

CREATIVITY IN EARLY CHILDHOOD: HOW DO FANTASY ORIENTATION AND SELF-
REGULATION PREDICT CREATIVITY ACROSS CONTEXTUALLY DISTINCT
MEASURES?

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ABSTRACT

Creativity is often considered to involve two processes: a generative process that includes forming multiple ideas and an evaluative process where one selects the highest-quality idea that was generated (Sowden, et al., 2015). Engaging in behaviors that naturally involve generative (e.g., imaginative play) and evaluative processes (e.g., self-regulation) may uncover how the development of these systems are involved in creative thought. It was predicted that children who had a preference for imaginative play (i.e., fantasy orientation; FO) and those who were high in self-regulation would produce the most creative ideas due to their experience engaging in both the generative and evaluative processes. Across two studies, this dissertation aimed to examine the interaction between fantasy orientation and self-regulation on creativity using two contextually distinct measures. In Study 1 creativity was evaluated using a story-stem laboratory task. In Study 2 a new observational measure was created: The Creativity in Play Scale. This measure evaluated children's natural creativity in their everyday self-selected play activities. Results of Study 1 suggested that the interaction between FO and self-regulation predicted creativity in a laboratory story stem task. Results of Study 2 suggested that assessing creativity through play is feasible and children high in FO had the highest creativity, but self-regulation and the interaction did not predict creativity using this task. This study extends upon previous research by creating a new measure of creativity that is developmentally appropriate for preschool aged children. It also informs creativity theory, providing a richer understanding of what variables contribute to the creative process in children.

Keywords: creativity, pretend play, fantasy orientation, self-regulation, executive functioning, emotion regulation

DEDICATION

This dissertation is dedicated to my children, Lily and Benny. They are my inspiration and my masterpiece.

LIST OF ABBREVIATIONS AND SYMBOLS

FO	Fantasy Orientation
EF	Executive Functioning
ER	Emotion Regulation
DT	Divergent Thinking
α	Cronbach's index of internal consistency
M	Mean
SD	Standard Deviation
NIH	The National Institutes of Health
CIQ	Childhood Imagination Questionnaire
ERC	Emotion Regulation Checklist
SR	Self-regulation
ICC	Intraclass Correlation
r	Pearson's r
R^2	Coefficient of determination
Δ	Change
b	Unstandardized beta
β	Standardized beta
NS	Not significant
<	Less than

>	Greater than
=	Equal to
<i>p</i>	Probability
<i>F</i>	Fisher's <i>F</i> ratio
<i>t</i>	Computed value of <i>t</i> test
Count	Number of five-minute segments a child interacted with another child in the study
NA	Not Applicable
ANOVA	Analysis of Variance
PCA	Principal Component Analysis
CIS	Child Imagination Scale
Rep	Representational

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CHAPTER 1.

INTRODUCTION

The 21st century is an era of constant change, with unprecedented breakthroughs in technology, spreading globalization and industrialization, and increasingly sophisticated information. Along with these advancements comes new and unparalleled problems that have to be solved. Scholars, CEOs, scientists, and artists speak of the importance of creativity as the fuel for innovation, the inspiration for the arts, the advancement for scientific discoveries, and the momentum for societal growth. Innovation may be more important than ever to solve our society's ever-growing problems. Indeed, the very future of our society may rest upon creative thinkers. For example, the creativity of scientist, Katalin Karikó, led her to develop the technology to use mRNA technology to fight disease; today her creative thinking and persistence solved the global pandemic crisis (Garde, 2020). Her peers said it was impossible and a waste of resources, yet she alone had the creativity to innovate. Our next generation's innovators are today's children, and creativity is among the most important skills for children to develop (Fisher et al., 2011). Yet, despite this, creativity is not taught in schools or even encouraged, possibly because is not well operationalized in childhood. It is essential to understand the development of creativity in childhood because early experiences with creativity persist throughout the lifespan to set the stage for creativity in adulthood (Russ, 2014). Therefore, in understanding what contributes to the development of creativity, caregivers and teachers can help cultivate creativity for the advancement of our society.

Although the development of creativity is not well understood in childhood, creativity has been researched extensively in adulthood. Creativity is commonly defined in terms of processes and products (Kozbelt et al., 2010). There are two general processes that are theorized to be important for creative thought: a generative process and an evaluative process. The generative process includes forming multiple ideas, whereas the evaluative process is the editing process where one selects the highest-quality idea that was generated (Sowden et al., 2015). Pretend play also involves a generative process in which children demonstrate a remarkable ability to invent imaginary characters and scenarios (Mottweiler & Taylor, 2014). Children high in fantasy orientation have a preference for imaginative play (Pierucci et al., 2014), and this play-style may be more generative than other styles because of its freedom from realism. Due to this preference, children high in fantasy orientation may have more practice in the generative process which may generalize to creativity. However, in order to be creative, one must also effectively utilize the evaluative process. Self-regulation has been theorized in the adult literature to aid in the evaluative process. Control processes, involved in self-regulation, may assist in generating a more effective evaluative search process by inhibiting obvious and uncreative ideas and flexibly shifting one's attention to more creative ideas. It may be that children who have a preference for generative pretend play and those who are high in self-regulation produce the most creative ideas due to benefits in both the generative and evaluative processes. However, models of creativity in childhood have not yet investigated the interacting influence of both pretend play preferences and control processes. The first aim of this dissertation was to investigate how fantasy orientation, self-regulation and their interaction predict preschooler's creativity.

After an individual engages in the creative process, a product is generated. Products can cover a variety of domains, such as works of art, inventions, or games. In order for a product to

be considered creative, it must be: (1) unique, (2) high-quality, and (3) useful, according to a specific task or domain (Sternberg et al., 2002). Children are as capable as adults in producing creative products; however, children's creative products are interpreted with a developmental lens to consider what children can accomplish, such as teaching a dog a new trick or inventing a new game (Russ, 2010). For children, researchers posit that play can be considered a natural and developmentally-appropriate creative product (Fein, 1987; Russ & Wallace, 2017). Children demonstrate play behaviors and generate play themes that span the range of creativity. Because of this, play behaviors, like any creative product, can be rated similarly to conventional creativity tasks (Russ & Wallace, 2017). Notably, research has not yet assessed play behavior itself as a developmentally-appropriate creative product even though there is a dearth of developmentally-appropriate creativity measures for preschoolers and young elementary school children. This measurement dearth continues to shackle research in childhood creativity. To address this, the second aim of this dissertation is to explore creativity using two contextually distinct tasks: a previously established laboratory task and a new observational measure assessing children's natural play behaviors. Children may perform differently on lab tasks in comparison to naturalistic observations; therefore, using contextually distinct tasks may provide a new understanding of creativity in this age group. Tasks that are completed within a laboratory setting are artificial and may ask children to perform unfamiliar tasks; however, these tasks may represent a child's capacity for creativity. By contrast, play observations are naturalistic and may reflect what children do in daily life, however, these tasks represent a child's performance for creativity. Therefore, by using two contextually distinct tasks, we may learn more about creativity in early childhood.

Creativity and Pretend Play. Pretend play, much like creativity, involves a generative process of coming up with ideas for play, creating new characters, and story-lines. It may be that engaging in pretend play can provide children practice in generating ideas, and this may translate to the creative process. Indeed, evidence suggests that pretend play processes are positively related to creativity in preschoolers (Fehr & Russ, 2016) and pretend play interventions have benefitted creativity in children compared to control groups (Hoffman & Russ, 2016). Some children show a distinct preference for imaginative play compared to other forms of play. Children high in fantasy orientation (FO) have a proclivity for fantastical play, toys, and games, often have imaginary friends, impersonate imaginary characters, and believe in fantastical entities (Pierucci, et al., 2014). Because of this preference, children high in FO may spend more time engaging in a generative process and this may translate outside the play realm and into the generative process in creativity.

Research supports the link between fantasy orientation and creativity. Mottweiler and Taylor (2014) investigated the link between role play activities involving imaginary friends, impersonation, and personified objects with narrative creativity evaluated through story-completion tasks in preschoolers. Collapsed across all forms of role playing, children who engaged in role play had higher narrative creativity in comparison to children who did not engage in role play. Specifically, children who personified characters and had imaginary friends had higher narrative creativity. Additionally, more creative descriptions of these role play characters was also related to narrative creativity. Bunce and Woolley (2021) found similar results in that children with higher FO scored higher on verbal and physical creativity measures. This effect was also observed in middle childhood (8-12); specifically, children with imaginary friends scored higher on a creativity task and reported engaging in more creative activities (Hoff,

2005). Further, children in middle childhood who reported having imaginary worlds (i.e., paracosms) exhibited higher creativity on story-completion tasks (Taylor, et al. 2018). Overall, these studies indicate that FO may predict creativity in children.

Self-Regulation and Creativity. There are numerous studies linking FO to benefits in self-regulation in early childhood (Bauer, et al., 2021; Bauer & Gilpin, 2022; Gilpin et al., 2015; Pierucci, et al., 2014; Thibodeau, et al., 2016; Thibodeau-Nielsen et al., 2020). Given the aforementioned relation between FO and creativity (Mottweiler & Taylor, 2014; Woolley & Bunce, 2021), it is plausible that there may also be a link between self-regulation and creativity in children. For children, self-regulation is conceptualized as an integrated regulatory system that involves cognitive control (e.g., executive functioning) and emotion control (e.g., emotion regulation; Calkins, & Marcovitch, 2010). For the purposes of this study, emotion regulation and executive functions will be defined under the broad umbrella term of self-regulation. Although highly researched in the adult literature, less is known about the role of self-regulation in child creativity, especially in early childhood when executive processes are developing rapidly and are the most malleable (Carlson et al., 2013). In the adult literature, two competing theories make opposing predictions on how self-regulation impacts creativity. The associative theory of creativity stresses the importance of low executive control, emphasizing that unconscious and automatic processes are important for creative ideas (Mendick, 1962). This theory suggests that children with lower self-regulation may inhibit fewer ideas, and this may allow more remote ideas to bypass the evaluative process, leading to greater creativity. By contrast, the controlled-attention theory of creativity states that high executive control can benefit creative thought in the evaluative process by inhibiting uncreative ideas and helping to shift attention to higher quality ideas (Beaty et al., 2014). According to the controlled-attention theory, preschool children with

high self-regulation may have a more successful search process in the evaluative stage of creativity. Studies on self-regulation and creativity in children have found mixed results across various age-groups and measures (see Table 1) and only one known study investigated this relationship in preschoolers. Yeh and Li (2008) found that preschoolers who scored higher on measures of creative problem-solving involving numbers and situations had higher observed emotion regulation. A similar trend was observed in middle childhood; emotion regulation was positively related to creativity across two studies (Butcher & Niec, 2005; Hoffman & Russ, 2012). However, in measures of executive functioning, the relationship is less clear. In middle childhood, some studies report a positive relationship between creativity and executive functioning (Krumm, 2018; Scibinetti et al., 2011), whereas others find an inverse relationship (Scibinetti et al., 2011), or no relationship at all (Hoffman & Russ, 2012). Given these mixed findings, more research needs to be conducted in order to understand the relationship between creativity and self-regulation in preschool populations, with particular emphasis on matching specific operational definitions with valid measures of each construct.

Table 1.

Creativity & Self-Regulation Across Studies and Ages

Study	Age-group	Creativity measure(s)	Self-regulation measure(s)	Results
Yeh and Li (2008)	4-6 years	Creative problem solving (number & situation-based)	Emotion regulation	Creative problem solving & ER - Positive relationship
Hoffman & Russ, 2012	5-10 years	Divergent thinking (DT, verbal)	Emotion regulation	DT & ER – positive relationship
		Story-stem creativity	Attention shift (EF)	DT & EF – no relationship Story creativity & ER – no relationship
				Story creativity & ER – no relationship
Butcher & Niec, 2005	6-10 years	Divergent thinking (DT, figural & verbal)	Emotion regulation	DT & ER – positive relationship
Scibinetti, Tocci, & Pesce, 2011	7-8 years	Motor creativity	Inhibition (EF)	Motor creativity & EF – positive relationship
		Divergent thinking (DT, figural)		DT & EF – negative relationship
Krumm, 2018	8-13 years	Divergent thinking (DT, figural)	EF (working memory, inhibition, & attention shift)	DT & All EF measures – positive relationship
		Creative intelligence		Creative intelligence & All EF measures – positive relationship

Note. EF = Executive Functioning, ER = Emotion Regulation, DT = Divergent thinking

One possible reason for discrepancies across studies could be the type of creativity task or creativity coding. Hoffman and Russ (2012) did not find a relationship between both emotion regulation and executive functioning and creativity assessed on a story-generation task, similar to what Study 1 one of this dissertation used. This may be because of the type of story prompt used and creativity coding scheme. Hoffman and Russ (2012) used a single realistic story prompt from a well-known Mercer Mayer book, *A Boy, A Dog and a Frog* (1967). It could be that this

story prompt did not encourage children to respond creatively and therefore was not representative of a child's creative potential, thus masking the self-regulation-creativity link. Participants may respond differently on creativity tasks based on prompts or the instructions provided. Indeed, when telling adult participants to "be creative" during a divergent thinking task, Nusbaum and colleagues (2014) found that the quality of creativity scores increased substantially in comparison to when those directions were absent. Mottweiler and Taylor (2014) used a fantastical story prompt to evaluate creativity, and it could be that a fantastical story prompt for children is comparable to telling adults to generate creative responses. A fantastical story already has an imaginative element to it; therefore, it may prime children to engage their imaginations and respond differently than a realistic prompt, resulting in more creative stories. This may in turn give a better indication of their creative potential. Hoffman and Russ (2012) may have unintentionally stunted a child's creative potential on this task by using a realistic story prompt from a well-known children's story. Therefore, in Study 1, several fantastical story prompts were used to evaluate creativity to further elucidate the creativity-self-regulation link. Further, Hoffman & Russ (2012) coded stories based on four criteria: creativity, imagination, novelty, and likeability, dimensions that may have considerable overlap (e.g., how is creativity different than novelty?). In Study 1, the coding scheme was modeled off of Mottweiler and Taylor's (2014) study by using a subjective rating of creativity, however, it was altered by incorporating the complete three-part definition of creativity, rating products for uniqueness, quality and usefulness.

Several of the studies that failed to find a link between creativity and self-regulation may have had limitations based on the type of creativity task used. The studies that used creativity tasks that covered more than one domain (e.g., verbal and pictorial) found links between

creativity and self-regulation (Butcher & Niec, 2005; Krumm, 2018; Ye & Li, 2008). In Study 2, creativity was evaluated using play observations that were on average 45 minutes long. This extended time may give children an opportunity to display a wide variety of behaviors, providing many opportunities to demonstrate their natural, creative potential. Moreover, play behaviors were coded on several dimensions of creativity, which may elucidate the creativity and self-regulation link. Finally, another possible reason for the mixed findings between creativity and executive functioning could be that some studies used a single measure of executive functioning (Hoffman & Russ, 2012; Scibinetti et al., 2011). Several studies examining child imagination and executive functioning have found that specific aspects of imagination relate to specific aspects of executive functioning (Pierucci et al, 2014; Gilpin et al., 2017; Thibodeau et al., 2016; Thibodeau-Nielsen et al., 2020). Indeed, Krumm (2018) used several measures of executive function and subsequently found a link between creativity and executive functioning. Therefore, in Study 2 several measures of self-regulation were used from multiple informants in order to fully capture a child's self-regulation.

In summary, theory and literature support that fantasy orientation and self-regulation may be important skills for creative processes. Models of creativity in children have placed emphasis on the role of affective fantasy themes in the creative process (Russ & Fiorelli, 2010), however, do not integrate the role of control processes in the evaluative stage of creativity. It may be that children need both high FO and high self-regulation to generate and evaluate creative ideas. No known study has investigated the interactive role of fantasy orientation and self-regulation on creativity in preschoolers. Therefore, this dissertation aimed to examine how fantasy orientation and self-regulation predicted preschooler's creativity with the hypothesis that these two constructs will interact to benefit creative thinking. In support of theories of creativity, it may be

that fantasy orientation and self-regulation are related to the generative and evaluative processes and these joint processes aid children in generating the most creative ideas.

Preschool Creativity Measurement. In addition to understanding what may impact the creative process in young children, it is also necessary to understand creative products in this age-group and to address whether measures are effective for preschoolers. In the literature, the most common way to evaluate creativity in both children and adults is through divergent thinking tasks. These tasks typically have participants generate multiple ideas on how to use common household objects, such as a brick or a paper clip, and are scored on dimensions such as fluency (i.e. the number of ideas generated), elaboration (i.e. how complex the idea is), flexibility (i.e. the number of categories used), and uniqueness (i.e. how rare the idea is within the given sample; Guilford, 1950; Wallach & Kogan, 1965). These tasks have recently been criticized by researchers for validity issues where uniqueness scores are inflated for bizarre answers that are inappropriate to the task (Silvia et al., 2008). Additionally, when using these tasks to assess young children, these tasks may be overly abstract, rely on world knowledge not yet obtained, and may be cognitively taxing. For example, preschool children are inexperienced in generating multiple solutions to a problem and have limitations in cognitive flexibility, often making perseveration errors (Beck et al., 2006; Chevalier & Blay, 2008; Guajardo & Turley-Ames, 2004; Mottweiler & Taylor, 2014). For these reasons, many divergent thinking tasks, such as the Torrance Tests of Creative Thinking verbal and figural tests, are generally not recommended until age 5 or 6 (Scholastic Testing Services Inc., 2018). Alternatively, another common creativity measure for young children is the story-completion task in which children are provided a story stem and are asked to complete the story by narrating their thoughts. These tasks are typically scored through Amabile's (1982) consensual assessment technique based on the

assessor's subjective definition of creativity. While these tasks are more developmentally appropriate, they rely heavily on verbal ability which disadvantages young and shy children. Further, fluent narration begins developing in the preschool years, but stories are typically disjointed until the ages of 5 or 6 (Peterson & McCabe, 1983) which may impact a child's performance on these types of creativity tasks.

As a result, researchers have recently criticized traditional creativity methodologies, calling for developmentally-appropriate measures (Lillard et al., 2013). As aforementioned, creative products for children are interpreted with a developmental lens. Creativity should be evaluated in such a way that young children have the *capacity* to accomplish it. That is, a creativity task should involve behavior that the majority of children have mastered in a specific developmental stage, so that any child in this developmental stage can generate a product. Generating multiple solutions to problems and narrating stories are examples of skills that are beyond the majority of preschool aged children's developmental abilities. Thus, instead of using conventional measures of creativity that rely on these advanced skills, researchers need to develop tasks that are based on skills or behaviors children have mastered. Play behaviors may be an ideal creative product for young children because play is a natural activity that is ubiquitous in childhood (Russ & Wallace, 2017). Indeed, Vygotsky's (1930/1967) theory of creativity states that creativity in young children is evident in the activities that children engage in during play (Smolucha, 1992). Despite the emphasis that researchers have placed on play in relation to creativity for almost a century, creativity is not yet measured through play behaviors in the literature.

Instead, creative products are thought of in terms of prolific achievement and genius, otherwise known as Big-C creativity. Everyday creativity, or little-c creativity results in small-

scale products and may not be considerably groundbreaking, desirable, or valuable (Silvia et al., 2014; Richards, 1999; Russ & Fiorelli, 2010), but they may better represent a child's natural and everyday creative potential. To understand everyday creativity, it is important to observe it in natural, everyday environments based on the volition of the individual (Silvia, et al., 2014). Everyday creativity for children may be apparent in their free-play, where children can choose any activity for personal enjoyment. Further, play is an open-ended activity, and therefore there are many possibilities and directions a child can take play based on talents and interests (Russ & Wallace, 2017). By studying everyday creativity through children's self-selected play activities, we can gauge creativity based on any activity in which a child is engaged. In other words, play is a behavior in which any child can engage in, however, not every play behavior is creative.

Play behaviors across various activities can be an everyday creative product and a way to measure creative potential. Pretend play may be a context for the generative process of creativity, and researchers have speculated that pretense naturally involves creative processes in children (Russ & Fiorelli, 2010). However, children do not necessarily have to engage in pretense to demonstrate their creativity. There are several activities within the play context that can span the range of creativity and therefore researchers can rate the creativity using the three-part aforementioned definition of uniqueness, quality, and usefulness based on the play activity the child chooses to engage in during free-play. For example, play behaviors can be unique in several ways across different activities, such as building a unique block tower or playing a novel game with friends. Additionally, play in this context can be high-quality when children generate complexity and multiple ideas in their play, such as incorporating several artistic elements into a painting, or playing with manipulatives in multiple or various ways. Finally, the one utility for play is to engage the child, which can represent the usefulness part of the creativity definition for

this product. Indeed, play interventions such as Stay Play Talk used with children with ASD have the ultimate goal of keeping children engaged in the play with their peers (Barber, et al., 2016), therefore play across various activities can be useful when the play is engaging to the child. The most creative play within a free-play context would incorporate all three aspects of creativity, such as having a unique theme, incorporating several ideas and elements, while engaging the child.

In sum, because children demonstrate a range of creativity in their play behaviors, these behaviors can be rated on similar terms as conventional creativity tasks in terms of uniqueness, quality, and usefulness (Russ & Wallace, 2017). Additionally, Russ and Wallace (2017) discuss the need for observational measures that can evaluate creativity through play in natural settings. Using play behaviors as creative products may be a more valid and developmentally sensitive assessment for early childhood because, unlike previous measures, play is a behavior that any child has the capacity to engage in, and therefore any child has the capacity to generate a product. Therefore, in Study 2, a new naturalistic observational measure of creativity was created, evaluating children's everyday creativity within a free-play context.

Purpose of the Studies

The present study had two aims that were tested across two studies. The goal of Aim 1 was to investigate how fantasy orientation, self-regulation, and their interaction predicted preschooler's creativity across Study 1 and Study 2. Because creativity involves both generative and evaluative processes, it was predicted that children who engage in behaviors that naturally involve both the generative (related to fantasy orientation) and evaluative (related to self-regulation) processes would be the most creative. Thus, it was hypothesized that self-regulation

would moderate the effect of fantasy orientation on creativity scores. The goal of Aim 2 was to create a new naturalistic observational measure based on play behaviors in Study 2.

Hypotheses include:

- Hypothesis 1: It was hypothesized that fantasy orientation would predict creativity across measures.
- Hypothesis 2: It was hypothesized that self-regulation would predict creativity across measures.
- Hypothesis 3: It was hypothesized that the interaction between FO and self-regulation would predict creativity scores, in that children who have both high FO and self-regulation would have high creativity scores.
- Exploratory Hypotheses: (1) Different subscales of fantasy orientation may be more predictive of creativity than others (e.g., having an imaginary friend vs. pretense). (2) Different subscales of self-regulation may be more predictive of creativity than others (e.g., working memory vs. emotion regulation).

CHAPTER 2.

STUDY 1 METHODOLOGY

Creativity was first examined using a lab-based story-stem creativity task. It was predicted that fantasy orientation, self-regulation and their interaction were related to creativity utilizing this method.

The preregistration for this study is available here (<https://aspredicted.org/qp4kv.pdf>). This Open Science Framework page has links to the original preregistration listing the a priori hypotheses and methodology.

Participants

This study was conducted using secondary analysis on 66 preschoolers, ranging between 35 months and 68 months ($M = 53.03$ months, $SD = 9.72$) from 2 large grant-funded studies, with approximate equal numbers of boys and girls (42.6% female). Seventeen participants were recruited from one preschool in the Tuscaloosa, AL in Fall 2016 and 41 participants were recruited from two preschools in the Columbia, MO in Fall 2018. Children's race and ethnicity were 80% White, 4.9% Black, 8.2% Asian, and 6.5% other or more than one race.

Procedure

Children were interviewed by research assistants individually on measures described below in a quiet room in their preschool after teacher, parent, and child consent/assent were collected. Tasks were delivered in a fixed order to minimize task interference and maximize

engagement. Afterwards, children received a small gift (e.g., sticker) for participating. Teachers answered all surveys in a paper/pencil format and received \$10 for each completed survey.

Child Assessment Measures – Creativity To evaluate laboratory-based creativity, previously recorded video data was used and transcriptions were created from children's responses. Children were first given a warm-up task where they were asked to name items in a picture. Afterwards, children participated in the Imagination Interview, a 2-minute Story-Stem Task. In this task children were provided with up to three fantastical story prompts with accompanying pictures (e.g., a superhero in a magical castle) and children were asked to verbally finish the story. Creativity coding was modeled off of Mottweiler and Taylor's (2014) study by using a subjective rating of creativity. Coding was altered by incorporating the full three-part definition of creativity, uniqueness, quality, and usefulness, to ensure coders were taking into account the three features.

For the purposes of this study, three trained coders, unaware of the study's hypotheses rated children's stories on the three components of creativity: uniqueness, quality, and usefulness (see Appendix A; Cronbach $\alpha = 0.957$). First coders were instructed to read through all stories to in order to gauge the range of creativity within the sample and task. Then coders were instructed to read the stories a second time and rate stories for creativity, which is a common procedure in creativity coding (Mottweiler & Taylor, 2014; Silvia et al., 2008). Coders were instructed to use the full range of the scales and to refrain from using a child's language abilities as a criterion for creativity as with previous child creativity literature (Mottweiler & Taylor, 2014). Coders were required to obtain fidelity (over 80%) with the primary researcher on the study on two stories before they were able to code for data purposes.

Uniqueness ratings, based on previous creativity scoring for story-generation tasks (Hennessey & Amabile, 1988; Mottweiler & Taylor, 2014), indicated how unusual, unique, and original the story was in comparison to other stories in the sample, on a 1 (*not creative at all*) to 5 (*very creative*) scale. Quality ratings, based on previous creativity and laboratory pretend play tasks (Russ, 1999; Torrance, 1966) indicated how elaborate (e.g., extending beyond the story's prompt), and complex the child's story was in comparison to other stories within the sample, on a 1 (*not complex at all*) to 5 (*very complex*) point scale. Usefulness ratings were based on how engaging the and entertaining the story was in comparison to other stories in the sample on a 1 (*not engaging*) to 5 (*very engaging*) point scale. Scores were averaged across coders and subscales were averaged together for a final creativity score ranging between 1 and 5. For exploratory purposes, coders also indicated how fantastical the story the was on a 1 (*not imaginative at all*) to 5 (*highly fantastical*) scale.

To maximize the internal validity of this study, children were given the same conditions to demonstrate their creativity; every child was provided the same prompts under a 2-minute time limit. Time-limits were not imposed on previous story-stem tasks, so this limit may represent a child's creative capacity rather than their production, as is typical in laboratory tasks. Mottweiler and Taylor (2014) used raters who were authors to the study and therefore had knowledge of hypotheses, while Hoffman and Russ (2012) provided no training to raters beyond rating the stories relative to each other. This study aimed to address these inconsistencies by using three raters unaware of the hypotheses of the study, trained to code with a minimum of 80% fidelity. Raters read through all of the stories first before beginning to code so that they were aware of the full range. Further, multiple fantastical story prompts were used, which gave children several story-stems to choose from and may have primed children to respond creatively.

Finally, the coding scheme incorporated indicators of the three-part definition of creativity to ensure coders were noting the separate elements.

All subsequent measures were administered to child participants at initial date of data collection (beginning Fall 2016 & Fall 2018).

Child Assessment Measures – Fantasy Orientation. The Pretend Actions Task (Carlson et al., 2014; Overton & Jackson, 1973) measured pretense quality and in prior work has shown acceptable reliability $\alpha = 0.65-0.7$. In this task children are asked to physically demonstrate four pretend behaviors (e.g., brushing teeth). Experimenters coded children's responses either at a lower level of pretense, involving a body part (e.g., using a finger as a pretend toothbrush), or at a higher level of pretense, using an imaginary object (e.g., using a closed fist to hold an imaginary toothbrush). Scores ranged between 0 and 4 with higher scores indicating a higher level of pretense quality.

Child Assessment Measures – Vocabulary (control) Receptive vocabulary was assessed with the NIH toolbox's Picture Vocabulary Test (Gershon et al., 2013) taken on an iPad tablet. In prior work, this measure has shown excellent reliability $\alpha = 0.9$. In this task children heard a spoken word (e.g., "island"), then selected the correct picture out a choice of four pictures that corresponded with the spoken word. Trials were untimed and children could hear the word as many times as needed in order to make their selection. There are 25 computer adaptive trials that increased in difficulty as the participant provided correct answers. For the purposes of this study, the age-corrected score was used as a control variable.

Teacher Measure – Self-Regulation Teachers rated a child's self-regulation with the Emotion Regulation Checklist (Shields & Cicchetti, 1997) and prior work has shown excellent reliability, $\alpha = 0.83-0.98$. This 24-item measure has two subscales: emotion regulation

and negative lability. For the purposes of this study, only items from the emotion regulation subscale were used. This subscale indicates how often a child displays appropriate emotions in various situations with higher scores indicating higher emotion regulation (e.g., “*Can say when s/he is feeling sad, angry, or mad*”). Scores were averaged across this subscale on a 1 (*never*) to 4 (*almost always*) scale.

Teacher Measure – Fantasy Orientation To assess a child’s fantasy orientation, teachers completed the Childhood Imagination Questionnaire (Gilpin, et al. 2017) and prior work has shown good reliability, $\alpha = 0.84$. This 14-item measure has a teacher rate a child’s proclivity for fantastical play, whether a child believes in fantastical entities, impersonates characters, and whether a child has an imaginary friend (e.g., *How often does this child engage in pretend play during free-play time*) on a 1 (*never*) to 5 (*almost every day*) scale. This measure has three subscales: sociodramatic play, fantasy play, and imaginary companions/impersonation. For the main analyses, scores were averaged across questions with a total score ranging from 1 to 5. For exploratory analyses, subscale total scores were used.

CHAPTER 3.

STUDY 1 RESULTS

Preliminary Analyses

Descriptive statistics and correlations for all variables and composites are in Table 2. Interrater reliability for creativity scoring was evaluated using intraclass correlation (ICC) across each subscale (uniqueness, high-quality, and usefulness), with estimates ranging between 0.916-0.946. Because ICC estimates were excellent (< 0.90 ; Koo & Li, 2016), scores were averaged across the three raters for an average rating for each subscale. The internal reliability of the three creativity subscales were very good (Cronbach $\alpha = 0.957$) and therefore scores were averaged across subscales for a total creativity score that ranged between 1 and 5 ($M = 2.41$, $SD = 1.11$). The fantasy rating of the story-task also had good interrater reliability ($ICC = 0.825$) and therefore ratings were averaged across raters and used in exploratory analyses.

An FO composite variable was created by grouping variables based on the magnitude of relationships among variables (Song et al., 2013). Small correlations among FO variables were observed, which is common in the literature (e.g., Bauer & Gilpin, 2022). Scores on the Pretend Actions task and the Childhood Imagination Questionnaire were standardized (z-scores) and averaged to create the “FO composite.” Self-regulation scores were also standardized.

Primary Analyses

Prior to conducting a hierarchical multiple regression, the relevant assumptions of this statistical analysis were tested. First, a sample size of 66 was deemed adequate given 3

independent variables to be included in the analysis using a post-hoc power analysis with G*Power (Faul et al., 2007). With a medium effect size (0.15) and 3 predictors, power was at an acceptable level of .73. Residual and scatter plots indicated the assumptions of normality, linearity, and homoscedasticity were satisfied.

Table 2.

Study 1: Descriptive Statistics and Correlations

	1	2	3	4	5	6	7	8	9	10
1. Age in months	1									
2. Vocabulary	.16	1								
3. Average Uniqueness	.35**	.22	1							
4. Average Quality	.34**	.22	.94**	1						
5. Average Usefulness	.33**	.21	.85**	.85**	1					
6. Creativity	.36**	.23	.97**	.97*	.94**	1				
7. Pretend Actions	.34**	.17	.18	.24	.31*	.25	1			
8. CIQ	.34**	.06	.29*	.26*	.22	.27*	.12	1		
9. FO composite	.41**	.05	.31*	.30*	.34**	.33**	.62**	.69**	1	
10. ERC	-.02	.16	.21	.28*	.21	.25	.25	.13	.20	1
Mean	53.03	102.6	2.32	2.19	2.72	2.41	1.62	3.02	0.00	3.40
SD	9.72	14.47	1.71	1.19	1.12	1.11	1.37	0.82	0.66	0.40

Note. * $p < .05$, ** $p < .001$, CIQ = Childhood Imagination Questionnaire; FO = Fantasy Orientation; ERC = Emotion Regulation Checklist

To assess the primary hypothesis, that fantasy orientation, self-regulation, and their interaction predicted creativity scores, a hierarchical linear regression analysis was conducted with age-corrected receptive vocabulary scores and age in months entered on Step 1 as covariates, the FO composite and self-regulation entered on Step 2, and the interaction between

fantasy orientation and self-regulation entered on Step 3. Table 3 presents the standardized coefficients for each step of the model.

Table 3.

Study 1: Summary of Hierarchical Regression Analysis for Variables predicting Creativity

	Step 1	Step 2	Step 3
Model information	R^2 adjusted = 0.11 $\Delta R^2 = 0.11, p = 0.16$	R^2 adjusted = 0.19 $\Delta R^2 = 0.10, p = 0.041$	R^2 adjusted = 0.24 $\Delta R^2 = 0.06, p = 0.041$
Predictor	Beta	Beta	Beta
Age	0.30*	0.25 (NS)	0.25 (NS)
Vocabulary	0.20 (NS)	0.15 (NS)	0.13 (NS)
Fantasy Orientation		0.12 (NS)	0.17 (NS)
Self-regulation		0.28*	0.30*
FO x Self-regulation			0.26*

Note. * $p < 0.05$, ** $p < 0.01$, FO (Fantasy Orientation)

This analysis indicated that Step 1 explained 11.2% of the variance in creativity scores ($R^2 = 0.112$) and the overall model was significant, $F(2, 53) = 4.45, p = .016$. Adding fantasy orientation and self-regulation on Step 2 explained an additional 10.4% of the variance in creativity scores ($\Delta R^2 = 0.104$), and this increment model was significant $\Delta F(2, 51) = 3.41, p = 0.041$. Finally, the interaction between self-regulation and fantasy orientation was added to the model at Step 3, which explained an additional 6.1% of the variance in creativity scores ($\Delta R^2 = 0.061$), and this model was significant $\Delta F(1, 50) = 4.42, p = 0.041$. As hypothesized, there was a significant interaction between fantasy orientation and self-regulation ($b = .35, p = .041$). In other words, creativity was highest among children who were both high in fantasy orientation and high in self-regulation (see Figure 1). Moreover, simple slope analyses revealed that fantasy orientation significantly predicted creativity at high levels of self-regulation ($b = .60, p = .039$),

but not at average ($b = .24, p = .22$) or low levels of self-regulation ($b = -.108, p = .658$).

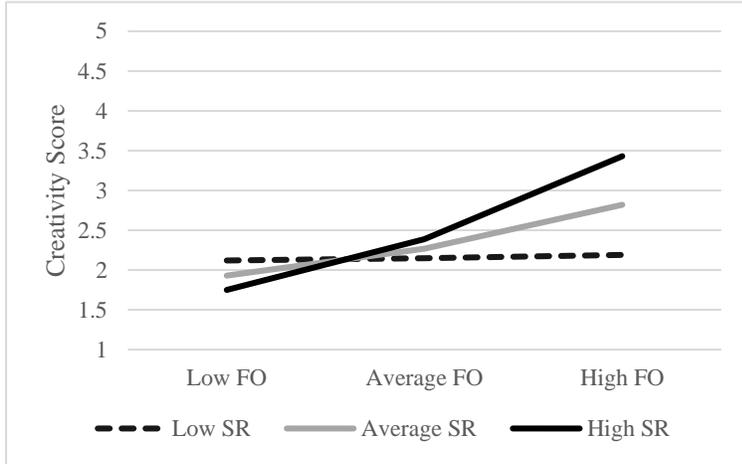


Figure 1. Fantasy orientation (FO) and self-regulation (SR) significantly interact to predict creativity while controlling for age in months and vocabulary. Children with high FO and high SR had the highest creativity scores.

Exploratory Analyses

For exploratory analyses, the different subscales of fantasy orientation (e.g., having an imaginary friend vs. pretense) were examined in relation to creativity. Specifically, correlations were conducted on the different subscales of the CIQ (sociodramatic play, fantasy play, and imaginary companions/impersonation), the Pretend Actions Task, and the fantasy ratings of the Story Stem Task to explore whether these constructs were associated with overall creativity scores and subscale creativity scores. The imaginary companions and impersonation subscale of the CIQ was significantly correlated with overall creativity scores ($r = .38, p = .002$) and all three subscales: uniqueness ($r = .38, p = .002$), quality ($r = .38, p = .002$), and usefulness ($r = .33, p = .008$). The fantasy play subscale of the CIQ was significantly correlated with the uniqueness subscale ($r = .27, p = .036$). The Pretend Actions Task was significantly correlated with the usefulness subscale ($r = .31, p = .017$). The fantasy rating of Story Stem Task was correlated with overall creativity scores ($r = .83, p < .001$) and all three subscales: uniqueness (r

= .84, $p < .001$), quality ($r = .81, p < .001$), and usefulness ($r = .75, p < .001$). All other relationships were non-significant.

CHAPTER 4.

STUDY 1 DISCUSSION

Results of Study 1 indicated that the interaction between self-regulation and fantasy orientation predicted preschool children's creativity. Specifically, children with high levels FO and high levels of self-regulation produced the most creative stories. These findings suggest that creativity in childhood may be enhanced by the development of self-regulation and children's fantasy orientation. This may be due to the theorized relations between the generative and evaluative processes that are necessary to produce creative thought. Models of creativity in childhood have emphasized the importance of imaginative play as a context for expressing emotions, suggesting that imaginative play provides children with advantages in the creative process (Fein, 1987; Russ & Fiorelli, 2010). However, research has not yet considered the joint role of self-regulation and fantasy orientation as important skills for creativity in preschoolers. Results from Study 1 suggest that self-regulation moderates the relationship between fantasy orientation and creativity. Further, research has not yet considered that these skills may be linked to the generative and evaluative creative processes in a preschool population. Theories of creativity in adulthood have emphasized the importance of these processes, however, research has not yet considered these processes in a developing population. Our results suggest that skills that naturally involve the generative and evaluative processes may be beneficial for creativity in early childhood, providing children with skills that may scaffold their creativity.

One limitation of this study is that its methodology affords developmentally advanced children an advantage in generating creative products over their peers. Specifically, the Story Stem Task may be outside some children's capacity for generating products, not due to differences in children's creativity, but instead due to differences in developmental skills. Because development occurs so rapidly during the preschool years, young children's cognitive skills vary widely (Diamond, 2013). Tasks that are heavily reliant on cognition, such as self-regulation and verbal skills, may not be appropriate for all children in this age group. Indeed, in this study, the Story Stem creativity task was correlated with age, receptive vocabulary, and self-regulation, supporting the conclusion that this task may rely on cognitive skills to demonstrate creativity. Because of this, it is important to explore creativity using alternative measures that allow all children to demonstrate their creativity. In short, the field lacks a task that assesses creativity in early childhood that does not tax developing cognitive skills.

CHAPTER 5.

STUDY 2 METHODOLOGY

To that end, in Study 2 creativity was assessed in a new way using naturalistic play observations. Developmental scientists posit that play behaviors can be considered a developmentally appropriate creative product that may represent a child's everyday creative potential (Fein, 1987; Russ & Wallace, 2017). Certainly, children demonstrate play behaviors and generate play themes that span the range of creativity (Russ & Wallace, 2017). For example, common play themes may include playing house or building a train track, while more creative play themes may include building a boat for a voyage to China or inventing a novel game. Because of this, these behaviors can be rated on similar terms as conventional creativity tasks, such as the Story Stem Task, in terms of uniqueness, quality, and usefulness (Russ & Wallace, 2017). Notably, research has not yet assessed play behavior itself as a developmentally appropriate creative product. Therefore, Study 2 aimed to evaluate preschool creativity using natural play behaviors, considering both the limitations of traditional creativity methods (e.g., validity issues with uniqueness scores on divergent thinking tasks; Silvia et al., 2008) and children's developmental range (e.g., limitations in cognitive flexibility and fluent narration). Further, in Study 2, play was evaluated using several indicators of everyday creativity based on the activity the child was engaged in, such as how rare the play script was within the sample, whether the child generated multiple or organized ideas, and how engaged the child was in the

play. By creating a new developmentally appropriate measure of creativity, we may increase our understanding of some of the skills that predict creativity in this age group.

The preregistration for this study is available here (<https://aspredicted.org/qp4kv.pdf>).

This Open Science Framework page has links to the original preregistration listing the a priori hypotheses and methodology.

Participants

Participants included 90 preschoolers (35 to 61 months, $M = 48.89$, $SD = 7.04$) and their preschool teachers from a large grant-funded study, with approximate equal numbers of boys and girls (55% female). Data was collected beginning Fall 2019 from 4 preschools in the Columbia, MO area. Children were distributed across 7 classrooms with a mean of 12.6 children per classroom, with a range of 6-17 children per classroom. The schools used a variety of curricula: Perry High Scope (Schweinhart, 1993), Creative Curricula (Teaching Strategies, 2010), and Emerging Language and Literacy Curricula (Dynamic Resources, 2021). Children's race and ethnicity were 53.7% Caucasian, 24.4% Asian, 6.1% African American, 6.1% Hispanic and 8.5% other or more than one race. The median for family's reported income was \$50,000-\$60,000 and the median for parents' highest level of education was college graduate.

Procedure

Children were interviewed by research assistants individually on measures described below in a quiet room in their preschool after teacher, parent, and child consent/assent were collected. Tasks were delivered in a fixed order and children received a small gift (e.g., sticker) for participating. Teachers answered all surveys in a paper/pencil format and received \$10 for each completed survey.

Children were video- and audio-recorded in seven preschool classrooms using a new audiovisual approach (Thibodeau-Nielsen, et al., 2021). This approach uses five video cameras, one 360-degree camera was placed in the center of the classroom, two cameras were placed in the dramatic play center at different angles, and two cameras were placed in the block center at different angles. Additionally, children wore a Language ENvironment Analysis (LENA) digital voice recorder, which is a small audio recording device. Video files from the 360-degree camera were edited to adjust the camera angle to follow the target child throughout the classroom and the audio recordings were overlaid to the video recording. Each observation occurred during free-play, so that children could choose to play in any center or area of the classroom. Recordings ranged in length depending on the classroom schedule (12 to 69 minutes), with an average of 45 minutes per observation.

Creativity in Play Scale Two trained coders, unaware of the hypotheses of the study rated videos using the Creativity in Play Scale (Cronbach $\alpha = 0.957$), a new creativity coding scheme based on naturalistic play behaviors (see Appendix B). To aid in coding, coders used Datavyu (Datavyu Team, 2014), an open-source coding software. This program allows coders to make time-stamped codes and transcribe notes while viewing all five classroom videos simultaneously. Viewing all 5 videos simultaneously is ideal so that coders were able to follow the target child and find the best camera angle. Coders underwent a comprehensive training (approximately 12 hours). This training focused on the coding scheme, software, and recognizing creativity and behaviors within this context. Coders practiced on 10 videos that varied in creativity to ensure coders could adequately evaluate creativity in this age group and context. Once training was complete, coders were required to obtain fidelity (over 80%) with the primary researcher on the study on two observations before they were able to code videos for data

purposes. Additionally, fidelity checks occurred after every tenth video to ensure fidelity; coders who did not maintain at least 80% fidelity were retrained.

Coding took place in two steps, real-time coding and holistic coding. During real-time coding, while viewing the videos, coders provided codes for every 5-minute segment. A five-minute time segment was chosen because this time interval is used in laboratory play observation tasks that examine play, creativity processes, (Fehr & Russ, 2014; Stagnitti, 2007) and naturalistic free-play tasks (Fantuzza et al., 1995). During holistic coding, coders used real-time codes to make overall ratings for the entire observation. Only holistic codes were used for data purposes.

Creativity Scoring: Coders noted the play theme and activity the child was engaging in and then rated play behaviors on three components of creativity: uniqueness, quality, and usefulness. Previous adult research has provided global creativity scores (Silvia, et al., 2009) that incorporated the three aspects of this definition. For this new measure, coders separately coded the three aspects of creativity to ensure they noted all three aspects in their ratings. Coders were provided a definition of indicators of uniqueness, quality, and usefulness based on previous creativity literature, play observation measures, and preschool curriculum (Kaugars & Russ, 2009; Russ, 1999; Silvia et al., 2008; Slot, et al., 2017; Wallach & Kogan, 1965). Coders first completed real-time coding, where they made note of the play theme and activity, then rated the play based on the activity for (1) uniqueness, (2) quality, (3), and usefulness for each five-minute segment. After real-time coding, coders provided a single holistic rating based on the entire play observation. This coding method was based off of Snap-Shot Creativity coding, a method that provides a holistic creativity score for a list of answers and is used in adult creativity literature. When compared to individual scoring methods, this holistic scoring method produces similar

creativity ratings and is less time-intensive (Silvia, et al., 2009). Coders provided a holistic rating on a 1 to 5 scale for each subscale (unique, quality, and usefulness) and only holistic scores were used for data analysis. Coders were instructed to use the full range of the scale similar to child measures of creativity (Mottweiler & Taylor, 2014). If the two coders were very discrepant (e.g., more than 1 point different on the 1-5 scale), a third coder was involved to reconcile discrepancies. Scores were averaged across coders and subscales were averaged together for a final creativity score ranging between 1 and 5.

Play Context: Separate coders completed play context coding. These coders noted the degree of fantasy in the play (Thibodeau-Nielsen et al., 2020), the group dynamics (solitary vs. social, active vs. passive; Coplan & Rubin, 1998), whether the child was a play leader (leader, follower, collaborator, joint leader, idea generator), the degree of emotionality (Fabes et al., 1999), and the affect of the target child (positive, neutral, or negative) using real-time coding for every 5-minutes increment. After real-time coding, holistic scores were provided for the entire observation based on the aforementioned criteria and only these scores were used in analyses. Additionally, coders indicated holistically whether the child was involved in group play at all or if a dominant social group was overshadowing their play to establish whether group play is an issue in this type of creativity coding. Discrepancies were reconciled between two coders after coding was complete.

All subsequent measures were administered to child participants at the initial date of data collection (beginning Fall 2019).

Child Assessment Measure – Self-Regulation. Children completed four measures assessing self-regulation: working memory, inhibitory control (behavior and cognitive), and attention shift.

(1) The Early Years Toolbox “Not This” task (Howard & Melhuish, 2017) measured phonological working memory. This task asked children to follow auditory instructions that increased in complexity in each of the 8 levels. In each level, children are provided 5 trials where they were asked to find a stimulus that does not have a specific quality (e.g., *Find a shape that is not small, not blue, and not a circle*). Children only progressed to a more challenging level if they completed 3 of the 5 total trials correctly in a level. Children received one point for each level they complete with an additional 1/5 of a point for all correct trials, for a total score ranging from 0 to 16.

(2) The Early Years Toolbox “Go/No-Go” Task (Howard & Melhuish, 2017) measured behavioral inhibition control and prior work has shown excellent reliability, $\alpha = 0.84-0.95$. This task has a mixture of “go” trials (“*catch the fish*”) where participants tap the screen and “no-go” trials (“*avoid catching sharks*”) where participants inhibited touching the screen. There were 75 stimuli between three test blocks separated by a break and reminder of instructions. Blocks were removed in which the child was largely non-responsive (go accuracy was below 20% and no-go accuracy exceeded 80%) or indiscriminately responsive (go accuracy exceeded 80% and no-go accuracy was below 20%). Inhibition scores were the product of the proportion correct for both “go” and “no-go” trials for a total score ranging between 0 and 1.

(3) The Early Years Toolbox “Card Sorting” Task (Howard & Melhuish, 2017) measured attention shift. This task had children sort cards by changing sorting rules (i.e., color or shape). Children sorted by one dimension (pre-switch) for 6 trials and then at post-switch were asked to switch based on a new rule. If children correctly answered five of the six pre- and post-switch trials they proceeded to a border phase. In the border phase children were asked to sort by color if a card has a black border or sort by shape if the card did not have a black border. Scores

represented the total number of correct trials following the pre-switch trials for a total score ranging between 0 and 12.

(4) The NIH Toolbox's Flanker task (Gershon et al.; $\alpha = 0.9$ to 0.94 .) measured a child's cognitive inhibition. This task has three blocks: a practice block, a fish block, and an arrows block. Children were presented with a set of stimuli (fish or arrows) that were facing either right or left and were instructed to select the button that corresponded with the direction the middle fish or arrow was pointing, with a mixture of congruent and incongruent trials. To remind the child to focus on the middle stimulus, the word "middle" was auditorily presented before each trial. Children were given 4 practice trials, followed by 25 fish trials and 25 arrow trials. Children only advanced to the more difficult parts of the game (e.g., arrow trials) if they met the accuracy criterion (3 practice trials or 5 or more fish trials). A child's accuracy score was the total number of correct selections, ranging from 0 to 5 (0.125/trial).

Child Assessment Measure – Fantasy Orientation Children were given two child measures of fantasy orientation measuring pretense quality and propensity toward imagination.

(1) The Pretend Actions Task (Carlson et al., 2014; Overton & Jackson, 1973) measured pretense quality. Prior research has shown acceptable reliability, $\alpha = 0.65$ - 0.70 . In this task children are asked to physically demonstrate four pretend behaviors (e.g., brushing teeth). Experimenters coded children's responses either at a lower level of pretense, involving a body part (e.g., using a finger as a pretend toothbrush), or at a higher level of pretense, using a symbolic object (e.g., using a closed fist to hold an imaginary toothbrush). Scores ranged between 0 and 4 with higher scores indicating a higher level of pretense quality.

(3) The Child Imagination Scale (Thibodeau et al., 2019) is a direct assessment of a child's propensity toward fantasy. Prior work has shown this measure has good reliability $\alpha = .76-.83$. In this 24-item task, children choose between realistic, representational, and fantastical activities (e.g., *What would you rather do more? Play with a magical wand, swing on the playground or play with a toy car like a Barbie car or a tractor*). Children were given scores ranging between 0 and 4 across the three subscales: fantasy, representational, and realistic. Only items from the fantasy subscale were used for this study with higher scores indicating a higher fantasy orientation.

Child Assessment Measure – Vocabulary (Control) Receptive vocabulary was assessed with the NIH toolbox's Picture Vocabulary Test (Gershon et al., 2013). Prior work has shown excellent reliability $\alpha = 0.9$. In this task children heard a spoken word (e.g., "island"), then selected the correct picture out a choice of four pictures that corresponded with the spoken word. Trials were untimed and children could hear the word as many times as needed in order to make their selection. There were 25 adaptive trials that increased in difficulty as the participant provided correct answers. For the purposes of this study, the uncorrected standardized score was used which is based on the total correct number of words selected.

Teacher Assessment Measure – Self-Regulation Teachers rated children's self-regulation using the Child Self-Regulation and Behavior Questionnaire (Howard & Melhuish, 2017). Prior work has shown good reliability, $\alpha = 0.83-0.89$. Three subscales were used for the purposes of this study focusing on different aspects of self-regulation: behavioral (e.g., *not able to sit still when necessary*), cognitive (e.g., *regularly unable to sustain attention*), and emotional (e.g., *most days will lose temper*). Scores were averaged across subscales on a 1 (*not true*) to 5 (*certainly true*) scale with higher scores indicating higher self-regulation.

Teacher Assessment Measure - Fantasy orientation To assess a child's fantasy orientation, teachers completed the Childhood Imagination Questionnaire (CIQ; Gilpin et al., 2017). Prior work has shown good reliability, $\alpha = 0.84$. On this 14-item measure, teachers rate the degree to which a child engages in and prefers fantasy play, believes in fantastical entities, impersonates characters, and whether a child has an imaginary friend (e.g., *How often does this child engage in pretend play during free-play time*) on a 1 (*never*) to 5 (*almost every day*) scale. This gauged a child's propensity to engage in imagination. This measure has three subscales: sociodramatic play, fantasy play, and imaginary companions/impersonation. For the main analyses, scores were averaged across questions with a total score ranging from 1 to 5 with higher scores indicating a higher fantasy orientation. For exploratory analyses, subscale total scores were used.

Teacher Assessment Measure - Sociability (Control) Because free-play often occurs in a group environment, the creativity of inhibited children may be expressed differently than uninhibited children in this context. Therefore, this was controlled for in analyses using the sociability subscale of the Child Self-Regulation and Behavior Questionnaire (Howard & Melhuish, 2017). Prior work has shown acceptable reliability for this subscale, $\alpha = 0.74$. Teachers indicated how the child responds to social situations (e.g., *is shy meeting new people*). Scores were averaged across the subscale on a 1 (*not true*) to 5 (*certainly true*) scale, with higher scores indicating more sociability.

CHAPTER 6.

STUDY 2 RESULTS

Creativity in Play Scale Reliability and Scoring

To calculate creativity scores, first interrater reliability was examined using intraclass correlation (ICC) for each subscale (uniqueness, high-quality, and usefulness). Coders had good interrater reliability, ranging from ICC = 0.842 to 0.896. Scores were then averaged across the two raters for each subscale. Next, the internal reliability of the three creativity subscales was evaluated using Cronbach's alpha. The internal consistency of the three subscales was excellent (Cronbach α = 0.957). Subscale scores were averaged for a total creativity score. As a first step in the evaluation of the Creativity in Play Scale, the distribution of scores was examined to determine if this scale assessed creativity across the full scale. The total possible range is 1-5, and actual scores ranged between 1.17 and 4.83 ($M = 2.93$, $SD = 0.87$), suggesting that this measure has good variability.

For play context variables, interrater reliability was examined using either intraclass correlations (ICC) or Cohen's kappa, depending on if the item was measured on a scale (e.g., 1-5) or if the item was a categorical variable. Coders had excellent reliability for the degree of fantasy in play (ICC = 0.908), emotion level (ICC = 0.866), and the count of the number of times a child interacted with a peer in the study (ICC = 0.977). Therefore, for these items, average scores were calculated across raters. Interrater reliability was inadequate for affect items (ICC = 0.515-0.565); therefore, these items were not used in further analyses. For categorical items,

interrater reliability was good for play activity (Kappa = 0.950), group dynamics (Kappa = 0.851), and leadership status (Kappa = 0.788). For these items, all discrepancies were reconciled between coder A and B, with the final codes being used in subsequent analyses. Interrater reliability was inadequate for the dichotomous variable of whether the child was involved in group play (Kappa = 0.683) and whether the child was overshadowed by a dominant peer group (Kappa = 0.315); therefore, these items were not used in further analyses.

Associations Among Creativity in Play Scale Scores

Descriptive statistics and correlations for all interval Creativity and Play Scale variables are in Table 4. Table 5 shows creativity score by categorical play context variable. Creativity in the natural play context occurs often in pretend play ($M = 3.44$) or play with manipulatives ($M = 2.92$). There was a positive association between creativity and the degree of fantasy in the play observation ($r = .67, p < .001$) and emotional expression ($r = .36, p = .001$). Additionally, children were more likely to demonstrate creativity when engaging in socially-active ($M = 3.39$) or solitary-active play ($M = 3.00$). When engaging with peers, children who were rated as the leader of the group ($M = 3.61$) were likely to be creative. Creativity in play was positively associated with the time length of the observation ($r = .37, p = .001$). To further explore this finding, the variable “length of observation” was categorized by 10-minute increments: under 30 minutes, 30-40 minutes, 40-50 minutes, 50-60 minutes, and 60 or more minutes. A one-way ANOVA was conducted to examine how creativity scores were related to observation length. Results indicated that creativity significantly differed by observation length, $F(4, 77) = 2.78, p = .032$. Post hoc comparisons using the Tukey HSD test indicated that creativity scores were significantly lower on observations under 30 minutes ($M = 2.22$) compared to observations over 60 minutes ($M = 3.37$). Creativity scores in 30–39-minute, 40–49-minute, 50-59 minute, and 60

or more-minute observation ranges did not significantly differ from each other. Taken together, this indicates that creativity scores were only lower in observations under 30 minutes. Finally, Creativity in Play scores were not associated with the number of times a child played with another child during the observation ($r = .18, p = .10$).

Table 4.

Study 2: Descriptive Statistics and Correlations for Creativity in Play Scale variables

	1	2	3	4	5	6	7	8
1. Creativity	1							
2. Average Uniqueness	.93**	1						
3. Average Quality	.93**	.82**	1					
4. Average Usefulness	.78**	.57**	.60**	1				
5. Fantasy in play	.67**	.67**	.58**	.49**	1			
6. Emotions in play	.36**	.35**	.34**	.25*	.51**	1		
7. Count	.18	.15	.17	.17	.17	.44**	1	
8. Minutes of observation	.37**	.36**	.28**	.36**	.32**	.19	.17	1
Mean	2.93	2.47	2.57	3.75	2.03	1.86	1.91	45.37
SD	.87	1.12	1.05	.75	1.30	.88	2.62	11.85
Range	1.17-4.83	1.00-5.00	1.00-5.00	1.50-5.00	0.00-5.00	1.00-5.00	0.00-11.50	12.00-69.00

Note. * $p < .05$, ** $p < .001$, Count = Count of 5-minute play segments where target child interacted with another child in the study

A one-way ANOVA was conducted in order to evaluate if creativity differed across the 7 preschool classrooms in order to rule out classroom context or curriculum as a contributor of creativity in the free-play setting. Overall creativity did not differ by classroom, $F(6, 75) = 1.33, p = .26$, nor did the individual subscales for uniqueness, $F(6, 75) = 1.30, p = .27$, quality, $F(6, 75) = .87, p = .52$, or usefulness, $F(6, 75) = 2.03, p = .07$. Additionally, an independent samples t-test was conducted in order to evaluate if creativity differed by gender. Results indicated that there

was not a significant difference in the overall creativity ratings, $t(72) = .58, p = .57$, the uniqueness subscale $t(72) = .20, p = .84$, quality subscale, $t(72) = 1.51, p = .14$, nor the usefulness subscale $t(72) = -.41, p = .69$.

Table 5

Study 2: Creativity by play context variable (Categorical)

Play Context Variable	Category	Creativity Mean	Creativity SD	N (%)
Play Activity	Pretend Play	3.44	.76	28 (34.1%)
	Construct	2.72	.65	6 (7.3%)
	Art	2.38	.32	10 (12.2%)
	Sensory	2.64	.57	7 (8.5%)
	Academic	2.69	1.14	6 (7.3%)
	Manipulative	2.92	.92	21 (25.6%)
	Talk	2.33	.94	2 (2.4%)
	No Task	1.58	.59	2 (2.4%)
Group Dynamics	Reticent	2.13	.76	4 (4.9%)
	Solitary-Passive	2.54	.62	15 (18.5%)
	Solitary-Active	3.00	1.43	4 (4.9%)
	Social-Passive	2.50	.78	12 (14.8%)
	Social-Active	3.39	.75	38 (46.9%)
	Teacher-Oriented	2.69	.55	8 (9.9%)
	Leader Status	Leader	3.61	.83
Idea Generator		3.10	1.24	5 (6.2%)
Follower		2.83	.72	5 (6.2%)
Collaborator		3.08	.61	19 (23.5%)
NA (Solitary Play)		2.58	.77	36 (44.4%)

Preliminary Analyses

Descriptive statistics and correlations for all final variables and composites are presented in Table 6. First, an FO composite was made. FO variables had small correlations (See Table 6)

and PCA confirmed that the following variables formed one construct: the fantasy subscale of the Child Imagination Scale, the Pretend Actions Task, the Child Imagination Questionnaire, and the fantasy ratings from the Creativity in Play Scale. A standardized composite score was created by averaging standardized (z-scored) variables together and this composite is referred to in the following analyses as the “FO Composite.” Similarly, two separate self-regulation composite scores (one for child-report and one for teacher-report) were created. PCA confirmed the sets of variables were two separate constructs. For the “child SR composite,” uncorrected standard scores were composited for the child-report tasks: Card Sort, Not This, Flanker, and Go No Go and these assessments were correlated (See Table 6). For the “teacher SR composite,” the three subscales for cognitive, behavioral, and emotional self-regulation of the Child Self-Regulation and Behavior Questionnaire were composited for the teacher-report task and these assessments were correlated (See Table 6).

Table 6.

Study 2: Descriptive Statistics and Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1. Age	1																		
2. Vocab	.43**	1																	
3. Soc	.23*	.12	1																
4. Creat	.17	.19	.25*	1															
5. CIS	.20	.25*	.14	.12	1														
6. PA	.29*	.16	.21	.09	.13	1													
7. CIQ	.30**	.37**	.25*	.17	.24*	.19	1												
8. FantP	-.02	.02	.11	.67**	.14	.11	.08	1											
9. FO	.36**	.34**	.31	.47**	.64**	.59**	.65**	.60**	1										
10. Flan	.50**	.50**	-.13	.15	-.1	.002	.27*	-.05	.12	1									
11. CS	.40**	.33**	.16	.01	.31*	.16	.39**	-.10	.34**	.33**	1								
12. NT	.11	.34**	-.08	.19	.07	.10	.29**	.09	.24*	.26*	.19*	1							
13. GNG	.32**	.39**	.04	.30*	.05	.23	.37**	.10	.31**	.41**	.29**	.36**	1						
14. SR-C	.47**	.53**	.03	.26*	.13	.19	.46**	.01	.36**	.75**	.66**	.68**	.75**	1					
15. Beh	.05	-.17	.23	.02	-.01	-.08	-.01	-.11	-.07	.04	.05	-.04	.23*	.12	1				
16. Cog	.34	-.02	.28**	.10	-.06	-.01	.19	-.20	.02	.34**	.34**	-.07	.27*	.32**	.48**	1			
17. Em	-.15	-.24*	.21	-.05	.02	-.13	-.16	-.14	-.17	-.12	.003	-.15	.02	-.05	.77**	.33**	1		
18. SR-T	.10	.17	.29**	.02	-.02	-.09	.01	-.18	-.09	.10	.16	-.10	.20	.20	.91**	.73**	.85**	1	
Mean	48.89	53.80	4.01	2.93	1.59	1.48	2.97	2.03	-.02	44.31	3.79	7.15	.43	-.03	3.87	3.71	3.88	3.88	.00
SD	7.04	9.71	.68	.87	1.12	1.39	.71	1.30	.63	17.15	3.97	3.86	.23	.72	.96	.84	1.02	1.02	.83

Note. * $p < .05$, ** $p < .001$, Age (Age in months), Vocab (NIH uncorrected vocabulary), Soc (EYT Sociability subscale), Creat (Creativity in Play Score), CIS (Child Imagination Scale Fantasy subscale), PA (Pretend Actions), CIQ (Childhood Imagination Questionnaire Total Score), FantP (Creativity in Play Scale Fantasy Score), FO (FO Composite), Flan (NIH uncorrected Flanker), CS (EYT Card Sort), NT (EYT Not This), GNG (EYT Go No Go), SR-C (SR Child Composite), Beh (EYT Behavioral Self-Regulation subscale), Cog (EYT Cognitive Self-Regulation subscale), Em (EYT Emotional Self-Regulation subscale), SR-T (SR Teacher Composite)

Creativity in Play Construct Validity

As stated previously, there is a scarcity of well-validated measures in preschool-aged children’s creativity; therefore, construct validity was evaluated by examining if common relationships were replicated between creativity and other constructs in the literature, specifically measures of fantasy orientation (See Table 7; Bunce & Woolley, 2021; Hoff, 2005; Mottweiler & Taylor, 2014; Taylor et al., 2018). In this study, creativity in play was correlated with observed fantasy in play ($r = .67, p < .001$), the overall FO composite ($r = .47, p < .001$), the sociodramatic play CIQ subscale ($r = .24, p = .029$), and negatively correlated with the reality subscale of the CIS ($r = -.34, p = .003$), providing evidence of construct validity. All other relationships were non-significant.

Table 7.

Study 2: Correlations for Creativity in Play Scale variables and FO variables

	1	2	3	4	5	6	7	8
1. Creativity	1							
2. CIS Reality	-.33**	1						
3. CIS Rep	.19	-.34**	1					
4. CIS Fantasy	.12	-.56**	-.58**	1				
5. Pretend Actions	.09	-.06	-.08	.13	1			
5. CIQ	.17	-.10	-.16	.24*	.19	1		
6. Fantasy in play	.67**	-.30**	.14	.14	.11	.08	1	
7. FO Composite	.47**	-.42**	-.42**	.64**	.59**	.67**	.60**	1

Note. * $p < .05$, ** $p < .001$, CIS = Child Imagination Scale, Rep = representational CIQ = Childhood Imagination Questionnaire

Primary Analyses

Prior to conducting a hierarchical multiple regression, the relevant assumptions of this statistical analysis were tested. First, a sample size of 90 was deemed adequate given 3

independent variables to be included in the analysis using a post-hoc power analysis with G*Power (Faul, et al., 2007). With a medium effect size (0.15) and 3 predictors, power at an acceptable level of .87. Residual and scatter plots indicated the assumptions of normality, linearity, and homoscedasticity were satisfied.

To assess the primary hypothesis, that fantasy orientation, self-regulation, and their interaction predicted Creativity in Play scores, two hierarchical linear regression analyses were conducted with the two self-regulation composites separately (child-report and teacher-report). The control variables including uncorrected receptive vocabulary scores, age in months, and sociability were entered on Step 1 as covariates, fantasy orientation and self-regulation were entered on Step 2, and the interaction between fantasy orientation and self-regulation was entered on Step 3. Table 8 presents the standardized coefficients for each step of the model for the child SR composite and Table 9 presents the standardized coefficients for each step of the model for the teacher SR composite.

For the analysis using the child SR composite, results indicated that Step 1 explained 2.1% of the variance in creativity scores ($R^2 = 0.021$) and the overall model was not significant, $F(3, 71) = 1.53, p = .214$. Adding fantasy orientation and the child SR composite on Step 2 explained an additional 13.1% of the variance in creativity scores ($\Delta R^2 = 0.131$), and this increment model was significant $\Delta F(2, 69) = 5.58, p = 0.005$. Finally, the interaction between self-regulation and fantasy orientation was added to the model at Step 3 and this model was not significant $\Delta F(1, 68) = 0.082, p = 0.776$. Fantasy orientation individually predicted creativity while controlling for vocabulary, age in months, and sociability ($b = .567, p = .003$), however, the child SR composite and the interaction did not.

Table 8.

Study 2: Summary of Hierarchical Regression Analysis for Variables predicting Creativity (SR-Child)

	Step 1	Step 2	Step 3
Model information	R^2 adjusted = 0.02 $\Delta R^2 = 0.06, p = 0.21$	R^2 adjusted = 0.13 $\Delta R^2 = 0.13, p = 0.006$	R^2 adjusted = 0.12 $\Delta R^2 = 0.001, p = 0.78$
Predictor	Beta	Beta	Beta
Age	0.01 (NS)	-0.07 (NS)	-0.07 (NS)
Vocabulary	0.18 (NS)	0.04 (NS)	0.04 (NS)
Sociability	0.16 (NS)	0.12 (NS)	0.12 (NS)
Fantasy Orientation		0.37**	0.37**
Self-regulation (child)		0.09 (NS)	0.10(NS)
FO x Self-regulation			-0.03 (NS)

Note. * $p < 0.05$, ** $p < 0.01$, FO = Fantasy Orientation

For the teacher SR composite analysis, results indicated that Step 1 explained 2.1% of the variance in creativity scores ($R^2 = 0.021$) and the overall model was not significant, $F(3, 71) = 1.53, p = .214$. Adding fantasy orientation and teacher reported self-regulation on Step 2 explained an additional 13% of the variance in creativity scores ($\Delta R^2 = 0.130$), and this increment model was significant $\Delta F(2, 69) = 5.52, p = 0.006$. Finally, the interaction between self-regulation and fantasy orientation was added to the model at Step 3 and this model was not significant $\Delta F(1, 68) = 0.033, p = 0.857$. As with the previous regression using child SR composite, fantasy orientation individually predicted creativity while controlling for vocabulary, age in months, and sociability ($b = .594, p = .002$), however, the teacher SR composite and the interaction did not.

Table 9.

Study 2: Summary of Hierarchical Regression Analysis for Variables predicting Creativity (SR-Teacher)

	Step 1	Step 2	Step 3
Model information	R^2 adjusted = 0.02 $\Delta R^2 = 0.06, p = 0.21$	R^2 adjusted = 0.13 $\Delta R^2 = 0.13, p = 0.006$	R^2 adjusted = 0.12 $\Delta R^2 = 0.00, p = 0.86$
Predictor	Beta	Beta	Beta
Age	0.01 (NS)	-0.05 (NS)	-0.05 (NS)
Vocabulary	0.18 (NS)	0.01 (NS)	0.09 (NS)
Sociability	0.16 (NS)	0.08 (NS)	0.08 (NS)
Fantasy Orientation		0.39**	0.39**
Self-regulation		0.07 (NS)	0.07(NS)
FO x Self-regulation			0.02 (NS)

Note. * $p < 0.05$, ** $p < 0.01$, FO (Fantasy Orientation)

Exploratory Analyses

Exploratory analyses were conducted in order to assess whether individual components of self-regulation and FO predicted overall creativity and the subscales of creativity. Correlations were conducted on the different measures and subscales of self-regulation and the subscales of creativity. Go No/Go accuracy was significantly correlated with overall creativity ($r = .30, p = .013$), the uniqueness subscale ($r = .33, p = .005$), and usefulness subscale ($r = .31, p = .009$). All other relationships were non-significant.

Correlations were conducted of the different measures and subscales of FO and the subscales of creativity. Average fantasy in play was significantly correlated with overall creativity ($r = .667, p < .001$), the uniqueness subscale ($r = .674, p < .001$), quality subscale ($r = .575, p < .001$), and usefulness subscale ($r = .485, p < .001$). The CIQ sociodramatic play subscale was significantly correlated with overall creativity ($r = .24, p = .029$), the uniqueness

subscale ($r = .24, p = 0.029$), and quality subscale ($r = .25, p = .025$). All other relationships were non-significant.

CHAPTER 7.

STUDY 2 DISCUSSION

Study 2 was the first study to evaluate preschool creativity using naturalistic play behaviors in a free-play preschool context. Results indicated that evaluating preschool creativity through natural play behaviors is feasible and provides variability in scores with high interrater and internal reliability. Additionally, the Creativity in Play Scale demonstrated construct validity by replicating common relationships found between creativity and FO documented in the extant literature. Using the Creativity in Play scale, certain aspects of the play context were likely to display creativity in this context. Particularly, creative play in this context is likely to be present in pretense activities that involve peers and minimal/moderate emotion levels. Notably, self-regulation, age, and vocabulary were not related to creativity when measured via play but are related when creativity is measured using The Story Stem Task and other measures. This provides evidence that the play measure can assess creativity earlier in the developmental range because this measure may not tax developing verbal or self-regulation skills, as traditional measures do. Further, these findings suggest that creativity in play may rely on generative processes due to links with FO. Imaginative behaviors may provide children with more practice in idea generation, which may be linked to creative products they generate during play. It may be that FO and creativity have overlapping processes. Children who have higher fantasy orientation generate play that is outside of reality, and this may translate to generating uncommon products,

especially within the play context (Bunce & Woolley, 2020).

CHAPTER 8.

GENERAL DISCUSSION

Scholars speculate that everyday creativity is essential to human survival with links to physical and psychological health in adulthood (Richards, 2010). This ability is not reserved for a select few who have made profound impacts in their fields or society. Rather, everyone, including young children, has a capacity for everyday creativity across multiple domains. In childhood researchers posit that creativity is helpful for academic success (Gajda, et al., 2017) and several curricula make creativity a learning goal in the preschool classroom (Craft, 2003). Despite this, during the preschool years, there is scant research examining creativity. Across two studies, this dissertation aimed to explore an alternative methodology for children in early childhood and to elucidate variables that may be related to creative processes in early childhood to further understand how creativity develops.

In Study 1, it was found that the interaction between self-regulation and fantasy orientation predicted creativity when evaluated through a laboratory Story-Stem Task. That is, children with higher levels of FO and higher levels of self-regulation had the highest creativity scores. This indicates that creativity measured this way may rely on joint generative and evaluative processes, and engaging in behaviors that naturally involve these processes, such as imaginative play (FO) and self-regulation, aid in creative thought in early childhood. Extant research has indicated that creativity in early childhood is related to FO and self-regulation in separate analyses (e.g., Mottweiler & Taylor, 2014, Yeh & Li, 2008), but the interaction between

these constructs has never been documented. Our findings suggest that the FO-creativity link may depend on the level of self-regulation that a child has. Contrary to our hypothesis, FO on its own did not predict creativity, which is disparate from previous studies (Mottweiler & Taylor, 2014). This could be because the story-stem methodology was altered or because FO was measured differently. Children physically demonstrated their pretense and teachers reported on children's FO behaviors, whereas Mottweiler and Taylor (2014) had children verbally discuss their imaginary companions which may align more with story-stem creativity in terms of task requirements. In support of our hypothesis, self-regulation on its own did predict creativity, which is consistent with other studies using different creativity tasks in preschoolers (Yeh & Li, 2008), and children in middle childhood (Butcher & Niec, 2005; Hoffman & Russ, 2012). Further, this finding also aligns with the controlled-attention theory of creativity which places emphasis on the role of self-regulation in the evaluative process of creativity (Beaty et al., 2014). Overall, our results suggest that the interaction between generative and evaluative processes may provide children with advantages in creativity in early childhood. Children high in FO may have more practice generating ideas due to engaging in fantasy-themed play but are only able to successfully generate creative stories if they can effectively evaluate the ideas they generate with sufficient levels of self-regulation.

In Study 2, the first observational measure of creativity was developed, evaluating young children's naturalistic play behaviors in a free-play preschool context. Results indicate that this type of measurement is feasible, produces variability in scores, with high interrater, and internal reliability. Moreover, the results suggest that evaluating creativity by this method does not tax a child's developmental skills. Self-regulation, age, and vocabulary were not related to creativity in play, indicating this style of measurement may be more developmentally-appropriate,

allowing researchers to assess the generative aspects of creativity at a younger age. Assessing creativity within a naturalistic play context may be an alternative to traditional styles of measurement that tax a child's developmental skills. This measure provides evidence for everyday creativity within an indoor group play context. Although this coding may need to be altered for other contexts, such as outdoor playgrounds, play in home environments, or solitary play, The Creativity in Play Scale is a good first step in developing a valid measure of creativity for early childhood. Further, this measure has exemplary ecological validity, as it does not have children generate artificial behaviors in a laboratory based on a prompt. Rather, this measure has strengths in examining children's natural creativity in their everyday self-selected play activities.

When considering what aspects of play are most likely to demonstrate creativity, exploratory analyses demonstrated that a few types of play were consistently more likely to produce creativity. Specifically, pretense and play with manipulatives involving higher levels of fantasy were likely to generate creative play themes. Additionally, social play in which children actively engage their peers in conversation, provide ideas and directives for the play script as the leader, may produce creative play. Further, play that involves higher emotional intensity may contribute to creativity in the free-play context. These findings are consistent with previous observational work that has found that children who engaged in more pretense in preschool classrooms were more likely to engage in play that involved peers and demonstrate emotions in their play behaviors (Bauer & Gilpin, 2022). These findings may have implications for the development of curricula designed to promote creativity, as this play style may be linked to several developmental skills in addition to creativity, such as self-regulation, emotion knowledge, and vocabulary (e.g., Elias & Berk, 2002; Lindsey & Colwell, 2013).

Additionally, results from Study 2 confirmed our hypothesis and added to the literature by documenting that fantasy orientation significantly predicted creativity utilizing play observations. This finding aligns with several studies that have found links between FO and creativity across several tasks in early childhood (Bunce & Woolley, 2021; Mottweiler & Taylor, 2014) and in middle childhood (Taylor, et al., 2018), suggesting that FO may be important in the generative process in creativity. Unlike Study 1 and contrary to our hypotheses, self-regulation on its own and the interaction between FO and self-regulation did not predict creativity using this type of task. This is consistent with work examining the relationship between creativity and executive functioning which found null associations between executive functioning and creativity measured multiple ways in middle childhood (Hoffman & Russ, 2012). Specifically, these null associations between self-regulation and creativity may indicate that creativity in play relies solely on generative processes rather than a combination of generative and evaluative processes. Because play is the product, an evaluative process may not be necessary for creativity to be unique, high quality, and useful. Creativity in the play modality may rely more on exploration and experimentation, therefore, children may have little need to evaluate ideas in order to generate a creative play idea. That is, when play is the product, it may not require the evaluation and selection of one finalized idea out of several play ideas. Rather, play is an open-ended activity in which children can readily switch play ideas based on their interests. Play may not require children to hone their evaluative search process for the single best creative play idea. In laboratory creativity tasks, children need to regulate their thinking and behavior in line with defined task demands and when children run out of creative ideas, the task ends. Whereas, when play is the product, the task demands are flexible and therefore children can switch between play ideas, continually generating ideas, without the evaluative, regulatory demands to select the most

creative product. Moreover, when children were evaluated through play, they were provided with substantially longer sessions compared to laboratory tasks. The length of a free-play session, compared to a lab task, may give children various opportunities to produce creative ideas, rather than just one laboratory task. In contrast, all studies demonstrated that fantasy orientation, the generative process, is required for creativity. Because fantasy orientation is an individual difference that represents a cognitive and behavioral proclivity centering on themes beyond reality, this individual difference parallels with creative thinking, especially during a play observation. A fantasy-based proclivity may translate into more unique play themes and creative play products because these children prefer to think outside of reality, to put in the cognitive work to think about things that are not observable in everyday life. This may translate to creative, “outside the box” play ideas that are not commonly seen in this age group (Bunce & Woolley, 2020; Runco & Pina, 2013).

Limitations and Future Directions Despite the strengths of this dissertation, there are a number of limitations worth noting. Both studies could have been strengthened by using a larger sample to increase power. Despite this, the current study provided an important first step that may justify future larger-scale studies examining these constructs. In addition, while these studies had acceptable diversity, future studies should consider replicating these results in a broader sample, or cross-culturally. Moreover, these studies do not provide any causal evidence for enhancing creativity, beyond associations. Future work should consider using fantasy-play interventions to provide evidence for changes in children’s creativity both through story-stem and play observations. Previous work has shown improvement in cognitive skills through fantasy-play interventions (Thibodeau et al., 2016; Thibodeau-Nielsen et al., 2020), therefore these kinds of interventions may extend to other cognitive skills, such as creativity.

In Study 1, one limitation is that a single creativity task was used in one domain, due to this study's use of secondary data analysis, which may not have fully represented a child's creative potential in other domains. Relatedly, a single measure of self-regulation was also used, which may not have fully captured a child's regulatory abilities. Previous research (Bunce & Woolley, 2020, Hoffman & Russ, 2012; Mottweiler & Taylor, 2014) used multiple creativity tasks in order to gauge a child's potential and have found differences in relationships between SR and FO based on the creativity and SR task (e.g., Hoffman & Russ, 2012; Yeh & Li, 2008). Therefore, future research should consider having children complete multiple SR measures (e.g., cool and hot EF) and demonstrate their creativity in multiple ways, such as through story-stem tasks, drawing tasks, and pretend play tasks. This may allow children of various skill-levels to generate products in several ways to get a more complete picture of children's creativity in relation to FO and SR.

In Study 2, one limitation when using naturalistic observations is that this style of measurement results in lower levels of control and potential confounding variables compared to laboratory tasks. As a result, this method was unable to control for peer effects or collaboration among children. This may have made it difficult to separate the creativity of an individual child from the play group. To address this, the number of times the target child played with another child in the study was evaluated and results did not find associations with their overall creativity score. This suggests that collaboration did not greatly impact an individual child's creativity. Further, collaboration may have been less influential due to Study 2's recording methodology. Audio-recorders were placed directly on the target child and during coding other sound sources were muted. This may have aided coders in distinguishing between the sounds of the target child, compared to their peers and the surrounding environment. Future research should evaluate group

play compared to solitary play in order to further disentangle how peers may influence creativity in free-play contexts. Despite this limitation, other potential confounding variables, such as the child's classroom or a child's gender, did not produce differences in creativity, indicating that the Creativity in Play Scale adequately accounted for these potential confounds. Additionally, while the majority of items coded using the Creativity in Play Scale resulted in good interrater reliability, some aspects of the play context were not reliably coded and therefore were excluded from analyses. Specifically, when trying to create holistic ratings of affect-type (i.e., positive or negative affect) or dominant peer groups (i.e., whether the target child's play overshadowed by peers) coders did not have sufficient interrater reliability. Future research should assess whether there are better ways to assess these variables in order to evaluate the impact of these variables in observational creativity.

Although Study 2 takes an important first step in developing an observational creativity measure based on play behaviors, one limitation with using existing data, is that the Creativity in Play Scale could not be validated with existing creativity measures. Moreover, there are few validated creativity measures for this age group, a main motivation for the proposed study. Future studies should incorporate various creativity measures from multiple informants (i.e., child-, teacher-, and parent-report), spanning multiple domains in order to further validate this measure. Additionally, because Study 2 used existing video data, the videos could not be altered through trial and error to improve the view of certain areas of classrooms. In contrast to live observations, where coders can modify their location to follow a child if they move out of range, in some classrooms, certain areas were difficult to view even with multiple camera angles. Therefore, altering the video setup in these classrooms may have improved the quality of the video observations. However, video data can have benefits in comparison to live observations

because cameras may be somewhat less intrusive and may decrease participant reactivity. Future research should consider various video setups based on the classroom and compare live observations to video observations as an alternative when video data is not feasible. The Creativity in Play Scale was created for observations within preschool-classroom contexts and consequently our study could be improved by incorporating multiple observations in various play contexts. Creativity demonstrated in play may depend on the context, therefore, this measure may only evaluate creativity in an indoor, free-play, preschool context. Play may be expressed differently based on where children are playing (e.g., indoors/outdoors, home, or school), available activities (e.g., toys, games), or who is available to play with (e.g., siblings, parents, or peers). Future research should consider adapting the Creativity in Play Scale to evaluate creativity across various contexts and perform multiple observations in order to further validate this measure and evaluate its test-retest reliability.

Overall, the Creativity in Play Scale may be an alternative creativity measure for preschoolers that is suitable for future research. Based on the results of Study 2, future research should investigate further the play activity, social dynamics, leadership status, fantasy level, and emotionality, as these components are important when evaluating creativity in play. Furthermore, results indicated a positive relationship between the time children spent in play and their creativity score. This indicates that longer play sessions may have provided children more time to get fully engaged in their play and afforded children more opportunities to demonstrate their creativity. However, longer play observations can limit the feasibility of this measure. To address this, time in observations was categorized by 10-minute increments. Results indicated that only observations under 30 minutes were significantly lower in creativity. This may mean that future research can perform 30-to-45-minute observations, which may easily align with existing

preschool classroom schedules, without any negative effects on children's creative potential. This may aid in the feasibility and ecological validity of future research evaluating creativity this way.

Implications for Practice The results of this dissertation have important practical implications for preschool classrooms and curricula development. The field of education places high value on creativity, as it may contribute to children's academic success. Moreover, early childhood may be an optimal time to help children develop creativity, along with several other school-readiness skills. Play-based curricula (e.g., Reggio Emilia; Schiller, 1995) have goals of developing childhood creativity, however, it is unknown if they are effective. Given that these results emphasize the relations between fantasy orientation and creativity, teachers may consider encouraging imaginative play as it may be related to creativity in multiple tasks. This style of play may also aid in children's development of self-regulation, as seen in the literature (e.g., Bauer, et al., 2021), which relates to story-based creativity. Further, teachers can provide longer play opportunities in the classroom (e.g., over 30 minutes), so that children have the opportunity to generate creative play and encourage social play to generate creativity. Research suggests that child-directed, adult-guided play is positively associated with several developmental skills (Weisberg et al., 2016). Teachers may implement these opportunities into their everyday routines, which may also be related to the development of children's creativity.

General Conclusions The experiences children have with creativity in early childhood have the potential to shape their creativity throughout life. Despite this, there is scant research investigating creativity in early childhood. Across two studies, we aimed to elucidate variables that are related to creativity in early childhood. Study 1 found that the interaction between self-regulation and fantasy orientation may be important to the generative and evaluative processes

necessary for creative thought in story-stem laboratory tasks. In Study 2, a new creativity measure, the Creativity in Play Scale, was created based on everyday play behaviors. Results indicate that the Creativity in Play Scale may be a more developmentally-appropriate measure of creativity in early childhood. Moreover, it confirmed that fantasy orientation was predictive of creativity using this task. Overall, these studies aid the understanding of how creativity develops in early childhood, and how it is best measured, so that caregivers and educators can create opportunities to foster creativity for young children.

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APPENDIX A

Lab-Based Creativity Task

Participant number: _____

RA Initials: _____

Date: _____

Circle one: Coder A Coder B Coder C

Step One:

1. Read through all transcribed stories to gauge the full range of responses. _____
2. Read through transcriptions a second time and rate the pretend play story on these criteria
3. Avoid using the child’s verbal ability or talkativeness as an indicator of creativity.
4. Use the full range of the scale (1 to 5)

Uniqueness:

Subscale 1: Use your own subjective definition of creativity. This is how unusual, unique, and original the story is in comparison to other stories in the sample. Make sure this score is taking into account a useful creative story. Do not provide high creative scores for simply bizarre answers, but be sure they are appropriate as well.

1	2	3	4	5
Not unique at all	A little unique	Somewhat unique	Unique	Very unique

Quality:

Subscale 2: This is how complex the plot of the child’s story is, the amount of extra information included in the story beyond what is provided in the pictures. How complex is the narrative/plot?

- a. Not complex = no elaboration, no real plot “there was a castle and we went inside”
- b. Somewhat complex = somewhat elaborate/gives some supporting details
- c. Very complex/elaborate = lots of details, complex plot

1	2	3	4	5
Not complex at all	A little complex	Somewhat complex	Complex	Very complex

Appropriateness/Usefulness:

Subscale 3: Is the story engaging to the reader? For example, did you find the story entertaining?
 Avoid using the child's verbal ability or talkativeness as an indicator of creativity.

1	2	3	4	5
Not engaging	A little engaging	Somewhat engaging	Engaging	Very engaging

Fantasy:

This is how fantastical the story is, or how removed from reality.

Highly fantastical = Using fantasy elements and going beyond the prompt given. If they are just talking about a prince in a magical castle (like in story 1), they would get a 1

Somewhat fantastical = Some fantasy elements incorporated, but most of the story is either representational or not imaginative.

Representational = for example talking animals, or just retelling another story like Snow White or Cinderella

Not imaginative = everything based in real-life, like going to a park, etc

1	2	3	4	5
Not imaginative	A little imaginative or representational	Representational	Somewhat fantastical	Highly fantastical

APPENDIX B

Creativity in Play Scale

Part 1: Real-time coding

Using Datavyu, complete the following WHILE watching the observation video. This is “real-time” coding which will be used to inform your holistic final coding which will be completed at the end of your observation. **Every 5 minutes of the observation, record the following (if two behaviors occur, select the one that occurred the majority of the time. If both were equal, write both):**

Step 1 - Play Themes and Activities - Please give a general description of the play themes for the entire observation. Provide enough detail where someone who read it without seeing the observation would understand what happened. What did they do? What happened during play? Please provide a new theme for every time something “happens” during play. This is different than activity because it is providing the details. Feel free to transcribe children’s language as a way to indicate a play theme (“We’re building a boat.” “Our boat is going to China.” – That’s 2 themes but provides enough information that we know that the theme is changing). Make sure that you are not being redundant, and only write new advances to the play theme. I find it helpful to write these as they occur within the 5-minute increment

For each 5-minute increment, indicate the activity (Fabes, et al. 1999). that is taking place:

1. **Pretend Play:** child is playing “make believe,” pretending to be mommy/daddy, superhero, animal, etc. Also includes dress up and object substitution (e.g., pretending a block is a car and making vroom vroom sounds)
2. **Construct:** child is building with legos, blocks, doing puzzles
3. **Art:** child is doing arts and crafts (coloring, cutting, painting)
4. **Sensory:** involved in sensory play (singing, music, playing with a bell, water, digging, smelling flower, sensory table, play dough, goop, clay, etc.)
5. **Academic:** child is reading, writing, counting, math, science in English. Also includes using the computer and board games involving numbers or alphabets.
6. **Large Motor:** child is engaged in activities that involve large muscle movements (running, climbing, swinging, riding a bike, jumping, bouncing a ball, dancing, bikes, wagons)
7. **Manipulative:** child is playing with manipulative objects (cars, dolls, games, blocks, toy animals)
8. **Talk** child is talking to friends or themselves but not engaging in any of the other activities (only select this if the child is clearly not doing any other activity).
9. **Other:** child is involved in an activity that does not fit into any of the other categories (e.g., screaming, crying)
10. **No Task:** child is not involved in any activity (i.e., unoccupied/on looking: characterized by lack of focus or intent, staring into space, or watching other kids/teacher)

For each 5-minute increment, indicate the quality of the play based on the activity.

Step 2: Uniqueness Scoring

Refer to the description of uniqueness in the creativity scoring. Use the full range of the scale (1 to 5).

Is the play, based on the play theme and activity uncommon and remote **based on the activity the child is engaged in**? For example....

1. **Pretend Play:** is the play script uncommon or remote compared to other play scripts children typically generate or to play themes seen in media, or literature?
2. **Construct:** Is the child constructing or building something uncommon or remote?
3. **Art:** If you can see the art generated, is it unique? If the child narrates the theme of the art piece, is it unique? If the child narrates their process (talking about the colors or piece), is it uncommon or remote?
4. **Sensory:** Is the child exploring sensory play in an uncommon or remote way? Is the child making unique play dough/clay creations?
Academic: Is the child Is the child telling a unique story? Is the child completing academic activities in a unique way?
5. **Large Motor:** Are the large motor games or dance sequences unique?
6. **Manipulative:** Does the child play with toys in an uncommon or remote way? In a way that the toy is not typically used for?
7. **Talk** Is the child's conversations (with self or peers) uncommon or remote?
8. **Other:**
9. **No Task**

For each 5-minute increment indicate how unique is the play based on the activity

1. **Not unique at all:** very common, exactly like other play themes
2. **A little unique**
3. **Somewhat unique:** moderately creative, uses some common play themes intermixed with novel themes, somewhat unique
4. **Unique**
5. **Very unique:** Very clever, unique, and unusual.

Step 3: Quality Scoring

Is the play, based on the play theme and activity clever, elaborate, and organized **based on the activity the child is engaged in**? For example....

1. **Pretend Play:** If the play theme is common, is the theme cleverly expressed? Are multiple voices or sound effects used? Is there a coherent complex story line used? Does the child continually extend story line?
2. **Construct:** Is the construction common but clever, incorporating various elements or structures? Are there various or complex structures?
3. **Art:** Is the art or narration of the process clever? Does the child incorporate various elements into the piece? If you can view the piece, does it have many elements?
4. **Sensory:** Is the child exploring sensory play in multiple ways, incorporating many elements?
5. **Academic:** Does the child complete many aspects of an academic activity?
6. **Large Motor:** Does the motor game or dance have various or organized elements?
7. **Manipulative:** Does the child play with toys in multiple and various ways?
8. **Talk :** Does the child talk about many different things?
9. **Other:**
10. **No Task:**

Refer to the description of high-quality in the creativity scoring. Use the full range of the scale (1 to 5).

1. **Not complex at all:** no elaboration, no real plot, unrelated, disjointed events with no cause and effect
2. **A little complex:**
3. **Somewhat complex:** somewhat elaborate, some details, some voices, themes, characters ideas, concept, sometimes extends play script
4. **Complex:**
5. **Very complex:** lots of details, very complex and integrated plot, uses multiple voices, themes, characters, ideas, concepts, always extending play script

Step 4: Usefulness (Russ, 1999)

For each 5-minute increment, indicate the engagement of the target child:

Engagement: Is the play enjoyable or engaging? If with peers, do the play themes engage peers? Pay attention to their voice and body language, look at how into the play they are.

1. **Not engaged:** Not participating, wandering aimlessly
2. **A little engaged:** minimal interest and participation
3. **Somewhat engaged:** Somewhat engaged and somewhat passive
4. **Engaged:** Engaged, somewhat enjoying the play, if with a group, effort is minimal
5. **Very engaged:** Highly engaged, obviously enjoying the play, provides ideas, if with a group engages and interacts peers

Holistic Creativity Scoring

1. **Primary activity** of entire observation. If more than one activity, code the most predominant activity that occurred within the observation. If it is completely equal – code both.

1. **Pretend Play**
2. **Construct**
3. **Art:**
4. **Sensory**
5. **Academic**
6. **Large Motor:**
7. **Manipulative:**
8. **Talk**
9. **Other:**
10. **No Task:**

Subscale 1: Creativity – Uniqueness (Amabile, 1982; Mottweiler & Taylor, 2014; Silvia et al., 2008; Silvia et al., 2009) 5 points

1. Uncommon: Creative ideas are uncommon: they will occur infrequently in our sample. Play activities that occur in a lot of children are common, by definition. Unique play tends to be creative, although play represented only once need not be judged as creative. For example, random or inappropriate play would be uncommon but not creative.

2. Remote: Creative play is remotely linked to everyday activities, objects, and ideas. For example, creative play is “far from” common play themes, activities, or ideas. Play that strays from obvious ideas will tend to be creative, whereas responses close to obvious ideas will tend to be uncreative.

Use your transcriptions of the play themes and previous real-time codes, indicate the uniqueness of the play and provide a **single holistic rating** for the entire play observation. Use the full range of the scale (1 to 5).

1. **Not unique at all:** very common, exactly like other play themes
2. **A little unique**
3. **Somewhat unique:** moderately creative, uses some common play themes intermixed with novel themes, somewhat unique
4. **Unique**
5. **Very unique:** Very clever, unique, and unusual.

Subscale 2: Creativity – High Quality (Kaugars & Russ, 2009; Wallach & Kogan, 1965; Silvia et al., 2008) 5 points

Products that are unique and high-quality are considered more creative than simply unique products. This can extend into the play realm. Play that is clever, elaborate, complex, organized, incorporating many ideas, concepts, and/or extend beyond a single idea is more creative than play than play that is simple, disorganized, or represents a single idea.

1. Clever: Creative play is often clever: and may strike people as insightful, ironic, humorous, fitting, or smart. Play that is clever tends to be creative play. Keep in mind that cleverness can compensate for the other facets. For example, a common play theme cleverly expressed could receive high score.

2. Elaborate: the amount of variety and complexity present in story themes, sound effects, voices, character development. incorporating many ideas, concepts, and/or extend beyond a single idea

3. Organized: coherence of the play narrative

Use your transcriptions of the play themes and previous real-time codes, indicate the quality of the play and provide a **single holistic rating** for the entire play observation. Use the full range of the scale (1 to 5).

1. **No quality at all:** no elaboration, no real plot, unrelated, disjointed events with no cause and effect
2. **A little bit of quality:**
3. **Some quality play:** somewhat elaborate, some details, some voices, themes, characters ideas, concept, sometimes extends play script
4. **High-Quality:**
5. **Very High-Quality:** lots of details, very complex and integrated plot, uses multiple voices, themes, characters, ideas, concepts, always extending play script

Subscale 3: Creativity Usefulness (5 points)

Creative products are not simply unique, but also must be useful and appropriate, meaning they should provide a solution to a problem, or in our case looking at play behaviors, they should engage children.

1. Engagement: is the target child engaged, does the play hold the child's attention, are they focused on the play?

Using real-time scores of engagement to inform the overall usefulness score. Use the full range of the scale (1 to 5)

1. **Not useful at all:** Child is not engaged
2. **A little useful:**
3. **Somewhat useful:** Child is moderately engaged
4. **Useful:**
5. **Very useful:** Child is highly engaged

Play Context

Part 1: Real-time coding

Using Datavyu, complete the following WHILE watching the observation video. This is “real-time” coding which will be used to inform your holistic final coding which will be completed at the end of your observation. **Every 5 minutes of the observation, record the following (if two behaviors occur, select the one that occurred the majority of the time. If both were equal, write both):**

Step 1: Fantasy (Thibodeau-Nielsen et al., 2020): This is how fantastical the play is, or how removed from reality.

For each 5-minute increment indicate how fantastical the play was

1. **No play** – Child is not playing but is instead wandering, talking, or doing another activity (including art without any pretense/narration)
2. **Realistic play:** children are not engaging in pretend play, such as moving a train around a track, playing sports, blocks, etc
3. **Representational:** this is realistic play, but children are still engaging in pretense. This would include things such as playing house, doctor, talking animals, saying “choo choo” and pretend as if they were the train etc
4. **Fantastical:** Using fantasy elements that cannot be observed in reality, such as dragons, fairies, unicorns, etc. It is okay if this follows a recognizable play theme from a movie (e.g. Elsa, superheroes). This is different from the creativity measures. This is only the degree of fantasy.

Step 2: Group Dynamics (PPBS; Coplan & Rubin, 1998)

For each 5-minute increment, indicate group dynamics of the play

1. **Reticent behavior:**
 - a. takes on the role of onlooker or spectator
 - b. wanders around aimlessly
 - c. watches or listens to other children without trying to join in
 - d. remains alone and unoccupied, perhaps staring off into space
2. **Solitary-passive behavior:**
 - a. plays by himself/herself, examining a toy or object
 - b. plays alone, building things with blocks and/or other toys
 - c. plays by himself/herself, drawing, painting pictures, or doing puzzles
 - d. plays alone, exploring toys or objects, trying to figure out how they work
3. **Solitary-active behavior:**

- a. plays by himself/herself, engaging in simple motor activities (e.g., running, ringing bells/buzzers)
 - b. engages in pretend play by himself/herself
 - c. plays ‘make-believe’, but not with other children
 - d. plays alone in an active fashion, enjoying an activity solely for the physical sensation it creates
4. **Social-passive:**
- a. Parallel play, child is playing alongside in the same activity as another child but is not interacting with others.
 - b. Minimal conversation with other children during play
 - c. Takes on a more passive role in the group
 - d. Playing with other children, but not involved in directing the play
5. **Social-active**
- a. talks to other children during play
 - b. plays ‘make-believe’ with other children
 - c. engages in group play
 - d. plays in groups with (not just beside) other children
 - e. engages in active conversations with other children during play
 - f. engages in pretend play with other children
6. **Teacher-oriented**
- a. Talks or plays with the teacher (only code if this occurs for the majority of the 5 min segment)

Step 3: Leadership

If the child is in group play, indicate the leader-status of the target child

- 1. **Leader**
- 2. **Joint Leader**
- 3. **Collaborator**
- 4. **Idea Generator**
- 5. **Follower**

**# OF CHILDREN IN
THE SOCIAL-
ACTIVE PLAY**

POTENTIAL PLAY ROLE CODES

2	<p>Leader- The child is instructing the other during the play</p> <p>Follower- The child is following directives of the other</p> <p>Collaborator- The 2 children are equally contributing to the play</p>
3	<p>Leader- The child is the <u>only</u> leader instructing the play</p> <p>Joint Leader- The child is <u>one of two</u> leaders in the play</p> <p>Idea Generator- The child is providing ideas, but the others do not comply</p> <p>Follower- The child is following directives of the leaders</p> <p>Collaborator- The children are equally contributing to the play</p>

4+

Leader- The child is the only leader instructing the play
Joint Leader- The child is one of two leaders in the play
Idea Generator- The child is providing ideas, but the others do not comply
Follower- The child is following directives of the leaders
Collaborator- The children are equally contributing to the play
OR the child is one of 3+ leaders in a group of 4+

Step 4:

During the 5-minute increment, was the child actively playing with another child in the study (a child wearing a “shape” t-shirt)?

1. **Yes**
2. **No**

Step 5: Emotions

For each 5-minute increment, indicate the emotionality of the play

Emotions (Fabes et al., 1999): Rate the degree of emotions evidenced by the child during the observation. Make your coding based on intensity and duration of the emotion.

**If a child is demonstrating “fake” emotions during pretend play, count these in the overall emotionality of the play. Emotions expressed during pretend play are considered “real emotions” and should contribute to the overall emotion score.

0. Not Codeable

1. **No emotions:** almost no emotions evident in play
2. **Minimal:** evidence of positive/negative emotions (slight smile, saying “this is fun” in a soft, unexcited voice, slight frown or fret on face, slight scowl, saying “I hate this” in a soft but angry voice).
3. **Moderate:** evidence of positive/negative emotions (enduring smile or laughter, saying “this is fun” in excited voice, obvious and/or enduring sadness/anxiety/fear/anger on face or in voice, saying “this is terrible” or “I hate you” in angry voice)
4. **Strong** evidence of positive/negative emotions (loud laughter, screaming in joy or excitement, loud crying or intense fear, loud screaming in anger, throwing an intense tantrum)

Step 6: Affect

For each 5-minute increment, indicate the affect of the target child

Positive Affect: smiling, excited, laughter, happy, joy

0. Not Codeable

1. **No Positive Affect**
2. **Minimal Positive Affect**
3. **Moderate positive affect**
4. **Strong positive affect**

Negative Affect frowning, crying, scowl, fear, anger, fear

0. Not Codeable

1. **No Negative Affect**
2. **Minimal Negative Affect**

3. **Moderate Negative affect**
4. **Strong Negative affect**

Neutral Affect Neither positive or negative, minimal affective state

0. Not Codeable

1. **No Neutral Affect**
2. **Neutral Affect**

Part 2: Holistic Observation Codes/Ratings – Play Context

Once you have watched the videos and completed the real-time coding, please provide holistic ratings/codes for the entire observation. Please look over previous codes in Datavyu to inform your decision.

1. Primary fantasy level for the entire observation.

0. **No Play**

1. **Realistic play**: children are not engaging in pretend play, such as moving a train around a track, playing sports, blocks, etc
2. **A little representational**: there is a mix of realistic and representational play,
3. **Representational**: this is realistic play, but children are still engaging in pretense. This would include things such as playing house, doctor, talking animals, saying “choo choo” and pretend as if they were the train etc
4. **Somewhat fantastical**: Some fantasy elements incorporated, but there are representational elements mixed with fantastical, for example
5. **Highly fantastical**: Using fantasy elements that cannot be observed in reality, such as dragons, fairies, unicorns, etc. It is okay if this follows a recognizable play theme from a movie (e.g. Elsa, superheroes). This is different from the creativity measures. This is only the degree of fantasy

2. Primary group dynamics. If more than one behavior, code the predominant behavior that occurred within the observation. If it is completely equal, code both.

1. **Reticent behavior:**
2. **Solitary-passive behavior:**
3. **Solitary-active behavior:**
4. **Social-passive:**
5. **Social-active**
6. **Teacher-oriented**

6. Was the child involved in group play during the observation?

1. **Yes**
2. **No**

7. Was the play overshadowed by a dominant social group?

1. **Yes**
2. **No**

8. What was the primary leadership status for the entire observation.

1. **Leader**
2. **Joint Leader**
3. **Idea Generator**
4. **Follower**
5. **Collaborator**
6. **NA**

9. How many play increments was the **child playing with another child in the study** (type number)?

10. **Primary emotion level** of the entire observation.

1. **Minimal or No emotions:** almost no emotions evident in play evidence of positive/negative emotions (slight smile, saying "this is fun" in a soft, unexcited voice, slight frown or fret on face, slight scowl, saying "I hate this" in a soft but angry voice).
2. **Minimal/Moderate**
3. **Moderate:** evidence of positive/negative emotions (enduring smile or laughter, saying "this is fun" in excited voice, obvious and/or enduring sadness/anxiety/fear/anger on face or in voice, saying "this is terrible" or "I hate you" in angry voice)
4. **Moderate/Strong**
5. **Strong** evidence of positive/negative emotions (loud laughter, screaming in joy or excitement, loud crying or intense fear, loud screaming in anger, throwing an intense tantrum)

11. **Primary type of affect** for the entire observation.

1. Positive
2. Negative
3. Neutral

Secondary type of affect

0. NA
1. Positive
2. Negative
3. Neutral

Positive Affect: smiling, excited, laughter, happy, joy

0. **Not Codeable**
1. **No Positive Affect**
2. **Minimal Positive Affect**
3. **Moderate positive affect**
4. **Strong positive affect**

Negative Affect frowning, crying, scowl, fear, anger, fear

0. **Not Codeable**
1. **No Negative Affect**
2. **Minimal Negative Affect**
3. **Moderate Negative affect**

4. **Strong Negative affect**

Neutral Affect Neither positive or negative, minimal affective state

0. Not Codeable

1. No Neutral Affect

2. Little Neutral Affect

2. Some Neutral Affect

2. Frequent Neutral Affect

APPENDIX C: IRB APPROVAL LETTER



March 8, 2022

Rebecca Bauer, M.A.
Department of Psychology
College of Arts & Sciences
The University of Alabama
Box 870348

Re: IRB # 21-10-5038 "Creativity in Early Childhood: How Do Fantasy Orientation and Self-Regulation Predict Creativity Across Contextually Distinct Measures?"

Dear Ms. Bauer:

The University of Alabama Institutional Review Board has granted approval for your proposed research. Your protocol has been given exempt approval according to 45 CFR part 46.104(d)(4)(ii) as outlined below:

(4) Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met: (ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;

The approval for your application will lapse on March 7, 2023. If your research will continue beyond this date, please submit the annual report to the IRB as required by University policy before the lapse. Please note, any modifications made in research design, methodology, or procedures must be submitted to and approved by the IRB before implementation. Please submit a final report form when the study is complete.

Good luck with your research.

Sincerely,

A black rectangular redaction box covering the signature of Carpentato T. Myles.

Carpentato T. Myles, MSM, CIM, CIP
Director & Research Compliance Officer

166 Rose Administration Building | Box 870127 | Tuscaloosa, AL 35487-0127 | 205-348-8461
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