

DIGITAL SURVEILLANCE, RISK-TAKING, AND CREATIVITY: AN
INVESTIGATION INTO THE ROLE OF INTRINSIC MOTIVATION

A Thesis

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ABSTRACT

This thesis presents the findings from a review of prior literature and an experiment conducted to better understand how surveillance, evaluation expectation, social risk-taking and intrinsic motivation interact with each other and affect individual creativity through the lens of the Componential Theory of Creativity. The first chapter presents the review of the literature on evaluation expectation and its effect on creativity. The second chapter reports on the findings from the experiment in which participants were randomly assigned to four different conditions in a 2 x 2 factorial design that crossed surveillance and evaluation expectation. All participants completed a creativity-assessment task, and measures of intrinsic motivation and social risk taking were assessed through self-report. No effect of surveillance or evaluation was found, but social risk taking was associated with higher creativity and that effect was mediated through intrinsic motivation. Limitations, implications, and future directions are discussed.

BIOGRAPHICAL SKETCH

Michael was born and raised in Ithaca, NY and is proud to finally be graduating from Cornell University. After graduating from Lansing High School, Michael attended Binghamton University and studied bioengineering and complex systems, which instilled in him a passion for emergent design and the power of networks. Upon graduating, Michael swiftly ran as far away from academia as possible and started a career as a carpenter, woodworker, and cabinet maker, working in Ithaca, NYC, and Philadelphia, PA.

It was during this time that he met his would-be wife and followed her to Philadelphia where they lived for 7 years and had their first child together. While in Philly, Michael was fortunate enough to be exposed to the burgeoning maker community that was present in the city and embarked on the next chapter in his career as an educator and designer.

After being accepted to graduate school, Michael and his family moved back to Ithaca. The next two years brought on many changes and challenges, some of which were expected – the birth of his second son – and some were not so expected – a global pandemic. Regardless (or, perhaps, because of) all of these changes this has been one of the most rewarding and revealing experiences of his life. But with newfound excitement, skills, and friendships, Michael is eager to begin the next chapter, the details of which are still TBD. Stay tuned.

Dedicated to SEK. Thanks for giving me the opportunity to pay it back.

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CHAPTER 1 - A REVIEW OF THE LITERATURE CONCERNING EVALUATION
EXPECTATION AND ITS EFFECT ON CREATIVITY

Abstract

One of the key roles of an educator or manager is to provide feedback to students and direct reports, but what effect does this expectation of evaluation have on the individuals who receive it? This synthetic review examines 19 published, peer-reviewed journal articles on the topic of evaluation expectation and its effects on creativity. The research in this area comes from the diverse fields of education, psychology, and organizational behavior, and therefore approaches the question from many different points of view. However, a broadly similar methodological approach was observed among the surveyed articles. The review identified four creativity domains that have been used in these studies: creative writing, visual arts, creative problem-solving, scientific creativity, as well as the domain-general creativity tasks of divergent and convergent thinking. In order to synthesize the information, the findings are examined through the lens of the componential theory of creativity, which holds that there are specific components that affect individual creative output and that help shape creative variance. The findings from the literature review generally support the componential theory of creativity, but they also indicate a need for stronger methodological approaches in this area to improve our understanding of the mediating and moderating roles of each component. Recommendations are provided for applying these findings to teaching and management along with suggestions for future research, notably, expanding research into the role of domain-relevant knowledge and prior experience in specific creative domains.

1. Introduction

It is hard to overstate the importance of creativity and its role in the individual success as well as the success of our society. Arnie Dietrich and Rian Kanso (2010, p. 822) went so far as to say that “Creativity is the fountainhead of human civilizations. All progress and innovation depend on our ability to change existing thinking patterns, break with the present, and build something new.” As the world becomes ever more dynamic and our ability to rely on existing patterns diminishes, creativity is something that is called for at all levels of society, from individual every-day creativity, to creativity in schools and education, to innovation in business and science. A recent report from the World Economic Forum (2016) ranked creativity as the third most important business skill, up from tenth place just five years earlier. The same report also found that creativity was the second most important competency for students, just behind critical thinking. Creativity has also been linked with higher wages (Gabe et al., 2007) and with better health and wellbeing (Gillam, 2018).

In educational settings, one of the key responsibilities of teachers is to be an evaluator, providing feedback, guidance, and corrections to students (Tschannen-Moran & Tschannen-Moran, 2011). A manager plays a somewhat similar role in the business realm (Torres et al., 2005). While this type of evaluation and oversight has been shown to improve vigilance and productivity on simple and algorithmic tasks (Deci, 1985), creativity is often thought of as being of a heuristic nature, requiring exploration and originality and, perhaps above all, intrinsic motivation, rather than the extrinsic motivation imposed by evaluation (Amabile, 2018; Amabile & Pratt, 2016). What then is the effect on creativity when individuals expect to be evaluated? This research question has drawn consistent attention over the past forty years. To the best of the author’s knowledge, the related literature and conclusions have not yet been systematically

collated in any peer-reviewed journal. The current article provides such a review and a synthesis of prior research findings, organizing them primarily through the lens of the Componential Theory of Creativity.

1.1. The Componential Theory of Creativity

The Componential Theory was first articulated in the 1980s by Theresa Amabile (1983) and has been under development ever since (Amabile, 2012, 2018; Amabile & Pratt, 2016). The theory holds that there are a discrete set of components that interact to shape the quality of creative production in any domain. In this outlook, all individuals have innate but difficult-to-measure creative potential, which is constrained or encouraged by component factors that mediate creativity's translation into tangible products or outcomes (Guilford, 1950; Pope, 2005). Although the theory has undergone several revisions over the years, the four basic components of creative production that it identifies have remained consistent: *domain-relevant skills*, *creativity-relevant processes*, *task motivation*, and *social/environmental factors*.

Domain-relevant skills, such as applicable knowledge and experience, are invaluable in the generation of new ideas and in the ability to parse and evaluate the pragmatic merit of those ideas. The second component, creativity-relevant processes, includes cognitive style, personality, and work style. The task motivation component includes both the intrinsic aspirations of the individual and external influences. Finally, the social/environmental component includes intersubjective factors that can either undermine creative output (harsh criticism of new ideas, emphasis on the status quo, risk tolerance, etc.) or else promote creative work (encouragement of new ideas, diversely skilled teams, etc.). The current version of the Componential Theory states that external factors act on creativity primarily by influencing the task motivation component (Amabile, 2018).

The relationship between these four components can be understood best through the Intrinsic Motivation Principle of Creativity which states that individuals are most creative when they are intrinsically motivated. Intrinsic here is defined as “any motivation that arises from the individual’s positive reaction to qualities of the task itself. This reaction can be experienced as interest, involvement, curiosity, satisfaction or positive challenge” (Amabile, 2018, p. 115). This motivation is contrasted with extrinsic motivation which is motivation that comes from without, such as a deadline or reward incentive. Earlier versions of the theory stated that all extrinsic motivation was detrimental to creativity (Amabile, 1983), but later revisions identified a more nuanced understanding of the effects of extrinsic motivation (Amabile, 1993). Factors in the social/environmental component, as well as domain-relevant skills and creativity-relevant processes, all act on an individual’s task motivation thus affecting that individual’s creativity during the execution of a particular task.

1.2. Present Study

Much attention has been paid in the creativity literature to the intrapersonal aspects of creative production, including cognition, motivation, personality, and knowledge, but far less attention has been paid to the external social and environmental aspects of creative production (Abraham, 2019). One specific factor of the external environment that has received consistent attention over the past forty years has been the effect that the expectation of evaluation has on creative products. In order to better understand this effect and the variables that mediate and moderate that effect, a synthetic literature review was conducted. The following research questions guided the literature review process:

RQ1: What effect does evaluation expectation have on creativity?

RQ2: Are different domains of creativity differentially affected by evaluation expectation?

RQ3: Can the componential theory of creativity be applied or further developed to understand the factors that mediate the effect of evaluation expectation on creativity?

2. Methods

To begin the literature review, a structured search query was devised based on the key terms “creativity” and “expected evaluation.” This was later expanded to include relevant synonyms derived from the literature. The final search terms were (Creative* OR “Creative Ability” OR “problem solving”) AND (“evaluation expectation” OR “expectation of evaluation” OR “expected evaluation” OR “threat of evaluation” OR “evaluation threat” OR “intrinsic motivation” OR “extrinsic motivation”). The inclusion criteria limited the review to studies that were published in reputable, peer-reviewed journals, that were written in English, and that used a method involving active manipulation of an evaluative element i.e., different evaluation conditions for different participant groups.

An initial search was conducted in four domain-relevant databases: APA PsycArticles, Business Source, Educational Resources and Information Center (ERIC), and Sociology Source Ultimate. Additional articles were identified by the researcher by searching the reference lists of included articles. Potential studies were initially screened for inclusion based on their abstracts, and if a study was deemed to be likely eligible then the full article text was retrieved for further assessment. The selection was finalized after discussion and consensus between the two researchers. This process resulted in a total of 19 articles identified for inclusion.

3. Results

3.1. *Methodological Approaches in the Literature*

Although the reviewed literature was drawn from multiple fields of study, there was a striking methodological consistency. Participants in the studies were usually asked to complete a task that the researchers viewed as requiring creativity, with different groups being told (either explicitly or implicitly) that their work would receive no evaluation or that it would receive various types and degrees of evaluation. Creativity measurements of the work output were then compared among the different groups (i.e., different evaluation-expectation conditions). Some studies also prompted participants to focus on certain aspects of a task or measured various personality qualities. Many of the studies followed up with measurements of the participants' mood or motivation levels.

Without exception, every study that was reviewed used the Consensual Assessment Technique (CAT) to evaluate the at least some portion of participants' creative product (Amabile, 1982). This technique was developed in the context of componential theory to address the need for a "clear and operational definition and an appropriate assessment methodology" for creative output (Amabile, 1982, p. 997). Unlike other measurement techniques in creativity that aim to assess either inter-individual or intra-individual differences, the CAT approach is centered on evaluating the products of creativity. The evaluation is carried out by independent observers who have expertise in the domain of endeavor (Amabile, 1982).

3.2. *Creativity Domains and Assessments*

Creativity is often studied within the context of particular domains of endeavor and their associated tasks (Abraham, 2019; Kaufman & Sternberg, 2010; Plucker & Beghetto, 2004; Silvia et al., 2009). The number and delineation of creative domains are widely disputed and potentially

somewhat artificial as evidenced by the wide range of reported domains (Baer, 2010; Carson et al., 2005; Kaufman, 2012; Koestler, 1981; Silvia et al., 2009). Studies in this review focused predominantly on creativity in the visual arts, followed by creative writing. Creative problem solving and scientific creativity were also represented in the studies but less frequently. Several other studies used domain-general tasks to assess creativity including divergent and convergent thinking tasks. A full summary of the reviewed articles, and their domains and major findings, is given in Table 1.1.

Visual arts. Creativity in the visual arts is usually operationalized with a collage activity, which consists of providing participants with identical collections of precut paper of various shapes, sizes, and colors that can be arranged in any way to create a collage. Typically, participants are given a target concept, such as “joyful” or “silly” and are asked to create an image that represents this concept. This priming is used to reduce thematic variability, thereby making it easier for judges/raters to evaluate the results. Inter-rater reliability for such collages has been shown to be reasonably high (~0.80) (Amabile, 1982). This evaluation structure has also been adapted for a digital context by Hennesey (1989). One of the advantages of using the manipulation of pre-defined shapes or objects is that it helps to separate visual creativity from technical skills in painting and other visual disciplines (Amabile, 1982). A further benefit of this technique is that it is language-agnostic and can be used with participants of an extensive age range.

Creative writing. Poetry and storytelling tasks are very frequently found in the creativity research literature. These tasks vary widely in regard to the level of freedom afforded to the participants. Studies that are concerned with measuring the creative product, aim to restrict the output as much as possible while still providing opportunities for creativity (Amabile, 1979,

1985; Amabile et al., 1990; Hennessey, 1989). One of the most common creative tasks used in the reviewed research literature involved asking participants to write poems based on a predetermined structure of lines and themes, such as a haiku or a cinquain. Similar to collage constraints in the visual arts domain, this approach makes the resulting products less variable and thus easier to compare against others for more reliable grading.

Scientific Creativity is a domain of creativity that is often overlooked because it may not be seen as traditionally creative. Previous studies exploring scientific creativity looked at correlational studies of creative persons or experimental studies of the creative process. The third type of study of the product of scientific creativity defined it as a type of “constrained stochastic behavior,” (Simonton, 2003, p. 475) and one that requires special knowledge within the domain (Hu & Adey, 2002). Only one study examined scientific creativity (Xue et al., 2018). This form of creativity was operationalized using the Scientific Creativity Test for Secondary Students (Hu & Adey, 2002). The test is similar in design to the Torrance Test of Creativity and asks students to develop multiple responses to questions that assess creativity within the Scientific Structure Creativity Model.

Problem solving is closely related to scientific creativity as it requires individuals to come up with solutions or responses that fit within a system of logic and is more reliant on strong convergent thinking skills. The one task that was used in this domain was the in-basket test which is designed to emulate tasks that one might find in their in-basket on their desk at work. Perhaps the first study to utilize an in-basket task was Frederiksen et al. (1957), and it has continued to garner attention. For this study, the entirety of the tasks in the literature that were of this type were based on work by Shalley (1991) in which participants were given prompts about

human resource related problems and asked to come up with creative solutions to these problems. Interrater reliability is generally fairly high ~0.75.

Divergent and Convergent Thinking. Studies that took this approach focused on two cognitive processes that have been extensively theorized in the creativity literature (Dietrich & Kanso, 2010; Silvia et al., 2008). “Divergent thinking” refers to the creative ability to come up with many new ideas. It is typically operationalized through an Alternative Use task, which asks participants to develop new and unusual uses for common objects such as a knife or a brick (Guilford, 1967). Responses were scored following the CAT approach and based on fluency, flexibility, originality - the number of responses, the number of different categories of responses, and the originality of the response relative to others. In contrast, convergent thinking refers to the creative process of finding connections and similarities between seemingly disparate items. Convergent thinking was evaluated using similar instruments as divergent thinking, again following the CAT approach. The validity of divergent and convergent tasks as an operationalization of creativity as well as the reliability of their associated instruments, has been criticized (Baer, 2011; Dietrich & Kanso, 2010; Reiter-Palmon et al., 2019; Silvia, 2011), but the evidence suggests that it is both reliable and predictive. In addition, the extensive amount of research that has been conducted using this approach makes it useful for cross-comparative purposes.

Table 1.1*Relevant information, classification, and a summary of findings from the reviewed articles*

Citation	Journal	Research Domain	Creativity Domain	Research Questions	Sample	Major Findings
Amabile, 1979	Journal of Personality and Social Psychology	Psychology	Visual Arts	How does evaluation expectation effect artistic creativity?	n = 95 100% female pop: undergrads	Evaluation produces lower creativity. This was reversed when participants were given explicit instructions on how to make work that was judged to be creative.
Bartis et al., 1988	Social Psychology Bulletin	Psychology	Divergent Thinking	How does social loafing theory apply to evaluation expectation and creativity?	n=111 pop: undergrads	When instructed to focus on fluency, participants produced more answers when results were not pooled. When instructed to focus on creativity, participants produced more creative responses when results were pooled.
Hennessey, 1989	Creativity Research Journal	Education	Visual Arts, Creative Writing	How is student creativity affected when evaluating their digital work is expected from either an experimenter, a computer, or not at all?	n = 29 age 7-13 48% female pop: parochial school students	Overall, there was no effect of evaluation on creativity, but there was a strong evaluation x age interaction with older students showing significantly lower creativity in their designs when expecting evaluation. The difference in the effect between expecting evaluation from a computer or an experimenter was not significant
Amabile, et al. 1990	Creativity Research Journal	Psychology	Creative Writing, Visual Arts	How does evaluation expectation, coaction and surveillance affect creativity?	Study 1: n = 48, 100% female, pop: undergrads Study 2: n = 40, 100% female, pop: undergrads	In both studies there was a main effect of evaluation on creativity. There was no effect of coaction and no interaction effect. The effect of surveillance was nearly significant. Participants who expected evaluation reported less satisfaction with their work and higher levels of anxiety
Szymanski & Harkins, 1992	Personality and Social Psychology Bulletin	Psychology	Divergent Thinking	How does the effect of evaluation change if the evaluation is self-administered?	n = 96 pop: undergrads	Participants expecting evaluation from self or experimenter produced lower creativity than those in no self-evaluation.
Shalley 1995	Academy of Management Journal	Business	Problem Solving	What are the effects of coaction, expected evaluation, and goal setting on creativity and productivity?	n = 84 age = 22 male = 63% population = Undergrad in an organizational behavior class	Study 1: higher levels of creativity when working alone. Higher levels of productivity when working alone w/o expectation of evaluation. Study 2: Highest creativity working alone, with a goal, under the expectation of evaluation. Productivity was low when people worked alone or were assigned a goal.
Klebbba & Tierney, 1995	Journal of Current Issues and Research in Advertising	Business	Visual Arts	What are the effects of expected evaluation on self-perceptions of creativity and what is the relationship between personal cognitive style and creativity?	n = 54 age = 27 40% female pop: undergrads enrolled in an advertising class	Participants expecting evaluation reported significantly lower perceived creativity and feelings of creativity. The potential to be creative was nearly significantly lower. An innovative cognitive style was associated with higher perceptions of creativity
Baer, 1997	Creativity Research Journal	Education	Creative Writing	How does gender affect the effects of evaluation on creativity?	128 8th graders 52% female	On average, evaluation expectation negatively affected creativity scores. There was also a significant gender x evaluation interaction.

Citation	Journal	Research Domain	Creativity Domain	Research Questions	Sample	Major Findings
Shalley & Perry-Smith 2001	Organizational Behavior and Human Decision Processes	Business	Problem Solving	How does the effect of evaluation expectation change when that evaluation is either informational or controlling? How does Modeling affect creativity?	n = 81 age = 22 41% female pop: undergraduates in organizational behavior course	On average, creativity among girls was more significantly affected by the expectation of evaluation when compared to boys. Individuals expecting an informational evaluation produced work rated as having higher creativity compared to those expecting a controlling expectation. Modeling with highly creative examples also produced higher creativity. There was no difference in creativity between receiving no or low creative modeling.
Zhou & Oldham, 2001	The Journal of Creative Behavior	Psychology	Problem Solving	Can self-evaluation improve creativity and what role does personality play in that relationship?	n = 68 age = 21.79 51.5% female Pop: Undergraduates enrolled in a management class	Individuals who expected to provide self-administered feedback showed marginally higher creativity when compared to expecting either no evaluation or external evaluation. There was a significant evaluation x CPS interaction. On average, individuals with high CPS were significantly more creative than all other conditions when expecting a self-administered evaluation.
King & Gurland, 2007	Journal of Research in Personality	Psychology	Visual Arts	How does evaluation change a person's perception of their creative experience and competency and what role does causality orientation play?	n = 90 63.3% female Population: undergrads	There was a main effect of gender on creativity and novelty and results were therefore analyzed separately by gender. There was also a main effect of evaluation on competence. There was a significant evaluation x causality orientation on creativity among men. On average, men with lower autonomy evaluation were more negatively affected by evaluation. The evaluation also negatively affected intrinsic motivation.
Miller, 2007	Psychology of Aesthetics, Creativity, and the Arts	Psychology	Visual Arts	How does field dependence-independence moderate the effect of evaluation expectation on creativity?	n = 90 age 19.74 67% female pop: undergrads	No effect of evaluation expectation on creativity or interaction between evaluation and FDI was reported. Greater field independence predicted higher creativity.
Chamorro-Premuzic & Riechenbacker 2008	Journal of Research in Personality	Psychology	Divergent Thinking	What role does personality play in moderating the effect of evaluation expectation on creativity?	n = 82 age = 21.4 72% Female pop: undergrad psychology students	The threat of evaluation negatively affected divergent thinking and marginally affected convergent thinking. There was no effect of negative affect on any condition or task. Neuroticism negatively predicted divergent thinking under the threat of surveillance. Extraversion fully accounted for the link between Neuroticism and divergent thinking
Yuan & Zhou 2008	Creativity Research Journal	Psychology	Problem Solving	How does evaluation expectation effect different parts of the creative process?	n = 73 age 21.7 52% Female pop: undergrads enrolled in a management class	Evaluation expectation negatively affected the number of ideas and marginally affected the number of novel ideas. Evaluation expectation positively affected the appropriateness of the solutions. Overall, creativity was highest when there was no evaluation expectation during the variation phase, but there was evaluation expectation during the selective retention phase.
Schoen, 2015	Journal of Organizational Behavior	Business	Problem Solving	What effect does implicit achievement motivation, domain knowledge and	n=139, 39% female, average age = 21. Pop: undergraduate	Creativity was positively correlated with high achievement motivation (AM) individuals. There was no main effect found of evaluation type on creativity. There was an AM x evaluation x domain knowledge (DK) interaction. High AM individuals were most

Citation	Journal	Research Domain	Creativity Domain	Research Questions	Sample	Major Findings
				expected evaluations have on creativity?	business school students	creative when expecting an informational evaluation. This effect was moderated by domain knowledge, with high achievement motivated, high DK individuals performing highest when no evaluation is expected. Low AM individuals performed worst under informational evaluations. This effect is moderated by domain knowledge with low AM, high DK individuals performing best with an informational interview.
Wang, et al. 2017	Motivation and Emotion	Psychology	Divergent Thinking	How does regulatory focus moderate the effect of expected evaluation on creativity?	Study 1: n = 166, age 19.21, 71% male, pop: undergraduate science majors Study 2: n = 230, age = 19.5, pop = Chinese undergrads	Study 1: Informational evaluation induced a more promotional strategy and controlling evaluation induced a more preventative strategy. The main effect of the evaluation was not significant, but the interaction was highly significant. Study 2: when both I.V.'s are manipulated, there was still no main effect of evaluation but there was a significant evaluation x regulatory focus interaction. Creativity was higher when the regulatory focus and evaluation type were in line, e.g., promotion-focused/informational evaluation and prevention-focused/controlling evaluation
Hu, et al. 2018	The Journal of Creative Behavior	Education	Visual Arts	How does creative self-efficacy (CSE) moderate the influence of evaluation on artistic creativity, and how do different evaluation styles change this interaction?	n=96 age 14+	Evaluation expectation negatively affected artistic creativity. There was also an evaluation x CSE interaction. For low CSE individuals, the effect was highly significant and negative, whereas there was no effect on high CSE individuals. Study 2 confirmed the finding of the main effect of evaluation on artistic creativity. There was also an evaluation style x CSE interaction. High CSE individuals performed best under negative informational evaluation and worst under positive controlling evaluation. The effect of evaluation type on creativity for low CSE individuals was not significant.
Xue, et al. 2018	The Journal of Creative Behavior	Education	Scientific Creativity, Visual Arts	Is the effect of evaluation on scientific and artistic creativity different when the evaluation comes from a teacher or a classmate?	n = 120, age: 11-13 45% female Pop: 7 th and 8 th grade students in Shandong	There was a main effect of evaluation on scientific creativity. Students' scientific fluency, flexibility, and originality was lowest when expecting evaluations from their teachers and highest under no-evaluation. There was a significant scientific creativity x age interaction. The direction of the main effect was flipped for students' artistic creativity where creativity was highest in the teacher evaluation condition and lowest with under no evaluation. These data support the notion that there is a significant evaluation x task interaction
Lei et al. 2020	The Journal of Creative Behavior	Education	Divergent Thinking	Does cognitive style moderate the effect of expected evaluation on adolescent's creative performance?	Study 1: n = 89, 53.8% female, age 16.31 Study 2: n = 92	Study 1: There was a main effect of evaluation on creativity. On average, participants' originality was highest when expecting evaluation. There was also a significant interaction between evaluation and cognitive style. On average field dependent thinkers were more negatively impacted by lack of evaluation than field-independent thinkers. Study 2: There was no main effect of evaluation type (informational v. controlling) on originality. There was no interaction either.

3.3. Research Findings

In the following sections the research results from the reviewed literature are categorized following the outlines of componential theory (social/environmental, task motivation, creativity-relevant processes, and domain-relevant skills), as well as an additional section on the demographic variables of age and gender. Since the literature review targeted evaluation expectations, nearly all of the included studies addressed differences in the social environment and task motivation conditions. The review also suggests that differences in an individual's creativity-relevant processes, domain-relevant skills, and demographic factors can also moderate the effects of expected evaluation on creativity.

3.3.1. Social Environment

A series of studies conducted in the context of early componential theory found that when students expect their work to be evaluated by external judges, their creativity's overall rating decreased (Amabile, 1979, 1985; Amabile et al., 1990). In the first study of this series (Amabile, 1979), participants (n = 95, 100% female) were tasked with creating a collage representing "silliness" from identical collections of pre-cut shapes under various evaluation-expectation conditions. One group of participants were told that after completing their collages, a panel of judges "will make a detailed evaluation of your design, noting the good points and criticizing the weaknesses" (Amabile, 1979, p. 225). The other group of participants were told that the researchers were not interested in their output but rather their mood after completing the task as assessed through a self-report survey. The output of the participants who expected their work to be evaluated was rated significantly lower in creativity than those who did not expect their work to be evaluated. However, this effect disappeared when participants were given explicit instructions on how to improve their creativity scores. This result may be due to the instructions

on how to improve one's creativity score shifting the experiment from a heuristic task to more of an algorithmic task (Kozbelt et al., 2010; McGraw, 1978). These results were tested again by Amabile and colleagues in a later experiment (n = 48, 100% female) and were confirmed with similar results when the visual arts collage task was replaced by a creative writing task (Amabile et al., 1990).

Bartis, Szymanski, and Harkins (1988) conducted a similar study that looked at the effects of evaluation through the lens of social loafing theory (Harkins & Jackson, 1985). Participants (n = 111) were asked to complete a divergent thinking task in which they were to generate as many creative uses as possible for a common object, either under the expectation of evaluation, or under no expectation of evaluation. Those that did not expect to be evaluated were told that to write down their responses on individual pieces of paper and then to place their answers in a box with the responses of other participants, thus implying that there would be no way for evaluators to be able to identify any individual response. In fact, participants' papers were secretly tagged so that they could be cross-referenced later. Participants who expected evaluation were told that after completing the task, a judge would come by to rate their responses. Participants in the evaluation condition scored significantly lower in creativity than participants who were told that their responses would be pooled.

In a study on scientific creativity, Xue and colleagues (2018) also reported greater creativity under no evaluation-expectation conditions. The participants (n = 120, 43.3% female, mean age = 12.62) were randomly assigned to three conditions: expecting evaluation from their teacher, expecting evaluation from fellow classmates, or no expectation of evaluation. In addition to confirming that the no-expectation group scored higher on creativity output, the study also found that the effect of peer evaluation diminished with age, with the older students

performing better than younger ones under the expectation of evaluation from fellow classmates. Participants also completed a collage task under the same conditions. In this case, the findings were the opposite, with students performing best under the condition of expected teacher evaluation. The difference in results between scientific creativity and the visual arts may be partially explained by the differential importance that the Chinese educational system places on science versus visual arts. As the authors explain “Although the Chinese government has always advocated quality-oriented education and students’ holistic development, under enormous academic pressure, schools tend to emphasize courses such as mathematics and physics and ignore the cultivation of students’ artistic ability” (Xue et al., 2018, p. 46). The lack of emphasis on artistic creativity may have construed any feedback as helpful, especially from a respected authority figure such as a teacher. By contrast, in scientific creativity, an area that is highly valued, the desire to perform well is strong and therefore the expectation of evaluation is sufficiently salient.

One article in the reviewed literature reported contradictory evidence regarding the broad effects of evaluation on creativity (Shalley, 1995). This article presented the findings of two studies. In Study 1, participants’ creativity when working on a business problem-solving test was not affected by the presence of evaluation. In Study 2, participants who worked alone with the goal of being creative and who expected evaluation showed a higher level of creativity compared to other participants who did not expect evaluation. This study's experimental conditions were very similar to those in the studies conducted by Amabile (1979) and Bartis and colleagues (1988) but produced the opposite results. Shalley (1995) suggested that the instruction to the participants to focus on being creative may have removed external distractors, thus allowing individuals to focus exclusively on coming up with novel and appropriate responses. However,

other studies that provided a similar focus for participants did not find similar results (Szymanski & Harkins, 1992; Yuan & Zhou, 2008). It seems more likely that the discrepancy was due to different domains of endeavor—problem-solving in a business context vs. artistic creation—and the general advanced level of domain-specific knowledge that the participants possessed. These contradictory findings will be discussed further below in terms of creativity-relevant processes and domain-relevant skills.

Other studies included in the review further modified the social environment component by examining how the evaluation effect changed depending on who, or what, was expected to deliver the evaluation. Hennessey (1989) examined how creativity changes when evaluation is expected from a computer vs. a teacher. Participants ($n = 29$, 48% female, ages 7-3) completed two creativity tasks on the computer; one was a design-based task, and one was a creative writing task. The participant groups included those who expected to be evaluated by the experimenter, those who expected to be evaluated by the computer software, and those who expected no evaluation at all. The results indicated that creativity scores among the older students (ages 10 – 13) were lowest in the experimenter-evaluation condition, and highest in the no-evaluation condition, with the computer-evaluation group falling in between. Younger students' creativity was not significantly affected by evaluation expectations. This age effect was the opposite of that reported by Xue and colleagues (2018) for artistic tasks, and more similar to what Xue and colleagues reported in the Chinese context for scientific problem-solving.

Researchers have also found that simple the presence of other people during creative tasks can affect performance, though the presence and direction of the effect seem to vary. Amabile, Goldfarb, and Brackfield (1990) studied evaluation expectation effects for individuals working alone vs. those who were “coacting” (i.e., working independently but with others

present). The participants ($n = 48$, 100% female) were asked to express their creativity by writing poems. Those in the coaction condition sat in a ring of chairs with other people working on the same task. Those in the non-coaction condition sat in the same room to complete the task, but without any other people present. In each group, some of the participants were told to expect evaluation while others were not. This study found a significant negative effect of expected evaluation on creative output, but it did not find any effect for coaction vs. individual action. A later study by Shalley (1995) ($n = 84$, 47% female, average age = 22) replicated these experimental conditions and, in contrast, did find an effect from the presence of other people, with creativity output being significantly higher among those participants who were working alone. In a related study, Amabile and colleagues (1990) examined the effects of surveillance on creativity, with participants in the surveillance condition being told that a panel of judges behind a one-way mirror was observing their work. This study found a possible tendency of surveillance to negatively impact creative output, but the results were below the threshold of statistical significance ($p < .08$).

3.3.2. *Task motivation*

According to the Componential Theory of Creativity, social influences such as the expectation of evaluation act primarily by affecting an individual's task motivation (Amabile, 2018). A general assumption of the theory is that intrinsic motivation is vastly more conducive to creativity when compared to external motivation—though in recent years theorists working within this tradition have moved toward a more nuanced view of extrinsic motivations as capable of either working in concert with or antagonistically against intrinsic motivation (Amabile, 1993). To test this assumption, many of the early studies in this area collected self-reported response data from participants about their motivation levels during creativity related tasks. The

studies generally found that individuals who expected evaluation reported lower levels of intrinsic motivation, including interest, enjoyment, and satisfaction with their performance (Amabile, 1979; Amabile et al., 1990). In one study (Amabile, 1985), intrinsic motivation was actively manipulated by having participants read one of two pamphlets, either emphasizing the joy and satisfaction of creative writing, or emphasizing the importance of creative writing for the sake of extrinsic goals, such as getting a good grade. A control group that did not read any pamphlet was also used as a baseline comparison. Participants who read the intrinsic motivation pamphlet demonstrated greater on creativity in the subsequent writing task compared to those in the other groups.

Research conducted by Shalley and Perry-Smith (2001) suggested that modifying the quality of an evaluation to be more informational rather than judgmental/controlling can have a significant positive impact on creativity and on intrinsic motivation. Participants in this study (n = 81, 41% female, mean age = 22) were either told that their work would be judged and scored critically by experts and compared to the rest of the group, or else told that an analysis of their work would be provided so that they would have an opportunity to learn how to be more creative in the future. Individuals who expected an informational evaluation scored higher for creativity in task output compared to those who expected a controlling evaluation. This work suggests that in situations where evaluation is necessary and unavoidable, setting clear expectations that the feedback will be informational will better support creativity compared to an expectation of judgmental evaluation or comparative rankings. The authors of this study also found that the type of evaluation (informational vs. controlling) mediated the effect of evaluation on the participants' intrinsic motivation.

Another study in this context was carried out by Zhou and Oldham (2001), who examined the effects of formal self-evaluation on creative work. This research demonstrated that participants with opportunities to provide a self-evaluation upon completion of a task showed higher creativity output compared to those who expected to receive an external evaluation or who expected no evaluation. These results contradicted an earlier study by Szymanski and Harkins (1992), in which “self-evaluation” was operationalized by providing participants with an opportunity to rank their own performance against a set of pre-scored responses. It is likely that the predefined judgements shown to the participants in Szymanski and Harkins’s study were actually perceived more as an external evaluation, which would explain the creativity dampening effect seen in that study’s results. In contrast, by allowing for relatively free-form self-assessment, Zhou and Oldham’s (2001) work reversed this creativity dampening effect.

3.3.3. Creativity-relevant Processes

Factors that fall into the component of creativity-relevant processes have seen considerable attention during the past two decades, so it is not surprising that these issues appear prominently in the surveyed literature. Areas of study in this category include personality traits, cognitive styles, work styles, and previous experience with creative activities (Amabile, 2018). In Zhou and Oldham’s (2001) study, the participants ($n = 68$, 51.5% female, mean age = 21.74) were asked to complete a creative personality scale (Gough, 1979) prior to engaging in a business problem-solving task. Those participants who represented themselves as highly creative did actually receive higher creativity scores from independent judges on the task outcomes. More importantly, the researchers also found a personality \times evaluation expectation interaction in the category of self-administered evaluations. Among this group who expected to conduct self-evaluations of their own work, those with high creative-personality scores performed

significantly better than their peers who had low creative-personality scores. Presumably this result indicates that individuals who report having creative personalities are more enthusiastic about reflecting on and improving their own work.

Self-efficacy, as described by Bandura (1977, 2010) is a personality factor that is defined as a belief in one's "ability to exert influence over one's own life" (Bandura, 2010, p. 1).

Creative self-efficacy (CSE), specifically, is a belief in one's ability to generate novel and appropriate ideas, actions, or products (Tierney & Farmer, 2011). Research by Hu and colleagues (2018) tested the moderating effects of CSE for the impact of expected evaluation on creativity. Participants' (n = 96, median age = 14) CSE were assessed using a self-report measure, and then asked to complete a visual arts (collage) task. Half of the participants expected evaluation from judges, and the other half did not. Like the majority of studies in this area, the researchers found that creativity was negatively affected by evaluation expectation. However, they also found that there was a strong CSE × evaluation interaction. The creativity output of individuals with a high CSE was not affected by evaluation expectations, but creativity in individuals with low CSE scores was negatively affected by this expectation. This finding, again, suggests that a belief in one's ability to be creative can provide a buffer against the creativity dampening impacts of evaluation expectation.

Chamorro-Premuzic and Reichenbacher (2008) examined the effects of the "Big Five" personality traits (Goldberg, 1993) in the context of creativity output and evaluation expectations. Previous research had correlated the trait of "openness" with creativity (Dollinger et al., 2004; McCrae, 1987), with one researcher going as far as to say that openness could be used as a proxy for creativity (Chamorro-Premuzic, 2007). To test this claim, the experiment conducted by Chamorro-Premuzic and Reichenbacher (2008) operationalized creativity using

two sub-tests from the Torrance Test of Creative Thinking. Participants ($n = 82$, 73% female, mean age = 21) were randomly assigned to complete the tests under one of two experimental conditions, either under surveillance through the presence of a video camera which served as a proxy for evaluation, or without surveillance. The researchers found that the Big Five personality traits in general only accounted for 6% of the variation in the creativity test scores. The traits of openness and extraversion were associated with higher “divergent thinking” scores under both conditions of surveillance and non-surveillance, while neuroticism (emotional instability) was associated with lower “divergent thinking” scores under the surveillance condition. These results should be regarded with caution, since the validity of the test instruments that were used has been challenged in the creativity literature (Dietrich & Kanso, 2010; Silvia, 2011; Silvia et al., 2008), and because surveillance is not a precise stand-in for evaluation expectations (Amabile et al., 1990).

Miller (2007) and Lei and colleagues (2020) both evaluated the moderating effect of Field Dependence–Independence (FDI). This understanding of cognition places individuals’ intellectual style on a continuum from field-dependence (relying more on external references to define information) to field-independence (making independent judgements regardless of the external factors) (H. A. Witkin, 1965; Zhang, 2004). The researchers hypothesized that a field-dependent cognitive style would be more highly affected by expected evaluation. Miller’s (2007) study found that field independence predicted higher creativity scores on a collage task, however the results did not show a mediating effect of FDI on evaluation expectation.

The study by Lei and colleagues (2020), in contrast, did find a significant interaction. Participants in this study ($n = 89$, 63.8% female, mean age = 16.31) completed an instrument called the Group Embedded Figure Test, which was designed to locate individuals on the FDI

spectrum (H. Witkin et al., 2002). They were then divided into evaluation-expectation vs. no-evaluation-expectation groups and asked to complete a divergent thinking task, the results of which were rated on fluency, flexibility, and originality. The results showed that individuals with high field-dependence scores also scored higher on creativity when they expected evaluation, while individuals with high field-independence did not show much variability between the evaluation conditions. This finding was contrary to the researchers' hypotheses and to the expectations of componential theory. Taken together, the studies by Miller (2007) and Lei and colleagues (2020) present conflicting results, indicating a need for more careful and detailed research in this area.

Another approach to individual cognitive differences is "regulatory focus theory," which describes two types of motivational orientations: *promotion-focused* - concerned with nurturance, achievement and growth - and *prevention-focused* - concerned with safety and responsibility (Higgins, 1998). The theory suggests that individuals with different regulatory foci benefit when they adopt appropriate strategies to reach their goals. Promotion-focused individuals are more successful with an *eager* strategy in which they seek opportunities for advancement and gain, while prevention-focused individuals are more successful with *vigilant* strategies that protect against the potential for loss (Cesario et al., 2004). Two studies reported by Wang and colleagues (2017) examined this concept as a potential mediating variable between creativity and evaluation-expectation. In the first study, participants (n = 166, 29% female) were asked to complete the Alternative Uses Task (AUT) in a 2 x 2 factorial design that crossed evaluation style (informational vs. controlling) with regulatory focus (promotion vs. prevention). The results did not indicate an overall effect of evaluation type on creativity, but they did show a significant evaluation \times regulatory-focus interaction. Promotion-focused participants did worse

on creativity output when they expected a controlling evaluation, while prevention-focused participants did worse when they expected informational evaluations.

Wang and colleagues' (2017) second study expanded on these findings by inducing regulatory focus through the use of a maze-finding exercise (Förster et al., 1998). Participants (n = 230, 81% female) were asked to complete the same AUT with the same two expected-evaluation conditions. However, before they did so they were randomly divided into two groups and asked to complete the maze tasks under two different conditions. In the promotion-focused group, participants were asked to help a mouse find the cheese, and in the prevention-focused group, participants were asked to help the mouse escape predation from an owl. This study confirmed the findings that promotion-focused participants (in this case induced by the prior maze exercise) did worse on creativity output when they expected a controlling evaluation, and vice-versa for the prevention-focused participants. These studies from Wang and colleagues provide compelling evidence about the relevance of regulatory focus theory for different individual responses to evaluation types. Equally interesting, however, is the fact that these studies did not find a main/overall effect of evaluation type on creativity output as measured by “divergent thinking” instruments. This lack of significance in terms of the main effect of evaluation-expectation on “divergent thinking” instruments is consistent with the results of other reviewed studies (Bartis et al., 1988; Chamorro-Premuzic, 2007).

Yuan and Zhou (2008) provided further strong evidence that evaluation expectation provides differential effects depending on its format and timing. These researchers drew from a concept of creativity as a two-step process, as grounded in the work of Campbell (1960) and developed by later theorists (Dietrich & Haider, 2015; Finke et al., 1996; Runco & Chand, 1995). In this view the first step in the process is the generation of many ideas (“blind variation”), and

the second phase is weeding out inappropriate or impractical ideas (“selective retention”). In the study conducted by Yuan and Zhou (2008), the participants (n = 73, 52% female, mean age = 21.6) were first tasked with coming up with as many solutions as possible to a business-related in-basket problem. Then, in a separate task, were asked to evaluate the creativity of their own ideas and develop the one they like best into a final answer. Expected evaluation conditions (with or without evaluation) were manipulated for each session, resulting in four different condition groups.

The results from the first session of Yuan and Zhou (2008)’s experiment indicated that there was a main effect of evaluation expectation on the number of ideas generated, with individuals expecting evaluation producing fewer ideas; and that the novelty of the answers produced, as rated by an independent panel of judges, was marginally worse among the individuals who expected evaluation. The results from the second session indicated a main effect of evaluation on the quality of the answers, but in this case the direction was reversed, with the participants who expected evaluation performing significantly better compared to those who did not expect evaluation. A planned comparison showed that participants in the group who (a) did not expect evaluation during the variation session and (b) expected evaluation on the selective retention session produced the highest ratings on their final creative output.

3.3.4. Domain-relevant Skills

According to the Componential Theory, domain-relevant skills are the foundational building blocks and raw material of creativity. This component includes expertise, factual knowledge, technical skills, and other “special domain-relevant talents” (Amabile & Pratt, 2016, p. 160). The impact of these domain-relevant skills seems to be a possible explanation of seemingly contradictory findings in the research literature, such as two studies by Shalley and

colleagues (Shalley, 1995; Shalley & Perry-Smith, 2001) that found improved creativity under conditions of expected evaluation. In both of the studies the participants were assigned problem-solving tasks in a business context, and in both cases the participants were recruited from an undergraduate class on organizational behavior. In addition to focusing on more scientific/logical problems compared to the domain of visual arts or creative writing, the sampling bias in Shalley and colleagues' studies created a pool of individuals who had a high-level domain-relevant skills. In contrast, most of the other studies in the literature review recruited participants from a more general population, in many cases working with children or teenagers.

As discussed earlier, research by Xue and colleagues (2018) also points towards a mediating effect of domain-specific knowledge. In this case, the researcher pointed to the relative emphasis on science and math in the Chinese educational system as a possible reason why study participants in that environment were more constrained by evaluation expectation in scientific problem-solving compared to artistic problem-solving. Interestingly, the direction of this effect in Xue and colleagues' research is the opposite of the effect seen by Shalley and colleagues. Thus, it seems that multiple intersecting variables are in play, most likely a combination of the nature of the domain, the degree of domain-specific knowledge (often linked to the age of participants), the type of evaluation (more informational or more judgmental), and possibly other cognitive or social variables not yet identified.

One of the studies in the literature review directly examined the relationship between the degree of domain-relevant skills and responses to evaluation-expectation. Schoen (2015) operationalized the variable of domain-relevant knowledge as a function of years of education in business classes, again using creative problem-solving tasks in a business context as the independent variable. The participants ($n = 139$, 39% female, mean age = 21) were then divided

into three condition groups to complete the creative tasks: controlling evaluation, informational evaluation, and no evaluation. The results indicated that years of business education was not in itself a significant predictor of creativity. However, intrinsic task motivation as assessed by self-report survey was related to creative performance, and that effect was moderated by both the expectation of evaluation and domain knowledge. This finding again suggests a very complex relationship between domain-relevant skills and creativity, with numerous active variables.

Taken together, these results suggest that there may be a non-linearity to the moderating effect of domain-relevant knowledge on evaluation-expectation as it pertains to creative production. In low-pressure environments (such as the young Chinese students completing artistic tasks in Xue and colleagues' study), some individuals with low domain-skill levels may see evaluation and feedback, at least from a trusted source, as informative and supportive. Meanwhile some individuals with high levels of domain-skills and creative self-efficacy (such as the business students in Shalley and colleagues' study) may similarly see evaluation as more helpful than threatening. These situations may be exceptions to the more general tendency of moderately skilled individuals to experience a creativity dampening effect in the context of evaluation-expectation. How domain types and degrees of domain-skill interact with other variables in shaping reactions to evaluation-expectation is an intriguing and under-developed research area.

3.3.5. Age and Gender

Two studies in the current literature review looked specifically at the potential mediating effects of age and gender. Hennessey (1989) recruited participants from a parochial school in Eastern Massachusetts, ranging in age from 7 to 13. These participants completed computer-based creative tasks while under different evaluation conditions: expectation to be evaluated by

the teacher, expectation to be evaluated by the computer, or expectation of no evaluation. The overall results of this experiment showed no significant effect of the different evaluation-expectation conditions on the participants' creative output. However, the study authors also carried out an analysis of just the students in the 10–13 age range, and in this population a significant effect of the different evaluation-expectations did appear. Those who expected an evaluation from the teacher had significantly lower creativity output scores, those with no expectation of evaluation had significantly higher creativity output scores, and those expecting an evaluation from the computer software fell in between. Hennessey (1989) suggested that this emerging effect in the older age group might be the result of using a computer-based test, under the assumption that the younger children's fascination with the computer itself protected their creative interest from any evaluation-expectation effects. This explanation is broadly hypothetical, and the effect size of expected evaluation for the older children was quite large, indicating that these age differences could benefit from further research. Besides this reported difference in evaluation at the lowest end of the age range, no major trends were observed when comparing findings from studies whose participants were predominantly undergrads and those whose participants were younger students in secondary education.

Baer (1997) examined gender as a potential mediating variable. The participants in this study were 8th-grade students in New Jersey, 52% of which identified as female. They were asked to write poems and stories under two different conditions, either expecting that their work would be read but not evaluated, or else expecting that their work would be evaluated by an external expert from the Department of Education. The results indicated an overall main effect, with the expectation of evaluation predicting reduced creativity scores. There was also a significant gender \times condition effect in this study, with the participants who identified as female

performing significantly worse under evaluation than did their peers who identified as male. Baer (1997) provided three potential explanations for these findings based on previous findings: (a) girls of this age have been shown to be more socially attentive and therefore the evaluator effect may be more salient for them (Gilligan et al., 1990); (b) girls are more performance-responsive to changes in their own motivational states (Kohn, 1999); or (c) boys and girls respond differently to external motivational influence (Deci et al., 1975).

Participants in the early studies by Amabile (1979; 1990) were exclusively female. The author noted that males were excluded in an effort to reduce variability as pretesting had shown that females scored higher than males on the collage task. This finding is directly contrary to the findings of King and Gurland (2007) who found that males' collages were scored higher than females. Results reported by Xue and colleagues (2018) found no difference between boys' and girls' collages, though younger age may make comparisons to the previous two studies more difficult. Clearly, the role of gender is a complex one that may be heavily dependent on a number of external factors that are not being controlled for across studies.

4. Discussion

The literature reviewed here indicates that, on the whole, when people expect that their creative work will be judged and scored by an external evaluator, their creativity output will decrease in comparison to individuals who do not expect their work to be evaluated. This finding is consistent with componential theory, though it is important to note that the majority of these studies use a limited population drawn from school-age children and undergraduate students, and that they examine creative production in controlled settings rather than in real-life working environments. The review also found a notable minority of studies presenting convincing evidence in contradiction of the general trend, indicating that in some contexts, for some

individuals, the expectation of evaluation may have no effect on creative output or may even enhance it.

The complex and, in some cases, contradictory findings in this literature indicate a need to delve deeper by examining potential mediating and moderating variables. There are a great number of candidates to pursue in the accumulated research results. One important aspect is the creativity domain, which varied in different studies from visual arts, to creative writing, to scientific creativity, and beyond. Studies that used tasks related to visual arts and creative writing tended to show a strong negative impact on creativity from evaluation-expectation, with one notable counterexample (Xue et al., 2018). In contrast, research that focused on creative problem-solving in scientific and business contexts revealed more mixed findings, with roughly equal numbers of studies showing a negative impact, a positive impact, and no impact at all on creativity from evaluation-expectation. One possible explanation for this pattern is that the creative tasks used in scientific and business contexts may be closer to algorithmic problems (i.e., more susceptible to rules-based learning and solutions) in comparison to the heuristic problems presented in the visual arts and creative writing studies.

In addition to the type of creativity domain, the participants in these studies varied in the extent of their domain-specific knowledge. In some studies, the participants were children and absolute novices in the creative tasks they were asked to complete. In other studies, the participants were advanced students and practitioners. No consistent linear pattern emerged in the reviewed studies in regard to the effect of domain-relevant skills on response to evaluation-expectation. Both the lowest-skilled and highest-skilled participants seemed to have reduced negative effects from evaluation-expectation, with mid-ranged participants have the most negative impact on their creativity when they believed their work would be critiqued. However,

there were many variations and nuances in this pattern as it interacted with other confounding variables, and at the current time there does not appear to be enough robust evidence to come to any firm conclusion about the effects of domain-knowledge on response to evaluation-expectation.

The specific manner in which evaluations were described, in combination with individual personality and demographic differences, was shown to have a significant mediating effect in many of the reviewed studies. Evaluations that were presented as helpful, individualized, and informative feedback, rather than as rankings, judgements, or comparisons, were in general more likely to have a positive or neutral effect on creative output. However, the personality concepts of “promotion-focused” vs. “prevention focused” emerged as a strong secondary mediating factor of this effect—promotion-focused participants did worse on creativity output when they expected a judgmental evaluation, but prevention-focused participants did worse when they expected an informational evaluation (Higgins, 1998; Wang et al., 2017). Other personality spectrums that were investigated in the research literature, including “field dependence–independence,” showed inconclusive and contradictory results. Several studies noted age and gender effects, but the amount of evidence for these factors was too limited to support any strong conclusions. Finally, individuals who demonstrated high creative self-efficacy and those who reported themselves as having a creative personality type were significantly less likely to show a negative creativity impact under conditions of expected evaluation.

4.1. Future Research

Perhaps the most pressing research in this area of study is the interaction between creativity domains and evaluation-expectation. Baer (1997) reported one such possible interaction, finding that the results of a poetry task were significantly different in his population

from the results of a storytelling task, in regard to the effects of evaluation-expectation on creative output. Rather than speculating on the reason for this discrepancy or pursuing the finding, Baer simply stated: “this was not a predicted difference, and no attempt will be made here to interpret it” (Baer, 1997, p. 28). The current literature review findings suggest that the variable of creative domain type may be present throughout the previous literature, but that it has gone largely unexamined.

It is also worth noting that the range of creative endeavors evaluated in the literature is rather limited, focusing primarily on visual arts, creative writing, and creative problem-solving in scientific and business contexts. Further research into areas such as music, dance, or cooking might provide a broader understanding. It would also be valuable to analyze the cross-domain effects of domain-specific knowledge; in other words, does having expertise in one creative domain confer moderating effects when working outside of one’s expertise in other domains? Future research in this area could benefit from broader participant samples, both in terms of their domain-relevant experience and their demographic backgrounds. It is strongly recommended that age, gender, nationality, and similar variables be considered in future work, and that sample sizes be increased to provide greater statistical power.

5. References

Abraham, A. (2019). *The neuroscience of creativity*. Cambridge University Press.

Amabile, T. M. (1979). Effects of external evaluation on artistic creativity. *Journal of Personality and Social Psychology*, 37(2), 221–233. <https://doi.org/10/dfr92k>

Amabile, T. M. (1982). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology*, 43(5), 997–1013. <https://doi.org/10/dkfnxb>

- Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. *Journal of Personality and Social Psychology*, 45(2), 357. <https://doi.org/10/czk2qw>
- Amabile, T. M. (1985). Motivation and creativity: Effects of motivational orientation on creative writers. *Journal of Personality and Social Psychology*, 48(2), 393–399. <https://doi.org/10/dxnb6k>
- Amabile, T. M. (1993). Motivational synergy: Toward new conceptualizations of intrinsic and extrinsic motivation in the workplace. *Human Resource Management Review*, 3(3), 185–201. <https://doi.org/10/fp7sw6>
- Amabile, T. M. (2012). Componential theory of creativity. *Harvard Business School*, 12(96), 1–10. <https://doi.org/10/bfb3>
- Amabile, T. M. (2018). *Creativity in context: Update to the social psychology of creativity*. Routledge.
- Amabile, T. M., Goldfarb, P., & Brackfield, S. C. (1990). Social influences on creativity: Evaluation, coaction, and surveillance. *Creativity Research Journal*, 3(1), 6–21. <https://doi.org/10/frd5ks>
- Amabile, T. M., & Gryskiewicz, N. D. (1989). The creative environment scales: Work environment inventory. *Creativity Research Journal*, 2(4), 231–253. <https://doi.org/10/dkt9sv>
- Amabile, T. M., & Pillemer, J. (2012). Perspectives on the Social Psychology of Creativity. *The Journal of Creative Behavior*, 46(1), 3–15. <https://doi.org/10/ggdngf>
- Amabile, T. M., & Pratt, M. G. (2016). The dynamic componential model of creativity and innovation in organizations: Making progress, making meaning. *Research in Organizational Behavior*, 36, 157–183. <https://doi.org/10/gdg5kf>

Attanasi, G., Curci, Y., Llerena, P., Pinate, A. C., Ramos-Sosa, M. del P., & Urso, G. (2019).

Looking at creativity from east to west: Risk taking and intrinsic motivation in socially and culturally diverse countries. Bureau d'Economie Théorique et Appliquée, UDS, Strasbourg.

Augustyniak, R. A., Ables, A. Z., Guilford, P., Lujan, H. L., Cortright, R. N., & DiCarlo, S. E.

(2016). Intrinsic Motivation: An Overlooked Component for Student Success. *Advances in Physiology Education*, 40(4), 465–466. <https://doi.org/10/fb4k>

Baer, J. (1997). Gender Differences in the Effects of Anticipated Evaluation on Creativity.

Creativity Research Journal, 10(1), 25–31. <https://doi.org/10/bqbp9s>

Baer, J. (2010). Is creativity domain specific. In *The Cambridge handbook of creativity*.

Cambridge university press.

Baer, J. (2011). How divergent thinking tests mislead us: Are the Torrance Tests still relevant in

the 21st century? The Division 10 debate. *Psychology of Aesthetics, Creativity, and the Arts*, 5(4), 309–313. <https://doi.org/10/bqbftd>

Baer, J., & Kaufman, J. C. (2019). Assessing Creativity with the Consensual Assessment

Technique. In I. Lebeda & V. P. Glăveanu (Eds.), *The Palgrave Handbook of Social Creativity Research* (pp. 27–37). Springer International Publishing.

https://doi.org/10.1007/978-3-319-95498-1_3

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change.

Psychological Review, 84(2), 191–215. <https://doi.org/10/cgp>

Bandura, A. (2010). Self-Efficacy. In *The Corsini Encyclopedia of Psychology* (pp. 1–3).

American Cancer Society. <https://doi.org/10.1002/9780470479216.corpsy0836>

- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173–1182. <https://doi.org/10/cwx>
- Bawarith, R., Abdullah, Dr., Anas, Dr., & Dr., Prof. (2017). E-exam Cheating Detection System. *International Journal of Advanced Computer Science and Applications*, *8*(4). <https://doi.org/10/gh4tct>
- Blais, A.-R., & Weber, E. U. (2006). A Domain-Specific Risk-Taking (DOSPERT) scale for adult populations. *Judgment and Decision Making*, *1*(1), 15.
- Campbell, D. T. (1960). Blind variation and selective retentions in creative thought as in other knowledge processes. *Psychological Review*, *67*(6), 380–400. <https://doi.org/10/fnxcmk>
- Carson, S. H., Peterson, J. B., & Higgins, D. M. (2005). Reliability, Validity, and Factor Structure of the Creative Achievement Questionnaire. *Creativity Research Journal*, *17*(1), 37–50. <https://doi.org/10/ddph98>
- Cesario, J., Grant, H., & Higgins, E. T. (2004). Regulatory Fit and Persuasion: Transfer From “Feeling Right.” *Journal of Personality and Social Psychology*, *86*(3), 388–404. <https://doi.org/10/b5hjwh>
- Chamorro-Premuzic, T. (2007). *Personality and individual differences*. BPS Blackwell.
- Choi, J., Mogami, T., & Medalia, A. (2010). Intrinsic Motivation Inventory: An Adapted Measure for Schizophrenia Research. *Schizophrenia Bulletin*, *36*(5), 966–976. <https://doi.org/10/dbwrr6>
- Covey, M. K., Saladin, S., & Killen, P. J. (1989). Self-monitoring, surveillance, and incentive effects on cheating. *The Journal of Social Psychology*, *129*(5), 673–679. <https://doi.org/10/d9v9zk>

- Dawson, S. (2006). The impact of institutional surveillance technologies on student behaviour. *Surveillance & Society*, 4(1/2). <https://doi.org/10/ghnr8b>
- Deci, E. L. (1985). Intrinsic motivation and self-determination in human behavior. *New York and London: Plenum*.
- Deci, E. L., Cascio, W. F., & Krusell, J. (1975). Cognitive evaluation theory and some comments on the Calder and Staw critique. *Journal of Personality and Social Psychology*, 31(1), 81–85. <https://doi.org/10/c68s77>
- Deci, E. L., & Ryan, R. M. (1980). Self-determination Theory: When Mind Mediates Behavior. *The Journal of Mind and Behavior*, 1(1), 33–43.
- Dewett, T. (2004). Employee creativity and the role of risk. *European Journal of Innovation Management*, 7(4), 257–266. <https://doi.org/10/bsrd3t>
- Dewett, T. (2006). Exploring the Role of Risk in Employee Creativity. *The Journal of Creative Behavior*, 40(1), 27–45. <https://doi.org/10/fx2cmj>
- Dewett, T. (2007). Linking intrinsic motivation, risk taking, and employee creativity in an R&D environment. *R&D Management*, 37(3), 197–208. <https://doi.org/10/cw2687>
- Dietrich, A., & Haider, H. (2015). Human creativity, evolutionary algorithms, and predictive representations: The mechanics of thought trials. *Psychonomic Bulletin & Review*, 22(4), 897–915. <https://doi.org/10/f7kd5n>
- Dietrich, A., & Kanso, R. (2010). A review of EEG, ERP, and neuroimaging studies of creativity and insight. *Psychological Bulletin*, 136(5), 822–848. <https://doi.org/10/dvwd6v>
- Dollinger, S. J., Urban, K. K., & James, T. A. (2004). Creativity and Openness: Further Validation of Two Creative Product Measures. *Creativity Research Journal*, 16(1), 35–47. <https://doi.org/10/b7rf4w>

- Eisenman, R. (1987). Creativity, birth order, and risk taking. *Bulletin of the Psychonomic Society*, 25(2), 87–88. <https://doi.org/10/gh45sg>
- Finke, R. A., Ward, T. B., & Smith, S. M. (1996). *Creative cognition: Theory, research, and applications* (1. MIT Press paperback ed). MIT Press.
- Fleiss, J. L. (1981). Balanced Incomplete Block Designs for Inter-Rater Reliability Studies. *Applied Psychological Measurement*, 5(1), 105–112. <https://doi.org/10/bzzcb8>
- Förster, J., Higgins, E. T., & Idson, L. C. (1998). Approach and avoidance strength during goal attainment: Regulatory focus and the “goal looms larger” effect. *Journal of Personality and Social Psychology*, 75(5), 1115–1131. <https://doi.org/10/dqnbhq>
- Frederiksen, N., Saunders, D. R., & Wand, B. (1957). The in-basket test. *Psychological Monographs: General and Applied*, 71(9), 1–28. <https://doi.org/10/bmwqnk>
- Gallup, A., Church, A. M., Miller, H., Risko, E. F., & Kingstone, A. (2016). Social Presence Diminishes Contagious Yawning in the Laboratory. *Scientific Reports*, 6(1), 1–5. <https://doi.org/10/f8kww3>
- Gilligan, C. E., Lyons, N. P., & Hanmer, T. J. (1990). *Making connections: The relational worlds of adolescent girls at Emma Willard School*. Harvard University Press.
- Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist*, 48(1), 26–34. <https://doi.org/10/c6tzrk>
- Gough, H. G. (1979). A creative personality scale for the adjective check list. *Journal of Personality and Social Psychology*, 37(8), 1398. <https://doi.org/10/csvdss>
- Govern, J. M., & Marsch, L. A. (2001). Development and Validation of the Situational Self-Awareness Scale. *Consciousness and Cognition*, 10(3), 366–378. <https://doi.org/10/cnkc26>

- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5(9), 444–454.
<https://doi.org/10/fxdfvn>
- Guilford, J. P. (1967). Creativity: Yesterday, Today and Tomorrow. *The Journal of Creative Behavior*, 1(1), 3–14. <https://doi.org/10/fzpgdw>
- Harkins, S. G., & Jackson, J. M. (1985). The role of evaluation in eliminating social loafing. *Personality and Social Psychology Bulletin*, 11(4), 457–465. <https://doi.org/10/c7r5g8>
- Hennessey, B. A. (1989). The effect of extrinsic constraints on children's creativity while using a computer. *Creativity Research Journal*, 2(3), 151–168. <https://doi.org/10/ckh2wv>
- Higgins, E. T. (1998). Promotion and Prevention: Regulatory Focus as A Motivational Principle. In *Advances in Experimental Social Psychology* (Vol. 30, pp. 1–46). Elsevier.
[https://doi.org/10.1016/S0065-2601\(08\)60381-0](https://doi.org/10.1016/S0065-2601(08)60381-0)
- Hu, W., & Adey, P. (2002). A scientific creativity test for secondary school students. *International Journal of Science Education*, 24(4), 389–403. <https://doi.org/10/fpkzgf>
- Hu, W., Wang, X., Yi, L. Y. X., & Runco, M. A. (2018). Creative self-efficacy as moderator of the influence of evaluation on artistic creativity. *Journal of Creativity Research*, 28, 39–55.
- Jansen, A. M., Giebels, E., van Rompay, T. J. L., & Junger, M. (2018). The Influence of the Presentation of Camera Surveillance on Cheating and Pro-Social Behavior. *Frontiers in Psychology*, 9, 1937. <https://doi.org/10/gfg3mp>
- Kaufman, J. C. (2002). Narrative and Paradigmatic Thinking Styles in Creative Writing and Journalism Students. *The Journal of Creative Behavior*, 36(3), 201–219.
<https://doi.org/10/fxpxgc>

- Kaufman, J. C. (2012). Counting the muses: Development of the Kaufman Domains of Creativity Scale (K-DOCS). *Psychology of Aesthetics, Creativity, and the Arts*, 6(4), 298–308. <https://doi.org/10/f4ftqc>
- Kaufman, J. C., Baer, J., & Cole, J. C. (2009). Expertise, Domains, and the Consensual Assessment Technique. *The Journal of Creative Behavior*, 43(4), 223–233. <https://doi.org/10/fzx54x>
- Kaufman, J. C., Lee, J., Baer, J., & Lee, S. (2007). Captions, consistency, creativity, and the consensual assessment technique: New evidence of reliability. *Thinking Skills and Creativity*, 2(2), 96–106. <https://doi.org/10/dcnz5t>
- Kaufman, J. C., & Sternberg, R. J. (2010). *The Cambridge Handbook of Creativity*. Cambridge University Press.
- King, L., & Gurland, S. T. (2007). Creativity and experience of a creative task: Person and environment effects. *Journal of Research in Personality*, 41(6), 1252–1259. <https://doi.org/10/drn52t>
- Koestler, A. (1981). The three domains of creativity. In *The concept of creativity in science and art* (pp. 1–17). Springer.
- Kohn, A. (1999). *Punished by Rewards: The Trouble with Gold Stars, Incentive Plans, A's, Praise, and Other Bribes*. Houghton Mifflin Harcourt.
- Kozbelt, A., Beghetto, R. A., & Runco, M. A. (2010). Theories of creativity. *The Cambridge Handbook of Creativity*, 2, 20–47. <https://doi.org/10/gf7hzn>
- Kurzban, R. (2001). The Social Psychophysics of Cooperation: Nonverbal Communication in a Public Goods Game. *Journal of Nonverbal Behavior*, 25(4), 241–259. <https://doi.org/10/ccqt6m>

- Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two-component model. *Psychological Bulletin*, *107*(1), 34–47. <https://doi.org/10/dxcrb9>
- Lei, W., Deng, W., Zhu, R., Runco, M. A., Dai, D. Y., & Hu, W. (2020). Does Cognitive Style Moderate Expected Evaluation and Adolescents' Creative Performance: An Empirical Study: Cognitive Style and Expected Evaluation. *The Journal of Creative Behavior*. <https://doi.org/10/ghnscx>
- Levine, M. (2000). SIDE and Closed Circuit Television (CCTV): Exploring Surveillance in Public Space. In *SIDE Issues Centre Stage: Recent Developments in Studies of Deindividuation in Groups* (p. 18). Royal Netherlands Academy of Arts and Sciences.
- Lurtz, K., & Kreutzer, K. (2017). Entrepreneurial Orientation and Social Venture Creation in Nonprofit Organizations: The Pivotal Role of Social Risk Taking and Collaboration. *Nonprofit and Voluntary Sector Quarterly*, *46*(1), 92–115. <https://doi.org/10/f9p5qp>
- Markland, D., & Hardy, L. (1997). On the Factorial and Construct Validity of the Intrinsic Motivation Inventory: Conceptual and Operational Concerns. *Research Quarterly for Exercise and Sport*, *68*(1), 20–32. <https://doi.org/10/gckf3v>
- Mazerolle, L., Hurley, D., & Chamlin, M. (2002). Social Behavior in Public Space: An Analysis of Behavioral Adaptations to CCTV. *Security Journal*, *15*(3), 59–75. <https://doi.org/10/dhzhrd>
- McAuley, E., Duncan, T., & Tammen, V. V. (1989). Psychometric Properties of the Intrinsic Motivation Inventory in a Competitive Sport Setting: A Confirmatory Factor Analysis. *Research Quarterly for Exercise and Sport*, *60*(1), 48–58. <https://doi.org/10/gd6dz4>

- McCahill, M., & Finn, R. (2010). The Social impact of Surveillance in Three UK Schools: Angels, Devils and Teen Mums. *Surveillance & Society*, 7(3/4), 273–289.
<https://doi.org/10/ghnsbw>
- McCoy, J. M., & Evans, G. W. (2002). The Potential Role of the Physical Environment in Fostering Creativity. *Creativity Research Journal*, 14(3–4), 409–426.
<https://doi.org/10/fnkp7>
- McCrae, R. R. (1987). Creativity, Divergent Thinking, and Openness to Experience. *Journal of Personality and Social Psychology*, 52(6), 1258–1265. <https://doi.org/10/c7sgqb>
- McGraw, K. O. (1978). The detrimental effects of reward on performance: A literature review and a prediction model. In *The hidden costs of reward: New perspectives on the psychology of human motivation* (pp. 33–60). Psychology Press.
- Meleady, R., Abrams, D., Van de Vyver, J., Hopthrow, T., Mahmood, L., Player, A., Lamont, R., & Leite, A. C. (2017). Surveillance or Self-Surveillance? Behavioral Cues Can Increase the Rate of Drivers' Pro-Environmental Behavior at a Long Wait Stop. *Environment and Behavior*, 49(10), 1156–1172. <https://doi.org/10/gcnw8z>
- Northover, S. B., Pedersen, W. C., Cohen, A. B., & Andrews, P. W. (2017). Artificial surveillance cues do not increase generosity: Two meta-analyses. *Evolution and Human Behavior*, 38(1), 144–153. <https://doi.org/10/f9kg9h>
- Pfattheicher, S., & Keller, J. (2015). The watching eyes phenomenon: The role of a sense of being seen and public self-awareness. *European Journal of Social Psychology*, 45(5), 560–566. <https://doi.org/10/gh443k>
- Plucker, J. A., & Beghetto, R. A. (2004). Why Creativity Is Domain General, Why It Looks Domain Specific, and Why the Distinction Does Not Matter. In R. J. Sternberg, E. L.

- Grigorenko, & J. L. Singer (Eds.), *Creativity: From potential to realization*. (pp. 153–167). American Psychological Association. <https://doi.org/10.1037/10692-009>
- Pope, R. (2005). *Creativity: Theory, history, practice*. Routledge.
- Reiter-Palmon, R., Forthmann, B., & Barbot, B. (2019). Scoring divergent thinking tests: A review and systematic framework. *Psychology of Aesthetics, Creativity, and the Arts*, *13*(2), 144. <https://doi.org/10/ggfvhq>
- Reyna, V. F., & Farley, F. (2006). Risk and Rationality in Adolescent Decision Making: Implications for Theory, Practice, and Public Policy. *Psychological Science in the Public Interest*, *7*(1), 1–44. <https://doi.org/10/cgv7tf>
- Risko, E. F., & Kingstone, A. (2011). Eyes wide shut: Implied social presence, eye tracking and attention. *Attention, Perception, & Psychophysics*, *73*(2), 291–296. <https://doi.org/10/bmw43q>
- Runco, M. A., & Chand, I. (1995). Cognition and creativity. *Educational Psychology Review*, *7*(3), 243–267. <https://doi.org/10/cjpch6>
- Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, *43*(3), 450–461. <https://doi.org/10/b7nbhz>
- Sarrayrih, M. A., & Ilyas, M. (2013). *Challenges of Online Exam, Performances and problems for Online University Exam*. *10*(1), 5.
- Schoen, J. L. (2015). Effects of implicit achievement motivation, expected evaluations, and domain knowledge on creative performance. *Journal of Organizational Behavior*, *36*(3), 319–338. <https://doi.org/10/f68sb9>

- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2001). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin.
- Shalley, C. E. (1991). Effects of productivity goals, creativity goals, and personal discretion on individual creativity. *Journal of Applied Psychology, 76*(2), 179–185.
<https://doi.org/10/djhxp6>
- Shalley, C. E. (1995). Effects of Coaction, Expected Evaluation, and Goal Setting on Creativity and Productivity. *Academy of Management Journal, 38*(2), 483–503.
<https://doi.org/10/d4vmqr>
- Shalley, C. E., & Perry-Smith, J. (2001). Effects of social-psychological factors on creative performance: The role of informational and controlling expected evaluation and modeling experience. *Organizational Behavior and Human Decision Processes; New York, 84*(1), 1–22. <https://doi.org/10/c7tx9d>
- Shen, W., Hommel, B., Yuan, Y., Chang, L., & Zhang, W. (2018). Risk-Taking and Creativity: Convergent, but Not Divergent Thinking Is Better in Low-Risk Takers. *Creativity Research Journal, 30*(2), 224–231. <https://doi.org/10/ggr3dn>
- Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin, 86*(2), 420–428. <https://doi.org/10/fkqpdn>
- Sica, L. S., Ragozini, G., Di Palma, T., & Aleni Sestito, L. (2019). Creativity as Identity Skill? Late Adolescents' Management of Identity, Complexity and Risk-Taking. *Journal of Creative Behavior, 53*(4), 457–471. <https://doi.org/10/ghnsfc>
- Silvia, P. J. (2011). Subjective scoring of divergent thinking: Examining the reliability of unusual uses, instances, and consequences tasks. *Thinking Skills and Creativity, 6*(1), 24–30. <https://doi.org/10/b4vz5m>

- Silvia, P. J., Kaufman, J. C., & Pretz, J. E. (2009). Is creativity domain-specific? Latent class models of creative accomplishments and creative self-descriptions. *Psychology of Aesthetics, Creativity, and the Arts*, 3(3), 139–148. <https://doi.org/10/c7hz4m>
- Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., Martinez, J. L., & Richard, C. A. (2008). Assessing creativity with divergent thinking tasks: Exploring the reliability and validity of new subjective scoring methods. *Psychology of Aesthetics, Creativity, and the Arts*, 2(2), 68–85. <https://doi.org/10/cbsj6d>
- Simonton, D. K. (2003). Scientific creativity as constrained stochastic behavior: The integration of product, person, and process perspectives. *Psychological Bulletin*, 129(4), 475–494. <https://doi.org/10/bwhgqs>
- Sternberg, R. J. (2012). The Assessment of Creativity: An Investment-Based Approach. *Creativity Research Journal*, 24(1), 3–12. <https://doi.org/10/5xq>
- Sternberg, R. J., & Lubart, T. I. (1991). An Investment Theory of Creativity and Its Development. *Human Development*, 34(1), 1–31. <https://doi.org/10/fr4p8n>
- Tierney, P., & Farmer, S. M. (2011). Creative self-efficacy development and creative performance over time. *Journal of Applied Psychology*, 96(2), 277–293. <https://doi.org/10/frgz3w>
- Torres, R. T., Preskill, H., & Piontek, M. E. (2005). *Evaluation strategies for communicating and reporting: Enhancing learning in organizations*. Sage.
- Tschannen-Moran, B., & Tschannen-Moran, M. (2011). The Coach and the Evaluator. *Educational Leadership*, 69(2), 10–16.

- Tyagi, V., Hanoch, Y., Hall, S. D., Runco, M., & Denham, S. L. (2017). The Risky Side of Creativity: Domain Specific Risk Taking in Creative Individuals. *Frontiers in Psychology, 8*. <https://doi.org/10/f9qbk9>
- van Bommel, M., van Prooijen, J.-W., Elffers, H., & van Lange, P. A. M. (2014). Intervene to be Seen: The Power of a Camera in Attenuating the Bystander Effect. *Social Psychological and Personality Science, 5*(4), 459–466. <https://doi.org/10/gh4t2t>
- van Rompay, T. J. L., Vonk, D. J., & Fransen, M. L. (2009). The Eye of the Camera: Effects of Security Cameras on Prosocial Behavior. *Environment and Behavior, 41*(1), 60–74. <https://doi.org/10/c6fn7r>
- Weber, E. U., Blais, A.-R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making, 15*(4), 263–290. <https://doi.org/10/cc44b2>
- Wintrol, K., & Jerinic, M. (2013). Rebels in the classroom: Creativity and risk-taking in honors pedagogy. *Honors in Practice, 9*, 47-. Gale Academic OneFile.
- Witkin, H. A. (1965). Psychological differentiation and forms of pathology. *Journal of Abnormal Psychology, 70*(5), 317–336. <https://doi.org/10/cgrj96>
- Witkin, H., Oltman, P., Raskin, E., & Karp, S. (2002). Group embedded figures test manual. Redwood City, CA: Mind Garden, Inc.
- Xue, Y., Gu, C., Wu, J., Dai, D. Y., Mu, X., & Zhou, Z. (2018). The effects of extrinsic motivation on scientific and artistic creativity among middle school students. *The Journal of Creative Behavior, 54*(1), 37–50. <https://doi.org/10/ghnr6g>

- Yuan, F., & Zhou, J. (2008). Differential effects of expected external evaluation on different parts of the creative idea production process and on final product creativity. *Creativity Research Journal*, 20(4), 391–403. <https://doi.org/10/b38vnx>
- Zhang, L. (2004). Field-dependence/independence: Cognitive style or perceptual ability?—validating against thinking styles and academic achievement. *Personality and Individual Differences*, 37(6), 1295–1311. <https://doi.org/10/b22pj6>
- Zhao, X., Lynch, J. G., Jr., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis. *Journal of Consumer Research*, 37(2), 197–206. <https://doi.org/10/fbfr8w>
- Zhou, J., & Oldham, G. R. (1999). Expected Evaluation and Creative Performance. *Academy of Management Proceedings & Membership Directory*, A1–A6. <https://doi.org/10/c5vhhp>

CHAPTER 2 - THE EFFECTS OF SURVEILLANCE AND SOCIAL RISK-TAKING ON
CREATIVITY AND THE ROLE OF INTRINSIC MOTIVATION.

Abstract

This study evaluated how three of the components in the Componential Theory of Creativity—*creativity relevant processes, task motivation, and social/environment*—interact with one another and affect creativity. Participants ($n = 99$) were randomly assigned to one of four conditions in a 2×2 factorial design that crossed visual surveillance with expected evaluation. Participants in the surveillance condition shared their computer's screen as well as a live video and audio feed. Participants in the evaluation group were told that their work would be evaluated later by experts. Risk-taking perception and intrinsic motivation were assessed through a self-report instrument. The study did not find an effect of surveillance or evaluation-expectation on creativity or intrinsic motivation. Social risk-taking was found to have an indirect positive relationship with creativity mediated through intrinsic motivation. In previous studies, the effect of surveillance and evaluation have been dependent on personal characteristics as well as type of creativity task and have consistently shown a positive influence of intrinsic motivation and risk taking on creativity. This study builds on previous literature and is also the first to demonstrate the relationship between risk taking and intrinsic motivation. The findings are discussed in relation to existing literature and in relation to the COVID-19 pandemic and other possible confounds including race and socio-economic status.

1. Introduction and Background

1.1. Creativity

Creativity is often analyzed as having two distinct components. The first is novelty and the second is appropriateness (Reyna & Farley, 2006). New ideas alone are not sufficient for creativity; these new ideas must also be deemed suitable and appropriate within a given context—a judgment that is often made by peers, supervisors, or domain experts (Abraham, 2019). The need to evaluate the appropriateness of creative ideas can lead to a sense of tension between the innovative brainstorming process and the expectation of judgement. Another defining feature of creativity is that it is considered to be a heuristic task; which is to say, one that cannot be easily codified into a precisely defined process or algorithm (Kozbelt et al., 2010; McGraw, 1978). This also can create a potential tension between the amorphousness of brainstorming activity and the productivity expectations of peers or supervisors.

Many theories have been put forward to explain creativity and its necessary antecedents, and a full discussion of those theories is beyond the scope of this paper. For the purposes of this study, the Componential Theory of Creativity served as the basis for the research design (Amabile, 1983, 2018). Rooted in social psychology, the Componential Theory is one of the first analytical frameworks to incorporate the effects of external (non-individual) factors on creative output. This formulation allows not only for differences in personal creative abilities, but also for variations that can emerge in different domains of creativity and in different social/environmental contexts. Although the Componential Theory has undergone continual development since its inception, its four basic components—*domain-relevant skills*, *creativity-relevant processes*, *task motivation*, and *social/environmental factors*—have remained essentially unchanged (Amabile, 2012, 2018; Amabile & Pillemer, 2012; Amabile & Pratt, 2016).

Figure 2.2.1 provides a graphic representation of the Componential Theory. The framework holds that domain-relevant skills, such as knowledge and experience, are a critical component for the generation and evaluation of new ideas. Creativity-relevant processes include individual traits such as personality, work ethic, and habits that can help shape a person's approach to creative work. Task motivation can include both internal and external factors that prompt the creative activity. The social/environmental component of the model refers primarily to intersubjective factors that can either hinder creativity (such as an overly critical work environment), or foster creativity (such as a supportive and diverse workplace). The physical environment has also been shown to affect creativity (McCoy & Evans, 2002).

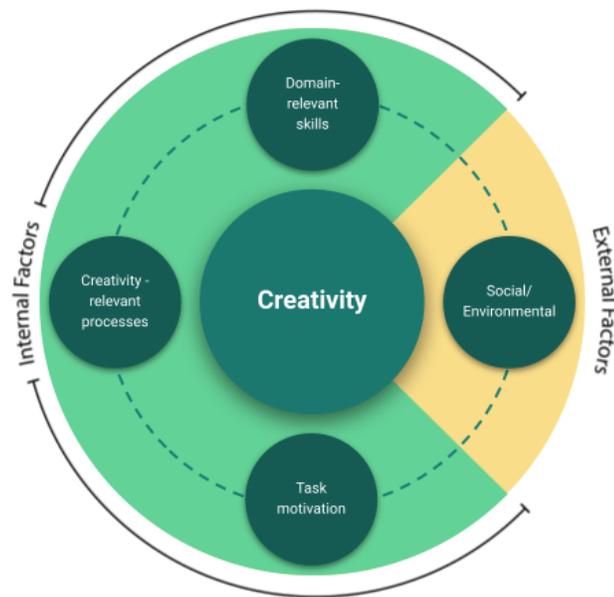


Figure 2.2.1. A graphic representation of the Componential Theory of Creativity.

1.2. Intrinsic Motivation

One of the ideas that is central to Amabile's Componential Theory of Creativity is the Intrinsic Motivation Principle, which states that individuals are most creative when they are focused on direct personal goals. The earliest theory of intrinsic motivation was set out by Deci and Ryan (Deci, 1985; Deci & Ryan, 1980), who centered motivation as a key determinant of human behavior in contrast to the prior "attraction and avoidance" psychological models. The difference between intrinsic and extrinsic motivation was developed by Deci and Ryan and later adopted as part of the Componential Theory by Amabile, who explained it as follows:

"Individuals are intrinsically motivated when they seek enjoyment, interest, satisfaction of curiosity, self-expression or personal challenge Individuals are extrinsically motivated when they engage in the work in order to obtain some goal that is apart from the work itself" (1993, p. 188).

In the initial formulation of the Componential Theory, intrinsic motivation was regarded as the major positive determinant of creativity within the "task motivation. External motivation, on the other hand, was understood to decrease creativity by reducing, in relative terms, the positive influence of intrinsic motivations. This led to a rather strict interpretation of the role of motivation in creativity (Amabile, 1982). However, other researchers working within this framework found that certain extrinsic motivators, such as clearly defined project goals, reward and recognition of ideas, and frequent feedback, did increase creative productivity in Research and Development settings (Amabile & Gryskiewicz, 1989). The Componential Theory was subsequently revised to acknowledge these potential synergistic relationships between intrinsic and extrinsic motivations (Amabile, 1993). In the broader creativity literature this impact of "good" extrinsic motivation is often discussed in terms of the type of evaluation or feedback that

individuals are expected to receive—whether it is “controlling” feedback intended to constrict further decisions, or “informational” feedback intended to provide support for improvement (Shalley & Perry-Smith, 2001).

1.3. Surveillance

Surveillance can take many forms—video, digital, physical, audio—and in various contexts it has been shown to affect many types of social behaviors (Jansen et al., 2018; Mazerolle et al., 2002; van Bommel et al., 2014), pro-environmental behaviors (Meleady et al., 2017), propensity to donate money (Kurzban, 2001; Northover et al., 2017; Pfattheicher & Keller, 2015), online behaviors (Dawson, 2006), gazing behaviors (Risko & Kingstone, 2011), and even contagious yawning (Gallup et al., 2016). Within an educational setting, one commonly reported goal of surveillance is to reduce the prevalence of cheating during exams (Covey et al., 1989)(Bawarith et al., 2017; Sarrayih & Ilyas, 2013). Different framings of surveillance’s intent have been shown to affect its success in modifying behavior—for example, in the context of student cheating, one study found that explaining the purpose of video surveillance to the students in authoritarian terms was successful at reducing incidents of cheating, while mentioning the presence of surveillance in a casual/neutral fashion did not lead to similar reductions (Jansen et al., 2018). Other researchers found that the perception of being observed did not by itself increase environmentally responsible behaviors, but when the surveillance was accompanied by a judgmental text the combination achieved the intended behavioral results (Meleady et al., 2017). Additional research indicates that surveillance can sometimes lead to fewer pro-social initiative behaviors; for example, bystanders were less likely to intervene during a robbery if they believed that the events were being captured on a security camera (Bommel et al., 2014).

Various theories have been put forward to explain these complex effects of surveillance on behavior. The most influential view is that the real or imagined presence of others may lead individuals to feel that their actions are being judged, which may in turn lead them to adjust their behavior to be more in line with perceived group norms or to avoid standing out (Leary & Kowalski, 1990; van Rompay et al., 2009). Supporting this view, Govern and Marsch (2001) demonstrated that self-awareness increased in the presence of cameras (as well as in the presence of a mirror). This interpretation points to a possible link between surveillance and evaluation expectation—although the two concepts are not identical, they both may function by enhancing concerns about potential social ostracism, rejection, or embarrassment.

Numerous studies have examined how surveillance affects creativity. A detailed review of this literature has been conducted by Darfler and Kalantari (forthcoming). Most studies have found a negative impact of surveillance on artistic and linguistic creativity. (Amabile, 1979, 1982; Hennessey, 1989; Hu et al., 2018; Lei et al., 2020; Schoen, 2015; Yuan & Zhou, 2008; Zhou & Oldham, 1999). However, other evaluations of creative problem-solving have yielded more mixed results, with surveillance regularly being shown to increase creative output in individuals who have a high degree of domain-specific knowledge (Shalley, 1995; Shalley & Perry-Smith, 2001). A recent study by Xue and colleagues also found a moderating effect among individuals with extremely low levels of domain-relevant knowledge, who also performed better when being observed (Xue et al., 2018). Presumably these findings are due to individuals with very high levels of knowledge and very low levels of knowledge both being less concerned about social judgement, compared to individuals who have mid-range capacities.

1.4. Risk-taking

Risk, in the context of decision-making, refers to uncertain (or variable) potential rewards and consequences of a decision or action (Reyna & Farley, 2006). Propensity toward risk-taking has been shown to play an important role in creativity across cultures and domains (Attanasi et al., 2019; Sternberg, 2012; Sternberg & Lubart, 1991). Since creativity requires the production of something new, it almost always requires a certain amount of risk due to the intrinsic uncertainty of success (Sternberg, (2012). Researchers have demonstrated associations between risk-taking and creativity in many contexts, including entrepreneurship (Lurtz & Kreutzer, 2017), research and development (Dewett, 2007), management (Dewett, 2004, 2006), classroom achievement (Wintrol & Jerinic, 2013), and adolescent identity development (Sica et al., 2019). As can be expected, individuals differ in their willingness to engage in activities that entail risk, and in their perception of such activities. It is too simplistic, however, to label different individuals as “risk-tolerant” or “risk-averse,” because such evaluations may change in different environments or domains of activity. Weber and colleagues (2002) identified five broad risk-taking domains, including financial, ethical, health/safety, recreational, and social. Of the five domains identified by Weber and colleagues, only social risk-taking has been shown to be related to creativity (Shen et al., (2018); Tyagi et al., (2017).

1.5. The Current Study

The current research is, to the best of the author’s knowledge, the first evaluation of interactions between the social/environmental component and the motivational component of the Componential Theory of Creativity. In this study the social/environmental component was operationalized through remote, visual surveillance and evaluation-expectation, and the motivational component was operationalized through assessments of intrinsic motivations. Risk-

taking perception was also assessed, since this factor has been consistently shown to affect creativity, as discussed in the background above. Figure 2.2.2 provides a graphic representation of the overall experimental design. The study was set up to evaluate direct relationships between surveillance and evaluation-expectation vs. creativity, as well as the mediating effect of intrinsic motivation on these relationships. Additionally, the direct relationship between social risk-taking vs. creativity, and the mediating effect of intrinsic motivation on this relationship were also assessed. Formally stated, there were four central hypotheses:

H1: There will be main effects of Surveillance and Expected Evaluation on Creativity.

H2: The effects of Surveillance and Expected Evaluation on Creativity will be mediated through Intrinsic Motivation.

H3: There will be a main effect of Social Risk-taking on Creativity.

H4: The effect of Social Risk-taking on Creativity will be mediated through Intrinsic Motivation.

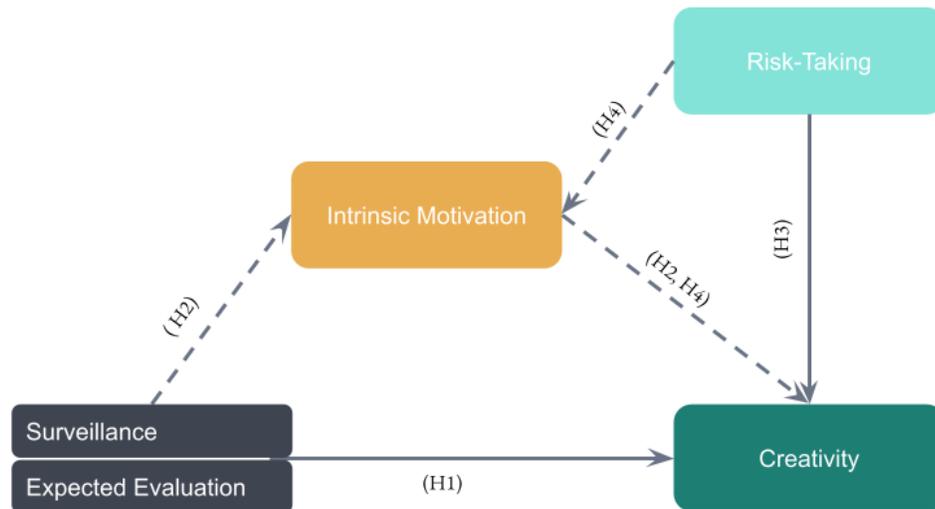


Figure 2.2.2. Graphic representation of the experimental design and hypotheses.

2. Methods

The methods for this study were derived largely from previous research and were approved by the Internal Review Board of Cornell University and deemed to be exempt from full review as there was little threat of possible harm to the participants. The entire study was administered entirely online through Qualtrics. The was of a 2 x 2 factorial design which crossed the surveillance with evaluation-expectation. All participants completed a creativity task and were assessed on a number of dimensions, including social risk taking.

2.1. Participants

The participants in this study were selected using a convenience sampling method. They included undergraduate (82%) and graduate (18%) students at a large research university in the United States. The participants were recruited through announcements on internal departmental

e-mail lists, and through a participant recruitment platform hosted by the university. Participants received research course credit for their participation in the study. A total of 111 students were recruited, but 12 had to be excluded from the study due to incomplete data. This resulted in a final total of 99 participants. One additional participant was later excluded after their responses were found to be greater than 2 SD outside of the mean. Sixty-seven of the participants identified as female, 30 identified as male, and 1 identified as non-binary/other. In regard to their ethnicity, 48% identified as White/Caucasian, 35% as Asian, 8% as Black or African American, and 9% identified as other. 15% identified as Hispanic.

2.2. Procedure

Participants completed the experiment in two sections, both of which were administered entirely online. In the first section the participants were asked to complete a survey collecting demographic information, as well as separate survey instruments assessing their risk-taking propensity. These were short questionnaires (described in more detail below) and the participants took approximately 7 minutes to complete all three of them.

In the second section of the experiment, participants were randomly assigned to one of four conditions in a 2 x 2 factorial design, which crossed surveillance with evaluation expectation. During this part of the experiment the participants were given 72 hours to begin the next section in which they were asked to complete several creative assignments. This was done so as to reduce mental fatigue prior to the creativity tasks. Ultimately, only one task was assessed for this study. Since express prompting has been shown to enhance creativity (Kaufman et al., 2007; Shalley, 1991), all of the participants were first told, “You will be asked to complete several creativity related tasks. It is important that you try your best to come up with creative responses for each task.”

Individuals in the expected-evaluation condition (e+) were told, “In order to assess your performance on the following tasks, your responses will be evaluated and scored for their creativity by a panel of expert judges.” The participants in the non-evaluation condition (e-) were instead told, “The researchers are *not* interested in your responses, but rather in the mood you will report after completing the following tasks. What you report there will be an important source of data.” Individuals in the surveillance (s+) condition were further told, “It is important that we collect as much information during the experiment as possible. In order to do so, we are asking you to log into a Zoom meeting and share your audio, video, and screen for the purpose of observation. You will be in the meeting by yourself, but the meeting will be recorded and reviewed later by the researchers.” These participants were also asked to take and upload a screenshot to verify that they had logged into the Zoom meeting room. (Ninety-six percent of the participants in the surveillance condition successfully completed this verification, but one participant failed to submit the requested screenshot.) Individuals who were in the non-surveillance condition (s-) were not given any prompting regarding audio/video sharing.

Creativity was operationalized using the procedure developed by Kaufman (2002). All of the participants were provided with a series of ten photographs and were asked to write a caption for each photograph. The prompt was as follows: “Write a few sentences as a caption for each photograph. There are no set rules or expectations; just write whatever you feel should go with each photograph.” The photographs used in the experiment were chosen for their ability to be open to multiple interpretations, as well as for portraying a diverse range of individuals and backgrounds. In all of the images at least one person was shown in a natural setting, either indoors or out. All participants were shown the same ten photographs, but the order of the photographs was randomized for each participant. After completing their written captions, the

participants were asked to submit their work electronically to the researchers (those in the surveillance condition were also asked to exit the online meeting room and turn off their camera). All of the participants then completed a post-experiment survey that assessed their task specific intrinsic motivation. They were thanked for their participation in the research and informed that they could contact the researchers with any follow-up concerns.

2.3. Measures

Risk-taking propensity was assessed using the Domain Specific Risk Taking (DOSPRT) survey (Blais & Weber, 2006). This is a self-report instrument that assesses the perceived likelihood that participants would engage in various risky activities, using a 7-point Likert scale from “extremely unlikely” to “extremely likely.” The questions are divided into five activity domains: social, financial, health/safety, ethical, and recreational. Example activities from the survey included, “Admitting that your tastes are different from those of a friend” (social), “Drinking heavily at a social function” (health/safety), and “Betting a day’s income at the horse races” (financial). There were a total of 30 questions, equally distributed among the five activity domains. Blais and Webber (2006) reported reliabilities of 0.71 and 0.86 for this instrument. In the current study, the reliability of the individual subscales ranged from 0.57 to 0.81. Reliability for social risk-taking was .64

Intrinsic motivation was assessed using the Intrinsic Motivation Inventory developed by Ryan (1982). This instrument has been widely used in a variety of disciplines including psychology, education, sports, and creativity research and has been shown to be reliable and predictive (Augustyniak et al., 2016; Choi et al., 2010; Markland & Hardy, 1997; McAuley et al., 1989). The scale has five sub-domains, which evaluate perceived interest/enjoyment, pressure/tension, effort/importance, locus of causality, and perceived competence. Each sub-

domain is assessed with 3 to 4 questions. For the purpose of the current study, the the “locus of causality” section of the questionnaire was omitted. (The locus of causality was the same for all participants, since the creative task was assigned as part of the research study). Reliability for this instrument was very high, with Cronbach α coefficients ranging from 0.85 to 0.90 on the four sub-scales. Previous researchers have also reported generally high reliability for the Intrinsic Motivation Inventory sub-scales, ranging from 0.72 to 0.90 (Markland & Hardy, 1997).

Creativity was evaluated using the Consensual Assessment Technique (CAT). This approach was developed in the context of the Componential Theory of Creativity with the goal of establishing a “clear and operational” means of rating creative output (Amabile, 1982, p. 997). Unlike other creativity measurement techniques that focus on either inter-individual or intra-individual differences, the CAT approach is centered on evaluating the products of creativity, and it is flexible enough to be used across varied domains (writing, music, painting, etc.). The evaluation of creative products in the CAT approach is carried out by multiple independent observers who have expertise in the domain of interest (Baer & Kaufman, 2019; Kaufman et al., 2009).

To reduce the workload on the judges in the current study, a Balanced, Incomplete Block Design (BIBD) (Fleiss, 1981) was used to balance out which photographs were seen by each judge. The evaluation had a treatment size (n) of 10 photographs, with each judge evaluating responses (r) to a total of 4 photographs, and responses to each photograph being reviewed (k) by 6 judges, leading to a required total (m) of 15 judges. This meets the first two BIBD conditions of $mr = nk$ and $n \leq m$. The reviewing tasks were distributed so that any pair of judges overlapped in their duties (λ) by 2 photographs, which meets the third BIBD condition of

$\lambda(m - 1) = r(k + 1)$. The design of this evaluation process was created via the JMP software package using the Design of Experiments function (Appendix A).

The reliability of the judges was calculated using Intraclass Correlations (ICC), which is a ratio between the variance of interest and the variance of interest plus error. For this study the model chosen corresponds to “Case 2” from Shrout and Fleiss (1979) in which “a random sample of k judges is selected from a larger population and each judge rates each target” (Shrout & Fleiss, 1979, p. 421). The unit of reliability for the study was determined to be the mean rating since the aim is to build a consensus rating for each target based on multiple ratings from independent judges. After computing the ICCs for each judge, the median score was 0.71, and the Inter Quartile Range (IQR) was 0.079. Three judges’ responses were removed from the study due to low correlations (greater than $1.5 \times \text{IQR}$), and these trials were repeated with new judges. The final median score was 0.76, with a IQR of 0.07 and no outliers. A similar analysis was computed to determine the ICC for the photographs, resulting in a median score of 0.837, with an IQR of 0.085 and no outliers.

3. Results

3.1. Manipulation Checks

Two manipulation checks were used to confirm the participants’ perception of the intended experimental manipulations (surveillance and evaluation-expectation). As part of the post-experiment survey, participants were asked if they believed that they were being observed and if they believed that their work would be evaluated. They were also asked the same thing in a second set of questions elsewhere on the post-experiment survey, using a reverse coding of the first questions. The Cronbach’s alpha was then calculated for each type of experimental

manipulation. The evaluation-expectation manipulation was $\alpha = 0.53$, and the surveillance manipulation was $\alpha = 0.71$.

3.2. Preliminary Analysis

An initial correlation table was constructed to provide an overview of interactions among variables of interest, excluding the main conditions of surveillance and evaluation-expectation. The variables of “average time to complete the creative task” and “average number of words in the responses” were log-transformed to maintain a normal distribution (Table 2.1). As expected, many of the measures from the Intrinsic Motivation Index were well correlated with each other. Likewise, the time taken to complete the writing tasks and the average number of words in the responses were well correlated. Focusing on the creativity rating, the overview indicated that it was most strongly correlated with interest/enjoyment (part of the Intrinsic Motivation Index). Creativity was also moderately correlated ($p \leq 0.1$) with perceived competence, effort, and time taken to complete the writing task. These findings generally support the Principle of Intrinsic Motivation, which holds that creativity is closely linked to the presence of intrinsic motivation factors (Amabile, 2018).

Table 2.1. Correlations among the Variables of Interest (Numbers on the Horizontal and Vertical Axes Indicate the Same Variables)

Measure	1	2	3	4	5	6	7	8	9	10	11	Mean	SD
1. Creativity	—	0.11	0.23*	0.32**	0.19†	0.20•	-0.06	-0.07	-0.01	0.14	0.04	2.12	0.67
2. Word Count ^a		—	0.60***	-0.02	0.18†	0.15	-0.05	-0.03	-0.10	-0.06	-0.05	2.20	0.94
3. Time to Complete (s) ^a			—	0.10	0.14	0.23*	0.00	-0.10	-0.14	0.04	0.06	3.46	0.76
Intrinsic Motivation													
4. Interest/Enjoyment				—	0.49***	0.55***	-0.05	0.02	-0.04	0.21*	0.25*	27.90	7.35
5. Perceived Competence					—	0.40***	-0.42***	-0.03	-0.18	0.25*	0.22*	21.04	5.84
6. Effort						—	0.10	0.03	-0.11	0.09	0.11	16.68	4.89
7. Pressure							—	0.16	0.02	-0.08	0.01	14.13	6.28
8. Zoom Familiarity								—	-0.08	0.10	0.16	4.30	0.73
9. Privacy									—	-0.17†	-0.22*	1.74	0.93
10. Social Risk Taking										—	0.29**	29.12	5.36
11. Open-Mindedness											—	11.56	2.25

^a these values were log-transformed to maintain a normal distribution

† p ≤ 0.1 * p ≤ 0.05 ** p ≤ 0.01 *** p ≤ 0.001

3.3. Effects of Surveillance and Evaluation-expectation

A two-way ANOVA was conducted to test for differences in creativity ratings among participants in the different surveillance and evaluation-expectation conditions (Table 2.2, **Error! Reference source not found.**). The results indicated no main effect for either surveillance or evaluation-expectation on creativity. There was also no indication of an interaction between surveillance and evaluation-expectation. Thus, hypothesis H1, “There will be main effects of Surveillance and Expected Evaluation on Creativity,” was not supported by the findings. In fact, the distributions of the creativity scores were nearly identical among the different conditions, providing evidence for the counter-hypothesis: when evaluating $1 - Pr(> F)$ the value is nearly significant for the effect of surveillance ($p = 0.059$), and it is significant for evaluation-expectation ($p = 0.016$). This means that the findings actually support the conclusion that there was *no* effect of surveillance and evaluation-expectation on creativity, at $\alpha = 0.95$.

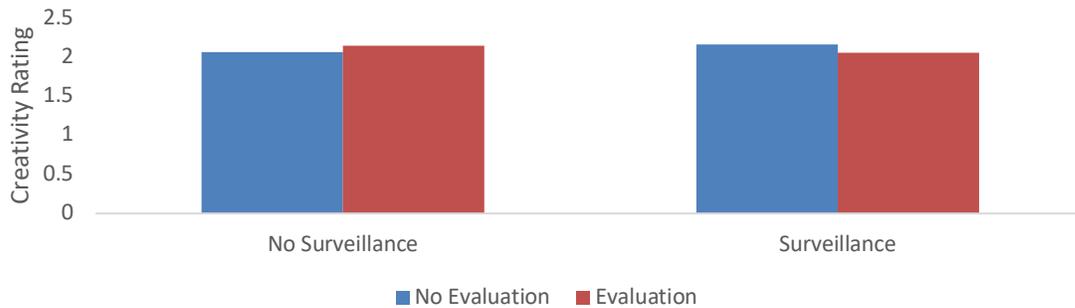
Table 2.2.

Two-way ANOVA for the Effects of Surveillance and Evaluation-expectation on Creativity

	Df	Sum Sq	Mean Sq	F value	Pr (>F)
Surveillance	1	0	0.0023	0.005	0.941
Evaluation	1	0	0.0002	0	0.984
Surveillance × Evaluation	1	0.21	0.2136	0.51	0.477
Residuals	94	39.34	0.4185		

Figure 2.3

Average creativity ratings for participants in each of the experimental conditions.



3.4. Effects of Intrinsic Motivation

A linear regression model was constructed with creativity rating as the response variable and the total score from the Intrinsic Motivation Index as the predictor variable. The results indicated a significant effect of intrinsic motivation on the creativity ratings ($F_{(1,97)} = 5.44$, $p = 0.02$, $r^2 = 0.054$). Further examination of the coefficients showed that the total intrinsic motivation score was a significant predictor of creativity ratings ($t = 3.311$, $\beta_0 = 0.007$, $p = 0.02$, $\eta^2 = 0.54$). To provide more details, a multiple linear regression model was constructed, with creativity rating as the response variable and the four intrinsic motivation sub-scales as predictor variables (**Table 2.3**). The results again showed that there was a joint effect of the intrinsic motivation subscales on creativity ratings ($F_{(4,94)} = 2.749$, $p = 0.0327$, $r^2 = -0.105$). However, examining the coefficients indicated that only the sub-scale of interest/enjoyment was a significant predictor of creativity ratings ($t = 2.217$, $p = 0.03$, $\eta^2 = 0.005$). Since the other three sub-scales were not significant predictors, subsequent evaluation of hypotheses H2 and H4 below used only the interest/enjoyment sub-scale as a measurement of intrinsic motivation effects.

Table 2.3.

Multiple Linear Regression Model of the Relationship between Intrinsic Motivation and Creativity

Coefficients	Estimate	Std. Error	t value	Pr (> t)
(Intercept)	1.254	0.378	3.32	0.001 **
Interest/Enjoyment	0.024	0.011	2.217	0.029 *
Perceived Competence	0.003	0.015	0.202	0.840
Effort/Importance	0.007	0.017	0.436	0.664
Pressure/Tension	-0.001	0.012	-0.094	0.925

*p < 0.05 **p < 0.01

3.5. Effects of Risk-taking Propensity

A linear model was constructed with creativity rating as the response variable and the score from the social risk-taking subscale from the Domain Specific Risk-Taking survey as the predictor variable. The results did not indicate a significant effect ($F_{(1,96)} = 2.909$, $\beta = 0.128$, $p = 0.0913$, $r^2 = 0.29$). Therefore, the findings did not support hypothesis H3, “There will be a main effect of Social Risk-taking on Creativity.” This finding also jeopardized the evaluation of hypothesis H4, “The effect of Social Risk-taking on Creativity will be mediated through Intrinsic Motivation.” Some early studies of pathway analysis required a significant direct effect in order to proceed to evaluate mediations (Baron & Kenny, 1986). However, later work has acknowledged the existence of partial mediations in which the direct effect is not significant but the indirect effect is significant (Zhao et al., 2010). Therefore, H4 was investigated using a structured model via the lavaan package in the “R” statistical computing environment to evaluate the mediation effect. Standard errors were calculated with bootstrapping.

The results from this mediation analysis confirmed the lack of a direct significant effect between social risk-taking and creativity ratings. However, there was a significant main effect of social risk taking and the interest/enjoyment sub-scale of the Intrinsic Motivation Inventory, as well as a significant direct effect of interest/enjoyment on creativity ratings, both with p-values <

0.01. On average, one unit of increase in the social risk-taking scores was correlated with a 0.369 unit increase in interest/enjoyment scores. For each unit increase in interest/enjoyment, there was a creativity rating increase of 0.154 units. The total mediated effect of social risk-taking on creativity was found to be marginally significant ($p = 0.079$) (Table 2.4, Figure 2.4)

Table 2.4.

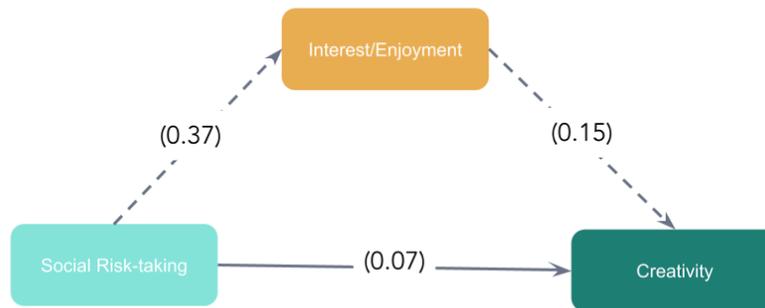
Social Risk-taking's Effect on Creativity through the Mediating Variable of Interest/Enjoyment

Regressions:				
	Estimate	Std. Error	z-value	P (> z)
Creativity ~ Social Risk-taking	0.071	0.074	0.962	0.336
Social Risk-taking ~ Interest	0.369	0.118	3.118	0.002 **
Creativity ~ Interest	0.154	0.059	2.617	0.009 **
Intercepts:				
	Estimate	Std. Error	z-value	P (> z)
.Creativity	1.056	0.425	2.481	0.013 *
.Interest	2.924	0.578	5.062	0 ***
Variances:				
	Estimate	Std. Error	z-value	P (> z)
.Creativity	0.398	0.047	8.452	0 ***
.Interest	1.168	0.18	6.482	0 ***
Defined Parameters:				
	Estimate	Std. Error	z-value	P (> z)
indirect	0.057	0.028	2.036	0.042 *
total	0.128	0.073	1.754	0.079 •

• $p < 0.1$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Figure 2.4

A graphic representation of the mediation analysis involving social risk-taking, interest/enjoyment, and creativity. Values represent the estimated β coefficients of the direct effect of one variable on another.



4. Discussion

This study analyzed relationships between surveillance, evaluation-expectation, social risk-taking propensity, intrinsic motivation, and creativity. One of the central findings is that there was no effect of surveillance or evaluation-expectation on the participants' creativity in completing a photo-captioning task. This result is at odds with previous research literature that has found a creativity-dampening effect of surveillance and evaluation-expectation during similar writing tasks (Amabile et al., 1990; Baer, 1997; Hennessey, 1989). The implication of the findings cannot be ascertained without additional experiments. However, the researchers speculate that demographic factors may have played a role in these divergent findings. The population in the current study consisted of students attending a very prestigious university in the United States, where the student body as a whole is largely drawn from high-achieving social backgrounds. The participants were primarily White (47%) and Asian (35%), with only 15% identifying as Hispanic and 3% identifying as other ethnicities. It is logical to suppose that such individuals may have different responses to surveillance and evaluation-expectation compared to those from lower-income backgrounds and those who have experienced greater social marginalization (McCahill & Finn, 2010).

Another factor that may have contributed to the study's findings is that the entire experiment took place remotely, with surveillance operationalized through audiovisual recording and evaluation-expectation operationalized through the electronic submission of work. To the best of the authors' knowledge, there has not been much research evaluating the relative effects of remote vs. in-person surveillance on creativity. The study also took place in a unique environment, during the COVID-19 pandemic, in which the student participants had become strongly acclimated to virtual learning. Mazerolle and colleagues (2002) found that the behavioral effects of remote video surveillance declined over time as people acclimated to the camera's presence; it is reasonable to suspect that a similar dynamic could occur in remote-learning contexts. Without a baseline understanding of this type of virtual evaluation and visual surveillance, it is hard to determine the extent to which the findings are comparable to other environments. At the very least, the outcomes of this study should promote caution when generalizing from one type of surveilled population to another.

The study found a marginally significant mediation relationship between social risk-taking, intrinsic motivation, and creativity. This finding is in alignment with previous work, outside of the Componential Theory model, that has viewed social risk-taking as an important factor in enhancing creativity (Sternberg, 2012) (Eisenman, 1987; Tyagi et al., 2017). The contribution of the current research is to show the mediating effect of intrinsic motivation (in particular, the sub-component of greater personal interest/enjoyment in the creative task), as a pathway that links social risk tolerance to creativity. To the best of the researchers' knowledge this relationship has not previously been investigated. The findings suggest that a greater tolerance for social risk may be associated with a shift in the balance between extrinsic and intrinsic motivations, with positive results for creativity.

There are important cautions and limitations that should be considered when interpreting the study's results. The manipulation check that was carried out to test whether or not participants were responding to the experimental conditions produced weak outcomes. Participants' recognition of the evaluation-expectation condition was very low (0.53), and their recognition of the surveillance condition was moderately low (0.71). This indicates a lack of awareness or concern about the experimental conditions, which would be expected to lower the impact of surveillance and evaluation-expectation (Amabile et al., 1990; Levine, (2000). This reduced response to the manipulation could be partially explained by the factors of affluence/privilege or acclimatization as discussed above. From an external validity perspective, the danger can be understood as "Selection \times Treatment" (Shadish et al., 2001), which occurs when the selection of participants interacts with the experimental conditions in a non-random way. It is important not to generalize the results to other populations with different life experiences who may have dissimilar reactions to surveillance and evaluation-expectation, or who may have widely different familiarity with video-conferencing platforms.

In future work, researchers may want to tackle these variables directly, by using a more diverse population sample and integrating a demographic and familiarity analysis into the study design. It would also be useful to manipulate the framing of the surveillance's intent, from authoritarian to casual (Jansen et al., 2018; Levine, 2000), and the framing of the evaluation-expectation, from controlling to informative (Shalley & Perry-Smith, 2001). Future studies should also consider incorporating levels of domain-specific knowledge into their models—in other words, how much experience the participants have with the specific domain of creative activity—based on prior findings that such knowledge can mediate relationships between surveillance and creativity (Shalley, 1995). Considering all of these factors, the research in this

area shows that the effects of surveillance and evaluation-expectation on creativity can be very complex. The more we can learn about how these factors interact, the more successful we can become at establishing working conditions that fluidly merge the heuristic brainstorming aspects of creativity with the need for external judgement and evaluation.

5. Conclusion

This study examined the effects of virtual surveillance and evaluation-expectation on creativity and the role of intrinsic motivation and social risk-taking. Previous studies have shown that under certain circumstances the external factors of surveillance and evaluation-expectation can negatively affect performance on creativity. It is believed that these external factors reduce intrinsic motivation a key determinant of creativity according to the Intrinsic Motivation Principal of creativity (Amabile, 2012). Elsewhere in the literature, risk-taking has also been shown to be a creativity-relevant process that positively affects creativity. Sternberg (2012) highlights the necessity for risk-taking in creative endeavors due the inherent uncertainty that a new and untested idea or product is view as successful. Individual propensity for social risk-taking, in particular, has been shown to predict better creative results. However, thus far, no study has addressed the interactions between surveillance, evaluation-expectation, social risk-taking and intrinsic motivation.

It was hypothesized that the external factors of surveillance and evaluation-expectation would negatively affect creativity and that the effect would be mediated through a decrease in intrinsic motivation. In a similar, but opposite fashion, more favorable views of social risk-taking would predict higher creativity and that the effect would be mediated through intrinsic motivation, i.e. individuals who view social risk-taking more favorable would be perform better on creativity-related tasks because they would be more intrinsically motivated.

In order to test these hypotheses, an online, 2x2 factorial study was designed that crossed evaluation-expectation (present or not) with surveillance (present or not). All individuals (n=99) completed a creativity-related task in which they created captions for photographs and completed psychometric tests that assessed their views on risk-taking, their task-specific intrinsic motivation. Individuals in the evaluation-expectation condition were told that their work would be judged and graded by external experts, while those who did not expect evaluation were told that the researchers were interested in their mood which was reported at the end of the study. Individuals in the surveillance condition shared their computer screen and a video and audio stream of themselves through an online video conferencing platform during the study. Other individuals did not share any data.

Results indicated that there was no significant effect of either surveillance or evaluation expectation on creativity. There were no statistically significant differences across any of the experimental groups. Due to the lack of significant effects, further analysis on the mediating role of intrinsic motivation was not carried out. These results could be due to a lack of salience of the intervention, especially for evaluation-expectation where answers to a manipulation check were unreliable. Alternatively, the results of the study could be attributable to the effects of external events that co-occurred with the experiment, e.g. The COVID-19 pandemic.

The association between individual social-risk taking and creativity were more pronounced. On average individuals who had more favorable views of social risk-taking did not perform significantly higher in terms of creativity. However, a mediation analysis did show that there was a significant effect of social risk-taking on intrinsic motivation and of intrinsic

motivation on creativity. In total, the indirect effect was significant and the total effect was nearly significant.

In conclusion, it appears that in an online format, there is no detectable effect of surveillance and evaluation-expectation on creativity-related tasks. However, intrinsic motivation did appear to support creativity, as suggested by the literature, and that social risk-taking improves creativity by increasing individual task-specific creativity. Further studies should focus on testing different populations outside of well-educated students for whom video conferencing has become the norm for instruction. Additionally, these studies should also strive to understand individuals' historic relationship with surveillance.

References

Abraham, A. (2019). *The neuroscience of creativity*. Cambridge University Press.

Amabile, T. M. (1979). Effects of external evaluation on artistic creativity. *Journal of Personality and Social Psychology*, 37(2), 221–233. <https://doi.org/10/dfr92k>

Amabile, T. M. (1982). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology*, 43(5), 997–1013.

<https://doi.org/10/dkfnxb>

Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization.

Journal of Personality and Social Psychology, 45(2), 357. <https://doi.org/10/czk2qw>

Amabile, T. M. (1985). Motivation and creativity: Effects of motivational orientation on creative writers. *Journal of Personality and Social Psychology*, 48(2), 393–399.

<https://doi.org/10/dxnb6k>

- Amabile, T. M. (1993). Motivational synergy: Toward new conceptualizations of intrinsic and extrinsic motivation in the workplace. *Human Resource Management Review*, 3(3), 185–201. <https://doi.org/10/fp7sw6>
- Amabile, T. M. (2012). Componential theory of creativity. *Harvard Business School*, 12(96), 1–10. <https://doi.org/10/bfb3>
- Amabile, T. M. (2018). *Creativity in context: Update to the social psychology of creativity*. Routledge.
- Amabile, T. M., Goldfarb, P., & Brackfield, S. C. (1990). Social influences on creativity: Evaluation, coaction, and surveillance. *Creativity Research Journal*, 3(1), 6–21. <https://doi.org/10/frd5ks>
- Amabile, T. M., & Gryskiewicz, N. D. (1989). The creative environment scales: Work environment inventory. *Creativity Research Journal*, 2(4), 231–253. <https://doi.org/10/dkt9sv>
- Amabile, T. M., & Pillemer, J. (2012). Perspectives on the Social Psychology of Creativity. *The Journal of Creative Behavior*, 46(1), 3–15. <https://doi.org/10/ggdngf>
- Amabile, T. M., & Pratt, M. G. (2016). The dynamic componential model of creativity and innovation in organizations: Making progress, making meaning. *Research in Organizational Behavior*, 36, 157–183. <https://doi.org/10/gdg5kf>
- Attanasi, G., Curci, Y., Llerena, P., Pinate, A. C., Ramos-Sosa, M. del P., & Urso, G. (2019). *Looking at creativity from east to west: Risk taking and intrinsic motivation in socially and culturally diverse countries*. Bureau d’Economie Théorique et Appliquée, UDS, Strasbourg.

- Augustyniak, R. A., Ables, A. Z., Guilford, P., Lujan, H. L., Cortright, R. N., & DiCarlo, S. E. (2016). Intrinsic Motivation: An Overlooked Component for Student Success. *Advances in Physiology Education*, 40(4), 465–466. <https://doi.org/10/fb4k>
- Baer, J. (1997). Gender Differences in the Effects of Anticipated Evaluation on Creativity. *Creativity Research Journal*, 10(1), 25–31. <https://doi.org/10/bqbp9s>
- Baer, J. (2010). Is creativity domain specific. In *The Cambridge handbook of creativity*. Cambridge university press.
- Baer, J. (2011). How divergent thinking tests mislead us: Are the Torrance Tests still relevant in the 21st century? The Division 10 debate. *Psychology of Aesthetics, Creativity, and the Arts*, 5(4), 309–313. <https://doi.org/10/bqbftd>
- Baer, J., & Kaufman, J. C. (2019). Assessing Creativity with the Consensual Assessment Technique. In I. Lebuda & V. P. Glăveanu (Eds.), *The Palgrave Handbook of Social Creativity Research* (pp. 27–37). Springer International Publishing. https://doi.org/10.1007/978-3-319-95498-1_3
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215. <https://doi.org/10/cgp>
- Bandura, A. (2010). Self-Efficacy. In *The Corsini Encyclopedia of Psychology* (pp. 1–3). American Cancer Society. <https://doi.org/10.1002/9780470479216.corpsy0836>
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. <https://doi.org/10/cwx>

- Bawarith, R., Abdullah, Dr., Anas, Dr., & Dr., Prof. (2017). E-exam Cheating Detection System. *International Journal of Advanced Computer Science and Applications*, 8(4).
<https://doi.org/10/gh4tct>
- Blais, A.-R., & Weber, E. U. (2006). A Domain-Specific Risk-Taking (DOSPERT) scale for adult populations. *Judgment and Decision Making*, 1(1), 15.
- Campbell, D. T. (1960). Blind variation and selective retentions in creative thought as in other knowledge processes. *Psychological Review*, 67(6), 380–400. <https://doi.org/10/fnxcmk>
- Carson, S. H., Peterson, J. B., & Higgins, D. M. (2005). Reliability, Validity, and Factor Structure of the Creative Achievement Questionnaire. *Creativity Research Journal*, 17(1), 37–50. <https://doi.org/10/ddph98>
- Cesario, J., Grant, H., & Higgins, E. T. (2004). Regulatory Fit and Persuasion: Transfer From “Feeling Right.” *Journal of Personality and Social Psychology*, 86(3), 388–404.
<https://doi.org/10/b5hjwh>
- Chamorro-Premuzic, T. (2007). *Personality and individual differences*. BPS Blackwell.
- Choi, J., Mogami, T., & Medalia, A. (2010). Intrinsic Motivation Inventory: An Adapted Measure for Schizophrenia Research. *Schizophrenia Bulletin*, 36(5), 966–976.
<https://doi.org/10/dbwrr6>
- Covey, M. K., Saladin, S., & Killen, P. J. (1989). Self-monitoring, surveillance, and incentive effects on cheating. *The Journal of Social Psychology*, 129(5), 673–679.
<https://doi.org/10/d9v9zk>
- Dawson, S. (2006). The impact of institutional surveillance technologies on student behaviour. *Surveillance & Society*, 4(1/2). <https://doi.org/10/ghnr8b>

- Deci, E. L. (1985). Intrinsic motivation and self-determination in human behavior. *New York and London: Plenum.*
- Deci, E. L., Cascio, W. F., & Krusell, J. (1975). Cognitive evaluation theory and some comments on the Calder and Staw critique. *Journal of Personality and Social Psychology*, *31*(1), 81–85. <https://doi.org/10/c68s77>
- Deci, E. L., & Ryan, R. M. (1980). Self-determination Theory: When Mind Mediates Behavior. *The Journal of Mind and Behavior*, *1*(1), 33–43.
- Dewett, T. (2004). Employee creativity and the role of risk. *European Journal of Innovation Management*, *7*(4), 257–266. <https://doi.org/10/bsrd3t>
- Dewett, T. (2006). Exploring the Role of Risk in Employee Creativity. *The Journal of Creative Behavior*, *40*(1), 27–45. <https://doi.org/10/fx2cmj>
- Dewett, T. (2007). Linking intrinsic motivation, risk taking, and employee creativity in an R&D environment. *R&D Management*, *37*(3), 197–208. <https://doi.org/10/cw2687>
- Dietrich, A., & Haider, H. (2015). Human creativity, evolutionary algorithms, and predictive representations: The mechanics of thought trials. *Psychonomic Bulletin & Review*, *22*(4), 897–915. <https://doi.org/10/f7kd5n>
- Dietrich, A., & Kanso, R. (2010). A review of EEG, ERP, and neuroimaging studies of creativity and insight. *Psychological Bulletin*, *136*(5), 822–848. <https://doi.org/10/dvwd6v>
- Dollinger, S. J., Urban, K. K., & James, T. A. (2004). Creativity and Openness: Further Validation of Two Creative Product Measures. *Creativity Research Journal*, *16*(1), 35–47. <https://doi.org/10/b7rf4w>
- Eisenman, R. (1987). Creativity, birth order, and risk taking. *Bulletin of the Psychonomic Society*, *25*(2), 87–88. <https://doi.org/10/gh45sg>

- Finke, R. A., Ward, T. B., & Smith, S. M. (1996). *Creative cognition: Theory, research, and applications* (1. MIT Press paperback ed). MIT Press.
- Fleiss, J. L. (1981). Balanced Incomplete Block Designs for Inter-Rater Reliability Studies. *Applied Psychological Measurement*, 5(1), 105–112. <https://doi.org/10/bzzcb8>
- Förster, J., Higgins, E. T., & Idson, L. C. (1998). Approach and avoidance strength during goal attainment: Regulatory focus and the “goal looms larger” effect. *Journal of Personality and Social Psychology*, 75(5), 1115–1131. <https://doi.org/10/dqnbhq>
- Frederiksen, N., Saunders, D. R., & Wand, B. (1957). The in-basket test. *Psychological Monographs: General and Applied*, 71(9), 1–28. <https://doi.org/10/bmwqnk>
- Gallup, A., Church, A. M., Miller, H., Risko, E. F., & Kingstone, A. (2016). Social Presence Diminishes Contagious Yawning in the Laboratory. *Scientific Reports*, 6(1), 1–5. <https://doi.org/10/f8kww3>
- Gilligan, C. E., Lyons, N. P., & Hanmer, T. J. (1990). *Making connections: The relational worlds of adolescent girls at Emma Willard School*. Harvard University Press.
- Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist*, 48(1), 26–34. <https://doi.org/10/c6tzrk>
- Gough, H. G. (1979). A creative personality scale for the adjective check list. *Journal of Personality and Social Psychology*, 37(8), 1398. <https://doi.org/10/csvdss>
- Govern, J. M., & Marsch, L. A. (2001). Development and Validation of the Situational Self-Awareness Scale. *Consciousness and Cognition*, 10(3), 366–378. <https://doi.org/10/cnkc26>
- Guilford, J. P. (1950). Creativity. *American Psychologist*, 5(9), 444–454. <https://doi.org/10/fxdfvn>

- Guilford, J. P. (1967). Creativity: Yesterday, Today and Tomorrow. *The Journal of Creative Behavior*, 1(1), 3–14. <https://doi.org/10/fzpgdw>
- Harkins, S. G., & Jackson, J. M. (1985). The role of evaluation in eliminating social loafing. *Personality and Social Psychology Bulletin*, 11(4), 457–465. <https://doi.org/10/c7r5g8>
- Hennessey, B. A. (1989). The effect of extrinsic constraints on children's creativity while using a computer. *Creativity Research Journal*, 2(3), 151–168. <https://doi.org/10/ckh2wv>
- Higgins, E. T. (1998). Promotion and Prevention: Regulatory Focus as A Motivational Principle. In *Advances in Experimental Social Psychology* (Vol. 30, pp. 1–46). Elsevier. [https://doi.org/10.1016/S0065-2601\(08\)60381-0](https://doi.org/10.1016/S0065-2601(08)60381-0)
- Hu, W., & Adey, P. (2002). A scientific creativity test for secondary school students. *International Journal of Science Education*, 24(4), 389–403. <https://doi.org/10/fpkzgf>
- Hu, W., Wang, X., Yi, L. Y. X., & Runco, M. A. (2018). Creative self-efficacy as moderator of the influence of evaluation on artistic creativity. *Journal of Creativity Research*, 28, 39–55.
- Jansen, A. M., Giebels, E., van Rompay, T. J. L., & Junger, M. (2018). The Influence of the Presentation of Camera Surveillance on Cheating and Pro-Social Behavior. *Frontiers in Psychology*, 9, 1937. <https://doi.org/10/gfg3mp>
- Kaufman, J. C. (2002). Narrative and Paradigmatic Thinking Styles in Creative Writing and Journalism Students. *The Journal of Creative Behavior*, 36(3), 201–219. <https://doi.org/10/fxpxgc>
- Kaufman, J. C. (2012). Counting the muses: Development of the Kaufman Domains of Creativity Scale (K-DOCS). *Psychology of Aesthetics, Creativity, and the Arts*, 6(4), 298–308. <https://doi.org/10/f4ftqc>

- Kaufman, J. C., Baer, J., & Cole, J. C. (2009). Expertise, Domains, and the Consensual Assessment Technique. *The Journal of Creative Behavior*, 43(4), 223–233.
<https://doi.org/10/fzx54x>
- Kaufman, J. C., Lee, J., Baer, J., & Lee, S. (2007). Captions, consistency, creativity, and the consensual assessment technique: New evidence of reliability. *Thinking Skills and Creativity*, 2(2), 96–106. <https://doi.org/10/dcnz5t>
- Kaufman, J. C., & Sternberg, R. J. (2010). *The Cambridge Handbook of Creativity*. Cambridge University Press.
- King, L., & Gurland, S. T. (2007). Creativity and experience of a creative task: Person and environment effects. *Journal of Research in Personality*, 41(6), 1252–1259.
<https://doi.org/10/drn52t>
- Koestler, A. (1981). The three domains of creativity. In *The concept of creativity in science and art* (pp. 1–17). Springer.
- Kohn, A. (1999). *Punished by Rewards: The Trouble with Gold Stars, Incentive Plans, A's, Praise, and Other Bribes*. Houghton Mifflin Harcourt.
- Kozbelt, A., Beghetto, R. A., & Runco, M. A. (2010). Theories of creativity. *The Cambridge Handbook of Creativity*, 2, 20–47. <https://doi.org/10/gf7hzn>
- Kurzban, R. (2001). The Social Psychophysics of Cooperation: Nonverbal Communication in a Public Goods Game. *Journal of Nonverbal Behavior*, 25(4), 241–259.
<https://doi.org/10/ccqt6m>
- Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two-component model. *Psychological Bulletin*, 107(1), 34–47. <https://doi.org/10/dxcrb9>

- Lei, W., Deng, W., Zhu, R., Runco, M. A., Dai, D. Y., & Hu, W. (2020). Does Cognitive Style Moderate Expected Evaluation and Adolescents' Creative Performance: An Empirical Study: Cognitive Style and Expected Evaluation. *The Journal of Creative Behavior*.
<https://doi.org/10/ghnscx>
- Levine, M. (2000). SIDE and Closed Circuit Television (CCTV): Exploring Surveillance in Public Space. In *SIDE Issues Centre Stage: Recent Developments in Studies of De-individuation in Groups* (p. 18). Royal Netherlands Academy of Arts and Sciences.
- Lurtz, K., & Kreutzer, K. (2017). Entrepreneurial Orientation and Social Venture Creation in Nonprofit Organizations: The Pivotal Role of Social Risk Taking and Collaboration. *Nonprofit and Voluntary Sector Quarterly*, 46(1), 92–115. <https://doi.org/10/f9p5qp>
- Markland, D., & Hardy, L. (1997). On the Factorial and Construct Validity of the Intrinsic Motivation Inventory: Conceptual and Operational Concerns. *Research Quarterly for Exercise and Sport*, 68(1), 20–32. <https://doi.org/10/gckf3v>
- Mazerolle, L., Hurley, D., & Chamlin, M. (2002). Social Behavior in Public Space: An Analysis of Behavioral Adaptations to CCTV. *Security Journal*, 15(3), 59–75.
<https://doi.org/10/dhzhrd>
- McAuley, E., Duncan, T., & Tammen, V. V. (1989). Psychometric Properties of the Intrinsic Motivation Inventory in a Competitive Sport Setting: A Confirmatory Factor Analysis. *Research Quarterly for Exercise and Sport*, 60(1), 48–58. <https://doi.org/10/gd6dz4>
- McCahill, M., & Finn, R. (2010). The Social impact of Surveillance in Three UK Schools: Angels, Devils and Teen Mums. *Surveillance & Society*, 7(3/4), 273–289.
<https://doi.org/10/ghnsbw>

- McCoy, J. M., & Evans, G. W. (2002). The Potential Role of the Physical Environment in Fostering Creativity. *Creativity Research Journal*, *14*(3–4), 409–426.
<https://doi.org/10/fnkp7>
- McCrae, R. R. (1987). Creativity, Divergent Thinking, and Openness to Experience. *Journal of Personality and Social Psychology*, *52*(6), 1258–1265. <https://doi.org/10/c7sgqb>
- McGraw, K. O. (1978). The detrimental effects of reward on performance: A literature review and a prediction model. In *The hidden costs of reward: New perspectives on the psychology of human motivation* (pp. 33–60). Psychology Press.
- Meleady, R., Abrams, D., Van de Vyver, J., Hopthrow, T., Mahmood, L., Player, A., Lamont, R., & Leite, A. C. (2017). Surveillance or Self-Surveillance? Behavioral Cues Can Increase the Rate of Drivers' Pro-Environmental Behavior at a Long Wait Stop. *Environment and Behavior*, *49*(10), 1156–1172. <https://doi.org/10/gcnw8z>
- Northover, S. B., Pedersen, W. C., Cohen, A. B., & Andrews, P. W. (2017). Artificial surveillance cues do not increase generosity: Two meta-analyses. *Evolution and Human Behavior*, *38*(1), 144–153. <https://doi.org/10/f9kg9h>
- Pfattheicher, S., & Keller, J. (2015). The watching eyes phenomenon: The role of a sense of being seen and public self-awareness. *European Journal of Social Psychology*, *45*(5), 560–566. <https://doi.org/10/gh443k>
- Plucker, J. A., & Beghetto, R. A. (2004). Why Creativity Is Domain General, Why It Looks Domain Specific, and Why the Distinction Does Not Matter. In R. J. Sternberg, E. L. Grigorenko, & J. L. Singer (Eds.), *Creativity: From potential to realization*. (pp. 153–167). American Psychological Association. <https://doi.org/10.1037/10692-009>
- Pope, R. (2005). *Creativity: Theory, history, practice*. Routledge.

- Reiter-Palmon, R., Forthmann, B., & Barbot, B. (2019). Scoring divergent thinking tests: A review and systematic framework. *Psychology of Aesthetics, Creativity, and the Arts*, 13(2), 144. <https://doi.org/10/ggfvhq>
- Reyna, V. F., & Farley, F. (2006). Risk and Rationality in Adolescent Decision Making: Implications for Theory, Practice, and Public Policy. *Psychological Science in the Public Interest*, 7(1), 1–44. <https://doi.org/10/cgv7tf>
- Risko, E. F., & Kingstone, A. (2011). Eyes wide shut: Implied social presence, eye tracking and attention. *Attention, Perception, & Psychophysics*, 73(2), 291–296. <https://doi.org/10/bmw43q>
- Runco, M. A., & Chand, I. (1995). Cognition and creativity. *Educational Psychology Review*, 7(3), 243–267. <https://doi.org/10/cjpch6>
- Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, 43(3), 450–461. <https://doi.org/10/b7nbhz>
- Sarrayrih, M. A., & Ilyas, M. (2013). *Challenges of Online Exam, Performances and problems for Online University Exam*. 10(1), 5.
- Schoen, J. L. (2015). Effects of implicit achievement motivation, expected evaluations, and domain knowledge on creative performance. *Journal of Organizational Behavior*, 36(3), 319–338. <https://doi.org/10/f68sb9>
- Shadish, W. R., Cook, T. D., & Campbell, D. T. (2001). *Experimental and quasi-experimental designs for generalized causal inference*. Houghton Mifflin.

- Shalley, C. E. (1991). Effects of productivity goals, creativity goals, and personal discretion on individual creativity. *Journal of Applied Psychology, 76*(2), 179–185.
<https://doi.org/10/djhxp6>
- Shalley, C. E. (1995). Effects of Coaction, Expected Evaluation, and Goal Setting on Creativity and Productivity. *Academy of Management Journal, 38*(2), 483–503.
<https://doi.org/10/d4vmqr>
- Shalley, C. E., & Perry-Smith, J. (2001). Effects of social-psychological factors on creative performance: The role of informational and controlling expected evaluation and modeling experience. *Organizational Behavior and Human Decision Processes; New York, 84*(1), 1–22. <https://doi.org/10/c7tx9d>
- Shen, W., Hommel, B., Yuan, Y., Chang, L., & Zhang, W. (2018). Risk-Taking and Creativity: Convergent, but Not Divergent Thinking Is Better in Low-Risk Takers. *Creativity Research Journal, 30*(2), 224–231. <https://doi.org/10/ggr3dn>
- Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin, 86*(2), 420–428. <https://doi.org/10/fkqpdn>
- Sica, L. S., Ragozini, G., Di Palma, T., & Aleni Sestito, L. (2019). Creativity as Identity Skill? Late Adolescents' Management of Identity, Complexity and Risk-Taking. *Journal of Creative Behavior, 53*(4), 457–471. <https://doi.org/10/ghnsfc>
- Silvia, P. J. (2011). Subjective scoring of divergent thinking: Examining the reliability of unusual uses, instances, and consequences tasks. *Thinking Skills and Creativity, 6*(1), 24–30. <https://doi.org/10/b4vz5m>

- Silvia, P. J., Kaufman, J. C., & Pretz, J. E. (2009). Is creativity domain-specific? Latent class models of creative accomplishments and creative self-descriptions. *Psychology of Aesthetics, Creativity, and the Arts*, 3(3), 139–148. <https://doi.org/10/c7hz4m>
- Silvia, P. J., Winterstein, B. P., Willse, J. T., Barona, C. M., Cram, J. T., Hess, K. I., Martinez, J. L., & Richard, C. A. (2008). Assessing creativity with divergent thinking tasks: Exploring the reliability and validity of new subjective scoring methods. *Psychology of Aesthetics, Creativity, and the Arts*, 2(2), 68–85. <https://doi.org/10/cbsj6d>
- Simonton, D. K. (2003). Scientific creativity as constrained stochastic behavior: The integration of product, person, and process perspectives. *Psychological Bulletin*, 129(4), 475–494. <https://doi.org/10/bwhgqs>
- Sternberg, R. J. (2012). The Assessment of Creativity: An Investment-Based Approach. *Creativity Research Journal*, 24(1), 3–12. <https://doi.org/10/5xq>
- Sternberg, R. J., & Lubart, T. I. (1991). An Investment Theory of Creativity and Its Development. *Human Development*, 34(1), 1–31. <https://doi.org/10/fr4p8n>
- Tierney, P., & Farmer, S. M. (2011). Creative self-efficacy development and creative performance over time. *Journal of Applied Psychology*, 96(2), 277–293. <https://doi.org/10/frgz3w>
- Torres, R. T., Preskill, H., & Piontek, M. E. (2005). *Evaluation strategies for communicating and reporting: Enhancing learning in organizations*. Sage.
- Tschannen-Moran, B., & Tschannen-Moran, M. (2011). The Coach and the Evaluator. *Educational Leadership*, 69(2), 10–16.

- Tyagi, V., Hanoch, Y., Hall, S. D., Runco, M., & Denham, S. L. (2017). The Risky Side of Creativity: Domain Specific Risk Taking in Creative Individuals. *Frontiers in Psychology, 8*. <https://doi.org/10/f9qbk9>
- van Bommel, M., van Prooijen, J.-W., Elffers, H., & van Lange, P. A. M. (2014). Intervene to be Seen: The Power of a Camera in Attenuating the Bystander Effect. *Social Psychological and Personality Science, 5*(4), 459–466. <https://doi.org/10/gh4t2t>
- van Rompay, T. J. L., Vonk, D. J., & Fransen, M. L. (2009). The Eye of the Camera: Effects of Security Cameras on Prosocial Behavior. *Environment and Behavior, 41*(1), 60–74. <https://doi.org/10/c6fn7r>
- Weber, E. U., Blais, A.-R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making, 15*(4), 263–290. <https://doi.org/10/cc44b2>
- Wintrol, K., & Jerinic, M. (2013). Rebels in the classroom: Creativity and risk-taking in honors pedagogy. *Honors in Practice, 9*, 47-. Gale Academic OneFile.
- Witkin, H. A. (1965). Psychological differentiation and forms of pathology. *Journal of Abnormal Psychology, 70*(5), 317–336. <https://doi.org/10/cgrj96>
- Witkin, H., Oltman, P., Raskin, E., & Karp, S. (2002). Group embedded figures test manual. Redwood City. CA: Mind Garden, Inc.
- Xue, Y., Gu, C., Wu, J., Dai, D. Y., Mu, X., & Zhou, Z. (2018). The effects of extrinsic motivation on scientific and artistic creativity among middle school students. *The Journal of Creative Behavior, 54*(1), 37–50. <https://doi.org/10/ghnr6g>

- Yuan, F., & Zhou, J. (2008). Differential effects of expected external evaluation on different parts of the creative idea production process and on final product creativity. *Creativity Research Journal*, 20(4), 391–403. <https://doi.org/10/b38vnx>
- Zhang, L. (2004). Field-dependence/independence: Cognitive style or perceptual ability?—validating against thinking styles and academic achievement. *Personality and Individual Differences*, 37(6), 1295–1311. <https://doi.org/10/b22pj6>
- Zhao, X., Lynch, J. G., Jr., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis. *Journal of Consumer Research*, 37(2), 197–206. <https://doi.org/10/fbfr8w>
- Zhou, J., & Oldham, G. R. (1999). Expected Evaluation and Creative Performance. *Academy of Management Proceedings & Membership Directory*, A1–A6. <https://doi.org/10/c5vhhp>

CHAPTER 3 - APPENDIX

Appendix 1 - Balanced Incomplete Block Design

Block				
1	P02	P08	P05	P01
2	P07	P01	P06	P10
3	P05	P06	P09	P04
4	P02	P08	P03	P06
5	P05	P03	P01	P07
6	P07	P04	P02	P03
7	P01	P10	P09	P02
8	P10	P02	P05	P04
9	P01	P04	P08	P06
10	P08	P05	P07	P09
11	P09	P03	P10	P08
12	P03	P09	P04	P01
13	P09	P06	P07	P02
14	P04	P07	P08	P10
15	P06	P10	P03	P05

Pairwise Treatment frequencies

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
P1	6	2	2	2	2	2	2	2	2	2
P2		6	2	2	2	2	2	2	2	2
P3			6	2	2	2	2	2	2	2
P4				6	2	2	2	2	2	2
P5					6	2	2	2	2	2
P6						6	2	2	2	2
P7							6	2	2	2
P8								6	2	2
P9									6	2
P10										6

Positional Frequencies

1	2	3	4
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P1	2	1	1	2
P2	2	1	1	2
P3	1	2	2	1
P4	1	2	2	1
P5	2	1	2	1
P6	1	2	1	2
P7	2	1	2	1
P8	1	2	2	1
P9	2	1	2	1
P10	1	2	1	2

Appendix 2 – Images used for Creativity Task

