The CMC scale from this study comprised a total of 10 items, including the following examples: “I know how creative I am,” “I know when to be original and when to be realistic in school,” “I know when creative solutions are needed in school,” and “I know how to actualize my creative ideas in school.” A 5-point Likert scale (1= *strongly disagree* to 5 = *strongly agree*) was applied. The CMC scale from this study was found to be highly reliable ($\alpha = .91$). Detailed information on CMC scale construction is listed in Table 2, and an example of the questionnaire used in the study is demonstrated in Appendix D.

Background Knowledge on Subjects

The background knowledge scale was constructed to control the effect of prior knowledge from the creative performance as the creative performance task integrated middle school subjects based on the current revised middle school curriculum. The scale was developed by three current middle school teachers who had eight years of teaching experience in middle schools, and it is based on the current revised middle school curriculum (Ministry of Education, 2015). The scale consisted of four multiple-choice questions, including the following examples: “Which of the following is not an adequate way to prevent COVID-19” and “Which of the following correctly describes the function of architecture.” Students were asked to choose one correct answer regarding each question. An example of the scale utilized in the study is demonstrated in Appendix E.

Creative Performance Task

The creative performance task was specifically designed to evaluate students' general creativity, originality, and usefulness for the study. The theme of the creative performance task is Designing a new classroom after COVID-19. The creative performance was designed based on the current revised middle school curriculum of Health Education and Technology Education. The content validity was confirmed with two current middle school teachers and three professionals from the educational psychology field, and the creative performance task has been revised a total of 3 times. For the creative performance task, students were required to provide original and useful ideas by meeting the following two constraints: 1) Classroom design has to be effective in preventing COVID-19, 2) Classroom design has to be physically and emotionally safe for students and teachers while it is efficient for learning. Students were asked to draw their ideas and explain ideas with the words on the activity sheet's second page. Students were instructed that creative ideas' quality is more important in this performance task than drawing itself. An example of the creative performance task provided in this study is illustrated in Appendix A.

Although many performance tasks tried measuring student's creative potential in many different ways, it was not easy for educators to adopt those creative performance tasks directly to educational practice as tasks were often too general or disparate from the school context (Ward et al., 2004). In the present study, the creative performance task was designed by integrating two subjects from the current revised middle school curriculum (Ministry of

Education, 2015), and it was highly related to a real-life problem. In this regard, the creative performance task provided the possibilities of its application in educational practice (Mumford et al., 2003). Therefore, regarding content relevancy, this study's creative performance task can benefit educators in practice.

3.4. Data Analysis

Prior to the data analysis, incomplete data were removed from the sample. First, descriptive statistics of the variables measured through the survey (i.e., demographic information, PTR, WTR, creative metacognition, background knowledge) were reviewed. Second, a correlation analysis was also conducted to review the relationships between the variables. Third, a hierarchical regression analysis was conducted to examine the moderating effect of creative metacognition on the relationships between different risk-taking types (i.e., PTR, WTR) and creative performance subfactors (i.e., general creativity, originality, usefulness). In phase 1: controlled variable (i.e., background knowledge) was inserted to each dependent variable (i.e., general creativity, originality, usefulness); in phase 2: independent variables (i.e., PTR, WTR) and moderator (i.e., creative metacognition) were inserted to each dependent variable; in phase 3: interaction terms (i.e., PTR x creative metacognition, WTR x creative metacognition) were inserted to each dependent variable. Every continuous variable (i.e., PTR, WTR, background knowledge) was mean-centered before the

regression analysis to prevent multicollinearity (Cohen et al., 2015). Once we confirmed the interaction terms' statistical significance on each dependent variable, we tested a simple slope analysis to probe the exact condition of interaction effects on each dependent variable. Analyses were conducted using IBM SPSS 25.

Chapter 4. Results

4.1. Descriptive Analysis

Descriptive statistics (i.e., means, standard deviations, skewness, kurtosis) and zero-order correlations are presented in Table 3. Pearson correlation coefficients were calculated to measure associations among the measures corresponding to risk-taking, creative metacognition, background knowledge, as well as subfactors of creative performance (i.e., general creativity, originality, usefulness). While PTR reported a high degree of correlation with WTR ($r = .57$), the Pearson correlation coefficients revealed that different types of risk-taking showed different levels of correlations with variables. In particular, PTR is significantly correlated creative metacognition ($r = .44$), general creativity ($r = .44$), originality ($r = .52$), and usefulness ($r = .38$), but, on the other hand, WTR and demonstrated slightly stronger correlations with creative metacognition ($r = .59$), general creativity ($r = .60$), originality ($r = .67$), and usefulness ($r = .49$). Background knowledge was significantly correlated with neither PTR nor WTR, whereas background knowledge reported a significant correlation with several dependent variables – general creativity ($r = .15$) and originality ($r = .11$). Every dependent variable is correlated with one another, but general creativity and usefulness especially reported a stronger correlation ($r = .82$).

Table 3*Means, Standard Deviations, Skewness, Kurtosis, and Pearson Correlations.*

Variables	Correlations						
	1	2	3	4	5	6	7
1 Background Knowledge	-						
2 PTR	.01	-					
3 WTR	.07	.57**	-				
4 Creative Metacognition	.05	.44**	.59**	-			
5 General Creativity	.15**	.44**	.60**	.77**	-		
6 Originality	.11*	.52**	.67**	.47**	.66**	-	
7 Usefulness	.07	.38**	.49**	.85**	.82**	.47**	-
M	.92	3.73	3.41	3.71	3.01	2.93	3.22
SD	.15	.99	.87	.74	1.02	1.28	1.13
Skewness	-1.95	-.65	-.49	-.26	.15	.04	-.07
Kurtosis	3.54	-.10	-.08	-.21	-.79	-1.01	-.74

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Overall $N = 319$; * $p < .05$, ** $p < .01$, *** $p < .001$.

All continuous independent variables were mean-centered prior to the regression analysis To prevent multicollinearity from the interaction (Cohen et al., 2015). The Variance Inflation Factor (VIF) was also examined prior to the regression analysis. VIF on continuous independent variables indicated that the problem of multicollinearity was not present ($VIF < 2$). The residual plots were examined, and there was no systemic variation of the error terms among continuous variables utilized in the study. All the variables are situated between the range of -1.95 to .15 on skewness and -1.01 to 3.54 on kurtosis. As an

absolute value of skewness is smaller than two and an absolute value of kurtosis is smaller than 7, researchers indicated that the assumption of normality was not violated (Curran et al., 1996) (see Table 3).

Additionally, considering that preceding studies stated the association of gender with both risk-taking (Agarwal & Kumari, 1982; Cárdenas et al., 2012; Dewett, 2006; Karakowsky & Elangovan, 2001) and creativity (Abraham, 2016; Shen et al., 2015), independent *t*-tests were conducted between gender and different types of risk-taking and creativity variables used in the study (i.e., PTR, WTR, general creativity, originality, usefulness). However, the *t*-test did not yield statistically significant differences between gender on any of the risk-taking or creativity variables. Detailed results on moderating effects of creative metacognition on the relationships between different types of risk-taking and each subfactor of creativity are explained with the study hypothesis as follows.

4.2. Moderating Effect of Creative Metacognition on the Relationship between Risk Taking and General Creativity

To examine the moderating effect of creative metacognition on the relationship between different risk-taking types (i.e., PTR, WTR) and general creativity while background knowledge of the task is controlled, hierarchical regression was conducted. The standardized regression coefficient is presented with β , which is used to compare the relative effect size of variables on the dependent variable. The result of the hierarchical analysis on general creativity is

demonstrated in Table 4. In phase 1, background knowledge was inserted as a controlled variable. Fit of the hierarchical regression model of the general creativity was adequate that dependent variable was significantly explained ($R^2 = .02$, $F_{(1, 317)} = 7.48$, $p = .007$). The background knowledge significantly explained general creativity ($\beta = .15$, $p < .007$).

In phase 2, PTR, WTR, and CMC were additionally inserted to confirm if each variable has significant effect on general creativity after background knowledge is controlled. Fit of the hierarchical regression model of the general creativity was about 62% increased and adequate that dependent variable is significantly explained ($R^2 = .64$, $F_{(4, 314)} = 140.61$, $p < .001$). After inserting additional variables, background knowledge ($\beta = .11$, $p = .002$) as well as WTR ($\beta = .19$, $p < .001$) and CMC ($\beta = .63$, $p < .001$) significantly predicted general creativity while PTR was not ($\beta = .04$, $p = .30$).

Last, in phase 3, interaction terms (i.e., PTR x CMC, WTR x CMC) were additionally inserted to confirm if each interaction term has significant effect on general creativity while background knowledge, PTR, WTR, and CMC are controlled. Fit of the hierarchical regression model of the general creativity was about 1% increased and adequate that dependent variable is significantly explained ($R^2 = .64$, $F_{(6, 312)} = 95.82$, $p < .001$). After inserting the interaction terms, background knowledge ($\beta = .11$, $p = .002$) as well as WTR ($\beta = .04$, $p < .001$) and CMC ($\beta = .64$, $p < .001$) significantly predicted general creativity. However, both interaction terms – PTR x CMC ($\beta = .05$, $p = .41$), WTR x CMC ($\beta = .07$, $p = .23$) and PTR ($\beta = .20$, $p = .30$) were not able to significantly predict the general creativity.

Table 4

Hierarchical Regression Analysis Results on Creative Performance (General Creativity)

	<i>Step</i>	<i>Measures</i>	<i>b</i>	β	<i>t</i>	<i>F</i>	R^2	ΔR^2	$\Delta R^2(F)$
GC	1	Bkn	1.06	.15	2.74***	7.48**	.02	.02	7.48**
	2	Bkn	.75	.11	3.19**	140.61***	.64	.62	180.74***
		PTR	.04	.04	0.04				
		WTR	.23	.19	4.18***				
		CMC	.88	.63	14.85***				
	3	Bkn	.75	.11	3.19**	95.82***	.64	.01	2.88
		PTR	.24	.20	4.34				
		WTR	.05	.04	1.05***				
		CMC	.89	.64	15.03***				
		PTRxCMC	.05	.04	0.82				
		WTRxCMC	.07	.05	1.19				

Note. Bkn: Background Knowledge, PTR: Risk Taking Propensity, WTR: Willingness to Take Risk, CMC: Creative Metacognition, GC: General Creativity; * $p < .05$, ** $p < .01$, *** $p < .001$.

Therefore, the research hypothesis that with high creative metacognition, the higher the risk-taking, the higher the creative performance (general creativity) (Research Hypothesis 1-1) was not supported as well as the research hypothesis with low creative metacognition, the lower the risk-taking, the higher creative performance (general creativity) (Research Hypothesis 2-1). As previous research stated, the hierarchical regression analysis results indicated that background knowledge, WTR, and creative metacognition independently

explained general creativity on creative performance. In other words, middle school students who tended to take more cognitive risks in school or had higher knowledge of creative self, task, and context were more likely to demonstrate higher general creativity on creative performance while the level of background knowledge of the performance task was controlled.

4.3. Moderating Effect of Creative Metacognition on the Relationship between Risk Taking and Originality

To examine the moderating effect of creative metacognition on the relationship between different types of risk-taking and originality while background knowledge of the task is controlled, the hierarchical regression was conducted. The result of the hierarchical analysis on originality is demonstrated in Table 5. In phase 1, background knowledge was inserted as a controlled variable. Fit of the hierarchical regression model of originality was adequate that dependent variable was significantly explained ($R^2 = .01$, $F_{(1, 317)} = 3.96$, $p = .01$). The background knowledge significantly explained originality ($\beta = .11$, $p = .05$).

In phase 2, PTR, WTR, and CMC were additionally inserted to confirm if each variable has statistically significant effect on originality after background knowledge is controlled. Fit of the hierarchical regression model of the originality was about 47% increased and adequate that dependent variable is significantly explained ($R^2 = .48$, $F_{(4, 314)} = 73.99$, $p < .001$). After inserting

additional variables, PTR ($\beta = .20, p < .001$) and WTR ($\beta = .51, p < .001$) significantly predicted originality while background knowledge ($\beta = .07, p = .07$) and CMC were not ($\beta = .07, p = .19$).

Table 5

Hierarchical Regression Analysis Results on Creative Performance (Originality)

	Step	Measures	b	β	t	F	R ²	ΔR^2	$\Delta R^2(F)$
Ori	1	Bkn	.97	.11	1.99*	3.96*	.01	.01	3.96*
	2	Bkn	.64	.07	1.82	73.99***	.48	.47	96.15***
		PTR	.26	.20	4.09***				
		WTR	.75	.51	9.14***				
		CMC	.12	.07	1.32				
	3	Bkn	.63	.07	1.8	50.55***	.48	.01	2.37
		PTR	.25	.20	3.89***				
		WTR	.76	.52	9.35***				
		CMC	.14	.08	1.57				
		PTRxCMC	-.08	-.05	-.94				
		WTRxCMC	.19	.11	2.11*				

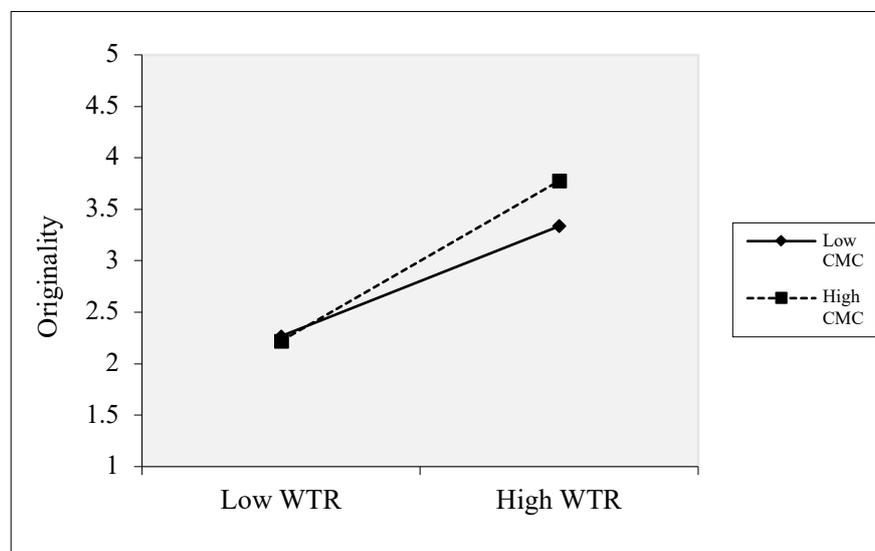
Note. Bkn: Background Knowledge, PTR: Risk Taking Propensity, WTR: Willingness to Take Risk, CMC: Creative Metacognition, Ori: Originality; * $p < .05$, ** $p < .01$, *** $p < .001$.

Last, in phase 3, interaction terms (i.e., PTR x CMC, WTR x CMC) were additionally inserted to confirm if each interaction term has significant effect on originality while background knowledge, PTR, WTR, and CMC are controlled. Fit of the hierarchical regression model of the originality was adequate that dependent variable is significantly explained ($R^2 = .48, F_{(6, 312)} = 50.55, p$

< .001). After inserting the interaction terms, PTR ($\beta = .20, p < .001$), WTR ($\beta = .52, p < .001$), and the interaction term WTR x CMC ($\beta = .64, p < .001$) significantly predicted originality. However, background knowledge ($\beta = .07, p = .07$), CMC ($\beta = .08, p = .12$), and another interaction term PTR x CMC ($\beta = -.05, p = .35$) were not able to significantly predict the originality. Specifically, the interaction effect between risk-taking and creative metacognition on originality resulted differently depending on the types of risk-taking.

Figure 3.

Interaction Effect of Creative Metacognition and Risk Taking on Creative Performance (Originality)



Simple slope analysis was conducted to examine the detailed condition of WTR and CMC's interaction effect on originality. The interaction term was

examined with mean-centered variables according to Aiken and West (1991). The simple slope analysis graph on originality is depicted in Figure 3, and the detailed regression coefficient is listed in Table 6. The interaction term was probed by examining conditional effects of WTR at $\pm 1SD$ of CMC on originality. As listed in Table 6, WTR was able to significantly predict the originality at both high (i.e., one standard deviation above the mean) and low (i.e., one standard deviation below the mean) level CMC. In particular, the effect size of WTR on originality increased with the high level of CMC. With high creative metacognition, the higher the WTR, the higher the originality ($b = .89, p < .001$). With lower metacognition, the higher the WTR, the higher the originality ($b = .61, p < .001$).

Table 6

Conditional Effects of Creative Metacognition and Risk Taking on Creative Performance (Originality)

CMC	<i>b</i>	<i>t</i>
-1SD	.61	5.99***
M	.75	9.28***
+1SD	.89	8.33***

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

The result indicated that creative metacognition consolidated the relationships between the WTR and originality. As a result, the research

hypothesis that with high creative metacognition, the higher the risk-taking, the higher the creative performance (originality) (Research Hypothesis 2-1) was partially supported as well as the research hypothesis with low creative metacognition, the lower the risk-taking, the higher creative performance (originality) (Research Hypothesis 2-2). Along with the preceding research results, the hierarchical regression analysis results showed that PTR, WTR, and the interaction term WTR x CMC independently explained originality on creative performance. That is to say, middle school students who had a propensity to take risks in general or tended to take more cognitive risks in school were more likely to demonstrate higher originality on creative performance. Furthermore, middle school students who had higher WTR were more likely to demonstrate higher originality on creative performance when they had a higher level of creative metacognition regardless of the background knowledge of the performance task.

4.4. Moderating Effect of Creative Metacognition on the Relationship between Risk Taking and Usefulness

To examine the moderating effect of creative metacognition on the relationship between different types of risk-taking and usefulness while background knowledge of the task is controlled, the hierarchical regression was conducted. The result of the hierarchical analysis on usefulness is demonstrated in Table 7. In phase 1, background knowledge was inserted as a controlled

variable. Fit of the hierarchical regression model of originality was not adequate that dependent variable was not significantly explained ($R^2 = .01$, $F_{(1, 317)} = 1.51$, $p = .22$). The background knowledge was not able to significantly predict usefulness ($\beta = .07$, $p = .22$).

In phase 2, PTR, WTR, and CMC were additionally inserted to confirm if each variable has statistically significant effect on usefulness after background knowledge is controlled. Fit of the hierarchical regression model of the usefulness was about 70% increased and adequate that dependent variable is significantly explained ($R^2 = .72$, $F_{(4, 314)} = 199.78$, $p < .001$). After inserting additional variables, CMC ($\beta = .85$, $p < .001$) significantly predicted usefulness while background knowledge ($\beta = .03$, $p = .34$), PTR ($\beta = .01$, $p = .83$), and WTR ($\beta = -.02$, $p = .62$) were not.

Last, in phase 3, interaction terms (i.e., PTR x CMC, WTR x CMC) were additionally inserted to confirm if each interaction term has significant effect on usefulness while background knowledge, PTR, WTR, and CMC are controlled. Fit of the hierarchical regression model of the usefulness was adequate that dependent variable is significantly explained ($R^2 = .73$, $F_{(6, 312)} = 146.81$, $p < .001$). After inserting the interaction terms, CMC ($\beta = .87$, $p < .001$) and the interaction term WTR x CMC ($\beta = .12$, $p = .003$) significantly predicted usefulness. However, background knowledge ($\beta = .03$, $p = .35$), PTR ($\beta = .01$, $p = .86$), WTR ($\beta = -.01$, $p = .15$), another interaction term PTR x CMC ($\beta = .04$, $p = .28$) were not able to significantly predict the usefulness. Specifically, the interaction effect between risk-taking and creative metacognition on usefulness resulted differently depending on the types of risk-taking.

Table 7

Hierarchical Regression Analysis Results on Creative Performance (Usefulness)

	<i>Step</i>	<i>Measures</i>	<i>b</i>	β	<i>t</i>	<i>F</i>	R^2	ΔR^2	$\Delta R^2(F)$
Usf	1	Bkn	.53	.07	1.23	1.51	.01	.01	1.51
	2	Bkn	.22	.03	.95	199.78***	.72	.71	264.61** *
		PTR	.01	.01	.21				
		WTR	-.03	-.02	-.49				
		CMC	1.3	.85	22.55***				
	3	Bkn	.21	.03	.94	146.81***	.73	.02	12.25***
		PTR	.01	.01	.17				
		WTR	-.01	-.01	-.15				
		CMC	1.33	.87	23.64***				
		PTRxCMC	.06	.04	1.09				
		WTRxCMC	.17	.12	2.98**				

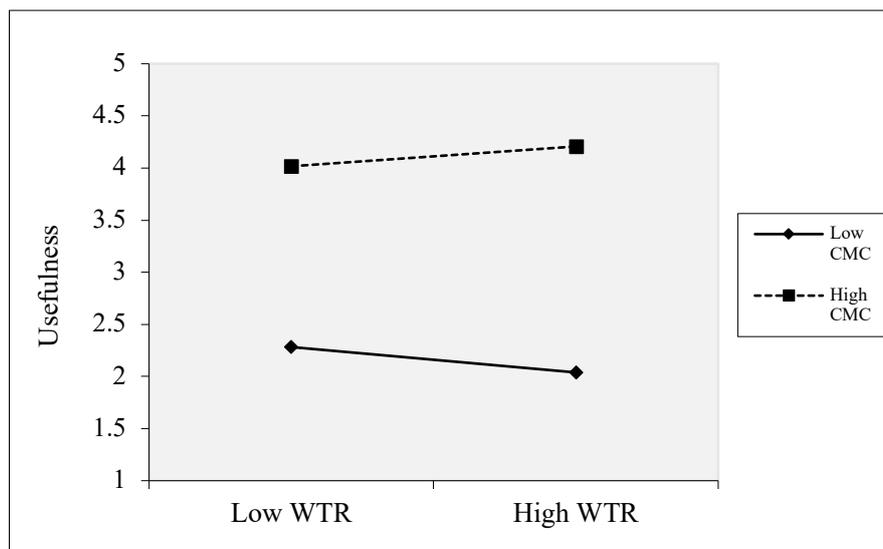
Note. Bkn: Background Knowledge, PTR: Risk Taking Propensity, WTR: Willingness to Take Risk, CMC: Creative Metacognition, Usf: Usefulness; * $p < .05$, ** $p < .01$, *** $p < .001$.

Simple slope analysis was conducted to examine the detailed condition of WTR and CMC's interaction effect on usefulness. The interaction term was examined with mean-centered variables according to Aiken and West (1991). The simple slope analysis graph on usefulness is illustrated in Figure 4, and the detailed regression coefficient is listed in Table 8. The interaction term was probed by examining conditional effects of WTR at $\pm 1SD$ of CMC on usefulness. As listed in Table 8, at the low level of CMC, WTR predicted the

usefulness significantly. Specifically, it was found that with low creative metacognition, the higher the WTR, the lower the usefulness ($b = -.14, p = .03$). However, WTR was not able to significantly predict usefulness at high and mean levels of CMC. This result indicated that low creative metacognition moderated the relationship between WTR and usefulness.

Figure 4.

Interaction Effect of Creative Metacognition and Risk Taking on Creative Performance (Usefulness)



Consequently, the research hypothesis that high creative metacognition does not moderate the relationship between risk-taking and creative performance (usefulness) (Research Hypothesis 3-1) was supported. The research hypothesis that with low creative metacognition, the higher the risk-taking, the lower

creative performance (usefulness) (Research Hypothesis 3-2) was partially supported. The hierarchical regression analysis results showed that high CMC independently explained usefulness on creative performance along with the preceding studies.

Table 8

Conditional Effects of Creative Metacognition and Risk Taking on Creative Performance (Usefulness)

CMC	<i>b</i>	<i>t</i>
-1SD	-.14	-2.16*
M	-.02	-.29
+1SD	.11	1.62

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Chapter 5. Discussion

5.1. Summary and Implication

This study attempted to address the effects of creative metacognition and middle school students' risk-taking tendency on creative performance in an educational context. In the present study, two research aims were examined. The first was to examine the moderating effect of high creative metacognition on the relationships between two different types of risk-taking (i.e., PTR, WTR) and subfactors of creative performance (i.e., general creativity, originality, usefulness), and the second aim was to examine the moderating effect of low creative metacognition on the relationship between two different types of risk-taking and subfactors of creative performance. Based on the results that the study aimed to examine, the detailed discussion is as followed.

As a whole, the moderating effects of creative metacognition on the relationship between risk-taking and creative performance resulted differently according to the level of creative metacognition, the subordinate types of risk-taking, and the subfactors of creative performance. First, the moderating effect of high and low creative metacognition on the relationship between both risk-taking types and general creativity was not statistically significant. It failed to confirm the research hypothesis that with high creative metacognition, the higher the risk-taking, the higher the creative performance (general creativity) as well as the research hypothesis that with low creative metacognition, the lower the risk-

taking, the higher creative performance (general creativity). One possible explanation for the insignificant moderating effects of creative metacognition on the relationship between both risk-taking types and general creativity is that general creativity was evaluated based on middle school teachers' comprehensive perspectives on creativity in a school context.

Unlike the other factors under the creative performance, such as originality and usefulness, researchers did not provide an explicit rubric on general creativity to creative performance evaluators (i.e., middle school teachers). As creativity is a multidisciplinary concept that cannot be defined as a single ability, general creativity is more than a simple sum of creativity subfactors. It is a complex and integrated process of various components. Yet, one's creativity has to be evaluated in an integrated manner from a macroscopic perspective (Collins & Amabile, 1999). In the present study, general creativity was assessed with the evaluators' general and comprehensive understanding of general creativity as a current middle school teacher instead of assessing general creativity by taking the sum of the other two subfactors of creative performance. This allowed a more integrated understanding of creativity. However, at the same time, it is hard to define creativity even theoretically since creativity is neither a unitary phenomenon nor a single trait. A number of creativity researchers often had to adopt many different approaches to understand the concept of creativity (Kaufman, 2009). For that reason, it might have been challenging for an evaluator to grasp the meaning of general creativity. According to Plucker and associates (2004), many teachers are still surrounded by myths and stereotypes of creativity regardless of the various researchers'

efforts on defining creativity. Further, researchers found that misunderstandings of creativity are one of the most critical problems amongst numerous challenges creative education faced (Plucker et al., 2004).

Moreover, an individual's general perspective on creativity can be equivocal as it is highly dependent on one's subjective understanding and perspectives on creativity. While the inter-reliability of evaluators was acceptable ($\alpha = .78$), it does not represent the evaluators' agreement on the exact definition of general creativity. In this regard, the evaluation of general creativity may vary how an evaluator perceived integrated creativity in a middle school classroom. Although the researchers asked the evaluators to focus on each student's ideas and concepts that they were trying to illustrate on the creative performance task rather than drawing itself, it is possible that the evaluators focused more on other factors that are commonly considered necessary in the school context task such as elaboration, completion, specialized knowledge, etc. Likewise, the evaluators might have considered subfactors of creativity that the creative performance task was not targeted to measure. It may have resulted in neither high metacognition nor low creative metacognition moderating the relationships between risk-taking and general creativity.

Second, the moderating effect of high and low creative metacognition on the relationship between WTR and originality was statistically significant even after the background knowledge effect was controlled. It partially confirmed the following research hypothesis that with high creative metacognition, the higher the risk-taking, the higher the creative performance (originality) as well as the research hypothesis that with low creative metacognition, the higher the risk-

taking, the higher the creative performance (originality). Consistent with the research expectations, the study results found out that the creative metacognition consolidated the positive relationships between WTR and originality. In particular, the results indicated that middle school students who had high WTR were more likely to demonstrate higher originality on creative performance when they had a higher level of creative metacognition compared to the students with a lower level of creative metacognition.

The result corresponded with preceding literature that indicating the positive effect of risk-taking on originality (Amabile, 1988; Albrecht & Hall, 1991; Cummings & Mize, 1968; Dewett, 2006; Eisenman, 1987; Zhou & George, 2001). Besides, the present study supported the previous empirical studies reporting that there is no statistically significant relationship between metacognition and originality (Amabile, 1996; Kim, 2008; Shoghi & Ghonsooly, 2015; Van de Kamp et al., 2015), which were conducted with different age groups (e.g., preschoolers, undergraduates) and contexts (e.g., visual art education, language learning) from this study. While the present study corroborated the precedent about the relationship among risk-taking, creative metacognition, and originality, this study went one step forward and was also able to show the interaction effect between WTR and creative metacognition on originality.

Interaction between WTR and originality can be interpreted with the property of WTR and creative metacognition. One of the risk-taking types utilized in the study is WTR, a risk-taking state, which includes considerations of the particular context and potential negative outcomes (Dewett, 2006).

According to Hollenbeck and associates (1994), one's risk-taking is more about how one perceives the risk and targeted gain than the situation or one's disposition. It is known that people's metacognition monitor and manage the uncertainties that one perceives (Deroy et al., 2016). Hence, how confident people are about their decision represents how accurate their perception is. In this process, metacognition takes an active hand. Particularly, when individuals make decisions on taking risks for the creative performance, creative metacognition will take a huge part of it. Previous literature has indicated the interaction between WTR and creative metacognition. It is possible that one knowing their own creative ability, time and place to be creative, and how to be creative resulted in helping one to develop and construct their creative potential to original ideas efficiently.

Third, the moderating effect of high creative metacognition on the relationship between different types of risk-taking and usefulness was not statistically significant. It confirmed the research hypothesis that high creative metacognition does not moderate the relationship between risk-taking and creative performance (usefulness). As the present study initially suspected, the study results found out that high creative metacognition independently predicted the usefulness rather than interacting with WTR. In particular, the result showed that middle school students who had a high level of creative metacognition were more likely to demonstrate higher usefulness on creative performance regardless of one's risk-taking level or background knowledge.

The result corresponded with the preceding literature that indicating the positive effect of creative metacognition on creativity (Ackerman et al., 2011;

Putwain et al., 2012). According to Kaufman and Beghetto (2013b), knowing when to provide original ideas, provide useful ideas, or provide original and useful ideas are crucial in creative performance. The result supported the previous literature that the high level of creative metacognition allows an individual's creativity to be adequately expressed in a certain context (Sternberg & Williams, 1996). Having accurate knowledge of one's own creative ability, when to be creative, and how to be creative may have helped students understand and meet the existing constraints within the creative performance context. According to the simple slope analysis (see Figure 4), with high creative metacognition, the high level of WTR tends to depict higher performance on usefulness, although it was not statistically significant. Besides, little research has been reported on the correlation between risk-taking and usefulness, and risk-taking often has been stated as a concept that contradictory to usefulness and relevancy (Eisenman, 2001). Based on the previous literature, it is possible that the high level of creative metacognition overruled the effect of risk-taking on usefulness. The result can also be interpreted as the high level of creative metacognition offset against the negative tendency of risk-taking on usefulness.

Fourth, the moderating effect of low creative metacognition on the relationship between WTR and usefulness was statistically significant. It partially confirmed the research hypothesis that with low creative metacognition, the lower the risk-taking, the higher the creative performance (usefulness). Consistent with the research expectations, the study results found out that low creative metacognition and WTR demonstrated the interaction effect. Specifically, the interaction between low creative metacognition and high WTR

predicted a lower level of usefulness compared to the interaction between low creative metacognition and low WTR. That is to say, middle school students who have little knowledge of their creative ability, when to be creative, and how to be creative in a specific context were more likely to show lower usefulness on creative performance, especially when they possessed a strong willingness to take a risk.

The present study was able to empirically support the previous literature that creative metacognition has a positive impact on an individual's creativity (Baer & Kaufman, 2006; Feldhusen, 1995; Glover et al., 2010; Kaufman & Beghetto, 2013b). By the same token, Salles and colleagues (2016) demonstrated that children with low metacognition often take reckless risks and make decisions that are not optimal. On top of the previous literature, this study revealed that possessing a strong willingness to take a risk without the creative metacognition, even if it is intended to be productive within a specific context, negatively affects students to produce useful ideas for the creative performance. The study revealed that not only high creative metacognition benefits creative performance, but also low creative metacognition negatively affects the creative performance, especially when students tend to take risks. It is possible that knowing one's own creative ability, when to be creative, and how to be creative may have helped students understand and meet the existing constraints within the creative performance context.

Lastly, while most of the interaction effects between creative metacognition and WTR on subordinate factors of creative performance (i.e., originality and usefulness) were resulted statically significant, interaction effects

between creative metacognition and PTR were not statistically significant on every subordinate factor of creative performance (i.e., general creativity, originality, and usefulness). In other words, student's creative metacognition was not statistically significant on the relationship between RTP and creative performance. This study result can be explicated with the context specific characteristics of the creative performance.

Plucker and colleagues (2004) defined creativity as the interaction of the ability, process, and environment of individuals or groups to produce original and useful products within the context of their society. As a nature of creativity, the context of displayed creativity often has a huge impact on creative performance (Sternberg & Lubart, 1991). On top of that, researchers claimed the importance of creative metacognition on creativity as it allows an individual's creativity to be properly expressed in a certain context (Baer & Kaufman, 2006; Feldhusen, 1995; Glover et al., 2010). Further, despite the fact that creative metacognition itself also encompasses both domain general and specific quality, it plays a more important role when as it manages when and how to demonstrate one's creative potential (Kaufman & Beghetto, 2013b). In the present study, the creative performance was designed based on the specific context, which is the current revised middle school curriculum of Health Education and Technology Education (Ministry of Education, 2015). It was designed to evaluate middle school students' creativity in a school context.

Considering the fact that creativity is often a highly contextual concept, it is significant to note if the other variables are context-specific when examining the relationships among them. However, PTR was designed to measure

adolescent's creative dispositional aspects of risk-taking (Lee et al., 2018), which encompass general everyday context, while WTR was particularly designed and modified to measure middle school student's cognitive and substantial aspects of risk-taking, which encompass specific context and situations (Dewett, 2006).

The WTR scale from the study was targeted middle school students in educational practice since the scale delineated the possible negative outcome in the context of creative performance in school. It is possible that creative metacognition may have resulted in only interacting with WTR (i.e., a domain-specific variable) and not PTR (i.e., a domain general variable) on creative performance due to the domain specificity of each variable.

Furthermore, the described present study found out that gender differences in risk-taking do not exist, which is not consistent with previous literature. Bear and Kaufman (2008) claimed that there are clear gender differences in creativity. On top of that, many researchers found that males are more likely to take risks and make risky decisions during the creative task compared to females Charyton et al., 2008; Charlton & Snelbecker, 2007; Karakowsky & Elangovan, 2001; Kaufman et al., 2004; Matud et al., 2007). The results indicated that girls are also comfortable with taking risks despite the possible failure in school. It may be interpreted that social and environmental climate has a huge impact on gender differences in creativity, but further examination is required.

The present study also carried practical implications in the educational site. This study demonstrated a preliminary attempt to experimentally explore the moderating effect of creative metacognition on the relationship between middle

school student's risk-taking and creative performance in the school context. This study contributed to the literature by empirically approach the subsequent interaction effect between creative metacognition and risk-taking on creative performance. A detailed discussion on the practical implication of the study is proposed as follows.

First, positive effects of creative metacognition on school context creative performance have been proved. Creativity education in school is important for students' creativity development. According to Hennessey and Amabile (2010), creativity development is critical for students to achieve an advanced level outcome in various fields, and the classroom plays an important role by creating an environment for students to learn and apply creativity. Regarding the importance of creative education in school, having a precise understanding of creative metacognition in an educational site is important as well (Baer & Kaufman, 2006; Glover et al., 2010). Although theoretical literature about creative metacognition and creativity have been made, few empirical studies that examine the connection between metacognition and creative performance (Ambrose & Sternberg, 2016). The study investigated the effect of creative metacognition on creativity within the scoop of creative education in the school. The present study suggested the possibility of promoting students' accurate understandings of the exterior and interior constraints within the creative performance context while encouraging their creative potential by developing creative metacognition. Additionally, based on previous studies that confirmed the positive effects of teaching creative metacognition through a well-constructed lesson in a middle school (Joseph, 2009), this study proposed the

possibilities of creative metacognition lessons as an intervention and its positive effect on student's creative performance.

Second, different types of risk-taking were examined to evaluate the detailed relationships between creative metacognition and creative performance. Too little is known about the relationship between different types of risk-taking and actual creative performance. In this study, risk-taking was classified into two different types, and the interaction effect between each risk-taking type and creative metacognition on creative performance was examined. This study found that only context-based type of risk-taking (i.e., WTR) interacted with creative metacognition. Findings from this study extend the body of literature on the positive relationship between risk-taking and creative performance. The result suggested the need to classify the concept of risk-taking in the educational practice rather than understanding it as a single dispositional concept.

Third, subfactors of creative performance were measured to understand creativity from multiple angles regarding risk-taking and creative performance. This study intended to avoid making mistakes in measuring creativity only with divergent thinking without the comprehensive perspectives (Zeng et al., 2011). Creativity is a multifold concept that cannot be defined as a single concept, but the specific factors and aspects are often neglected by teachers from the educational field. The present study classified the creative performance into three subfactors (i.e., general creativity, originality, and usefulness) rather than considering creativity as a single concept. It allowed us to examine the different interaction effects of risk-taking and creative metacognition on different subfactors of creativity. Findings from the study revealed the clear differences of

each subfactor of creative performance by examining the interaction effect of risk-taking and creative metacognition. Evidently, it is important to distinguish the subfactors of creativity and evaluate student's creative performance based on each subfactor. The present study encouraged teachers to specifically distinguish the specific concept of creativity and provide a meaningful evaluation based on each category rather than just relying on their intuition and general perception of creativity as it is often influenced by myths and stereotypes (Plucker et al., 2004).

Last, creativity was measured with a creative performance task, which was designed based on the current revised middle school curriculum and a real-life problem. There have been issues for teachers to adopt creative performance tasks directly to educational practice to measure student's creativity in school since creative tasks are either too general or disparate from the school context (Ward et al., 2004). As the creative performance tasks used in the study was based on actual middle school curriculum and applied a real-life problem, the task was able to fill the gap between creativity measure and what teachers actually can use in the classroom (Mumford et al., 2003). In this regard, the study was able to provide substantial creative performance that can be directly applied in the classroom. Furthermore, as the creative performance was evaluated with current middle school teachers, the present study was able to peep through teacher's perception of general creativity. However, further study is needed to precisely profile each teacher's different perceptions of students' creativity in school. Consequently, this study was able to add to the body of creative metacognition literature by not only demonstrating the positive effects

of creative metacognition on subfactors of creative performance in relation to the risk-taking but also demonstrating the potential effects of creative metacognition in educational practice.

5.2. Limitation and Direction for Future Research

The limitations of the present study and the direction of future researches are proposed as follows. First, the present study measured creative metacognition with self-report. According to Flavell (1979), metacognition is defined as "thinking about thinking." In other words, metacognition is knowledge of one's own thoughts and thought process, which is hard to observe. Due to the difficulties of measuring metacognition, previous studies regarding metacognition often measured the metacognition with self-report (Craig et al., 2020). Using self-report measures on metacognition benefits researchers on practical perspectives (Sperling et al., 2002), but it still has its limits. It is hard to confirm the validity and accuracy of an individual's responses if research only uses the self-report measure (Pereira-Laird & Deane, 1997). Self-reporting on measuring abilities can also cause methodological problems. Individuals frequently overrate their own abilities on self-report, and it leads their self-report results to regress towards the mean. Relatedly, Shin and Choi (2005) addressed that performance task on metacognition predicts academic achievement better than self-report. Therefore, further research on measuring creative metacognition with performance tasks is needed. Furthermore, the discriminant validity of

creative metacognition measurement was not tested (Campbell & Fiske, 1959). The creative metacognition scale might or might be highly correlated with the metacognition measure, and further research is needed.

Second, another noticeable delimitation of the study is that three evaluators relied on their intuition and subjective perspectives as a middle school teacher to evaluate general creativity (Amabile, 1982). Although the inter-reliability of evaluators was acceptable (Amabile & Pillemer, 2012), it does not guarantee the agreement on the exact definition of general creativity. According to Plucker and colleagues (2004), many teachers are still surrounded by the myths and stereotypes of creativity in the school context (Kaufman et al., 2006). It is possible that creative metacognition did not moderate the relationship between risk-taking and general creativity due to the non-united standards on general creativity evaluation. Despite the fact that the present study was able to peep through several middle school teacher's perceptions of general creativity, further study is needed to precisely profile each teacher's different perceptions of students' creativity in school.

Last, since the creative performance from this study was specifically designed based on two subjects – Health Education and Technology Education from the currently revised middle school curriculum (Ministry of Education, 2015), the generalizability of the results may be limited. Although that the study controlled the background knowledge on creative performance tasks, the result might have still influenced by the topic of the performance task. The creative performance task was designed based on the specific middle school subjects and a real-life problem as it was intended its easy application in educational practice

and benefit educators (Mumford et al., 2003). Further research on the effects of risk-taking and creative metacognition on other subjects-related creative performance is needed to generalize the results.

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Appendix A: Creative Performance Task

중학생 여러분, 안녕하세요?

저는 중학생들의 창의성을 알아보기 위해 다음과 같은 연구를 진행하고 있습니다.

1. 설문 응답
2. 창의적 그리기 활동

앞으로 답할 설문과 창의적 활동은 정답이 있는 것이 아니고 여러분이 평소에 어떻게 느끼고 생각하는지에 대해 알아보기 위한 것이므로 솔직하고 성실하게 응답해주시면 됩니다.

응답하시는 내용은 비밀이 보장되며, 오직 연구 목적으로만 사용됩니다.

연구책임자: 000(서울대학교 교육학과 석사과정 연구원)

1. 학교: _____

2. 학년: _____

3. 번호: _____

4. 성별: _____

Appendix B: Questionnaire for Risk Taking Propensity

문항	매우 그렇다					전혀 아니다
1) 나는 모험심이 있다	5	4	3	2	1	
2) 나는 잘 아는 것 보다는 새로운 것에 도전하고 싶다	5	4	3	2	1	
3) 나는 한 번도 해보지 않은 일을 하는 것은 즐겁다	5	4	3	2	1	

Appendix C: Questionnaire for Willingness to take a Risk

문항	매우 그렇다					전혀 아니다
1) 나는 학교에서 과제를 완성하는데 더 나은 방법이 생각나면 실패할 수 있더라도 시도해 본다.	5	4	3	2	1	
2) 나는 선생님의 평가와 별개로 과제를 완성하는데 더 좋은 생각이 떠오르면 위험을 무릅쓰고 새로운 방법을 시도해 본다.	5	4	3	2	1	
3) 나는 학교에서 최고의 결과물을 내기 위해서라면 어느정도 예상되는 위험을 감수한다.	5	4	3	2	1	
4) 학교에서 과제를 더 잘 할 수 있는 방법이 있다면 내 노력이 헛수고가 될지라도 주저하지 않고 일단 시도해 본다.	5	4	3	2	1	
5) 학교에서 나는 내 목표를 이루는 데 도움이 된다면 예상되는 실패의 위험을 감수하고 과제를 도전한다.	5	4	3	2	1	
6) 수업 과제의 질을 높이기 위해서라면 결과가 확실하지 않더라도 일단 위험을 감수하고 시도해 본다.	5	4	3	2	1	
7) 학교에서 더 나은 결과를 위해 나는 비록 성공한다는 보장이 없더라도 예상되는 위험을 감수하는 노력을 한다.	5	4	3	2	1	

Appendix D: Questionnaire for Creative Metacognition

문항	매우 그렇다					전혀 아니다
1) 나는 내가 얼마나 창의적인지 알고 있다.	5	4	3	2	1	
2) 나는 수업시간에 창의적인 아이디어가 필요한 순간이 언제인지 알고 있다.	5	4	3	2	1	
3) 나는 나의 창의적인 아이디어를 구체화시킬 수 있는 방법을 알고 있다.	5	4	3	2	1	
4) 새로운 문제를 보았을 때, 나는 내가 얼마나 창의적으로 문제를 해결할 수 있는지 알고 있다.	5	4	3	2	1	
5) 나는 학교에서 창의적인 해결책이 필요한 상황과 필요하지 않은 상황을 알고 있다.	5	4	3	2	1	
6) 나는 새로운 문제를 해결하는데 있어 중요한 정보를 찾고 거기에 집중한다.	5	4	3	2	1	
7) 나는 내가 창의적인 아이디어를 더 잘 생각해낼 수 있는 주제에 대해서 알고 있다.	5	4	3	2	1	
8) 나는 새롭고 기발한 아이디어가 더 필요한 순간인지, 아니면 유용하고 현실적인 아이디어가 더 필요한 순간인지 판단할 수 있다.	5	4	3	2	1	
9) 나는 새로운 문제를 어떻게 창의적으로 해결할 수 있을지 먼저 구체적으로 생각해 본다.	5	4	3	2	1	
10) 나는 창의적 과제를 하면서 잘 하고 있는지 스스로 체크한다.	5	4	3	2	1	

Appendix E: Questionnaire for Background Knowledge

1. 다음 중 바람직한 건축기술을 바탕으로 만들어진 건축물에 대해 잘못 말하고 있는 것을 고르세요.

- a) 완공된 후 건축가의 이견에 따라 쉽게 바뀔 수 있는 공간이다.
 - b) 많은 사람이 함께 이용할 수 있는 공공의 공간이다.
 - c) 주변 환경의 특성과 조화를 이루는 공간이다.
 - d) 사람들이 안전하고 쾌적한 생활을 하기에 적합한 공간이다.
-

2. 다음 중 지역의 특성에 맞지 않게 계획된 건설 기술을 고르세요.

- a) 비가 많이 오는 지역은 빗물 재활용 시스템을 활용하기로 했다.
 - b) 건조하여 불이 잘 나는 지역은 나무를 사용하기로 했다.
 - c) 남극에서는 쉽게 구할 수 있는 얼음과 눈으로 돛형의 집을 짓기로 했다.
 - d) 겨울에 추운 지역은 온돌을 활용하기로 했다.
-

3. 다음 중 코로나 19 바이러스를 예방하기에 적절하지 않은 방법은?

- a) 손에 닿는 주위 환경을 자주 소독한다.
 - b) 못에 긁힌 곳에 연고를 바르고 반창고를 붙여 상처가 외부와 접촉하지 않게 한다.
 - c) 머물고 있는 곳에 환기를 자주 시킨다.
 - d) 친구들을 만날 때는 마스크를 끼고 서로에게 침을 튀기지 않는다.
-

4. 다음 중 코로나 19 바이러스 감염이 의심되지 않는 경우를 고르세요.

- a) 편의점에서 마스크를 턱에 걸친 사람이 바로 앞에서 심하게 기침을 한 적이 있다.
 - b) 며칠 전부터 열이 나고 기침과 호흡곤란 증상이 있다.
 - c) 후식으로 땅콩 아이스크림을 먹은 뒤 목이 붓고 몸이 간지럽다.
 - d) 코로나 19 바이러스에 오염된 택배를 만지고 눈을 만진 적이 있다.
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국문 초록

위험감수가 창의적 메타인지 수준에 따라 창의적 수행에 미치는 영향

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본 연구의 목적은 중학생들의 위험 감수 유형이(위험 감수 성향, 위험 감수 경향) 학교 맥락에서의 창의적 수행 하위 요인(전반적 창의성, 독창성, 유용성)에 각각 어떤 영향력을 미치는지 파악하고 이들의 관계를 창의적 메타인지가 어떻게 조절하는지 검증하는 데 있다. 선행연구에서는 창의적 메타인지와 위험 감수가 창의성에 미칠 수 있는 긍정적인 영향에 대해 이론적으로 제시되었지만, 창의적 메타인지와 위험 감수가 교육 현장에서 학생들의 창의적 수행에 실질적으로 어떠한 역할을 하는지에 대한 경험적 연구는 거의 이뤄지지 않았다. 개인의 창의적 메타인지 수준은 창의적인 학생에 대한 교사와 학생들의 인식에 영향을 미칠 뿐만 아니라 창의적 수행에도 영향을 미친다는 점이 논의되어 왔다. 본 연구에서는 다양한 위험 감수 유형과 학교 맥락에서 제시된 창의적 수행 간의 관계에 대한 창의적 메타인지의 조절 효과를 확인하고자 하였다. 중학교 1 학년과 2 학년 학생 350 명이 연구에 참여하였으며, 이 중 불성실한 응답을 제외한 319 명의 자료를 분석에 활용하였다.

본 연구에서는 위계적 회귀분석(hierarchical regression analysis)을 통해 창의적 수행 하위 요인에 대한 위험 감수와 창의적 메타인지의 상호작용을 각각 확인하고자 하였다. 위험 감수와 창의적 메타인지의 상호작용이 유의한 경우

상호작용 효과의 특성을 확인하기 위해 평균 중심화된 점수를 기준으로 단순 기울기 검증을 실시하였다. 분석 결과는 위험 감수의 유형에 따라 창의적 수행 하위 요소에 대한 창의적 메타인지와의 상호작용이 다르게 나타난다는 것을 확인하였다. 즉, 창의적 메타인지의 조절 효과는 위험을 감수하고자 하는 경향과 독창성 및 유용성의 관계에서 통계적으로 유의하게 나타났다. 위험 감수 성향과 위험 감수 경향은 모두 독창성을 직접적으로 예측하였으며, 창의적 메타인지가 높을수록 창의적 수행의 독창성에 대한 위험 감수 경향의 예측력이 높아졌다. 이러한 결과는 창의적 메타인지가 위험 감수 경향이 독창성에 미치는 긍정적인 영향을 강화할 수 있음을 보여준다. 또한, 분석 결과, 창의적 메타인지가 유용성을 직접적으로 예측하였으며, 위험 감수 경향과 유용성 사이 창의적 메타인지의 조절 효과 역시 확인하였다. 특히, 창의적 메타인지의 수준이 낮을 경우, 위험 감수 경향이 높을수록 창의적 수행에서 유용성 수준이 낮아지는 것을 확인하였다. 즉, 높은 창의적 메타인지는 위험 감수 경향이 유용성에 미칠 수 있는 부정적인 영향을 완화시키는 반면, 낮은 창의적 메타인지는 유용성에 미칠 수 있는 위험 감수 경향의 부정적인 영향을 강화할 수 있음을 확인하였다.

본 연구는 창의적 메타인지 수준에 따라 중학교 수업 맥락 내에서 다양한 유형의 위험 감수 유형 및 각 창의적 수행 하위 요인 사이의 관계에 어떠한 차이가 있는지를 확인하고 그 방법을 경험적으로 검증함으로써 기존 창의적 메타인지 문헌에 대한 이해를 넓혔다. 이러한 결과는 창의적 메타인지가 창의적 수행을 바탕으로 중학교 교육현장에 기여할 수 있는 가능성을 시사하였다. 본 연구의 교육적 시사점, 한계 및 후속 연구 가능성 역시 논의되었다.

주제어: 창의적 메타인지, 위험감수, 위험감수경향, 위험감수성향, 창의적 수행
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