BECOMING CREATIVE AGENTS: TRAJECTORIES OF CREATIVE DEVELOPMENT DURING THE TURBULENCE OF EARLY ADOLESCENCE

by

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DISSERTATION ABSTRACT

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Creativity is made up of originality, flexibility, and tolerance for risk and ambiguity, among other intrapersonal and interpersonal facets. These agile creative skills are critically important to survival and fulfillment in today's world. During the turbulent developmental period of early adolescence, creative resources may be highly advantageous for healthy development. However, creativity remains an understudied and undervalued part of student preparation in formal K-12 education. Though many of the creative resources that students develop can be cultivated in the classroom, opportunities remain inequitable and rare.

National trends in divergent thinking suggest an alarming decline in general creative thinking capacity, especially for younger age groups. Systematic declines could indicate intensifying negative environmental influences that stymie creative development. The current body of research is unclear about how creative resources, such as divergent thinking develop, during early adolescence; however, research does indicate that students' creative resources play a role in their academic achievement and important motivational factors.

This dissertation links the study of adolescents' creative development, the potential of long-term experience in multi-arts integration to contribute positively to that

healthy development, and the role of creative development in preparing students for high school and beyond. This study used group-based trajectory modeling techniques to identify distinct trajectories of creative development during middle school and to analyze how those trajectories are influenced by students' motivation, engagement, and experiences in school. Results indicate that higher levels of creative development in ideational fluency, flexibility, and originality were influenced by malleable environmental, adaptive, and affective factors. Growth mindset about abilities, flow experiences, higher engagement in school, and less valuing of social conformity were the most consistent predictors.

Findings also suggest that higher levels of creative development contributed to higher levels of agentic, academic, creative, and school engagement outcomes at medium to very large effects. Overall, this study contributes new understanding about the factors that support positive creative development in early adolescence as well as new evidence to support the role that creative development plays to prepare early adolescent learners for successful pathways in school and life.

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Katz-Buonincontro, J. & Anderson, R.C. (in press). Observation methods for researching creativity: Past approaches and recommendations for advancing the field. *Journal of Creative Behaviors.*

Madison, E., Anderson, R.C., & Bousselot, T. (in press). Self-determined to write: Catalyzing critical thinking, collaboration, and self-direction in middle school. *Reading and Writing Quarterly.*

Anderson, R.C., Graham, M., Kennedy, P., Nelson, N., Stoolmiller, M., Baker, S., & Fien, H. (2019). Student agency at the crux: Mitigating disengagement in middle and high school. *Contemporary Educational Psychology, 56,* 205–217.

Anderson, R.C., & Beard, N. (2018). Envisioning, feeling, and expressing meaning: Training middle level educators to use tableaux vivants to engage students. In P. Howell, S. Faulkner, J. Jones, & J. Carpenter (Eds.), *Preparing middle level educators for 21st Century schools: Enduring beliefs,*

changing times, evolving practices (pp. 271–300). Charlotte, NC: Information Age Publishing.

Katz-Buonincontro, J. & Anderson, R.C. (2018). How do we go from good to great? The need for better observation studies of creativity in education. [Special Issue] *Frontiers in Psychology,* 9(2342).

Anderson, R.C. (2018). Creative engagement: Embodied metaphor, the affective brain, and meaningful learning. *Mind, Brain, and Education, 12*(2), 72–81.

Pitts, C., Anderson, R.C., & Haney, M. (2018). Measure of Instruction for Creative Engagement: Making metacognition, modeling, and creative thinking visible. *Learning Environments Research, 21*(1), 43–59.

Anderson, R.C., & Pitts, C. (2017). Growing sustainable school culture: Arts integration to nourish the soil and the seeds. In R. Rajan and I. Chand O'Neal (Eds.), *Arts evaluation and assessment: Measuring impact in schools and communities* (pp. 117–146). Switzerland: Palgrave MacMillan.

Anderson, R.C. (2017). Brazil: Not all GERMS make you sick. In Y. Zhao and B. Gearin (Eds.), *Dreams and nightmares: Global education reform on the brink of the fourth industrial revolution.* New York, NY: Routledge.

Anderson, R.C., Pitts, C., & Smolkowski, K. (2017). Creative ideation meets relational support: Measuring links between these factors in early adolescence. *Creativity Research Journal, 29*(3), 244–256.

Anderson, R.C., Thier, M., & Pitts, C. (2017). Interpersonal and intrapersonal assessment alternatives: Self-reports, situational judgment tests, and discrete choice experiments. *Learning and Individual Differences, 53,* 47–60.

Thier, M., Smith, J., Pitts, C., & Anderson, R.C. (2016). Influential spheres: Examining actors' perceptions of education governance. *International Journal of Education Policy & Leadership*, 11(9), 1–21.

Anderson, R.C., Guerreiro, M., & Smith, J. (2016). Are all biases bad? Collaborative grounded theory in developmental evaluation of education policy. *Journal of Multidisciplinary Evaluation, 12*(27), 44–57.

Anderson, R.C. (2015). The makers: Creativity and entrepreneurship. In Y. Zhao (Ed.), *Counting What Counts: Reframing Education Evaluation* (pp. 93-108). Bloomington, IN: Solution Tree Press.

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CHAPTER I

INTRODUCTION

Creativity is considered one of the most important assets to the future success of individuals and organizations in an increasingly complex world (IBM, 2010). Business experts refer to this new world of work as a *VUCA* environment, where volatility, uncertainty, complexity, and ambiguity are the new norms (Woodward, 2017). More than 1,500 Chief Executive Officers from 33 industries in 60 countries worldwide agreed that creativity was a key to their company's success (IBM, 2010). Creativity can buttress individuals with adaptability in the face of the unknown (Cohen, 1989)—a proliferating reality in this VUCA world. The IBM survey results suggest that companies composed of individuals with diverse creativity will respond to rapid change nimbly, proactively, and reflectively (Woodward, 2017).

The creative assets sought by organizations parallels what the newest job-seekers, fresh from school, most eagerly pursue. In a recent survey, more than ninety percent of college graduates ranked finding a career that allows them to be creative as one of their highest priorities—ranking higher than starting salary (National Association of Colleges and Employers, 2014). Unfortunately, K-12 educational settings, generally, do not prioritize the development of learners' creativity (Beghetto, 2010) and struggle to incorporate the subtle and often counterintuitive features needed to optimize students' creative development (Beghetto & Kaufman, 2014). This disjuncture between the demands of a fast-changing world and formal educational experience is problematic for the preparation of young people to be productive, healthy, and fulfilled.

Creativity is not a fixed trait or a singular skill. Some researchers (Barbot, Lubart, & Besancon, 2016) specify the different aspects of creativity through person-level *creative resources* that individuals bring to a specific context, such as a classroom. Through a multitude of theories (Kozbelt, Beghetto, & Runco, 2010), the field of creativity research describes these resources with several categories, such as creative thinking, creative behaviors, creative self-beliefs, and creative attitudes. Dimensions, such as tolerance for ambiguity, risk-taking, and openness (Lench, Fukuda, & Anderson, 2015) promote individuals' resiliency and well-being in the face of rapid change. Individuals' mindsets about whether creative growth is possible with focused effort, practice, and development contributes to their creative performance and self-beliefs (Karwowski, 2014). Attitudes and beliefs can play an important role in shaping creative thinking and action (Karwowski & Beghetto, 2018)—creativity cannot be reduced to novel problem solving and idea generation.

Not surprisingly, during a critical period of identity formation—adolescence—creative thinking capacities, such as flexibility, imagination, and managing complexity, support exploration of and commitment to healthy identities (Sica, Ragozini, Di Palma, & Aleni Sestito, 2017a). Generally, the development of an individual's creative resources links to their general well-being (Runco, 2016). For example, higher levels of flexibility help individuals adapt across the lifespan (Guilford, 1968; Runco, 1991). This flexibility, for instance, may provide multiple strategies for people to cope with anxiety (Carlsson, 2002) or stress (Carson & Runco, 1999) and deal with a range of problems they will inevitably face. Importantly, creativity research has shifted largely from a perspective focused on the creative personality—fixed traits—toward a multi-dimensional frame of

malleable behaviors, self-beliefs, mindsets, and thinking processes (Karwowski, 2014; Karwowski & Barbot, 2016; Runco, 2016). This new focus on malleability reinforces that creative resources can be shaped, learned, modeled, encouraged, and assessed in educational settings. For adolescent learners, who are beginning to understand the growing responsibilities they will shoulder, cultivating a rich set of creative resources may be vital to their healthy development and sense of optimism.

At a broader level, a region's investment in the creative economy—such as the number of practicing artists—and in creative opportunities for individuals—such as number of galleries, theaters, and museums—can support local economic health (Florida, 2002, 2014). At face value, the widely accepted evaluation of creativity—the generation of original, flexible, and effective ideas and solutions (Hennessey & Amabile, 1987; Runco & Jaeger, 2012)—seems like a skill that most would agree is critical to prioritize in our community life and in education. Yet, evidence suggests that educational reform and education research continue to hold creative development of students as a fringe priority. Only six articles published from 2007–2017 in top education research journal, *Educational Researcher,* included any meaningful focus on creativity in education. In response to that gap, this dissertation draws on a multidimensional perspective on healthy adolescent development to shine a spotlight on patterns of creative development and their role in preparing learners. The focus of this dissertation follows the logic that investment in adolescents' holistic healthy development, through a focus on their creative resources, can contribute to the enhancement of the individual, local communities, and the world.

This dissertation study takes a person-centered (Nagin, 2005) and social cognitive theory (Bandura, 1986) approach to understanding how creative development in early

adolescence evolves and the role this trajectory plays on readiness for success in school and life. This study will explore the characteristic profiles of developmental trajectories to identify the role of adaptive and agentic characteristics in shaping creative development. Additionally, this study will learn about the role those more adaptive profiles play in determining outcomes of preparedness, including personal agency, engagement in school, creative production and self-beliefs, and academic proficiency. Results from this project can inform improvements to research, policy, and practice in middle school education, shifting focus toward the development of creative resources for healthy adolescent growth. Beyond an exploration of creative development in early adolescence and its role in positive outcomes, this dissertation also studies the potential contributions of arts integrated learning to that development. To begin, available literature is reviewed in relation to four interrelated areas: (a) current practices for creative development in adolescence in school, (b) factors that may influence growth of students' creative resources in adolescence, (c) the potential role of arts integration in that development, and (d) the link between creative development, academic and creative performance, engagement, and student agency.

Challenges to Creativity in the Classroom

Though some research indicates that teachers recognize the societal value of creativity (Anderson & Pitts, 2017; Rubenstein, McCoach, & Siegle, 2013), results from classroom observation suggest that an emphasis on the creative process seldom occurs in practice (Katz-Buonincontro & Anderson, 2018; Pitts, Anderson, & Haney, 2018; Richardson & Mishra, 2018; Schater, Thum, & Zifkin, 2006). Teachers often hold implicit theories about what type of student is more creative and when creativity is

appropriate in classroom learning. Even when a teacher values creativity personally, different beliefs can create a barrier for integration into classroom practice (Gralewski & Karwowski, 2016; Gralewski, Weremczuk, & Karwowski, 2012; Scott, 1999; Seashore, Anderson, & Reidel, 2003). Undoubtedly, teachers' own beliefs about and development in creativity influence if and how they nurture student creativity through their teaching. Research is limited about how teaching for creativity in K–12 education has changed in the past few decades; yet, the evidence of curriculum narrowing to basic literacy and numeracy skills indicates a likely decline in creative opportunities in the classroom (Berliner, 2011; Darling-Hammond, 2007).

This narrowing may be a natural response to increased standardized testing and severity of accountability measures in the Every Student Succeeds Act (Every Student Succeeds Act, 2015) and its predecessors. Those pressures have resulted in the greatest narrowing of curriculum for students who have been historically furthest from opportunity already, and in schools hit hardest by increasing racial and economic segregation (Orfield, 2014). Standardized and scripted curriculum, and the defensive teaching that ensues, increases the focus on tested skills and knowledge and reduces the opportunities for teachers to engage students in the creative process (McNeil, 2002; Sawyer, 2004). In pursuit of homogeneity and conformity of student talent, skill, perspective, and knowledge (Zhao & Gearin, 2016), instructional time spent on non-tested subjects has decreased causing an overall effect of stifled risk-taking and diminished collaboration (Glaveanu & Beghetto, 2017; Kim, 2017). As Glaveanu and Beghetto (2017) detail, prominent individuals in the field of professional development for quality instruction (e.g., Marzano, Ellis, Worthington, and Carnine) promote a paradigm

of *teaching for sameness*. Creativity may be valued by society, at large, but an assortment of pressures and educational traditions continue to push creativity to the fringe of K-12 classroom priorities and counteract its development in students.

Under Siege? Creative Development in Early and Middle Years

Creativity theory from Guilford's (1950) momentous address to current advances in neuroscience (Kleibeuker, De Dreu, & Crone, 2016) highlight the distinct cognitive, metacognitive, and affective processes recruited in creative production and achievement (Kozbelt et al., 2010). From theory on cognitive creative ideation, divergent thinking is the process of generating many ideas (fluency), different types of ideas (flexibility), and novel ideas (originality) in response to either a domain-general or domain-specific challenge and evaluated within a specific cultural context (Barbot, 2018; Runco, 1991). Across the past two decades of increased high stakes accountability in U.S. education policy, research indicates a continued decrease in some important person-level creative resources related to divergent thinking and creative affect. Specifically, domain-general divergent thinking ability, elaborative and reflective thinking, and open-mindedness each declined from 1990 to 2008 across all age groups (Kim, 2011). Additional research suggests those trends continue into the most recent decade (Kim, 2017).

Kim's (2011) conclusions resulted from the comparison of six cohorts of data of Torrance Test for Creative Thinking scores, collected between 1966 and 2008. Those scores were normed across nationally representative samples and contained a range of creative thinking and attitudinal factors. Kim compared scores within age groups across the different generational waves and found some alarming declines, especially for younger age groups during the period covering 1990 to 2008. Specifically, for youth in

Grades 4–6, Kim (2011) concluded that decreases ranged from small to large effect sizes in (a) fluency in the generation of ideas, (b) elaborative and reflective thinking, (c) originality in producing unique and unusual ideas, and (d) emotive and expressive strengths. Kim found increases for this age group in resistance to premature closure and abstractness of titles, but effects were small or statistically not significant.

Importantly, those findings represent one approach to measuring creative potential that uses prompts unrelated to a specific domain. Though the approach has decades of history in the field of psychology and predictive validity of future achievement (Guilford, 1950; Runco & Acar, 2012), it presents one theoretical perspective to creativity research. Notably, that approach contrasts with other perspectives that highlight the domain-specific nature of creative potential, production, and achievement (Baer, 2015, 2016), which suggests that individual's creative potential links to a specific domain, such as music or science (or maybe both), due, in part, to the development of expertise in a domain. Relatedly, the educational context of high-stakes accountability has occurred alongside transformations in the creative process through global connectivity and accessibility enabled by technology (Weinstein, Clark, DiBartolomeo, & Davis, 2014). Integrating technological accessibility with a domain-specific perspective, Weinstein et al. (2014) documented increased creative production in the visual arts of high school students from 1990 to 2011, regarding sophistication, complexity, and less conventionality of student work. They also found decreased creative production and more conventional style in students' creative writing. In conclusion, research comparing recent generations of youth in the United States indicates systematic decreases in several general creative thinking resources; yet, the effects may be more or less severe depending on

domain and specific factor assessed.

The Complexity of Creative Development in Adolescence

It is important to note that systematic decreases within age groups across generations is distinct from developmental changes that might occur naturally during adolescent growth. Research indicates that different fluctuations in creative development likely exist during the adolescent years (Barbot et al., 2016)—a period marked by highly dynamic biological and social growth (Dahl, Allen, Wilbrecht, & Suleiman, 2018; Eccles & Roeser, 2011). However, those fluctuations likely depend on the creative resource measured and opportunities provided in the learning environment (Barbot et al., 2016). Importantly, during the adolescent years, middle and high schools typically provide less curricular freedom for creative opportunities than elementary schools, where creative development may occur across the entire school experience.

Complex concerns about how to structure the educational experience of learners during adolescence have remained largely the same for the past 100 years (Juvonen, Le, Kaganoff, Augustine, & Constant, 2004). Those concerns have emphasized academic preparedness and competition over individual and developmental growth. The result has produced learning conditions that heighten many students' dissatisfaction, disengagement, and emotional distress—all likely negative influences on creative development in school. Healthy identity exploration and commitment are important but difficult developmental tasks during adolescence, and creative development can support that identity formation through at least three pathways (Barbot & Heuser, 2017). Learners can solidify their identity through the creative commitments they make, such as joining a band. Adolescent learners can use creative activities as opportunities for adaptive self-

expression. Additionally, creative thinking processes, such as divergent idea production may enhance the identity exploration and formation process, as research suggests (Sica, Ragozini, Di Palma, & Aleni Sestito, 2017b). For educators to leverage and further cultivate the creative strengths of learners in early adolescence, greater clarity is needed about how this development differs for students, the distinct factors that characterize trajectory profiles, and their relationship to key outcomes. Though creative ideation has been studied for decades (Barbot, 2018), it is uncertain which creative resources are most advantageous and available to learners at different developmental stages.

Past research suggested that a lack of cognitive sophistication limited the creative potential of learners before the early adolescent years (e.g., 10–11 years old; Smith & Carlsson, 1983). Others found that learners in the middle years became more concerned about representational accuracy in visual artwork (Rosenblatt & Winner, 1988) and developed greater evaluative thinking to judge the appropriateness of ideas, which could theoretically decrease the capacity for ideas that are unusual and more original (Runco, 2007). More recently, Kim (2011) identified that students' motivation to elaborate, think reflectively, and think abstractly in their creative production increased across adolescence, while their capacity for original and unusual ideas and their open-mindedness decreased during those same years. However, deciphering the role of the environment from the role of natural developmental changes remains highly speculative and based on results that appear contradictory across a limited number of studies.

From a developmental science perspective, during this early adolescent period the value of social relationships and the pressures to achieve acceptance and a sense of belonging from peers intensifies, dramatically (Dahl et al., 2018). Even though those

pressures could reduce adolescents' willingness to be original for fear of not being accepted, Kleibeuker et al. (2016) found that the quality and originality of divergent thinking responses actually improved across adolescence. From a cognitive and developmental perspective, those improvements may result from a continual increase in knowledge across domains, a growing prefrontal cortex, and maturing cognitive processes that facilitate flexible associations and explorative thinking (Kleibeuker et al., 2016). That growth could also result, in part, from the need in adolescence for risk-taking and seeking of emotional arousal in learning (Dahl et al., 2018). Indeed, the ability for learners to identify and select unusual associations across unrelated categories improves into late adolescence, supporting the perspective that complementary creative resources may mature together through this period of development. However, much of that research results from a laboratory setting where the influence of social and cultural factors is reduced. As such, how those developmental features of creative thinking play out in the dynamic environment of a classroom setting remains unclear.

The same cognitive developmental circumstances explain the advantage afforded by early adolescence for more explorative thinking (Kleibeuker, De Dreu, & Crone, 2013) and greater resistance to premature closure when generating ideas (Kim, 2011). And, yet, the social environment interacts with that cognitive development, playing an outsized role in adolescence. Developmental science identifies "adolescence as a period of social reorientation, which includes increases in sensitivity to social evaluation and the importance of social status and popularity" (Dahl et al., 2018, p. 445). Naturally, the conditions of the learning environment can play a major role in how those sensitivities shape an adolescent learners' expectations, perceptions, and willingness to take creative

risks. Moreover, the biological differences in timing and growth rate of female and male adolescent learners presents another factor that may interact with the environmental conditions of school to influence the creative development in early adolescence (Dahl et al., 2018). For instance, the pressure to fit into a traditional model of masculinity appears to intensify during this important developmental period (Connell, 2005). Analyzing the cognitive and affective processes of early and late adolescence presents the possibility of both creative immaturities and potentials that may be naturally developmental but augmented or diminished by contextual and environmental conditions.

In early adolescence, documented downward trends of divergent thinking during adolescence may be an interaction between the neurological, physiological, and social development underway, the opportunities provided in the environment, and the task used in measurement (Barbot et al., 2016). The research of developmental trends of divergent thinking has spent substantial effort trying to explain specific developmental slumps (e.g., in Grade 4). Explanations appear through sociocultural perspectives, including (a) the effects of critical grade-to-grade transitions in school (He & Wong, 2015), (b) normative effects of more strict classroom environments (Torrance, 1968), (c) cultural differences, such as early emphasis on college entrance exams in China (Yi, Hu, Plucker, & McWilliams, 2013), and (d) socioeconomic characteristics of the students' school and the different educational experiences those characteristics afford (Dai et al., 2012).

Explanations also appear through affective and cognitive perspectives. Temporal gaps in socioemotional and cognitive control systems during adolescent development could explain different slumps in creative ideation development (Barbot & Hunter, 2012); however, research continues to be inconsistent about the external validity and

generalizability of the existence and interpretation of those slumps. The simultaneous peaking of logical reasoning during this developmental phase might limit the expression of explorative and imaginative thinking (Guignard & Lubart, 2017), even while those resources may be accelerating in growth. The role environmental, social, and affective factors play in this development has been studied less than these other areas—a gap this dissertation study aims to begin to fill.

In sum, creative development should play a positive and reciprocal role with healthy identity formation, and cognitive development during adolescence should contribute to creative growth. Additionally, the inconsistent patterns of development and the effectiveness of a wide array of creative ideation trainings (Scott, Leritz, & Mumford, 2004b) suggest that divergent thinking production is a trainable, malleable skill. However, research on the developmental trajectories of creative resources during early adolescence provides contrasting evidence alongside competing theories. In my own systematic review, I found no prior studies researching the characteristics of different profiles of creative development in adolescence longitudinally, using advanced structural equation modeling latent growth techniques (Ram & Grimm, 2009).[1] Most studies, including Kim's (2011) work suggesting a developmental decrease, were cross-sectional. Person-centered analytic techniques, such as group-based trajectory modeling, can provide a new informative illustration of creative development in three ways.

[1] This search sought research that studied creativity with latent growth modeling. I used "group-based trajectory", "latent class", or "growth model" and "creative" or "creativity" as the search terms in any field of the study published in the past ten years. I used the ProQuest Social Science Premium Collection of databases and PsychNET database to conduct these searches. I filtered studies to include only students in late childhood or early adolescence (approximately age 10–14), only peer-reviewed quantitative studies, and only studies conducted in the U.S.

First, the approach can explore the heterogeneity of distinct growth trajectories of creative development in adolescence. Second, the technique can estimate the predictive role of student and environmental factors to distinguish the characteristics of those trajectory groups. Third, classification of students into a distinct trajectory group can illustrate the relationship between creative development and important outcomes (Jung & Wickrama, 2008; Nagin, 2005).

Research on how the educational environment influences growth in creative resources continues to be underdeveloped (Besancon, Fenouillet, & Shankland, 2015). It is likely that the social setting and the individual interact reciprocally in a person-environment ecology. By following a student sample from Grade 6 to 8 and analyzing for distinct patterns of development and the influence of different factors, this dissertation aims to provide further clarity on creative development patterns during adolescence and the role that person-level and environmental factors may play. This study aims to understand how aspects of school-based identity shape students' development of creative ideation during middle school and are influenced by that development, in return. Though this study is limited by the use of a single, domain-general measure of divergent thinking, that measure is both empirically and theoretically key to creative ideation. However, it is expected that the patterns of development detected in this study could vary drastically when task-specific measures were used across different domains such as scientific, social, inventive, musical, or artistic.

Optimal Fit: The School Environment and Creative Development

Given the potential maturities of creative resource development occurring throughout adolescence as well as the overarching influence of the social setting, it is

surprising that social, creative, and expressive opportunities in learning are not prioritized across the curriculum in middle and high school to the same degree they are in elementary school (Armstrong, 2016; Eccles & Roeser, 2011). The environment may play a substantially more powerful role than the effects of natural adolescent growth when considering the cause of any developmental slumps. For instance, consider how social conformity takes shape and influences an adolescent learner. Conformity is an important part of the creative process to know how to shape an original idea to real-world constraints (Beghetto, 2017) within expected norms (Puccio, 2017). However, the pressure of conformity to fit the expectations of others may hold stronger value for a students and teachers than the expression of individuality. In that case, adolescent learners who feel the biological drive for acceptance strongly may be especially reluctant to pursue a divergent path or idea in learning, too different from what is expected.

In their own words, early adolescent students have described the value of unique expression of individuality, the autonomous choices they make to either be different and creative or not, and the intense pressure they experience to conform to the constraints of what is considered "normal" (Anderson, Haney, Pitts, Porter, & Bousselot, 2019). The value for conformity naturally emerges as adolescents become more socially and emotionally aware and driven to seek acceptance. Additionally, social conformity results from the conditions of a typical secondary educational setting that emphasizes and recognizes skills, perspectives, and a narrowly defined academic prowess (Zhao & Gearin, 2016). The power of the educational setting, and the system in which it resides, comes into play when interpreting systematic decreases in divergent thinking presented earlier. During the past few decades, generational decreases in the creative thinking

potential of younger students (Kim, 2011) have coincided with a national commitment to higher academic standards, an intensified testing regimen, and increasing stakes in accountability (Zhao, 2009). Undoubtedly, those conditions could have a large-scale effect at the national (and international) level on creative development and the environment in which students learn and grow (Kim, 2017).

To account for environmental effects, developmental research on creative potential can use an "optimal-fit" lens and consider creative performance outcomes, opportunities afforded by the environment, and the development of person-level creative resources (Barbot et al., 2016). In a school context, the opportunities for creative development depend on multiple forces that may guide a student's approach in different directions. For instance, teachers often wield the power to close the creative opening that a student might generate in a discussion, and, in time, enough restrictive gestures may stymie divergent thinking development (Gadja, Beghetto, & Karwowski, 2017). To a degree, teachers are aware that their modeling of creative thinking, behaviors, self-beliefs, and mindset can play a positive role for adolescent students (Anderson, Porter, & Adkins, 2019). Undoubtedly, teacher-controlled conditions can exacerbate existing marginalization of students (Gray, Hope, & Matthews, 2018). For instance, students identifying with non-dominant race, ethnic, language, cultural, ability, and/or sexual identities may face an even greater pressure to conform to dominant culture norms and ideas in a typical classroom. Teachers can choose to reach curricular goals using multiple modalities, such as artistic forms, or rely on a single format, such as lecture, with little opportunity for relationship-building and individual interpretation, expression, and cultural responsiveness (Hammond, 2015).

Classroom-based forces will have an indirect effect—either harmful or beneficial—on the creative potential realized in any learning task, assessment, or even semester-long engagement in a content area. A supportive environment that cultivates the diversity of creative resources accessible to adolescents may shape the broad set of motivational factors that dictate a learner's disposition to a learning experience (Beghetto, 2016). Some of those factors may include extrinsic and intrinsic motivation (Ryan & Deci, 2000), utility value (Wigfield, 1994), and situational and individual interest (Hidi & Ann Renninger, 2006), among others. Not surprisingly, Guilford's (1950) seminal invitation to the psychological research community framed the experience of new learning as itself a creative act.

In their literature review Jindal-Snape et al. (2013) organized the concept of environmental influences on creative development in school around three components: (a) the physical structure, use of space, and access to materials (b) the pedagogical choices, resources, and philosophy, and (c) the partnerships beyond the school that can be critical to cultivating creative opportunities. The environmental forces that link to those components, such as how conformity in thinking is emphasized or discouraged (Beghetto, 2017), can explain as much variance as a wide range of individual factors (e.g., personality, thinking style, and knowledge) in the development of creative resources (Niu, 2007). Indeed, Jindal-Snape et al. (2013) found positive links between creative learning environments and students' motivation and socioemotional growth. Unfortunately, two decades of education research indicates that the person-environment fit between typical middle schools and early adolescent development, especially regarding motivational and identity formation, is far from optimal (Eccles & Roeser,

2011; Roeser, Eccles, & Sameroff, 1998). That misalignment likely extends to creative development, as well.

Establishing Environmental Fit for Creative Development Through the Arts

Decades of research suggests that the development of creative resources, such as divergent thinking, can be targeted and developed by different types of training (Scott, Leritz, & Mumford, 2004; Torrance, 1972). To design training to foster students' creative resources requires consideration of many interacting influences and the specific resources of interest (Silvia, Christensen, & Cotter, 2016). As discussed earlier, focusing only on cognitive capacities is unlikely to result in increased creative performance in the social setting of a classroom in adolescence. The recent model of creative behavior as agentic action (Karwowski & Beghetto, 2018) resonated with the middle school student perspective (Anderson, Haney, et al., 2019) and suggests that self-beliefs about and valuing of creativity may shape how creative potential becomes creative behavior.

When considering an optimal approach to cultivating multiple resources, simultaneously—especially attitude and self-beliefs—the arts present a unique solution. Research has found that learning across arts disciplines engages learners in creative skills and habits such as visual-spatial ability, reflection, self-criticism, persistence, and openness to experimenting with ideas and learning from mistakes (Hetland, Winner, Veenema, & Sheridan, 2013; Winner & Hetland, 2008). And yet, arts-based training interventions were not included by Scott et al. (2004) in their survey of the field of creativity training. Additionally, a recent meta-analysis of the effects of arts education across international contexts found few rigorous studies undertaken to research the effects of arts education on different dimensions of creativity (Winner, Goldstein, &

Vincent-Lancrin, 2013). Unfortunately, that gap leaves a paucity of research to build theory and inform the design of rigorous arts-based training for creative development in adolescence.

For the most part, correlational studies provide some evidence that engagement in the arts supports development of creative resources in the cognitive domain (Winner et al., 2013). The advantage of applying the arts to the development of creative resources in adolescence may relate as much to the underlying motivational, socioemotional, and cultural factors as to specific cognitive elements of creativity that transfer across domains. A longitudinal, correlational study with a nationally representative sample indicated that students of low socioeconomic status with a history of in-depth arts engagement demonstrated better academic outcomes and civic engagement than peers with low involvement in the arts (Catterall, 2012). Moreover, across 47 studies, learning experiences that integrated drama training and experiences had a positive effect on 21st century skills (including creativity), attitudes toward academic domain, and motivation (Lee, Patall, Cawthon, & Steingut, 2015). A large study of recent Texas high school graduates showed a substantially lower risk of dropping out for students who completed just a single art course in high school (Thomas, Singh, & Klopfenstein, 2015). Those results point to the potential for an ecological boost to student motivation and engagement in school. Unfortunately, research on this potential role of the arts has been mostly absent in learning sciences research and interventions (Peppler & Davis, 2010). In my own systematic review, I found no research connecting factors of adolescent agency,

creative development, and the arts.[2]

Generally, the field can organize research relating arts learning to growth in skill and affect through four avenues linked to adolescent development (Peppler & Davis, 2010): (a) aesthetic experiences and qualities of the inquiry process (Deasy, 2002; Eisner, 2002); (b) the restorative and transformative effects of art making (Ebert, Hoffmann, Ivcevic, Phan, & Brackett, 2015) that motivate students to learn (Deasy, 2002; Eisner, 2002; Peppler, Powell, Thompson, & Catterall, 2014); (c) the process of discovery about the self and others (Catterall & Peppler, 2007; Greene, 1995) that builds awareness of systems of inequality (Deasy, 2002; Dewey, 1934); and (d) the expressive potential of the arts as a literacy form capable of communicating meaning across modalities (Jewitt & Kress, 2003; Jewitt, Kress, & Ogborn, 2001). With those dimensions in mind, the inconclusive links between arts learning and academic achievement from past research may be due, in part, to the narrow set of outcomes studied and the oversimplified conceptual model of transfer between domains (Winner et al., 2013). Considering the multidimensional effects of the arts on individuals, the outcomes of interest should be multidimensional, as well.

Issues of access and equity. The positive effects of arts learning on student development raises questions about the current state of equitable access to arts learning

[2] To keep the search broad and inclusive enough, I specified general terms from each of the three areas of interest: "creative" or "creativity", "art", and "agency". I required that the terms be included in the abstract to ensure that they were a meaningful aspect of the study. I made slight modifications to the search by replacing "agency" with "self-efficacy" as self-efficacy is a commonly researched component of agency. I used the ProQuest Social Science Premium Collection of databases and PsychNET database to conduct these searches from the past ten years. I filtered studies to include only students in late childhood or early adolescence (approximately age 10–14), only peer-reviewed quantitative studies, and only studies conducted in the U.S.

opportunities. Access to arts education in schools nationwide has decreased (Dwyer, 2011; Government Accountability Office, 2009), but the loss of hours per week for arts instruction was greater in rural schools and in schools serving high proportions of historically marginalized students furthest from opportunity. Even though state arts education requirements have remained relatively stable, state funding levels have steadily decreased (GAO, 2009). School officials reported the top reasons for this slow disintegration of access to the arts included the squeeze on state and local funding, competing demands for instructional time (GAO, 2009), and constraints and pressures of high stakes testing in core academic areas (Dwyer, 2011). In response to this concern, an approach that carefully integrates the arts with learning across school subjects has grown, substantially.

Arts integration across adolescent learning. Arts integration is not a new idea. During the early debates of how curriculum should be organized, the philosopher John Dewey argued for the interdependence of knowledge across domains and the relationship between that knowledge and the human drive for intellectual curiosity (Kliebard, 2004). For decades, different forms of curriculum integration, such as project-based learning, formed to counteract the challenges of subject-specific curriculum isolation (Burnaford, Brown, Doherty, & McLaughlin, 2007). When the Consortium of National Arts Education Associations endorsed the interdisciplinary integration of arts learning across academic domains as a means to enhance teaching and learning, they also warned that arts integration should not replace sequential discipline-specific arts instruction (Burnaford et al., 2007). In response to growing interest, arts integration models have proliferated to cultivate positive climate for creative engagement and academic success

across whole schools (e.g., Noblit, Corbett, Wilson, & McKinney, 2009). However, research on the effectiveness of those models remains largely developmental (Ludwig, Boyle, & Lindsay, 2017).

Arts integration can take different forms for different purposes (Burnaford et al., 2007). This interdisciplinary learning process can build on cognitive, socioemotional, and metacognitive benefits to develop students' creative resources (Anderson & Pitts, 2017; Burnaford et al., 2007). Arts integration can develop conceptual connections across the school curriculum and result in parallel processes in learning, where students might learn to observe carefully while viewing works of art while also attending to math skill development, for instance (Housen, 2001; Yenawine, 2003). Naturally, arts integration encourages collaborative engagement between school- and community-based educators with different specialization. That process can result in learning opportunities that build on students' unique resources and interpretations and engages them actively in the community (Burnaford et al., 2007). Those aspects of arts integration align with the suggestions from developmental science, such as creating opportunities for positive risk-taking in emotionally arousing learning and enhancing opportunities for collaborative social learning (Dahl et al., 2018). When considering how to weave the arts into other academic domains, recent developments in creative learning theory (Beghetto, 2016) bridge to theories informing arts integration practices (Burnaford et al., 2007) and align with the qualities of the arts integrated learning experiences that are most salient to adolescent leaners (Anderson, 2018; Anderson et al., 2019).

Given the high degree of variation in the design and implementation of multi-arts integration, research and evaluation of its effect on learning outcomes varies in quality

and rigor. Unfortunately, the few studies published since 2000 that meet rigorous research design standards focus on middle school students experience at an art museum not their experience applying artistic practices in other content learning (Ludwig et al., 2017). Some research suggests that high quality multi-arts integration can contribute to math achievement, creativity, critical thinking, self-efficacy, motivation, cooperation, and student engagement for students disadvantaged by socioeconomic inequities (Robinson, 2013). To date, most research on arts integration practices provide promising evidence that builds on a research- or theory-based rationale, only (Ludwig et al., 2017). Few studies exist that provide rigorous, empirical results to inform the decision-making of schools and educators. As such, the field can benefit from new research to clarify the potential role of arts integration to contribute to creative development during adolescence to prepare students for bright futures in their lifelong pursuits.

Creativity, Academic Achievement, and Motivational Mechanisms

At the granular level of moments in learning, a sociocultural perspective on creativity suggests that the creative learning process in a school environment is culturally mediated action (Glaveanu et al., 2019) containing internalized and externalized stages driven by the sociocultural forces of that context (Anderson et al., 2019). As such, creative learning in a classroom is both intrapersonal—part of the individual's act of learning—and interpersonal—learning as a creative act that may contribute to the learning of others (Beghetto, 2016). From the student perspective, numerous opportunities arise for both person-level motivation and environmental influences to play a reciprocal role and affect creative development (Anderson, Haney, et al., 2019). For instance, when students make a mistake, the teacher's pedagogical response will play a

role in shaping students' motivation to take creative risks and express their ideas publicly. Middle school students have shared how important those mistakes can be to illustrate the individuality of each students' perspective and composition of creative resources (Anderson et al., 2019). As with specific academic content, such as learning in science (Schmidt, Kafkas, Maier, Shumow, & Kackar-Cam, 2018), whether or not teachers reinforce the value and relevance of creative growth may shape learners' perceived value of creative risk-taking, thinking, and behavior.

In a classroom, any form of response is some type of feedback. With enough negative experiences of correction to a single *right* approach or unintentional reinforcement about fixed ability beliefs, a learner's creative aspirations may undergo creative mortification (Beghetto & Dilley, 2017). Theoretically, this mortification process should contribute to greater disengagement in school for students and the degradation of their own self-beliefs about both academic agency and creative self-concept. That process may explain, in part, why high school students with creative strengths tend to dropout from anticreative environments (Kim & Hull, 2012). However, for those students whose creative development is buffered by enough protective factors, their creative potential should support their academic achievement, and vice versa.

A recent meta-analysis established a link between creative resources and academic achievement (Gajda, Karwowski, & Beghetto, 2016). That research found, on average, a small-to-medium effect for the association between some person-level creative resources and academic achievement. This effect was substantially larger for students in middle school compared to elementary school and high school. Those results reinforce what research has suggested for decades (Hennessey, 2015; Hennessey & Amabile,

1987)—cognitive creative resources, such as divergent thinking, can play a role in the processing, attainment, motives, and application of new knowledge and learning skills relevant to school (Gajda et al., 2016). Alongside a small, but growing, body of developmental research on creativity (Barbot, 2019), those results suggest that the early adolescent period during middle school may be a time of critical growth in creative abilities and those abilities play a supportive role in academic engagement and achievement. To clarify the mechanisms at play in this link between creative resources and academic achievement requires the consideration of underlying motivational factors (Hennessey & Amabile, 1987). As the model of creative behavior as agentic action suggests, social cognitive theory on human agency encourages a multi-faceted perspective to account for both the conditioned and agentic nature of creative development. Indeed, the effects of systemic socioeconomic inequity in school resources on creative potential can be moderated by person-level motivation factors, such as intrinsic motivation to engage in cognitively demanding learning (Dai et al., 2012).

An integrated model of overlapping theories. The field of creativity research has developed complementary *systems*, *componential*, and *developmental* theories (Kozbelt et al., 2010) to illustrate the interaction of (a) individual's motivational orientation, (b) the experiences that condition that motivation, and (c) resulting creative development and performance. A recent manifesto from 20 creativity scholars (Glaveanu et al., 2019) further conceptualizes creativity as embedded within and emergent from the complex sociocultural context in which it is developed and expressed. Though componential theories elucidate stages of the creative process across different contexts, they largely ignore the role of the sociocultural context and personal affect toward

creativity of the individual. Developmental theories of creativity situate other theories within a longitudinal frame to take into account the sociocultural context, biological processes, and individual characteristics of the person. A model to understand creative development that focuses on both ability (e.g., dispositions, knowledge, and skills), motivation (e.g., goals, drive, and persistence), and context (e.g., social and cultural factors) can thoughtfully build on those theories and help to understand the role of different environmental conditions (Silvia et al., 2016).

The current state of research reinforces the need for such a multidimensional model. The model of creative behavior as agentic action (Karwowski & Beghetto, 2018) begins that endeavor with supportive empirical evidence and alignment to the middle school context for adolescents. In order for an individual to transform their creative potential into creative action, they need to have confidence in their ability to do so and believe that there is value in making that effort—creative behavior requires a decision to behave creatively. In early adolescence, the learning conditions and instructional approach will play a role in how that confidence and valuation develops or diminishes for the individual and community of learners (Anderson et al., 2019).

In addition to the role of motivation in creative action, past research across international contexts links creative development to various motivation and identity factors in academic learning. The creative self-beliefs of secondary school students in the United Kingdom predicted intrinsic and extrinsic motivation and literacy achievement at similar levels (Putwain, Kearsley, & Symes, 2012). Research with a sample of Taiwanese junior high school students revealed links between mastery goal structure of a classroom and divergent idea production. Those findings suggest mastery goal structures may shape

students' intrinsic and self-regulated autonomous motivations in mathematics learning, which in turn may support greater fluency in divergent thinking (Peng, Cherng, Chen, & Lin, 2013). Similarly, a Turkish sample of 9th grade students demonstrated that intrinsic goal orientation and openness to experience predicted mathematical creative performance (Erbas & Bas, 2015). Across age groups, extensive research indicates that intrinsic interest and enjoyment in the challenge of the work is a critical force for continued engagement and risk-taking in creative endeavors (Hennessey & Amabile, 2010; Lepper, 1988). In sum, though limited, research in adolescence suggests that learning conditions can foster individual interest, challenge, and enjoyment—key ingredients to a *flow* experience (Csikszentmihalyi, 1997)—as well as creative self-beliefs aimed at individual mastery. Those motivational factors promote creative performance in various types of creative tasks. However, it remains unclear if the experience of flow in learning, creative self-beliefs, and growth-oriented mindset about ability characterize positive creative development across the early adolescent period of development. This study responds to the need for further research about those relationships.

An adaptive affect toward creative growth. A state of flow in learning in school reflects an intense focus and enjoyment in a productive challenge (Csikszentmihalyi & Rathunde, 1993). An absence of flow in learning could result from disinterest, boredom, or a challenge level beyond the grasp of student skill level attainment. Naturally, more experiences of intrinsic enjoyment, deep concentration, and interest in school could lead to a consistently greater focus, persistence, and performance on creative tasks across middle school courses. Several other factors may play a role in the development of students' academic and creative development and identity formation during early

adolescence. A fixed versus growth mindset about the malleability of ability through dedicated effort can buffer students' academic engagement against the negative effects of poverty (Claro, Paunesku, & Dweck, 2016). That growth orientation undergirds students' orientation toward risk, challenge, and effort in learning, and should play an adaptive role in creative development and sense of self in the school setting. Students' self-confidence in their creative ideas (Karwowski & Barbot, 2016) should be another adaptive person-level factor influencing adolescents' sense of creative self and the cognitive and conative resources that will result in creative potential development. Theoretically, those three malleable adaptive factors at the onset of adolescence—flow experiences in learning, growth mindset, and creative ideational confidence—should influence the type of creative development that students demonstrate across the middle school years. Those three factors undergird the individual agentic nature of creative development .

A maladaptive affect undermining creative growth. Similarly, certain maladaptive factors should also play a role in that creative development. Creative risk-taking in a social environment becomes heightened during early adolescence (Anderson et al., 2019) and requires breaking from the norms and expectations of others. As such, a tendency to value conformity at the onset of adolescence should relate to a decline in creative development during this developmental period when peer approval is so crucial (Dahl et al., 2018). A value of conformity would also likely reflect an underdeveloped creative identity. Two other maladaptive factors—anxiety in school and affective disengagement—should also influence a decline in the development of creative resources during adolescence and reflect a less developed academic identity. Heightened anxiety over performance in school could result in suppressed creative performance in the context

of middle school if the stakes of an assessment feel high enough. Affective disengagement to school is linked to weaker sense of agency, lower attendance, and weaker academic performance (Anderson, Graham, et al., 2019). This harmful effect on agency and overall negative affect toward school would likely decrease the motivation, interest, and persistence required to demonstrate creative development during adolescence in a school setting.

Environmental and personal factors. Though scant empirical research describes the influence of the environment on creative development in adolescence, the classroom environment dictates learning opportunities, contextual cues, and curricular experiences that shape a students' learning experiences. The larger culture and climate of the school plays an overarching role in shaping that classroom experience (Wang & Degol, 2016). Consistent opportunities to learn in different subject areas through a creative process in different artforms (i.e., arts integration) should influence students' trajectory of creative demonstration and development during this dynamic early adolescent period. However, the influence of those experiences confronts the influence of earlier experiences prior to middle school and the existing expectations, opportunities, and culture that surround those creative opportunities in the broader ecology of the school. Moreover, the degree to which interdisciplinary experiences in artistic domains can shift toward and sustain positive creative development trajectories across a 3-year period remains unclear. The difficulty of initiating and sustaining a schoolwide approach is well-documented (Anderson & Pitts, 2017; Noblit et al., 2009)

Middle school students have expressed that the level of support for creativity they perceive in their school plays a role in their willingness to engage, take risks, and grow in

their creative resources (Anderson, Haney, et al., 2019). Student agency in learning is a combination of both person-level factors, such as self-efficacy and perceived control, and interpersonal factors such as relational support from others and vicarious experience and encouragement (Bandura, 1986, 2000). How students' perceive support for creativity in the classroom also relates to their unique person-environment fit. Regarding creative development, perceived support from teachers for creativity, in addition to arts integration experience, may play a role in that development. Figure 1 provides an illustration of these potential influences on different trajectories of creative growth.

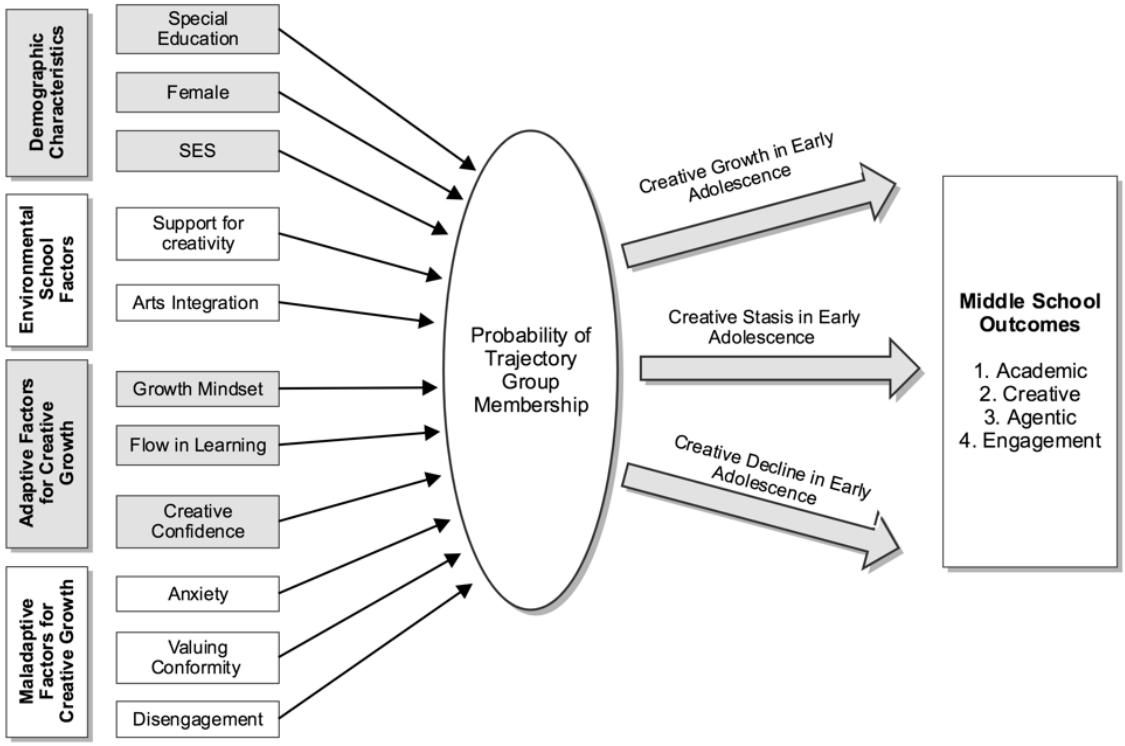

Figure 1. Model structure and baseline factors at the onset of adolescence and middle school, which could influence creative growth, stasis, decline, or other developmental patterns.

Importantly, access to financial resources at home and in the surrounding neighborhood will undoubtedly play a role in students' opportunity for creative development prior to and during early adolescence (Besancon et al., 2015; Dai et al., 2012; Schater et al., 2006). The different cognitive and social-emotional differences of students receiving special education support may also play a role in the demonstration of creative development trajectories in the context of this study and should be included as a control. Empirical work to detect differences in creative potential due to sex have been inconclusive from both biological and sociocultural perspectives; however, sociocultural differences have been more widely discussed (Abraham, 2016). Whereas men have demonstrated higher levels of creative achievement in the past, a sociocultural perspective would suggest that increases in gender equality should advantage young women. Conversely, the sociocultural stressors of masculinity norms experienced by boys at continually younger ages could disadvantage adolescent males (Connell, 2005; Marasco, 2018). As such, students' sex should explain some differences in classification into distinct trajectories of creative development and should be included as a correlate. The inclusion of student sex as a control variable should help to clarify the role of other factors that likely covary with sex; however, sex could demonstrate an explanatory role.

Creative Resources and Outcomes for Healthy Adolescent Development

As previously mentioned, the development of creative resources can support learners' resilience, academic achievement, and motivation. Therefore, creative development, and any positive influence of environmental factors on that development, should consider a multidimensional array of outcomes that capture a students' holistic readiness for success in high school and beyond. This dissertation includes multiple

dimensions that relate to students' creative development, sense of personal agency, creative production and self-beliefs, and preparedness for future success. I frame these outcomes through the following four domains: (a) academic, (b) creative, (c) agentic, (d) and engagement.

In addition to its link to academic achievement, creative growth in middle school may support other important aspects of healthy adolescent development. From a social cognitive perspective, human agency (Bandura, 1986, 2000) links students' self-efficacy, sense of control, and personal value in education to future success in school. From research, we know that aspects of agency play a role in student achievement and can be instrumental in students' capacity to break the cycle of systematic disadvantage in education (Burger & Walk, 2016). Through self-efficacy and perceived control, student agency is a protective factor from deteriorating engagement in middle school and high school, leading to higher academic performance (Anderson, Graham, et al., 2019). Given that agentic factors of self-efficacy and perceived value of creativity mediate the link between creative potential and creative behavior (Karwowski & Beghetto, 2018), higher creative development during middle school should predict higher levels of personal agency in school. From that agentic perspective, creative thought and action are personal decisions, and, developmentally, more robust creative development during early adolescence should result in greater agentic potential of the individual.

Academically, students' literacy skills for writing and mathematics skills in problem-solving serve as important cognitive outcomes that greater creative development should influence, positively (Gajda et al., 2016). Creatively, students' skills to imagine, create, and describe a novel idea, such as a newly imagined mythological creature, should

relate to their development across middle school as flexible, generative thinkers and makers. Additionally, creative growth during middle school should support greater creative self-concept in school—an important self-belief about their creative potential in the social school context. Finally, students' overall affective engagement toward school predicts the likelihood that they will participate and perform proactively in high school (Anderson, Graham, et al., 2019). The possibility that higher levels of creative development during middle school relate to an adolescent's overall engagement in school highlights the importance of environment-fit in creative development and the potential of creative development to serve as a protective factor for positive school outcomes.

Summary

Creative development in early adolescence remains an understudied and undervalued part of student preparation in formal education during a key developmental period. This current state of the education field is unfortunate given (a) the many benefits that diverse creative resources provide an individual across the lifespan and (b) the interconnectedness of creative development, identity formation, and preparedness for school success. Many of those creative resources are shaped substantially by the environment; yet, classroom opportunities remain inequitable and rare. Inaction may be due, in part, to continued uncertainties. How students' creative resources *actually* develop differently, which resources may be most advantageous, and how that development links to other outcomes are valuable questions to provide more clarity.

Recent evidence suggests that this period can be a time of maturity for many complementary creative resources. Unfortunately, the pressures from the standards and accountability movement have enforced a rigidity that counteracts efforts to develop

them, limiting critical opportunities in the arts, among other creative domains. A new movement of arts integration builds students' artistic and academic strengths simultaneously; yet, robust knowledge about the role of arts integration on creative development and healthy adolescent growth remains limited. This study breaks new ground by linking different types of development of creative thinking potential across the middle school years with environmental and adaptive and maladaptive characteristics at the onset of adolescence and creative, agentic, academic, and school engagement outcomes in preparation for high school and beyond.

As described previously, a body of research connects creative resources in adolescence to a variety of important outcomes and mechanisms of success; yet, the field can benefit from person-centered, descriptive longitudinal modeling to understand how this development takes shape during the critical years of middle school. This proposed study undertakes the challenge of converging multiple fields to support a shift in how we design educational experiences and environments to ensure learners thrive during the turbulent period of early adolescence.

Context of Study

In this study, I cross-referenced variables identified in the literature search with the variables that were available in the extant data set used in this study. The extant dataset was collected for program evaluation purposes and includes a large sample of middle school students ($N \sim 1{,}300$) from eight middle schools in the Pacific Northwest. Four of those schools received an intensive and long-term multi-arts integration schoolwide intervention as part of a federally funded Arts in Education Model

Development and Dissemination project.[3] The other four schools were selected as non-equivalent comparison sites located in the same school districts as intervention schools with similar neighborhood and student demographic characteristics and curricular and instructional programs. This dataset was selected for this research due to clear alignment of variables of interest, longitudinal measurement, diverse student sample, the nature of the intervention, and the goals of the study.

Research Questions

For this study, I used group-based trajectory modeling (Nagin, 2005), also known as latent class growth analysis (Jung & Wickrama, 2008), to model change in student divergent thinking and detect different homogenous subgroups, or latent classes, of student growth in three factors of creative ideation. That modeling approach allowed me to explore how different profiles of adaptive, maladaptive, and environmental characteristics, including intensive multi-arts integration during middle school may influence students' trajectories of divergent thinking fluency, originality, and flexibility. The approach to detecting distinct homogenous groups of creative growth set up analyses to link patterns of growth in divergent thinking to multidimensional outcomes of interest. The aims of this study address three research questions.

1. How many distinct latent trajectory groups of divergent thinking fluency, originality, flexibility, and composite divergent thinking are present for students during middle school Grades 6–8 and how do the patterns of change differ across groups?

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[3] The U.S. Department of Education grant that developed the extant dataset of interest was award number U351D140063.

2. Do students' (a) demographic characteristics, (b) environmental factors of participation in the multi-arts integration and sense of support for creativity, (c) adaptive factors of flow in learning, growth mindset, and creative confidence, and (d) maladaptive factors of anxiety in learning, disengagement, and value of conformity predict membership in distinct latent trajectory groups of divergent thinking?
3. Does membership in classes of higher divergent thinking development contribute to higher levels of students' academic, creative, agentic, and engagement outcomes?

Hypotheses

As explored in the previous sections, past research has found both increases and decreases in divergent thinking for the age group of interest. Based on those mixed findings, I expected to find at least three distinct latent classes representing trajectories of increasing, decreasing, and low but stable levels of divergent thinking during middle school. I expected some trajectories would follow linear trends, and others would follow unstable, fluctuating patterns. Given the conceptual differences represented by fluency, flexibility, and originality in divergent thinking, I believed each factor would demonstrate model solutions with different types of trajectories and numbers of groups. Based on the research reviewed previously, I expected that experience in arts integrated academic learning in middle school and higher levels of perceived support for creativity would predict higher or more positive trajectories in divergent thinking factors. While higher levels in adaptive factors should predict greater likelihood of membership in higher trajectory groups, higher levels of maladaptive factors should predict a lower likelihood

of membership in the higher trajectory groups. Similarly, I expected that higher levels or growth trajectories in divergent thinking fluency, originality, and flexibility would lead to higher performance in academic, creative, agentic, and engagement outcomes.

CHAPTER II

METHOD

Exploratory in nature, this dissertation study used group-based trajectory modeling (Nagin, 2005) to understand the nature of how divergent thinking, a complex underlying construct of creative potential, changes over time for a diverse population of students. Given the inconsistent fluctuations detected in past research, it is highly likely that trajectories of change may not follow a single homogenous pattern, such as stability or decline, and that if distinctive patterns exist they may have distinctive etiologies. Latent growth curve models and hierarchical modeling estimate a single homogenous growth curve based on the assumption of continuous distribution functions. Those approaches generate unconditional models with a mean and covariance structure, estimating individual-level differences by relating parameters to explanatory or control variables (Grimm, Mazza, & Mazzocco, 2016). Both approaches build from a multivariate normal distribution and assume that estimated parameters are continuously distributed throughout the population. In contrast to the assumptions of latent growth curve and hierarchical models for a continuously distributed function explained by a multivariate normal distribution, group-based trajectory modeling assumes that there may be multiple groupings of distinctive developmental trajectories that may be shaped by distinctive characteristics. In group-based trajectory modeling, differences that may explain or predict individual-level heterogeneity in developmental trajectories can be conceptualized as group differences, even though groups are statistical approximations of a complex reality, not real entities.

Group-based trajectory modeling tests the assumption that more than one longitudinal function exists. Rather than aiming to account for individual variability about the mean trajectory of development for a population, group-based trajectory modeling frames questions and draws inferences around distinct groups. Because past research has found contrasting trajectory patterns for creative development in adolescence, this current study assumes that multiple distinct groupings exist, and that the etiology of each trajectory group will be distinctive, deepening understanding about the characteristic profiles of adolescents' creative development. A single growth curve limits the ability to understand which characteristics shape a growth, stable, declining, or fluctuating pattern and the role those patterns play in determining outcomes. The information lost by fitting longitudinal divergent thinking data to a single trajectory limits the field's ability to understand if distinct patterns of change exist during early adolescence and what those patterns mean for adolescent development. Moreover, past research suggests (Eye & Bogat, 2006) that the single growth curve modeling approach can obscure the true nature of change and may even result in misleading conclusions if patterns vary in substantively important ways. To pursue my research questions and test hypotheses, I followed the outline below.

To begin, I conducted initial data preparation, missing data analysis, and diagnostic data analysis and visualization using R software (R Core Team, 2016). I report those diagnostic data visualizations in Appendix A. After visualizing the data descriptively to identify issues or anomalies, I observed the overall trend of divergent thinking during middle school by illustrating the means across five waves of data collection (see Table 1; Wave 6 did not include divergent thinking and included

outcomes only). I explored potentially distinct trajectory patterns of divergent thinking growth in middle school to address Research Question 1 by conducting group-based trajectory analysis (Jones & Nagin, 2007; Jones, Nagin, & Roeder, 2001), also known as latent class growth analysis (Jung & Wickrama, 2008). Group-based trajectory modeling provides a rigorous exploratory method to determine if the sample includes heterogenous trajectory groups of students with unique patterns of divergent thinking performance during middle school.

Table 1.
Descriptions of Longitudinal Waves of Data and Measurement Intervals

Wave	Fall	Winter	Spring
Wave 1: 0 months	2015; 6th grade	-	-
Wave 2: 7 months	-	-	2016; 6th grade
Wave 3: 14 months	-	2017; 7th grade	-
Wave 4: 19 months	-	-	2017; 7th grade
Wave 5: 26 months	-	2018; 8th grade	-
Wave 6: 31 months	-	-	2018; 8th grade

Once the number of distinct classes of trajectories were identified, I addressed Research Question 2 by testing baseline predictors to detect the impact of each predictor on each distinct trajectory class. During the class enumeration phase, where I select the solution of latent classes with the best substantive and statistical fit, I used the influence of those predictors as the primary substantive checking procedure. That substantive checking approach ensures that a statistical solution forms practically and meaningfully distinct groups (Nylund-Gibson & Choi, 2018). This step clarified which individual and environmental characteristics played a role in higher trajectories of divergent thinking

development in middle school. To address Research Question 3, I conducted analysis of variance to compare outcome variables across distinct trajectory groups. This step determined whether membership in any of the trajectory groups indicated higher or lower levels of the academic, creative, agentic, and engagement outcomes.

Sample

The analytic sample for this study included a sample of middle-school students from the Pacific Northwest, who began Grade 6 in 2015 and completed Grade 8 in 2018. When this sample of students were in Grade 6, past research described the sample as approximately n = 1,025 students (Anderson et al., 2017), and that sample increased to N = 1,299 by Grade 8 with new students joining and others leaving. Table 2 illustrates that 52.4% of the sample were male; 6.1% had been identified as English language learners at some point in middle school and 16.1% were identified for special education services at some point in middle school.

The total analytic sample that progressed from Grades 6–8 during the three-year period included a high degree of attrition. At 58% across the whole sample, the percentage of students eligible for free or reduced meals demonstrates a sample facing socioeconomic challenges that often result in disruptive transitions between neighborhoods and schools. These students attended schools serving some of the highest proportions of students and families marginalized by socioeconomic factors in the local county and state. As such, the total analytic sample included considerable missing data for students who either entered the schools after Grade 6 began, exited before the end of Grade 8, transitioned in and out of the a participating school multiple times, or was not in attendance for the assessment administrations. Analyses in this study included data from

all students who consented to participate in the research study as long as they were able to participate in at least one assessment of divergent thinking.

Table 2.
Descriptive Statistics of the Study Sample in Grade 6

Student Characteristic	Percent of Sample (n = 1,299)
Race	
White	67.4
Hispanic	20.0
Multiracial	8.2
Black	1.1
American Indian/Alaskan Native	1.4
Asian	1.4
Native Hawaiian/Pacific Islander	0.4
Gender	
Male	52.4
Other characteristics	
English language learner	6.3
Special education	16.1
Arts integration treatment	49.2

In group-based trajectory models it is important to ensure that *observed* characteristics of students do not fully explain the *unobserved* latent classes identified in the model. For instance, it is possible that male students demonstrate a distinct trajectory from female students in their divergent thinking development due to some of social, psychological, and biological factors discussed previously. It is important to identify the role that individual-level characteristics play in determining likelihood of membership in distinct trajectories that emerge from the data.

Setting

As reported in prior research, participating students attended N = 8 middle schools

in four school districts (Anderson et al., 2017; Anderson & Pitts, 2017). Those schools represent fringe rural and urban locales in small and mid-size pacific northwest towns and cities, according to the National Center for Education Statistics (US Department of Education, 2018). Data indicates that these schools are in a county where 90.1% of the population is White and 20% of persons live below the poverty level. According to Oregon Department of Education data, the participating middle schools served a student population that ranged from 50–95% economically disadvantaged, consistently over several years. That descriptive profile suggests that the middle school setting of the analytic sample represents higher than average concentration of students historically marginalized by socioeconomic or racialized circumstances.

Research indicates that middle school settings with this kind of concentration are often characterized by a number of challenges, such as high student mobility, leadership and teacher turnover, lack of adequate resources, and an assortment of often competing school improvement initiatives (Darling-Hammond, 2010). According to past research conducted with this analytic sample (Anderson et al., 2017; Anderson & Pitts, 2017), half of the schools included in the study had been selected by district officials for a school improvement project to support student engagement and student growth in math and reading achievement through arts integration in curriculum and instruction. The other four schools were identified as non-equivalent comparison sites, similar in student demographic composition, instructional practices, past academic achievement, and school policies. The circumstances of this selection process present possible selection biases that might explain the presence or lack of effects attributed to the treatment variable for arts integrated learning. For instance, the effects of higher concentrations of poverty in most

of the arts integration treatment schools may play a role in both initial level and change in divergent thinking. Concentrations of students with more financial resources in comparison sites may have had more opportunities to develop their creative resources outside of school, as well, which could decrease actual effects or create trends that are more difficult to disrupt during the middle school years.

Procedures

Most variables included in the data set, including divergent thinking task items, were measured using survey methodology through an online survey platform. Following a standardized administration protocol, classroom teachers introduced and oversaw student completion of assessments through a computer- or tablet-based or paper and pencil format. Across formats, students received sufficient time to respond to open-ended and close-ended items within a standard 55-minute class period. Completion rates were above 90% for waves, except for Wave 3 when one school experienced technical issues with the online survey. Generally, developers of the instruments, detailed below, have indicated that the format type of the assessment can be interchangeable. Survey instructions for students emphasized that the survey was not a test and was used solely for research and evaluation to support the school's efforts to improve the student learning experience. The protocol included 90 items and 22 distinct scales. The protocol was designed to place open-ended, divergent thinking tasks between different close-ended survey items to increase student interest and break up potential response set patterns. The paper-based creative production assessment used in Wave 6 followed a similar format to the survey protocol described above but was only completed in paper format. Students

completed the survey over one standard length class period. All other students variables were gathered from partnering district data administrators.

Measures

The measures included in this study reflect approaches that are well-established in the field of psychology and educational science. Generally, the measures and measurement approaches included in this study have demonstrated a history of adequate reliability and validity to measure the constructs of interest for this age group, depict changes in those constructs over time, and provide comparisons between individuals. Specifically, the measures have demonstrated structural and discriminant validity with a variety of other related and unrelated constructs. In addition to reporting on the measurement studies cited in the following section, I conducted analyses in this dissertation to evaluate the reliability and validity of measures across waves of data.

Divergent thinking. Divergent thinking (DT) was measured at each time wave using two sets of divergent thinking tasks—one verbal and one figural—with three stimuli in each set (Runco, 2011, 2012). Four forms of verbal and figural tasks were used, where the first tasks that students responded to at the beginning of Grade 6 (Wave 1) were used again 2.5 years later in the middle of Grade 8 (Wave 5). Figure 2 provides an example of a figural divergent thinking task included in this study. The verbal tasks followed the *Many Uses Games* or *Alternate Uses Task* protocol that has decades of use in creativity research (Barbot, 2018; Snyder, Hammond, Grohman, & Katz-Buonincontro, 2019). Those prompts were similar to the figural task depicted in Figure 2, except that students were given an object prompt in writing, such as *shoelace* or *tire*, and asked to generate as many ideas as possible for how to use that object. Importantly, the

prompt did not ask students to think of *creative* ideas—a decision that could have suppressed the originality of ideas produced (Reiter-Palmon, Forthmann, & Barbot, 2019). However, the decision to not prompt students to think of *creative* ideas was meant to avoid triggering any negative self-beliefs a student may carry or to inadvertently create an assessment experience that felt high stakes for students.

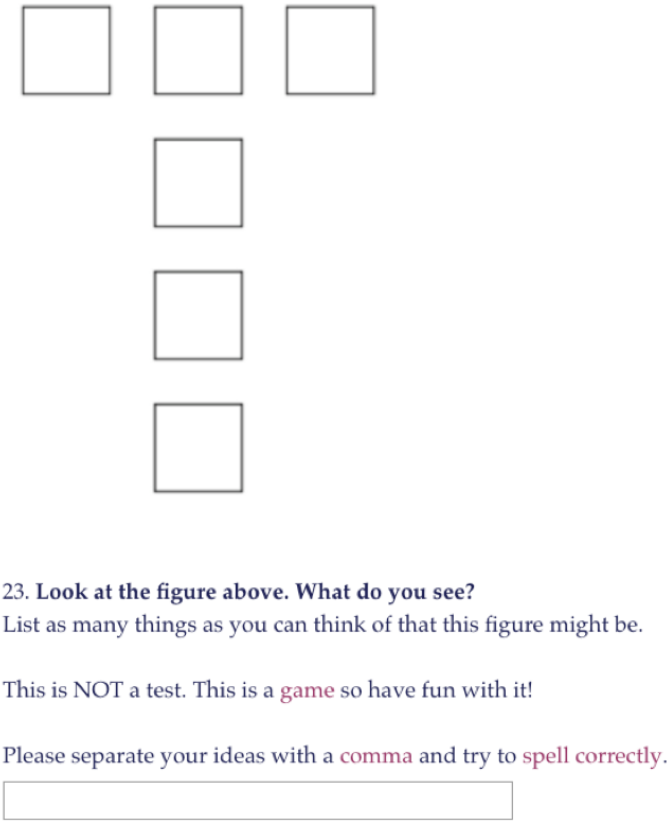

Figure 2. This example illustrates the figural divergent thinking tasks used in this study.

Student responses were scored on three dimensions of creativity—fluency, flexibility, and originality—by comparing responses within the study sample responding at each wave. Scoring procedures used a semantics-based algorithmic (SBA) process that recent research demonstrates is efficient and accurate in scoring these tasks on the three dimensions and comparable to traditional methods for scoring DT tasks (Acar & Runco,

2019; Beketayev & Runco, 2016). The three dimensions of DT—fluency, flexibility, and originality—were scored using the SBA technique. Though not without their limitations (Reiter-Palmon et al., 2019), each of those distinct dimensions have shown to be reliable measures of creative potential and produce valid predictions of creative production and accomplishment in past research (Runco & Acar, 2012). Considerable methodological and theoretical questions remain about the usefulness of divergent thinking tasks to the research of creativity (Baer, 2011). However, the approach to this study provides multiple ways to gauge the meaning of these dimensions in practice. Given the number of theoretically convergent and discriminant variables included in this current study, the validity of divergent thinking tasks to describe creative development during early adolescence should become internally visible.

Importantly, there are several caveats to consider regarding the scoring and interpretation of results from divergent thinking tasks. Though SBA should remove some cultural bias, the lexicon used for that scoring process will inevitably be biased toward dominant culture language and concepts, which could result in underestimating the originality or flexibility of non-white students creative ideation. Additionally, the measures may not be sensitive enough to between-individual differences and within-individual change to make meaningful recommendations for practice.

Generally, reliability measured with Cronbach's alpha, for each subscale was adequate. I selected the most reliable format for scaling originality among five possible approaches. That approach gave each idea judged to be unique among less than 10% of the sample one point and each idea unique among less than five percent of the sample received two points, following the approach of Milgram and Milgram (1976). One figural

item from the form used at Wave 1 and Wave 5 (they were purposefully identical) demonstrated an issue with reliability for the flexibility dimension. When removed, reliability improved at Wave 5 and decreased slightly at Wave 1 for flexibility and originality. To remain consistent, I removed that item from the scoring for flexibility, fluency, originality, and the composite score of divergent thinking. Reliability for originality ranged from $\propto$ = .75–.87; flexibility ranged from $\propto$ = .60–.75 (below .70 only at Wave 1); fluency ranged from $\propto$ = .83–.88; and the composite DT scale score was at least $\propto$ = .91 for each wave. Table 3 illustrates sample Many Uses Game responses.

Table 3.

Divergent Thinking Task Prompts for Many Uses Game and Sample Student Responses

Many Uses Verbal Prompt	Sample Student Responses
Shoelace	Bracelet, a belt, sandal design band, to trip someone, handcuffs, cat toy, a rope, to floss your toes, making crafts, to keep sibling out of your room, tie glasses around neck, zipper pull, a fake pet worm, a jump rope for ants, tie to tree to mark places
Bowl	Helmet, a speaker, a hard yarmulke, a container, as a template for a bowl haircut, catching falling snow, art utensil holder, fish bowl, transportation device, making music, for a rock display, put water in to make mirror, gold pan, to stop a leak, a trap, plant holder, recycled water fountain
Toothbrush	A magic wand, cleaning pets, a floor scrubber, potato masher, a stick, mouse comb, bottle lid cleaner, science experiments, a mini-broom, clean watches, toilet cleaner, pretend microphone, conversation maker, texturizing clay, lip scrubber, to tickle toes, to create friction

A major concern for studying creative development longitudinally is the potential stimulus dependency that could explain how individuals perform differently across time on seemingly interchangeable forms of divergent thinking tasks (Barbot, 2019). If the aim is to estimate the "true change" in demonstrated ability, then the stimulus dependency of

scores on alternate forms should be minimal. To reduce that concern, I analyzed the correlation of scores for each divergent thinking factor across waves. Additionally, by using the same form in Wave 1 and 5, we can assess the potential contribution of stimulus dependency to explain change in ability over time. The correlation plots provided in Appendix A illustrate that correlations for fluency ranged from r = .52-.67 and the correlation for the same form used in Wave 1 and 5 was .60. In one case, the correlation between alternate forms was higher than for the same form, but that could be due, in part, to the proximity in time of Waves 3 and 4. The correlations between measurement occasions for flexibility ranged from r = .35-.66, indicating that stimulus dependency could be more of a concern for flexibility than fluency. However, the correlation for Waves 1 and 5 using the same form fell in the middle of that range at r = .48. The correlations between measurement occasions for originality was similar to the results for fluency, ranging from r = .48-.65 (only one correlation between the form at Wave 3 and Wave 5 was below .50). The correlation for originality at Waves 1 and 5 using the same form fell on the higher end of that range at r = .59. In sum, concerns about stimulus dependency in describing longitudinal change may be less of a concern for this study, especially for fluency and flexibility scores.

Baseline adaptive predictors. Creative ideational confidence was measured using three items from the measure used by Beghetto (2006) to approximate creative self-efficacy of idea generation (e.g., *I am good at coming up with new ideas*) as well as an additional fourth item targeting confidence in the face of social pressure (e.g., *I like my ideas even if others don't*). Wave 1 reliability for the creative self-confidence score was $\propto = .72$. Growth mindset was measured with entity belief statements, representing a fixed

mindset, modified from a publicly available adult measure (e.g., *l can learn new things but I can't really change my basic intelligence*) to increase readability for adolescent students (Dweck, 2016). We framed items to be about personal self-theory beliefs about malleability of intelligence with "I" statements rather than using general theory beliefs with "We" statements due to evidence of improved predictive validity (De Castella & Byrne, 2015). Scores were reversed to create a predictor of less entity beliefs; reliability for the fixed mindset items was $\propto = .76$ at Wave 1. Flow in learning was measured with four items (e.g., *Sometimes I get so focused on my work that I forget what I was going to do next*) informed by assessments used in past research on flow (Csikszentmihalyi & Rathunde, 1993) and written to be relevant and understandable for students. Those items demonstrated evidence of validity in past research (Anderson & Haney, 2018). The reliability for the flow in learning measure was $\propto = .73$.

Baseline maladaptive predictors. The Motivation and Engagement Scale – Junior School (MES) (Martin, 2011) is a 44-item instrument targeting motivation and engagement in school. Past research provides thorough evidence of reliability and discriminant and predictive validity linking subscales of interest to important school outcomes (Martin, 2011). The MES measures *disengagement* as loss of motivation and positive affect toward school by gauging a student's care, interest, and involvement in school (e.g., *Each week, I'm trying less and less at school*). The reliability for the 3-item disengagement subscale was $\propto = .77$. Anxiety was also measured with three items from the MES; reliability for the Wave 1 anxiety subscale was weaker than the others at $\propto = .66$ at Wave 1. Value of conformity was measured using the Runco Attitudes and Values scale (Runco, 2015; e.g., *The important thing in school is to find out what gets other*

students to like me.), which demonstrated adequate factor structure validity in past research (Anderson & Haney, 2018). Students responded to Likert scale response options on 5-point scale to complete those measures.

Baseline environmental predictors. Students' perception of support for creativity from teachers was measured using a refined version of Runco's Evaluation of the Creative Setting measure (Runco, 2013). That measure demonstrated high reliability and structural validity in past research (Anderson, 2017) and demonstrated reliability of $\propto = .82$ at Wave 1. The other baseline predictor represents the environmental, curricular, and instructional influence of students' exposure to arts integrated teaching and learning across different middle school content areas, provided through a federally funded Arts in Education Model Development and Dissemination project (Anderson & Pitts, 2017).

That project used a quasi-experimental non-equivalent comparison group design (Cook, Campbell, & Shadish, 2002), where four schools were identified within participating districts to serve as control schools based on similar student demographics and academic programming. The program followed a cohort of middle school students from Grade 6 in 2015–2016 school year to 8th grade in the 2017–2018 school year, providing arts integration experiences across the curriculum. According to published reports about the first year of implementation, implementation across schools varied considerably and included professional development, design support, classroom coaching, and schoolwide efforts to support creative learning (Anderson & Pitts, 2017). Students received approximately 25–50 hours of classroom-based arts integrated instruction across subject areas, which differed slightly by school based on teacher interest and scheduling; subjects included math, English language arts, social studies,

physical education/health, and science. Participating teachers experienced at least 50 hours of professional development, including one-on-one coaching and school-based and off-site training provided by the program.

Preparedness outcomes. For the purpose of this dissertation study, student preparedness outcomes drew from variables included in the dataset that represented four domains: (a) academic, (b) creative, (c) agentic, (d) and engagement. To measure the academic domains, subscales from the Smarter Balanced Assessment Consortium (SBAC) math and English language arts tests were used (SBAC, 2016). To measure creative production using a different method than divergent thinking, I chose the 8th grade summative creativity assessment developed for the arts integration program and measured using the consensual assessment technique (Amabile, 1982; Baer & McKool, 2016), which has decades of application to measure creativity from a social psychology perspective. Based on results presented from developmental work with that measure, the internal consistency for inter-rater reliability across three raters was above $\propto = .80$ for all scores (Anderson & Haney, 2018). The prompt asked students to produce their own mythological creature visually and describe it further in writing. In addition to a creativity rating of students' visual and written work, the assessment measured their creative self-concept with six items that followed the recommendations from Beghetto and Karwowski (2017); reliability for the creative self-concept was $\propto = .90$ at Wave 6.

Motivationally, students' sense of personal agency was measured through MES subscales of self-efficacy and perceived control. Self-efficacy included four items measuring a student's perception of his or her ability to do well in school with enough effort (i.e., If I try hard, I believe I can do my schoolwork well). The MES measures

uncertain control as the maladaptive form of perceived control. Four reverse-coded items measure a student's sense of control over their academic performance (i.e., When I don't do well at school I don't know how to stop that happening next time). The reliability of combined subscales to approximate students' academic agency was $\propto = .85$ at Wave 6. Students' overall affective engagement and participation in school was measured with the MES disengagement items again.

Longitudinal Waves of Data

Following the cohort of students across three middle grades produced a longitudinal dataset appropriate for the aims of this dissertation study. Table 1 illustrates the waves of data and timeline of measurement intervals across the three years. There are approximately seven months between Waves 1 and 2, between Waves 2 and 3, and between Waves 4 and 5. There are approximately five months between Waves 3 and 4 and between Waves 5 and 6. The baseline predictors were measured at Wave 1, outcome measures were measured at Wave 6, and divergent thinking was measured at Waves 1–5.

Missing Data

Due to student attrition, which may be higher for the population of students given high rates of mobility and economic insecurity, the rate of missing data on variables measuring divergent thinking and student agency were expected to increase over measurement occasions to be as high as 30–40% by Wave 6. Random survey administration problems at a few of the participating schools contributed to an even smaller level of participation at Wave 4 with only scores of 55% of the sample recorded. Chapter 3 reports further on the results of missing data analysis. There is a good chance that some students moved out of and then returned to one of the participating schools

across the middle school years. I used logistic regression to identify potential instrumental variables in systematic missingness, expecting that identification for Limited English proficiency, free- and reduced-meals eligibility, and special education status would likely predict a greater likelihood of missing data at each wave. It is likely that socioeconomic status would be a primary driver of missingness given the role that socioeconomic challenges play in student mobility.

I conducted all analyses with full information maximum likelihood (FIML) where all students would be retained in estimation procedures, as long as they had one wave of data. FIML methods can address some issues with missing data by generating parameter estimates and standard error estimates in a single step in statistical software. Though not without limitations, FIML procedures have demonstrated robust estimation procedures with longitudinal data when data are not missing at random (Graham, 2009). Given the skewness of divergent thinking scores, it is important that FIML can also provide unbiased estimates when data do not fit a normal distribution. Though it is likely that students were more likely to be missing data due to systematic reasons, such as special education services or mobility due to economic factors, FIML should be able to provide trustworthy estimation in group-based trajectory.

Analytic Models

I followed the procedural guidelines outlined by Jones et al. (2001) to fit models that increase progressively in the number of groups until model fit or meaningfulness of group profiles worsens. I conducted latent class growth analyses (LCGA) using empirical methods of group-based trajectory modeling defined by Jones et al. (2001) and Jones and Nagin (2007) and exemplified in past applications (see Ryzin, Chatham, Kryzer, Kertes,

& Gunnar, 2009). I used the Proc Traj program (Nagin, 2005) in SAS software to run the group-based trajectory models. The Bayesian Information Criteria (BIC) evaluated model fit empirically, measuring the probability of a correct model compared to another model. I added latent groups until reaching a Bayes factor equaling less than the recommended level of 10 or until solutions produced groups smaller than 1% of the sample, at which point I removed the final group added. Next, I did substantive checking by testing the predictor sets in competing models to learn if the better fitting model with the lower BIC produced groups that demonstrated meaningful differences based on theoretically derived predictors. As Figure 3 illustrates, I retained all growth terms up to the fourth-order or quartic term to model the longitudinal patterns for all groups, even if they were not statistically significant. I followed the procedures and criteria described by Nagin (2005) for determining model adequacy: (a) the average posterior probability for each trajectory group ($AvePP_j > 0.7$); (b) the Odds of Correct Classification for each group ($OCC_j > 5.0$); and (c) an assessment of how close the probability of group assignment is to the proportion of individuals assigned to each group. If at least two of those indices are adequate for each group, I considered the model to be adequate.

In group-based trajectory analysis, predictors of membership in a latent group or class are evaluated using a baseline group for comparison. I followed Nagin's (2005) recommendations to test baseline predictors of group membership using the largest group as the normative pattern for comparison. The analysis generated the log odds for the role and influence of each predictor on the likelihood of an individual's membership in each latent trajectory class, relative to the baseline class—the largest or normative group. For instance, perhaps the baseline group represents a *stable low* group with an initial level of

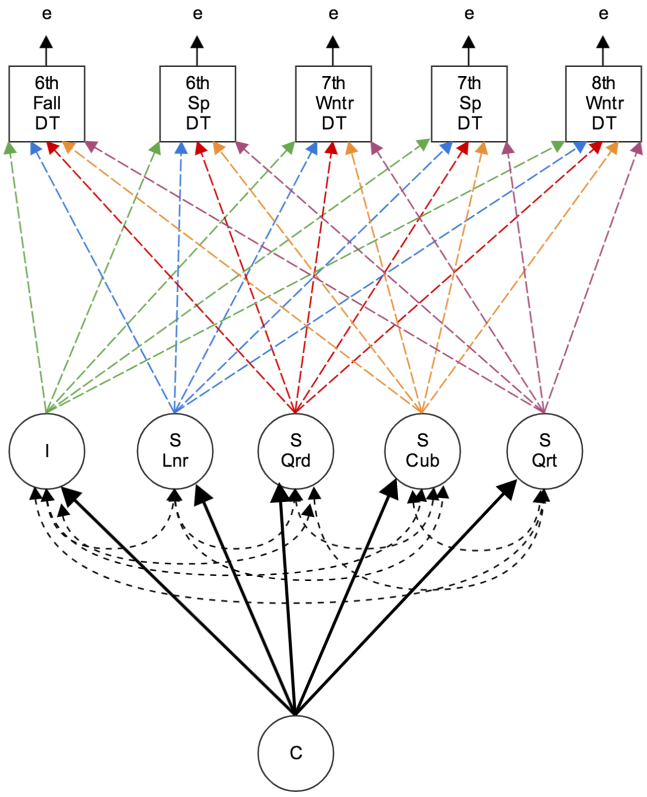

Figure 3. Group-based trajectory modeling with five waves of data can estimate distinct classes using up to the fourth order quartic term to model distinct trajectories. "I" represents intercept term; "S Lnr" represents linear slope term; "S Qrd" represents quadratic slope term; "S Cub" represents the cubic slope term; and "S Qrt" represents the quartic slope term.

divergent thinking that is substantially below the initial level of other groups with little to no growth across the five waves. The role of each predictor on determining likelihood in each identified latent trajectory class will be in reference to the low, normative baseline group. I report the results as binary regression models predicting class membership. A positive coefficient can be interpreted to indicate a higher probability of membership in the specified class compared to the baseline class. This step of baseline predictor analysis will help to evaluate the influence of hypothesized adaptive, maladaptive, and environmental factors to distinguish the profile characteristics of distinct classes of divergent thinking trajectories (Muthén, 2003; Nagin, 2005) and can help to determine

the trustworthiness of models and validity of the use of divergent thinking measures to approximate creative development (Nylund-Gibson & Choi, 2018).

To conduct outcome analyses to learn how different trajectories contribute to different outcomes, I extracted the most likely group membership assigned to each student and used that membership to compare the average outcome levels for each latent trajectory group in an analysis of variance (ANOVA) framework. I followed the guidelines from past applications of this technique to evaluate the differential influence of certain trajectories on the outcomes of interest (see Nagin, 2005; Van Ryzin et al., 2009). Based on the literature reviewed, I expected high probability of membership in the classes of high growth of divergent thinking or a class of stably high levels of divergent thinking factors to show the largest effects on academic and creative outcomes.

Although students were nested within schools, I did not run analyses using multilevel modeling because I expected the school-level interclass correlation to be relatively low and estimating school-level variance when some trajectory groups could be quite small would become methodologically untenable. Across modeling procedures, I used Bayesian Information Criteria (BIC) when evaluating and selecting the model and latent class structure which fit the data. The BIC can be a better fit index than others when modeling ignores the nested structure of the data or when interclass correlations are low (Chen, Luo, Palardy, Glaman, & McEnturff, 2017).

CHAPTER III

RESULTS

To identify the distinct trajectories for divergent thinking factors using group-based trajectory modeling I followed enumeration steps and procedures for testing model adequacy proposed by Nagin (2005). For each factor, I began by testing the model fit for a 2-group model that included linear, quadratic, cubic, and quartic terms for both groups with the five waves of divergent thinking data. Following standard practices (Nylund-Gibson & Choi, 2018), I used the Bayesian Information Criterion as a first step to identifying the model that best represents the distinctive features of the data. This study was exploratory and informed by minimal longitudinal research on creative development in early adolescence. As discussed previously, I expected to find different types of growth in these creative thinking factors due to the complex influences of developmental, environmental, motivational, and social-emotional factors in middle school and early adolescence.

To substantively inspect the statistical models, I increased the number of groups until the model fit (BIC) worsened, or a group represented < 1% of the sample. I analyzed the predictor sets between the top models to check the practical and theoretical significance of the empirically derived groups. For instance, when the choice between two models (e.g., 6-group model versus 5-group model) was unclear, I tested the predictor sets with both models to detect if the model with the higher BIC and larger number of groups generated distinct trajectory groups with any meaningful and practical significance. If more of the baseline predictors in Grade 6 were significant in the more parsimonious model, I chose the solution with less groups even if the BIC was smaller.

That result meant that the distinct trajectory patterns in the solution with less groups would provide more meaningful information beyond the statistical tests of model fit.

Across models, I retained the growth parameter terms up to the fourth order term (quartic) to describe each trajectory, regardless of whether they were statistically significant or not. Removing parameters that were not statistically significant often led to a different model solution, changing the proportion of the sample assigned to each group, which demonstrated that important information was lost about the solution when terms were eliminated. Before making a final decision about which models to retain, I followed the model adequacy guidelines provided by Nagin (2005), including posterior probabilities for each group (> .70), the odds of correct classification (> 5.0), and the percent difference between the theoretical and actual proportions of the sample for each group (< 50%). If at least two out of three of these guidelines were met for each group, I considered the model to be an adequate solution. Model results for predictor sets for originality, fluency, flexibility, and composite divergent thinking models are provided and results from separate outcome analyses are included in the following sections.

For each divergent thinking creative resource, I respond to each research question sequentially. In response to Research Question 1, I reported the model selection process to identify the number of distinct trajectory groups found. In response to Research Question 2, I reported the results of the predictor analyses to illustrate the different characteristic profiles of each group. In response to Research Question 3, I reported the results of group comparisons on outcomes. I also probed deeper into the demographic makeup of each group and tested interaction effects to understand if the influence of adaptive and maladaptive factors were moderated by certain student characteristics.

Importantly, models that demonstrated both the best fit as well as the most informative distinctions between trajectory groups ranged in number of groups for each factor: (a) a 6-group model for fluency, (b) a 5-group model for originality, (c) a 4-group model for flexibility, and (d) a 5-group model of the divergent thinking composite.

As can be seen in Table 4, the general trends of scores for each factor suggest an initial rise during Grade 6 and then a gradual decline through Grades 7 and 8. Correlations among predictors and each divergent thinking factor at Wave 1 are provided in Table 5 illustrating most of the hypothesized relationships between environmental, personal, adaptive, and maladaptive characteristics. Positive associations between female students' adaptive factors and divergent thinking and negative associations with disengagement and valuing conformity were noteworthy. Based on diagnostic information about the data reported in Appendix A, scores at each wave were positively skewed with outliers evident beyond three standard deviations of the mean.

Table 4.

Mean, Standard Deviation, Range, Cronbach's Alpha, and Percent Missing for Divergent Thinking Factors Across Waves for Longitudinal Sample (N =1,299)

Constructs	Grade 6 Fall '15 Wave 1	Grade 6 Spring'16 Wave 2	Grade 7 Winter '17 Wave 3	Grade 7 Spring'17 Wave 4	Grade 8 Winter '18 Wave 5
Divergent thinking					
Fluency	2.50 (1.43)	2.65 (1.67)	2.42 (1.62)	2.39 (1.54)	2.39 (1.62)
	0–11.00	0–14.33	0–13.67	0–13.50	0–16.67
	$\propto$ = .83	$\propto$ = .86	$\propto$ = .88	$\propto$ = .86	$\propto$ = .88
Flexibility	1.66 (0.63)	1.71 (.073)	1.62 (0.72)	1.65 (0.75)	1.63 (0.75)
	0–6.00	0–7.00	0–8.00	0–8.00	0–8.83
	$\propto$ = .60	$\propto$ = .72	$\propto$ = .75	$\propto$ = .70	$\propto$ = .71
Originality	3.86 (2.56)	4.30 (3.06)	3.97 (2.96)	3.67 (2.74)	3.28 (2.74)
	0–20.33	0–26.67	0–25.67	0–25.00	0–24.40
	$\propto$ = .79	$\propto$ = .86	$\propto$ = .87	$\propto$ = .84	$\propto$ = .86
Sample included in wave	*n* = 1,005	*n* = 931	*n* = 911	*n* = 720	*n* = 849
Percent of full sample	77%	72%	70%	55%	66%

Table. 5

Correlations of Predictor Variables at the Beginning of Grade 6 and Divergent Thinking Factors of Fluency, Originality, and Flexibility

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Female	-													
2. Special education	-.10*	-												
3. Free-reduced lunch	.05	.09*	-											
4. Arts integration	.03	.01*	.18*	-										
5. Support for creativity	.05	-.07*	.02	.02	-									
6. Flow in learning	.11*	-.07*	-.03	.05	.48*	-								
7. Growth mindset	.07*	-.09*	-.14*	.00	.03	.08*	-							
8. Creative confidence	.04	-.08*	-.08*	.00	.28*	.26*	.14*	-						
9. Anxiety	.10*	.06	.03	-.03	.05	.08*	-.19*	-.02*	-					
10. Disengagement	-.15*	.17*	.03	.02	-.37*	-.35*	-.20*	-.16*	.14*	-				
11. Valuing conformity	-.19*	.13*	.04	.04	-.13*	-.12*	-.30*	-.14*	.11*	.29*	-			
12. DT fluency	.25*	-.20*	-.10*	-.04	.13*	.16*	.15*	.13*	-.04	-.25*	-.23*	-		
13. DT originality	.25*	-.19*	-.10*	-.02	.13*	.17*	.13*	.13*	-.04	-.24*	-.22*	.98*	-	
14. DT flexibility	.20*	-.15*	-.06	-.04	.09*	.10*	.10*	.10*	-.03	-.20*	-.16*	.83*	.79*	-
15. DT composite	.25*	-.19*	-.10*	-.03	.13*	.16*	.14*	.13*	-.04	-.24*	-.22*	.99*	.99*	.86*

Note. DT refers to divergent thinking factors.

Missing Data

I conducted missing data analysis using logistic regression to regress the likelihood of missingness on each wave of data onto important student characteristics that are likely to explain systematic missingness. For instance, the wide array of exceptionalities represented by special education identification (SPED) and the special accommodations and pull-out services required by students' Individualized Education Plans would likely increase the odds of not being present for survey administration. Similarly, students with less financial resources at home, who are eligible for free-reduced lunch (FRL) would likely face more socioeconomic hardship, resulting in lower attendance rates and higher rates of mobility between schools. I hypothesized that those variables would play a systematic role in determining odds of missing data. I ran logistic regression with all demographic predictors included in one block entry for each wave of data and reported the statistically significant results below.

The odds of missing divergent thinking data at Wave 1 was 1.60 higher for students identified for SPED and 1.47 higher for students eligible for FRL in Grade 6. Limited English proficiency (LEP), minority race/ethnicity, and student sex did not relate to higher odds of missing data in Wave 1. In Wave 2, a similar patterned resulted with the exception that the odds of LEP students missing data were 3.80 higher than non-LEP students. In Wave 3, the odds of missing data followed the same pattern and similar levels of likelihood to Wave 1, where LEP students were not more likely to be missing data. In Wave 4, the odds of missing data were 2.12 higher for SPED students, 1.40 higher for LEP students, 1.59 higher for FRL eligible students, and 0.23 lower for female students. In Wave 5, the odds of missing data were 1.58 higher for FRL eligible students;

no other characteristic predicted missingness. In the final Wave 6, the same pattern of missingness was found from Wave 1.

In all, those results suggest that students' financial resources and special education status, in part, explained systematic missingness across waves of longitudinal data. Based on that information, we can assume data were not missing completely at random; missingness was due consistently to the observed student characteristics of SPED identification and FRL eligibility. The group-based trajectory approach employed full-information maximum likelihood estimation, so as not to exclude individuals with missing data at certain waves. The model adequacy diagnostics require that correct classification for each student into a trajectory group is high, even if those students had one wave of divergent thinking scores. Given evidence of systematic missingness, those class enumeration, diagnostic, and estimation techniques provide greater confidence in the resulting solutions.

Fluency Trajectories

For fluency, the BIC for models continued to improve to a 7-group model but the size of groups became too small to be meaningful in predictor and outcome analyses (< 1.0%). The 6-group model BIC statistics were -7,531.69 (N = 4,416) and -7,509.66 (N = 1,299) compared to -7,547.68 (N = 4,416) and -7,529.32 (N =1,299) for the 5-group solution. I tested both the 6-group and 5-group solutions with predictor sets and found the 6-group solution to represent the most meaningful patterns in the data. Using the largest normative group as the reference group in the 6-group model, eight environmental, adaptive, and maladaptive predictors demonstrated 15 moments of statistical significance. In contrast, the 5-group model demonstrated only three moments of statistical

significance, indicating substantial information lost with the more parsimonious model with much less meaningful representation of distinct trajectory group profiles.

Addressing Research Question 1, the results indicated that the addition of a small sixth group was highly meaningful to classification and trajectory profile specification, based on differences in environmental, adaptive, and maladaptive factors at Wave 1. As Table 6 illustrates, only one model adequacy diagnostic criterion (i.e., the OCC = 4.04 for the largest group) fell just below the threshold suggested by Nagin (2005), suggesting a good fitting model with high probability of correct group classification for all students.

Table 6

Diagnostics of Group-based Model Adequacy for Fluency

Trajectory Groups	$AvePP_j$	OCC_j	$Prob_j$	$Prop_j$	|% Dif.|
6 High Rise-to-Decline	.985[a]	4,312.11[a]	.015	.014	6.7[a]
5 Mid Stable-to-Late Rise	.794[a]	237.04[a]	.016	.011	31.3[a]
4 Mid Rise-to-Decline	.805[a]	117.29[a]	.034	.023	32.4[a]
3 Mid Gradual Rise	.767[a]	34.99[a]	.086	.080	7.0[a]
2 Mid Stable	.702[a]	5.88[a]	.286	.260	9.1[a]
1 Low Stable	.839[a]	4.04	.563	.613	8.9[a]

Note. Probabilities and proportions are presented to three decimal places.

[a]Meets or exceeds criteria presented in Nagin (2005) as evidence for a well-fitting model.

Addressing Research Question 1, each trajectory differed, substantively. Figure 4 illustrates that the largest group represented 61% of students demonstrating a low fluency of idea production in divergent thinking across middle school grades, with a slight decline from $M = 1.61$ ($SD = 0.84$) ideas at the beginning of Grade 6 to $M = 1.46$ ($SD = 0.74$) ideas at the middle of Grade 8—a medium Cohen's $d = 0.19$ small effect size.

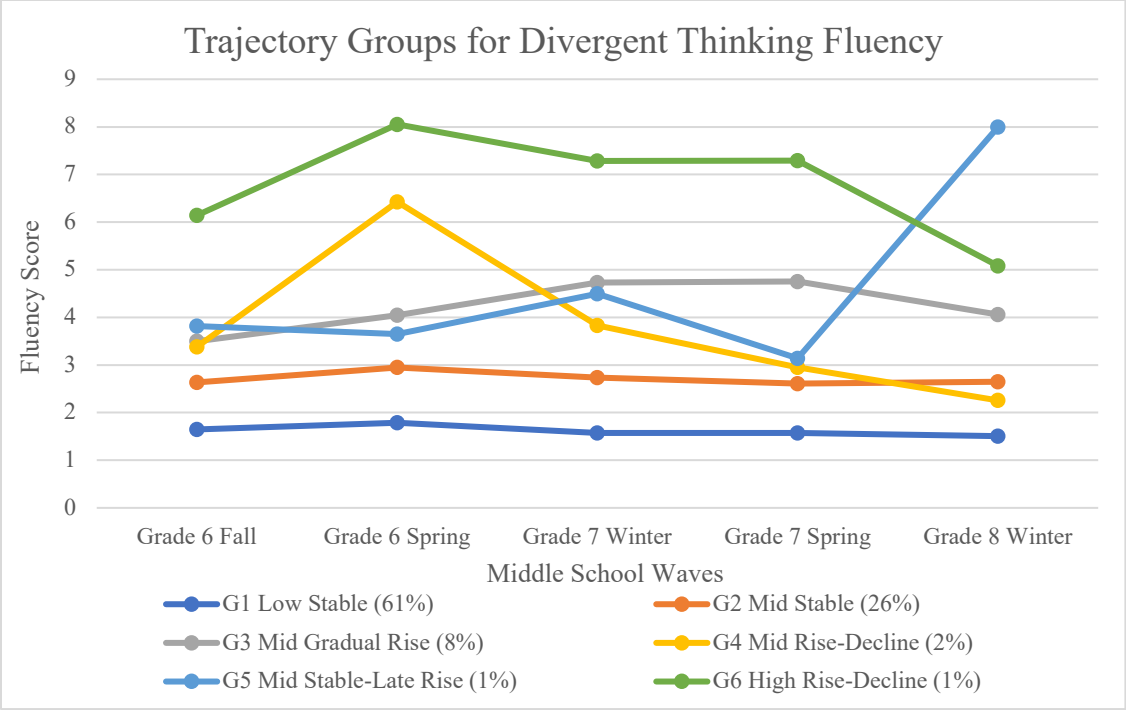

Figure 4. The trajectory patterns for the 6-Group solution (G1–G6) for fluency with proportion of sample in each group identified in parentheses as percentages.

That group's trajectory was considered the normative pattern and fit some results from past research. The second largest group of 26% of the sample also demonstrated a stable pattern rising slightly from $M = 2.83$ ($SD = 1.05$) ideas in Grade 6 to $M = 3.11$ ($SD = 1.06$) ideas by the end of Grade 6 and returning back to $M = 2.87$ ($SD = 1.01$) ideas by the middle of Grade 8. The third group of 8% of the sample began higher than Groups 1 and 2 at $M = 3.58$ ($SD = 1.37$) ideas, rising gradually to 4.75 until the end of Grade 7, then decreasing back to $M = 4.21$ ($SD = 1.09$) by the middle of Grade 8. In total, that increase demonstrated a medium Cohen's $d = 0.51$ effect size. Group 4 of approximately 2% of the sample began at about the same level as Group 3 ($M = 3.44$, $SD = 1.57$) rising sharply to $M = 6.67$ ($SD = 1.20$) ideas by the end of Grade 6, then declining steadily in Grades 7 and 8 to $M = 2.13$ ($SD = 1.12$) ideas. That decrease represents a large effect size, $d = 0.96$.

Group 5 represented 1% of students, who followed a gradual rise in the number of ideas generated, increasing from $M = 4.15$ ($SD = 1.48$) to $M = 8.15$ ($SD = 1.45$) by the middle of Grade 8 after a dip to $M = 3.11$ ($SD = 0.93$) ideas in Grade 7. That overall increase demonstrated a very large effect size of Cohen's $d = 2.73$ overall. The final Group 6 of 1% of the sample began almost twice as high as every other group at $M = 6.18$ ($SD = 1.87$) ideas, rising to $M = 8.12$ ($SD = 2.87$) ideas by the end of Grade 6. After that rise, Group 6 held steady above 7.0 ideas before declining in Grade 8 to $M = 5.10$ ($SD = 2.87$) ideas, below their starting level. Though the variance within that group was considerably high, overall the decrease was a small-to-medium effect size $d = 0.41$. In addition to those distinct patterns, each group also had different characteristics of demographic, environmental, adaptive, and maladaptive predictors that predicted their group membership compared to the normative group.

Predictor analysis for fluency. Predictors of group membership for fluency are provided in Table 7. To respond to Research Question 2, the reported growth parameters represent the unconditional model (Set 1); the log odds parameters for demographic (Set 2) and environmental predictors (Set 3) were generated next (retaining the growth parameters, as well). The log odds parameters of the adaptive predictors (Set 4) were estimated as a separate predictor set, with Sets 1 and 2 included, and the log odds parameters of the maladaptive predictors (Set 5) were estimated as a separate predictor set with Sets 1 and 2 included, as well. That block entry approach of predictor sets provided adequate statistical power to control for meaningful demographic variables and to explore statistically significant predictors within related constructs. This procedure to

Table 7.

Model Parameter Estimates for 6-Group Solution for Fluency Including Demographic, Environmental, Adaptive, and Maladaptive Predictors

Set ID	Parameters	Sets Included	Group 1 Low Stable	Group 2 Mid Stable	Group 3 Mid Gradual Rise	Group 4 Mid Rise-Decline	Group 5 Mid Stable-Late Rise	Group 6 High Rise-Decline
	N (sample percent)		815 (61%)	346 (26%)	106 (8%)	30 (2%)	15 (1%)	18 (1%)
	Model term	1						
1	Intercept		1.63** (0.06)	2.63** (0.11)	3.50** (0.18)	3.38** (0.27)	3.81** (0.71)	6.14** (0.27)
	Linear		0.75* (0.30)	0.93 (0.52)	0.03 (0.93)	10.55** (1.75)	-4.63* (2.35)	6.02** (1.60)
	Quadratic		-0.88* (0.38)	-0.83 (0.65)	0.80 (1.21)	-10.58** (2.21)	7.43* (2.99)	-6.04** (2.00)
	Cubic		0.32* (0.15)	0.23 (0.26)	-0.32 (0.49)	3.45** (0.87)	-3.44** (1.22)	2.19** (0.80)
	Quartic		-0.04 (0.02)	-0.02 (0.03)	0.03 (0.06)	-0.37** (0.11)	0.48** (0.15)	-0.27** (0.10)
	Demographic predictors	1, 2, 3						
2	Female		-	1.86** (0.27)	2.63** (0.39)	2.00** (0.59)	1.19 (0.84)	1.60** (0.55)
	Special education		-	-1.53** (0.40)	-14.50 (615.15)[a]	-1.99 (1.07)	-13.66 (632.10)[a]	-16.20 (1,441)[a]
	FRL		-	0.09 (0.26)	-0.82* (0.32)	-0.06 (0.56)	-13.81 (610.19)	-0.42 (0.54)
	Environmental predictors	1, 2, 3						
3	Arts integration		-	-0.45 (0.26)	-0.51 (0.33)	-0.27 (0.54)	-0.99 (1.06)	-0.57 (0.54)
	Support for creativity		-	0.55** (0.17)	0.41 (0..22)	0.18 (0.35)	0.80 (0.61)	0.80 (0.44)
	Adaptive predictors	1, 2, 4						
4	Flow in learning		-	0.53** (0.18)	0.75** (0.26)	1.10** (0.42)	0.75 (0.71)	0.25 (0.37)
	Growth mindset		-	0.30* (0.14)	0.48** (0.18)	0.31 (0.28)	0.32 (0.37)	0.32 (0.28)
	Creative confidence		-	0.28 (0.18)	0.16 (0.23)	0.32 (0.40)	-0.12 (0.59)	0.64 (0.43)
	Maladaptive predictors	1, 2, 5						
5	Anxiety		-	-0.13 (0.14)	-0.17 (0.17)	-0.43 (0.27)	-0.38 (0.33)	-0.01 (0.29)
	Disengagement		-	-0.59** (0.16)	-1.04** (0.29)	-1.18* (0.49)	-0.28 (0.41)	-1.05* (0.49)
	Valuing conformity		-	-0.44** (0.16)	-0.46* (0.21)	-0.75* (0.38)	-0.80 (0.46)	-0.77* (0.38)

Note. Growth parameters derive from the unconditional model. The intercept estimates Grade 6 starting level; linear term estimates constant change; and the quadratic, cubic, and quartic terms estimate acceleration or deceleration that may occur at different waves. Parameter estimates of predictors represent log odds, compared to Group 1. [a]There were no special education students in this trajectory group. * $p < .05$ and ** $p < .01$.

provide adequate statistical power to detect meaningful patterns of statistically significant predictors of group membership was used for subsequent models of all factors.

Compared to the normative reference group of a low, stable, and slightly declining fluency of idea production, students were more likely to be in the mid-stable Group 2 if they were female and were not in special education. Additionally, they were more likely to be in Group 2 if early in Grade 6 they reported higher levels of support for creativity in their school, flow experiences in learning, growth mindset, lower disengagement, and lower value of conformity. Students were more likely to be in the mid-gradual rise Group 3 than Group 1 if they were female, not in special education, and had greater financial resource at home and if they reported higher levels of flow experiences in learning and growth mindset and lower levels of disengagement and value of conformity early in Grade 6. Students were also more likely to be in the mid-level early rise-to-decline Group 4 if they were female with higher levels of reported flow experiences in learning and lower disengagement and value of conformity early in Grade 6. Students were more likely to be in the fluctuating mid-level, late rise Group 5 only if they were not in special education and had greater financial resource at home. Given the small sample size of Group 5 and the unstable nature of their fluency development, those results weren't surprising. It is likely they developed an adaptive orientation to creative development later in middle school. In contrast, students were more likely to be in the high, rise-to-decline Group 6 if they were female, not in special education and reported lower levels of disengagement and conformity early in Grade 6.

Notably, students' experience in arts integration during middle school did not predict their membership in Groups 2–6 compared to the normative group. Except for

Group 4, creative development trajectories demonstrated mostly stable patterns indicating that students' starting level held steady during middle school. If students entered arts integration experiences in middle school at the lowest normative level of fluency, those experiences were not sufficient to shift the trend upward. Indeed, only small Group 5 demonstrated a jump late in middle school; otherwise trends demonstrated a gradual rise and fall.

Outcome analysis for fluency. Due to attrition in the sample, the number of students with agentic, affective, and creative outcome data was missing approximately 35% of the sample. In response to Research Question 3 and following expected hypotheses, students in the mid and high trajectory groups of divergent thinking fluency (Groups 2–5), in most cases, demonstrated higher levels of personal agency, engagement, math and ELA achievement, creative production, and creative self-concept compared to the normative group; Table 8 details those results. Groups 2, 3, and 6 each had higher means of personal agency ranging from $M = 3.80$ ($SD = 0.72$) for Group 2 to $M = 4.21$ ($SD = 0.64$) for Group 6 with standard deviation effect sizes ranging from medium ($d = 0.42$) to large ($d = 1.09$). Differences between Groups 1, 4, and 5 in personal agency were not statistically significant indicating that only students that demonstrated steady mid-to-high patterns of creative development across middle school showed higher sense of agency by the end of middle school.

Mean disengagement was lower at a statistically significant level for students in Groups 2 and 6 compared to Groups 1, 3, 4, and 5 with standard deviation effect sizes as high as a large effect between Groups 1 and 6 at $d = 1.09$. Though math and ELA achievement were not different among Groups 2–6, the mean scores for each of those

Table 8

Outcome Analyses Results for Fluency and Originality Trajectory Groups Including Means, Standard Deviations, and Multiple Group Comparisons

	Preparedness Outcomes					
Trajectory Groups	Agency (N = 836)	Disengaged (N = 838)	Math (N = 1,156)	ELA (N = 1,169)	Creative (N = 838)	CSC (N = 845)
Fluency						
1 Low stable (n = 717)	3.50_{a} (0.72)	2.64_{a} (1.05)	$2,487.35_{a}$ (195.01)	$2,520.72_{a}$ (177.52)	2.81_{a} (1.05)	3.10_{a} (0.94)
2 Mid stable (n = 303)	3.80_{b} (0.72)	2.34_{b} (0.95)	$2,567.35_{b}$ (110.95)	$2,595.18_{b}$ (82.88)	3.28_{b} (0.95)	$3.41_{b,c}$ (0.81)
3 Mid gradual rise (n = 93)	3.92_{b} (0.74)	$2.29_{a,b}$ (1.11)	$2,617.14_{b}$ (107.41)	$2,625.20_{b}$ (78.69)	$3.55_{b,c}$ (0.92)	$3.60_{b,c}$ (0.80)
4 Mid rise-decline (n = 29)	$3.89_{a,b}$ (0.53)	$2.58_{a,b}$ (0.97)	$2,599.14_{b}$ (95.66)	$2,624.59_{b}$ (59.85)	$3.13_{a,b,c}$ (0.91)	$3.07_{a,b}$ (0.80)
5 Mid fluctuating -late rise (n = 13)	$4.11_{a,b}$ (0.64)	$1.79_{a,b}$ (1.09)	$2,643.38_{b}$ (107.72)	$2,660.46_{b}$ (48.26)	$3.94_{b,c}$ (0.72)	$3.86_{b,c}$ (0.71)
6 High rise-decline (n = 14)	4.21_{b} (0.64)	1.74_{b} (1.09)	$2,655.00_{b}$ (107.72)	$2,664.29_{b}$ (48.26)	4.10_{c} (0.72)	4.08_{c} (0.71)
Originality						
1 Low stable (n = 848)	3.55_{a} (0.73)	2.60_{a} (1.03)	$2,497.65_{a}$ (187.43)	$2,530.89_{a}$ (168.62)	2.89_{a} (1.03)	3.14_{a} (0.92)
2 Mid stable (n = 215)	3.83_{b} (0.74)	2.39_{a} (1.01)	$2,584.66_{b}$ (98.21)	$2,606.80_{b}$ (74.37)	$3.37_{b,c}$ (0.96)	$3.50_{b,c}$ (0.79)
3 Mid rise-decline (n = 37)	3.99_{b} (0.57)	2.28_{a} (1.06)	$2,593.84_{b}$ (108.08)	$2,624.84_{b}$ (75.25)	$2.91_{a,b}$ (1.06)	$3.04_{a,b}$ (0.85)
4 High rising (n = 55)	3.93_{b} (0.69)	1.96_{b} (1.03)	$2,629.48_{b}$ (127.94)	$2,632.29_{b}$ (89.47)	3.79_{c} (0.85)	3.81_{c} (0.79)
5 High rise-decline (n = 14	4.21_{b} (0.66)	1.74_{b} (1.09)	$2,648.29_{b}$ (115.72)	$2,663.21_{b}$ (49.02)	4.08_{c} (0.75)	4.06_{c} (0.74)
Overall means (n = 1,169)	3.66 (0.734)	2.50 (1.04)	2,524.67 (174.82)	2,554.18 (153.93)	3.06 (1.04)	3.27 (0.91)

Note. All estimates reported are of group means for each outcome. Proportion of sample included below each group in the Trajectory Group column represents the sample size with Math and ELA scores for each group. ANOVA omnibus tests were statistically significant at $p < .05$ for all outcomes and trajectory groups. Post hoc pairwise comparisons between trajectory groups used the Bonferroni adjustment (.05/# of comparison) to maintain $p < .05$. Outcome values with different subscripts are significantly different at adjusted $p < .05$.

groups were higher than the mean for students in normative Group 1 with standard deviation effect sizes ranging from medium (d = .50) to large (d = 1.11). Not surprisingly, students in Group 6 demonstrated higher levels of creative production and creative self-concept than students in Groups 1 and 2 with a very large standard deviation effect size of d = 1.43 between Groups 1 and 6 in creative performance and large effect at d = 1.19 in creative self-concept. Additionally, students in Group 2, 4, and 5 showed higher creative performance than students in normative Group 1 at medium effect sizes. Importantly, students in Group 3, whose fluency of ideas declined sharply after Grade 6, did not show a statistically significant difference in creative performance and creative self-beliefs compared to the normative Group 1.

Originality Trajectories

The BIC for originality models continued to improve to an 8-group model but the size of groups became too small to be meaningful in predictor and outcome analyses (< 1.0%). The 6-group model BIC statistics were -10,048.34 (N = 4,416) and -10,026.31 (N = 1,299) compared to -10,077.89 (N = 4,416) and -10,059.54 (N =1,299) for the 5-group solution. I tested the 6-group and 5-group solutions with predictor sets to substantively check the meaningfulness of solutions. Using the largest normative group as the reference group in the 6-group model, eight environmental, adaptive, and maladaptive predictors demonstrated 10 moments of statistical significance. In contrast, the 5-group model demonstrated 13 moments of statistical significance, indicating a more meaningful representation of distinct trajectory groups. Responding to Research Question 1, those results indicated that the addition of a small sixth group was not meaningful practically or theoretically even though the additional group improved statistical fit of the model—a

possible outcome of increasing degrees of freedom with more parameters. As Table 9 illustrates, only one model adequacy diagnostic criterion (the OCC = 4.05 for the largest group) fell below the threshold, suggesting a good fitting model.

Table 9

Diagnostics of Group-based Model Adequacy for Originality

Trajectory Groups	$AvePP_j$	OCC_j	$Prob_j$	$Prop_j$	|% Dif.|
5 High Rise-to-Decline	.964[a]	1,807.32[a]	.015	.014	6.5[a]
4 Mid Steady Rise	.821[a]	90.97[a]	.050	.046	12.4[a]
3 Mid Rise-to-Decline	.803[a]	93.67[a]	.044	.029	30.5[a]
2 Mid Stable	.736[a]	10.06[a]	.277	.190	4.2[a]
1 Low Gradual Decline	.895[a]	4.05	.678	.722	4.1[a]

Note. Probabilities and proportions are presented to three decimal places.

[a]Meets or exceeds criteria presented in Nagin (2005) as evidence for a well-fitting model.

In response to Research Question 1, Figure 5 depicts a trajectory model with 5 distinct groups. The largest group represented 72% of students demonstrating a low amount of originality in their divergent thinking across middle school grades, suggesting a slight decline from $M = 2.68$ ($SD = 1.61$) points for originality at the beginning of Grade 6 to $M = 2.20$ ($SD = 1.39$) points for originality at the middle of Grade 8. (Students received one point for originality if an idea was unique to < 10% of the sample and two points if an idea was unique to < 5% of sample.) That decrease demonstrates a small effect size of $d = 0.32$. That group's trajectory was considered the normative pattern and fit some results from past research, indicating a gradual decline across K-12 schooling (Kim, 2011). The second largest group of 19% of the sample demonstrated a stable pattern, rising slightly from $M = 4.82$ ($SD = 1.93$) points for originality in Grade 6 to $M = 5.59$ ($SD = 2.18$) points for originality by the middle of Grade 7 and returning back to $M = 4.89$ ($SD = 2.12$) points by the middle of Grade 8—a negligible change. The third

group of 3% of the sample began at a similar level to Group 2, rising sharply from *M* = 5.71 (*SD* = 2.69) and doubling points for their original ideas to *M* = 11.16 (*SD* = 1.96) by the end of Grade 6. They demonstrated a declining pattern, ending with *M* = 3.69 (*SD* = 1.78) by the middle of Grade 8. That decrease represented a large effect size, *d* = 0.89.

Group 4 of approximately 5% of the sample began with *M* = 6.86 (*SD* = 2.79) points for originality in Grade 6, more than Groups 1–3, and was the only trajectory to steadily increase original idea production, achieving *M* = 10.03 (*SD* = 3.36) points for originality by the middle of Grade 8. That increase produced a large effect size *d* = 1.03. The 1.5% of the sample in Group 5 began at *M* = 10.64 (*SD* = 3.89) points for originality, rose sharply receiving *M* = 15.27 (*SD* = 5.51) points for originality by the end of Grade 6,

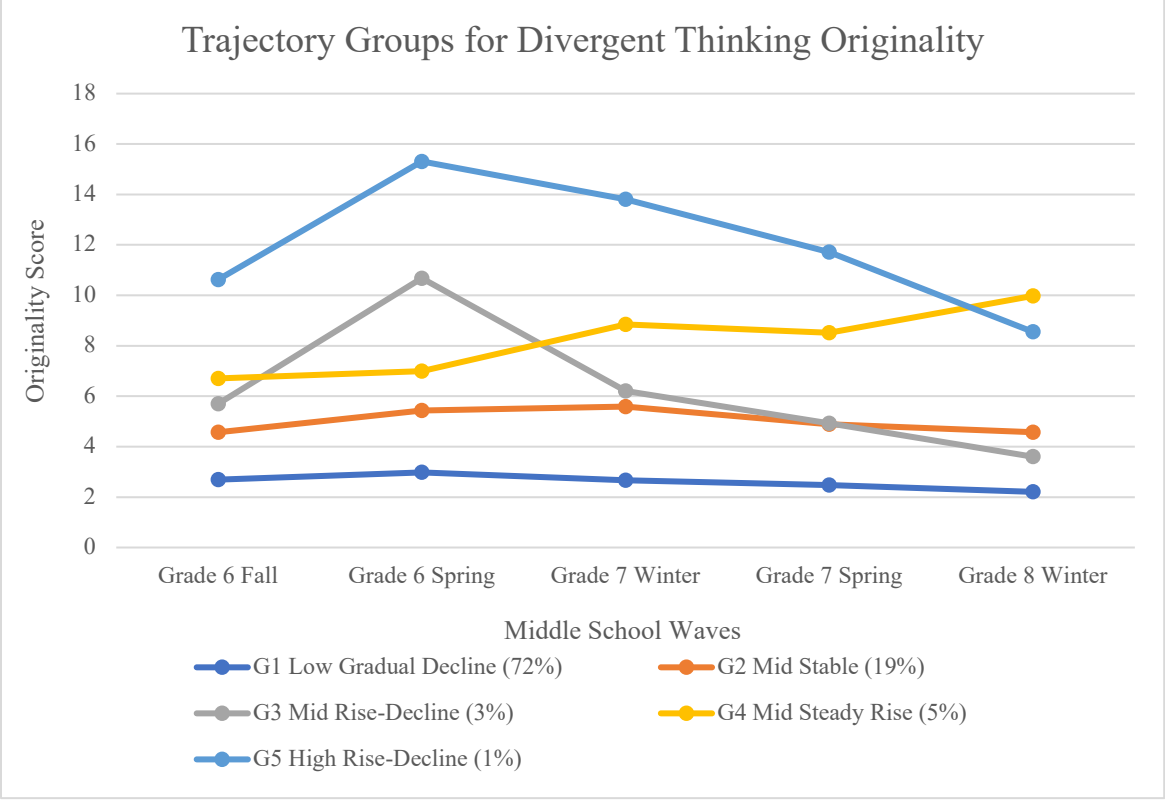

Figure 5. The trajectory patterns for the 5-Group solution (G1–G5) for originality with proportion of sample in each group identified in parentheses as percentages.

then declining gradually back to $M = 8.59$ ($SD = 6.15$) points for originality by the middle of Grade 8. That overall decrease amounted to a small-to-medium effect size, $d = 0.40$. Additionally, each group showed distinct characteristics of demographic, environmental, adaptive, and maladaptive predictors compared to the normative group.

Predictor analysis for originality. Predictors of group membership for originality are provided in Table 10 in response to Research Question 2. The reported growth parameters follow the same block entry approach of predictor sets outlined for fluency trajectories in order to provide adequate statistical power to detect meaningful patterns of statistically significant predictions of group membership, while also controlling for important demographic characteristics. Compared to the normative reference group of low, stable, and slightly declining originality trajectories, students were more likely to be in the mid-stable Group 2 if they were female and were not in special education. Additionally, they were more likely to be in Group 2 if early in Grade 6 they reported higher levels of support for creativity in their school, flow experiences in learning, growth mindset, creative confidence in their ideas, lower disengagement, and lower sense of conformity. Students were more likely to be in the mid-rise-to-decline Group 3 if they were female and had greater financial resource at home and reported higher levels of flow experiences in learning and lower levels of disengagement early in Grade 6. Students were also more likely to be in Group 4 if they were female and had greater financial resources. Importantly, students were more likely to be in the steady growth Group 4 if they reported higher levels of flow experiences and growth mindset and lower levels of disengagement and conformity early in Grade 6. The small group of highly original students were more likely to be in Group 5 if they were female and

Table 10.

Model Parameters for 5-Group Solution for Originality Including Demographic, Environmental, Adaptive, and Maladaptive Predictors

Set ID	Parameters	Sets Included	Group 1 Low Gradual Decline	Group 2 Mid Stable	Group 3 Mid Rise-to-Decline	Group 4 Mid Steady Rise	Group 5 High Rise-to-Decline
	N (proportion)	-	960 (72%)	253 (19%)	38 (3%)	61 (5%)	18 (1.4%)
	Model Term	1					
	Intercept		2.65**(0.09)	4.56**(0.23)	5.68**(0.63)	6.71**(0.56)	10.62**(0.52)
1	Linear		1.10* (0.48)	0.85 (1.13)	17.96**(4.25)	-3.70 (2.25)	11.19**(3.01)
	Quadratic		-1.10 (0.61)	0.33 (1.46)	-18.39**(4.93)	6.23* (2.96)	-8.72*(3.77)
	Cubic		0.35 (0.24)	-0.37 (0.59)	6.10**(1.85)	-2.57* (1.22)	2.47 (1.53)
	Quartic		-0.04 (0.03)	0.06 (0.07)	-0.66**(0.22)	0.32* (0.15)	-0.26 (0.19)
	Demographic Predictors	1, 2, 3					
2	Female		-	1.69** (0.27)	2.62** (0.50)	1.72**(0.37)	1.36* (0.54)
	Special education		-	-1.69** (0.52)	-16.53 (1,072)[a]	-2.77 (1.44)	-1.46 (1.06)
	FRL		-	0.08 (0.26)	-0.87* (0.39)	-0.95**(0.37)	-0.61 (0.54)
	Environmental predictors	1, 2, 3					
3	Arts integration		-	-0.28 (0.27)	-0.37 (0.38)	-0.73 (0.38)	-0.52 (0.55)
	Support for creativity		-	0.39* (0.17)	0.58 (0.31)	0.25 (0.23)	0.36 (0.38)
	Adaptive predictors	1, 2, 4					
4	Flow in learning		-	0.47**(0.18)	0.95**(0.30)	0.82**(0.28)	0.23 (0.37)
	Growth mindset		-	0.28* (0.14)	0.21 (0.19)	0.46* (0.19)	0.31 (0.27)
	Creative confidence		-	0.37* (0.19)	0.51 (0.30)	-0.10 (0.24)	0.61 (0.42)
	Maladaptive predictors	1, 2, 5					
5	Anxiety		-	-0.10 (0.13)	-0.13 (0.19)	-0.31 (0.18)	-0.00 (0.27)
	Disengagement		-	-0.54**(0.16)	-1.34**(0.40)	-0.72* (0.28)	-0.83 (0.45)
	Valuing conformity		-	-0.40* (0.16)	-0.49 (0.25)	-0.55* (0.23)	-0.78* (0.37)

Note. Growth parameters derive from the unconditional model. The intercept estimates Grade 6 starting level; linear term estimates constant change; and the quadratic, cubic, and quartic terms estimate acceleration or deceleration that may occur at different waves. Parameter estimates of predictors represent log odds, compared to Group 1. [a]There were no special education students in this trajectory group. * $p < .05$ and ** $p < .01$.

demonstrated less value of conformity early in Grade 6. Those two factors were salient enough to be statistically significant with a very small sample of n = 18 students.

Outcome analysis for originality. In response to Research Question 3, in most cases, students in the mid and high groups of originality trajectories (Groups 2–5) demonstrated higher levels of personal agency, disengagement, math and ELA achievement, creative production, and creative self-concept illustrated in Table 8. Groups 2–5 each had higher means of personal agency than Group 1, ranging from M = 3.83 (SD = 0.74) for Group 2 to M = 4.21 (SD = 0.66) for Group 5 with effects sizes ranging from medium (d = 0.40) to large (d = 0.97). Mean disengagement was lower for students in Groups 4 and 5 than Groups 1–3 with the largest effect size found between Group 1 and 5 at d = 0.81, a large effect. Though math and ELA achievement was not different among Groups 2–5, the mean scores for each of those groups was higher than the mean for students in normative Group 1 at medium and large effect sizes. Students in Groups 4 and 5 also demonstrated higher levels of creative production and creative self-concept than students in Groups 1 and 3 (Group 3 had experienced substantial decline in originality). The difference between Groups 1 and 5 on creative performance was at a very large effect size, d = 1.32. Students in Group 2 demonstrated a higher mean of creative production and self-concept than Group 1, but only at small-to-medium effect sizes.

Flexibility Trajectories

The BIC for models continued to improve to a 6-group model, but the size and profile of groups became too small to be meaningful in predictor and outcome analyses (< 1.0%). The 5-group model suggested two groups with between 1–2% of the sample with BIC statistics of -4,070.00 (N = 4,416) and -4,051.65 (N = 1,299). Though the BIC

was lower for the 5-group model compared to the 4-Group model at -4,107.19 (N = 4,416) and -4,092.51 (N = 1,299), there appeared to be little practical or theoretical difference between most of the groups in the 5-group model. Using the largest normative group as the reference group in the 5-group model, eight environmental, adaptive, and maladaptive predictors demonstrated only 3 moments of statistical significance. Those results indicated that the addition of another small group was not meaningful practically even though the model improved statistical fit. In response to Research Question 1, the 4-group model demonstrated nine moments of statistical significance, indicating a more meaningful representation of distinct trajectory groups, which differed in terms of the environmental, adaptive, and maladaptive factors to describe each group profile in reference to the normative group. As Table 11 illustrates, only one model adequacy diagnostic criterion (the OCC = 4.18 for the largest group) fell just below the threshold suggested by Nagin (2005), suggesting a good fitting model.

Table 11.

Diagnostics of Group-based Model Adequacy for Flexibility

Trajectory Groups	$AvePP_j$	OCC_j	$Prob_j$	$Prop_j$	|% Dif.|
4 High Decline-to-Rise	.933[a]	2,573.58[a]	.012	.011	8.3[a]
3 High Fluctuating	.812[a]	174.56[a]	.036	.030	16.7[a]
2 Mid Gradual Rise	.867[a]	19.28[a]	.183	.159	13.1[a]
1 Low Stable	.969[a]	4.18	.769	.801	4.2[a]

Note. Probabilities and proportions are presented to three decimal places.

[a]Meets or exceeds criteria presented in Nagin (2005) as evidence for a well-fitting model.

Figure 6 depicts the 4-group solution for flexibility. The largest group represented 80% of students demonstrating a low amount of divergent thinking flexibility across

middle school grades, suggesting a slight decline from $M = 1.43$ ($SD = 0.46$) points for flexibility at the beginning of Grade 6 to $M = 1.33$ ($SD = 0.38$) points for flexibility at the middle of Grade 8. (Flexibility points represent the number of distinct categories of ideas generated.) That group's decreasing trajectory at a small effect size, $d = 0.26$, was considered the normative pattern. The second largest group of 16% of the sample ($n = 211$) demonstrated a gradual rise from $M = 1.88$ ($SD = 0.55$) points for flexibility in Grade 6 to $M = 2.25$ points ($SD = 0.75$) for flexibility by the middle of Grade 8—a medium-to-large Cohen's $d = 0.70$ effect size. Group 3 of 3% of the sample began higher than Groups 1 and 2 at $M = 2.77$ ($SD = 0.89$) fluctuating sharply to a high of $M = 3.58$ ($SD = 1.09$) points at the end of Grade 6, before ending lower than their starting level at $M = 2.06$ ($SD = 0.60$) points for flexibility. That decrease equaled a large effect size, $d = 0.95$.

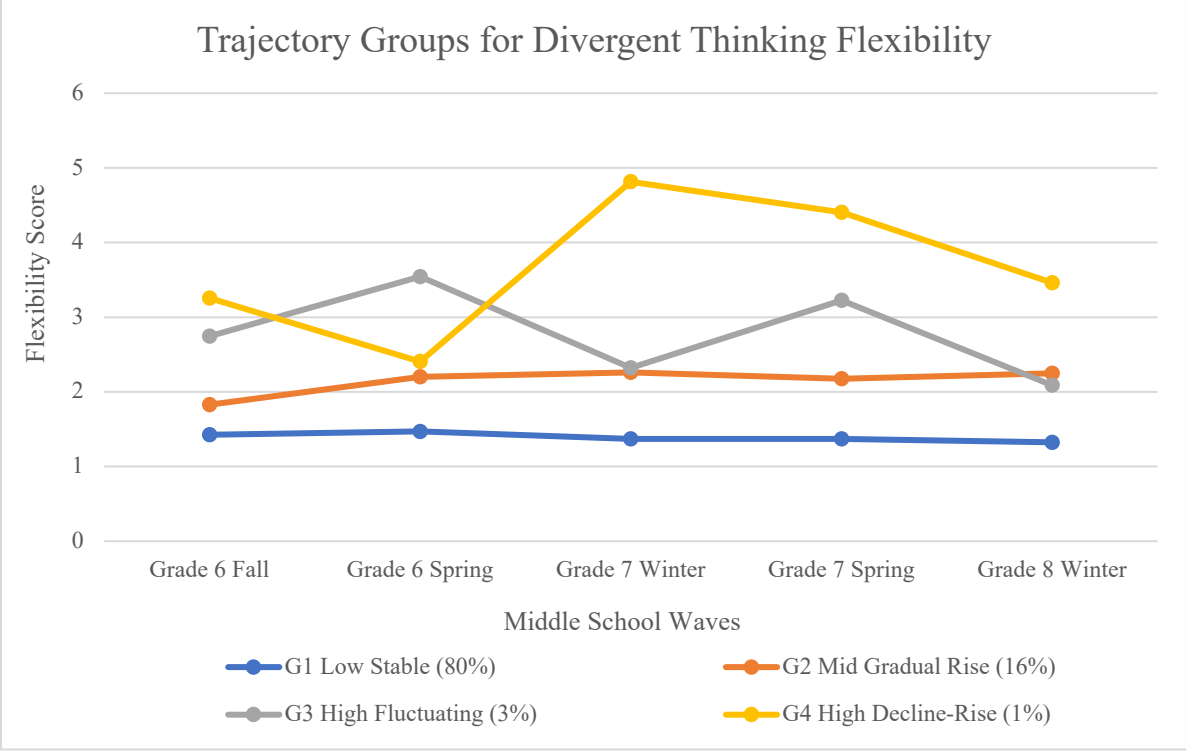

Figure 6. The trajectory patterns for the 4-Group solution (G1–G4) for flexibility with proportion of sample in each group identified in parentheses as percentages.

Group 4 of approximately 1% of the sample began highest at $M = 3.29$ ($SD = 0.90$) points for flexibility and dropped before rising again to as high as $M = 4.82$ ($SD = 1.70$) points in Grade 7. They returned close to their starting level by the middle of Grade 8 at $M = 3.54$ ($SD = 2.10$), representing an increase at a small effect size, $d = 0.16$. In addition to those distinct patterns, each group also had different characteristics of demographic, environmental, adaptive, and maladaptive predictors compared to the normative group.

Predictor analysis for flexibility. Predictors of group membership for flexibility are provided in Table 12. The reported growth parameters follow the same block entry approach of predictor sets outlined for fluency trajectories in response to Research Question 2. That approach provided adequate statistical power to detect meaningful patterns of statistically significant predictions of group membership, while controlling for demographic characteristics. Compared to the normative reference group of a low, stable level of flexibility, students were more likely to be in the mid-gradual-rise Group 2 if they were female and not in special education. Additionally, they were more likely to be in Group 2 if early in Grade 6 they reported higher levels of support for creativity in their school, flow experiences in learning, growth mindset, creative confidence in their ideas and lower disengagement and value of conformity. Students were more likely to be in the high fluctuating Group 3 if they were female, not in special education, had greater financial resource at home, and if they reported higher levels of flow experiences in learning and lower levels of disengagement and value of conformity early in Grade 6. Students were more likely to be in the high decline-to-rise Group 4 if they were not in special education. No other characteristics in Grade 6 distinguished students in that group from the normative group.

Table 12.

Model Parameters for 5-Group Solution for Flexibility Including Demographic, Environmental, Adaptive, and Maladaptive Predictors

Set ID	Parameters	Included Sets	Group 1 Low Stable	Group 2 Mid Gradual Rise	Group 3 High Fluctuating	Group 4 High Decline-to-Rise
	N (actual proportion)		1,065 (80%)	211 (16%)	40 (3%)	14 (1%)
	Model Term	1				
1	Intercept		1.42** (0.02)	1.83** (0.06)	2.74** (0.12)	3.26** (0.17)
	Linear		0.30* (.012)	0.56 (0.30)	5.27** (0.84)	-6.59** (0.93)
	Quadratic		-0.37* (0.15)	-0.19 (0.39)	-6.89** (1.05)	8.50** (1.18)
	Cubic		0.14* (0.06)	-0.00 (0.16)	2.77** (0.42)	-3.10** (0.47)
	Quartic		-0.02* (0.01)	0.01 (0.02)	-0.35** (0.05)	0.35** (0.06)
	Demographic	1, 2, 3				
2	Female		-	1.53** (0.24)	1.77** (0.36)	0.79 (0.75)
	Special ed.		-	-1.50** (0.51)	-2.29* (0.03)	-14.77 (1,544)[a]
	FRL		-	-0.40 (0.24)	-0.66* (0.33)	-1.39 (0.87)
	Environmental	1, 2, 3				
3	Arts integration		-	-0.18 (0.23)	-0.62 (0.34)	-0.44 (0.81)
	Support for creativity		-	0.37* (0.16)	0.40 (0.24)	-0.18 (0.44)
	Adaptive	1, 2, 4				
4	Flow in learning		-	0.43* (0.17)	0.79** (0.26)	0.01 (0.49)
	Growth mindset		-	0.26* (0.12)	0.31 (0.16)	0.00 (0.38)
	Creative confidence		-	0.41* (0.18)	0.24 (0.23)	.05 (0.49)
	Maladaptive	1, 2, 5				
5	Anxiety		-	-0.04 (0.11)	-0.11 (0.16)	-0.16 (0.38)
	Disengagement		-	-0.41** (0.15)	-1.34** (0.35)	-0.44 (0.48)
	Conformity		-	-0.42** (0.14)	-0.70** (0.23)	0.47 (0.41)

Note. Growth parameters derive from the unconditional model. The intercept estimates Grade 6 starting level; linear term estimates constant change; and the quadratic, cubic, and quartic terms estimate acceleration or deceleration that may occur at different waves. Parameter estimates of predictors represent log odds, compared to Group 1. [a]There were no special education students in this trajectory group. * $p <$ .05 and ** $p <$ .01.

Outcome analysis for flexibility. In response to Research Question 3, the results of the outcome analysis for divergent thinking flexibility demonstrated similar patterns to fluency and originality. As Table 13 details, Groups 2–4 each had higher means of

Table 13.

Outcome Analyses Results for Flexibility and Divergent Thinking Composite Trajectory Groups Including Means, Standard Deviations, and Multiple Group Comparisons

	Preparedness Outcomes					
Trajectory Groups	Agency (N = 836)	Disengaged (N = 838)	Math (N = 1,156)	ELA (N = 1,169)	Creative (N = 838)	CSC (N = 845)
Flexibility						
1 Low stable	3.57_{a}	2.56_{a}	$2{,}506.55_{a}$	$2{,}538.49_{a}$	2.94_{a}	3.16_{a}
(n = 942)	(0.73)	(1.04)	(182.07)	(163.02)	(1.04)	(0.91)
2 Mid gradual rise	3.91_{b}	2.31_{b}	$2{,}595.18_{b}$	$2{,}616.46_{b}$	3.43_{b}	3.64_{b}
(n = 178)	(0.72)	(1.02)	(110.52)	(79.25)	(0.96)	(0.79)
3 High transitory	3.97_{b}	$2.24_{a,b}$	$2{,}586.60_{b}$	$2{,}615.92_{b}$	3.46_{b}	$3.42_{a,b}$
(n = 36)	(0.62)	(1.05)	(100.92)	(84.25)	(1.03)	(0.84)
4 High decline-rise	4.26_{b}	$2.00_{a,b}$	$2{,}709.00_{b}$	$2{,}667.15_{b}$	4.30_{b}	$3.90_{a,b}$
(n = 13)	(0.71)	(1.12)	(121.40)	(82.53)	(0.46)	(0.82)
Divergent thinking composite						
1 Low stable	3.55_{a}	2.60_{a}	$2{,}497.94_{a}$	$2{,}531.07_{a}$	2.89_{a}	3.14_{a}
(n = 850)	(0.73)	(1.03)	(186.97)	(168.29)	(1.03)	(0.92)
2 Mid stable	3.83_{b}	2.38_{a}	$2{,}585.82_{b}$	$2{,}607.04_{b}$	3.34_{b}	3.51_{b}
(n = 214)	(0.73)	(1.01)	(103.07)	(77.47)	(0.98)	(0.79)
3 Mid rise-decline	3.97_{b}	2.36_{a}	$2{,}589.31_{b}$	$2{,}622.87_{b}$	$3.24_{a,b,c}$	$3.34_{a,b}$
(n = 39)	(0.52)	(1.05)	(102.25)	(67.73)	(1.07)	(0.90)
4 High rising	3.93_{b}	1.96_{b}	$2{,}623.80_{b}$	$2{,}630.75_{b}$	$3.68_{b,c}$	3.73_{b}
(n = 51)	(0.75)	(0.92)	(127.49)	(89.53)	(0.87)	(0.84)
5 High rise-decline	4.27_{b}	1.69_{b}	$2{,}664.47_{b}$	$2{,}670.60_{b}$	4.11_{c}	3.97_{b}
(n = 15)	(0.65)	(1.07)	(110.08)	(52.54)	(0.70)	(0.82)

Note. All estimates reported are of group means for each outcome. Proportion of sample included below each group in the Trajectory Group column represents the sample size with Math and ELA scores for each group. ANOVA omnibus tests were statistically significant at $p < .05$ for all outcomes and trajectory groups. Post hoc pairwise comparisons between trajectory groups used the Bonferroni adjustment (.05/# of comparison) to maintain $p < .05$. Outcome values with different subscripts are significantly different at adjusted $p < .05$.

personal agency than Group 1, ranging from $M = 3.91$ ($SD = 0.72$) for Group 2, a medium effect at $d = 0.48$, to $M = 4.26$ ($SD = 0.71$) for Group 4, a large effect at $d = 0.97$. Differences between Groups 2–4 in personal agency were not statistically significant. Mean disengagement was lower for Group 2 students compared to Group 1 at a small

effect size of $d = 0.24$—the only statistically significant difference. Though math and ELA achievement was not different among Groups 2–4, the mean scores for each of those groups was higher than the mean for students in normative Group 1 with effect sizes ranging from medium to large. Students in Groups 2–4 demonstrated higher levels of creative production than Group 1 and differences between Groups 2–4 were not statistically significant. The difference between Groups 1 and 4 in creative production was at a very large effect size, $d = 1.69$. Group 2 showed a higher level of creative self-concept than Group 1 at a medium effect size of $d = 0.56$; no other statistically significant difference was detected.

Divergent Thinking Composite Trajectories

Generally, the model fitting results for the divergent thinking composite score matched the results for originality. The divergent thinking composite score was calculated by summing the means for each factor and generating a new composite mean. The BIC for models continued to improve to an 8-group model but the size of groups became too small to be meaningful in predictor and outcome analyses (< 1.0%). The 6-group model BIC statistics were -7,676.36 ($N = 4,416$) and -7,654.33 ($N = 1,299$) compared to -7,719.62 ($N = 4,416$) and -7,701.26 ($N = 1,299$) for the 5-group solution. I tested both the 6-group and 5-group solutions with predictor sets and found the 5-group solution to represent the most meaningful patterns in the data. Using the largest normative group as the reference group in the 6-group model, eight environmental, adaptive, and maladaptive predictors demonstrated only 10 moments of statistical significance. In contrast, the 5-group model demonstrated 15 moments of statistical significance, indicating a more meaningful representation of distinct trajectory groups.

Those results indicated that the addition of a small sixth group was not meaningful practically even though that additional group improved statistical fit of the model. Only one diagnostic criterion (the OCC = 4.21 for Group 1 in Table 14) fell just below the recommended threshold, suggesting a good fitting model.

Table 14.

Diagnostics of Group-based Model Adequacy for Composite Score of Divergent Thinking

Trajectory Groups	$AvePP_j$	OCC_j	$Prob_j$	$Prop_j$	|% Dif.|
5 High Rise-to-Decline	.956[a]	1,426.76[a]	.015	.014	6.7[a]
4 Mid Steady Rise	.817[a]	86.65[a]	.049	.041	16.3[a]
3 Mid Rise-to-Decline	.766[a]	76.57[a]	.041	.032	22.0[a]
2 Mid Stable	.737[a]	10.17[a]	.276	.189	12.5[a]
1 Low Slight Decline	.899[a]	4.21	.679	.723	6.5[a]

Note. Probabilities and proportions are presented to three decimal places.

[a]Meets or exceeds criteria presented in Nagin (2005) as evidence for a well-fitting model.

Figure 7 depicts the 5-group model for divergent thinking composite. The largest group represented 72% of students demonstrating a low amount of divergent thinking across middle school grades, suggesting a slight decline from $M = 1.95$ ($SD = 0.97$) points at the beginning of Grade 6 to $M = 1.71$ ($SD = 0.82$) points at the middle of Grade 8—demonstrating a decrease at a small Cohen's $d = .28$ effect size. That group's trajectory was considered the normative pattern and fit some results from past research, suggesting a decline during this developmental period. The second largest group of 19% of the sample also demonstrated a stable pattern starting at $M = 3.21$ ($SD = 1.12$) in Grade 6, rising slightly to $M = 3.85$ ($SD = 1.20$) by Grade 7, and returning back to $M = 3.40$ ($SD = 1.19$) points by the middle of Grade 8. The third group of 3% of the sample began

similarly to Group 2 at *M* = 3.68 (*SD* = 1.51), rising sharply to *M* = 7.00 (*SD* = 1.27) points by the end of Grade 6, and ending even lower than Group 2 at *M* = 2.61 (*SD* = 1.15) by the middle of Grade 8. Group 4 of 4% of the sample began at *M* = 4.41 (*SD* = 1.60) points in Grade 6 and was the only trajectory to steadily increase divergent thinking, rising to *M* = 6.32 (*SD* = 1.94) points by the middle of Grade 8. Group 5 of 1.4% of the sample began at *M* = 6.70 (*SD* = 2.09) points, rising sharply to *M* = 8.67 (*SD* = 3.18) points by the end of Grade 6, and declining gradually back to *M* = 5.44 (*SD* = 3.58) points by the middle of Grade 8. In addition to those distinct patterns, each group also had different characteristics of demographic, environmental, adaptive, and maladaptive predictors compared to the normative group.

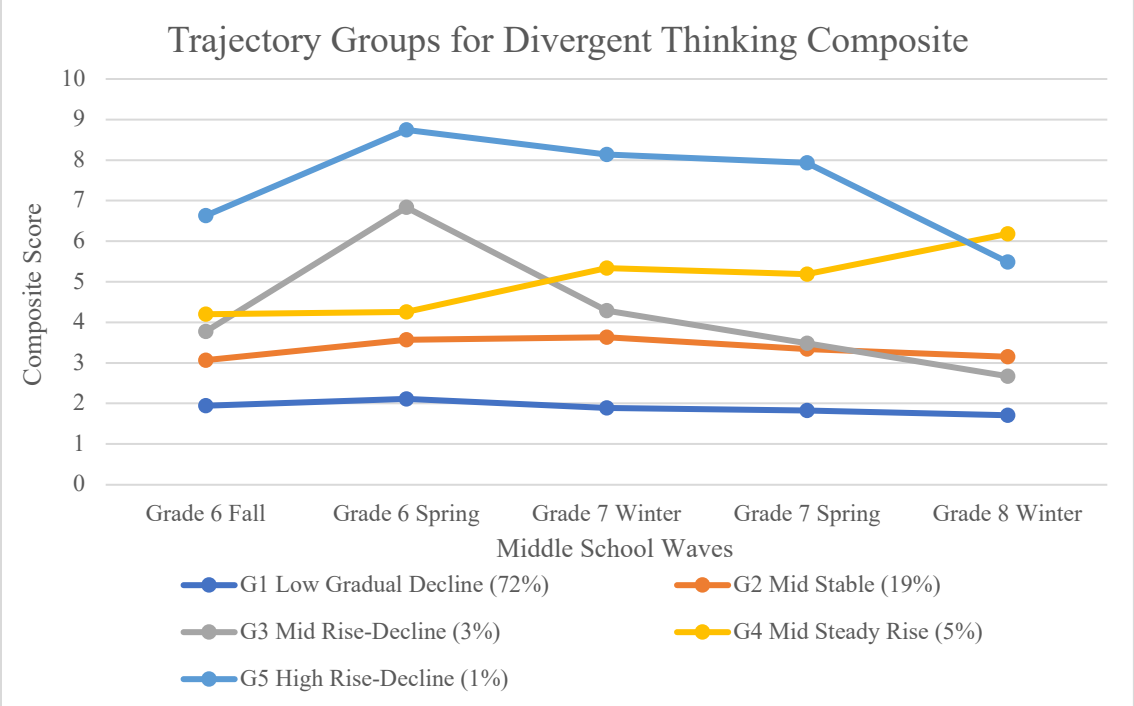

Figure 7. The trajectory patterns for the 5-Group solution for divergent thinking composite with proportion of sample in each group identified in parentheses as percentages.

Table 15.

Model Parameters for 5-Group Solution for Composite Divergent Thinking Including Demographic, Environmental, Adaptive, and Maladaptive Predictors

Set ID	Parameters	Included Sets	Group 1 Low Slight Decline	Group 2 Mid Stable	Group 3 Mid Rise-to-Decline	Group 4 Mid Steady Rise	Group 5 High Rise-to-Decline
	N (sample proportion)		961 (72%)	252 (19%)	43 (3%)	55 (4%)	19 (1.4%)
	Model Term	1					
1	Intercept		1.95**(0.06)	3.07**(0.14)	3.77**(0.29)	4.20**(0.30)	6.64**(0.29)
	Linear		0.73** (0.28)	0.67 (0.67)	10.58**(2.12)	-2.38 (1.54)	5.94**(1.70)
	Quadratic		-0.80* (0.35)	-0.10 (0.88)	-10.64**(2.56)	3.78 (1.95)	-5.55**(2.10)
	Cubic		0.27 (0.14)	-0.07 (0.35)	3.50**(0.98)	-1.54* (0.78)	1.96* (0.84)
	Quartic		-0.03 (0.02)	0.02 (0.04)	-0.38**(0.11)	0.19* (0.10)	-0.24* (0.10)
	Demographic Predictors	1, 2, 3					
2	Female		-	1.79** (0.26)	2.18** (0.52)	1.50**(0.37)	0.49 (0.79)
	Special education		-	-1.80* (0.72)	-1.90 (1.07)	-3.02 (3.53)	-14.83 (1,289)[a]
	FRL		-	0.01 (0.25)	-0.74 (0.10)	-1.23**(0.40)	-0.54 (0.79)
	Environmental predictors	1, 2, 3					
3	Arts integration		-	-0.08 (0.25)	-0.27 (0.43)	-0.51 (0.38)	-0.16 (0.80)
	Support for creativity		-	0.34* (0.17)	0.21 (0.31)	0.24 (0.23)	0.82 (0.67)
	Adaptive predictors	1, 2, 4					
4	Flow in learning		-	0.47**(0.17)	0.95**(0.33)	0.74**(0.25)	-0.01 (0.40)
	Growth mindset		-	0.21 (0.13)	0.48** (0.22)	0.40* (0.18)	0.18 (0.30)
	Creative confidence		-	0.40* (0.18)	0.41 (0.34)	-0.04 (0.23)	0.73 (0.56)
	Maladaptive predictors	1, 2, 5					
5	Anxiety		-	-0.09 (0.13)	-0.08 (0.18)	-0.30 (0.18)	-0.00 (0.27)
	Disengagement		-	-0.53**(0.16)	-1.30**(0.36)	-0.65* (0.28)	-0.89* (0.45)
	Valuing conformity		-	-0.40* (0.16)	-0.46* (0.23)	-0.60** (0.23)	-0.83* (0.37)

Note. Growth parameters derive from the unconditional model. The intercept estimates Grade 6 starting level; linear term estimates constant change; and the quadratic, cubic, and quartic terms estimate acceleration or deceleration that may occur at different waves. Parameter estimates of predictors represent log odds compared to Group 1. [a]There were no special education students in this trajectory group. * $p < .05$ and ** $p < .01$.

Predictor analysis for divergent thinking composite. Predictors of group membership for originality are provided in Table 15. The reported growth parameters follow the same block entry approach of predictor sets outlined for fluency trajectories in order to provide adequate statistical power to detect meaningful patterns of statistically significant predictions of group membership, while also controlling for important demographic characteristics. Compared to the normative reference group of a low, stable, and slightly declining divergent thinking trajectory, students were more likely to be in the mid-stable Group 2 if they were female and were not in special education. Additionally, they were more likely to be in Group 2 if early in Grade 6 they reported higher levels of support for creativity in their school, flow experiences in learning, creative confidence in their ideas, and lower disengagement and value of conformity. Students were more likely to be in the mid-level rise-to-decline Group 3 if they were female and reported higher levels of flow experiences in learning and growth mindset and lower levels of disengagement and value of conformity early in Grade 6. Students were more likely to be in the mid-steady-rise Group 4 if they were female and with greater financial resources at home and if they reported higher levels of flow experiences and growth mindset and lower levels of disengagement and conformity early in Grade 6. The small group of students achieving a consistently high level of divergent thinking were more likely to be classified in Group 5 if they were not in special education and demonstrated lower disengagement and value of conformity at the beginning of Grade 6.

Outcome analysis for divergent thinking composite. The results of the outcome analysis for the divergent thinking composite score followed the results of originality, closely, given that trajectory group composition and parameter estimates was very

similar. Groups 2–5 each had higher means of personal agency than Group 1 ranging from medium to large effect sizes. Mean disengagement was lower for students in Groups 4 and 5 than Groups 1–3. Though math and ELA achievement was not different among Groups 2–5, the mean scores for each of those groups was higher than the mean for students in normative Group 1 at medium to large effect sizes. Students in Groups 2, 4, and 5 demonstrated higher levels of creative production than Group 1, with the a very large effect size between Groups 1 and 5. Group 5 also demonstrated higher creative production than Group 2. Groups 2, 4, and 5 showed higher levels of creative self-concept than Group 1. Differences between normative Group 1 and early rise-to-decline Group 3 were not statistically significant.

Demographic breakdown. Table 16 illustrates the demographic makeup of trajectory groups of divergent thinking composite to visualize issues of over- and underrepresentation of specific groups in each latent trajectory class. White students were slightly overrepresented in Groups 2 and 4. Generally, students from racial-ethnic minority groups were not over- or under-represented in normative Group 1. Some specific descriptive statistics are noteworthy. Asian students were overrepresented in the high groups 4 and 5 and multiracial students were highly overrepresented in highly creative Group 5 at 3.5 times the proportion in the sample. Hispanic students were overrepresented in the mid-rise-to-decline Group 3. As the predictor analysis described, female students were underrepresented in Group 1 and overrepresented in every other group. Special education students were overrepresented in Group 1 at about 1.25 times their proportion in the sample but were present in Groups 2, 4, and 5. That result suggests that these trajectory groups for divergent thinking included different ability types and

levels. Students with less access to financial resource at home were slightly overrepresented in the low, normative Group 1 and underrepresented to different degrees in higher groups.

Table 16.

Demographic Makeup of Trajectory Groups for Originality and Divergent Thinking Composite (in Percentages)

Student Characteristics	Total	Group 1	Group 2	Group 3	Group 4	Group 5
Race-ethnicity						
White	67.4	65.9	71.9	66.7	74.6	61.1
Hispanic	20.0	21.6	16.1	27.8	11.9	5.6
Multiracial	8.2	8.1	7.2	5.6	8.5	27.8
American Indian/Native Alaskan	1.4	1.4	2.4	-	-	-
Asian	1.4	1.1	2.4	-	3.4	5.6
Black	1.1	1.5	-	-	1.7	-
Pacific Islander	0.4	0.5	-	-	-	-
Female	47.6	41.7	63.1	63.9	64.4	61.1
Special education	15.9	19.7	8.0	-	3.4	11.1
Free-reduced meals eligible	57.6	61.7	49.8	44.4	39.0	38.9

Note. Estimates in table represent percentages. A dash indicates that a group contained no students within that specific demographic group.

Tests of interaction effects. To understand if the benefit to creative development of being female was moderated by the role of valuing conformity or disengagement, I tested those interaction terms. Additionally, I tested if the detriment of lower access to financial and socioeconomic resources at home was moderated by growth mindset, creative confidence, or flow experiences in learning. No interaction effects were statistically significant when entered with the predictor sets illustrated in Table 15. Having access to greater financial resources or being female contributed to likelihood of being in higher groups of divergent thinking, but those predictors were no longer statistically significant for most groups when the interaction terms were included. Not

surprisingly, when comparing the value of conformity at the beginning of Grade 6 between male (M = 2.35; SD = 0.84) and female (M = 2.02; SD = 0.83) students, ANOVA results demonstrated a statistically significant difference $F(1, 986) = 38.22$ at a small-to-medium effect size of d = 0.39. In essence, it appears that the greater likelihood of being in higher creative trajectory groups for female students may be explained, in part, by the higher value that early adolescent male students place on conformity early in their middle level schooling.

CHAPTER IV

DISCUSSION

In this dissertation study, I sought to understand more about distinct profiles of creative development in early adolescence, and if and how positive creative development contributes to holistic preparedness of youth. I used group-based trajectory modeling techniques and substantive checking to determine the number of different trajectory groups that represented the data. I used a low and stable group as the normative pattern and comparison group for analyses of each divergent thinking factor. I ran several sets of analyses to identify if relevant demographic, environmental, adaptive, and maladaptive factors predicted students' group membership compared to the normative low and stable group. Those group characteristics played an important role in identifying the most meaningful number of groups for each divergent thinking factor.

In response to my first research question, the analyses resulted in solutions with a different number of groups for each of the three divergent thinking factors studied—six groups for fluency, five groups for originality, and four groups for flexibility. Consistently, between 20–40% of the sample fit into trajectories that were outside the low and stable normative pattern. In response to my second research question, compared to the normative group, higher trajectory groups of divergent thinking demonstrated more adaptive orientations toward school, learning, growth, and creativity alongside greater confidence to be different from what others expected. In response to my third research question, membership in the higher trajectory groups, showing stable, fluctuating, or growth patterns, usually demonstrated higher levels of agentic, academic, creative, and school engagement outcomes compared to the normative group. Not surprisingly, the

exception to this pattern was the declining group who began Grade 6 with moderately high divergent thinking performance, rose abruptly, and declined until Grade 8. Though they demonstrated more adaptive characteristics in Grade 6, that orientation likely shifted and had an adverse effect on agentic, engagement, and creative outcomes.

Overall, the results contribute several important findings to research on creativity, education, and adolescence. First, the results reinforce that the development of divergent thinking—a skill related to an individual's creative potential—contributes to well-rounded preparedness in middle and high school. Second, development of this creative resource during the important but turbulent developmental phase of early adolescence did not follow a linear or universal pattern across this population of students—increases, declines, and stability were detected. Third, students who consistently demonstrated both the capacity and willingness to generate original and diverse ideas reflected higher levels of creative self-concept, personal agency and engagement in school as well as achievement in both academic and creative tasks. That finding reinforces the validity of divergent thinking as a measure of creative potential in adolescence by demonstrating its substantive role in later creative self-concept and production. Fourth, students with higher divergent thinking trajectories had begun middle school with less concern for conformity, a growth mindset about their abilities, more confidence in their ideas, and more frequent experiences of flow in learning. Importantly, those conative and affective factors are malleable characteristics shaped, in part, by the school and classroom environments. That finding suggests that creative development in adolescence may result as much from self-beliefs and attitudes as from the cognitive dimensions, such as creative ideation.

In the following pages, I explore the results in relation to (a) the intricacies of change in divergent thinking within adolescent development, (b) the social and motivational context of middle level schools in relation to creativity and conformity, (c) the malleability of beliefs, perceptions, and learner engagement, (d) the role of creative development in healthy adolescence, and (e) implications for schools and educators. These findings represent the first group-based trajectory analyses available in the literature to illustrate distinct trajectories of creative development during the early adolescent period—a significant phase of human development. Given the limited availability of related research, interpretations are cautiously generalized beyond the context of this sample to consider broader implications for adolescent development. I integrated past theoretical and empirical work to find areas of support, contrast, and complementarity with the aim to contribute new understanding about creative resources, adolescent development, and the middle school context.

Developmental Processes of Fluency, Originality, and Flexibility

In addressing Research Question 1, I found that only one group across factors that demonstrated steady and moderate growth. That trajectory group of growth in originality represented 5% of the sample. Those students began Grade 6 at a mid-to-high level of original ideas and generated the highest number of original ideas by Grade 8. Compared to the normative low, slightly declining group, members of the originality growth group were especially adaptive and advantaged in important ways at the start of Grade 6. Across groups, they were most likely to experience the heightened concentration and enjoyment of flow in learning and hold a growth-oriented mindset (i.e., they had the largest log odds estimate). They were least likely to ascribe value to social conformity,

and they were among the most likely to be affectively engaged in school. Demographically, they were more likely to be female and have greater access to financial resources at home. The fact that opportunity inequities defined by family financial resources played a role above and beyond other factors, like growth mindset, demonstrates that ecological circumstances beyond the school play a role in creative development and performance (Brofenbrenner, 1977). The fact that originality increased steadily for some students could relate to the ever-expanding knowledge base forming in adolescence to produce new insights and unusual ideas (Kleibeuker et al., 2016).

Also, noteworthy, Hispanic students were the most underrepresented in that originality growth group. Alongside an increase in negative rhetoric against Hispanic populations in the U.S. (Fermoso, 2018), research reports an increase in teasing and bullying of students because of their race or ethnicity in some parts of the country (Huang & Cornell, 2019). Given that context, Hispanic underrepresentation in higher originality groups poses an important question. Could the broader socio-political climate in the U.S. have suppressed the creative ideation of Hispanic students, even in this seemingly low-stakes divergent thinking task? Could convergent thinking be a protective measure for individual's living in fear of discrimination? And could the enactment of that protective measure have stymied creative development and/or performance during early adolescence for Hispanic students? These questions are only speculative and require focused research; however, the toll of discrimination at the collective level for groups (Gray et al., 2018) and the intense drive for peer acceptance in early adolescence would suggest that a fear for safety would be deleterious to the creative development of youth.

Though the normative group trajectory demonstrated a similar declining pattern across divergent thinking factors, trajectories of the second largest group, which ranged from 16% of the sample in flexibility to 26% in fluency, demonstrated contrasting patterns. That second largest group ended Grade 8 at about the same level as the beginning of Grade 6 in fluency and originality after small rises. For flexibility, that second group of 16% of the sample, amounting to $n = 211$ students, demonstrated a medium-to-large effect size increase—the addition of almost a whole new associative category of ideas. As flexibility relates to the associative distance between the ideas students produce, this growth for almost one fifth of the sample aligns to a developmental advantage during early adolescence for associative and explorative thinking (Kleibeuker et al., 2016). Additionally, the fluctuating patterns of Groups 3 and 4 in flexibility suggest that this aspect of divergent thinking may undergo erratic changes for a small group of students, or they may respond much differently to alternate divergent thinking prompts.

The fluctuating trajectory groups in fluency require additional interpretation, as well. Group 3 represented 8% of the sample, about 106 students, and saw an increase in the number of ideas generated equal to a medium effect size or about one additional idea by Grade 8. Group 5 represented 1% of the sample, about 15 students, who doubled the number of ideas they generated by Grade 8. Those effects demonstrate the potential for wild variations in creative development for students during the early adolescent period. That variation is likely due to both cognitive and conative changes in how they approach the task of generating ideas in response to basic figural and verbal prompts. Importantly, students in Group 5 for fluency showed no distinctive characteristics in predictors from the normative group at Grade 6. What were the circumstances for the adaptive shift

during the last year of middle school that led to a doubling of ideas generated in Grade 8? The late growth of this group of students demonstrates how the creative potential of students can accelerate at different times and how variable patterns of growth can be. More research is needed to understand how and why that flourishing occurs and the differential roles of environment, experience, and cognitive and conative development.

A normative decline not guaranteed. The majority of students demonstrated a low, stable level or slight decline in divergent thinking fluency, flexibility, and originality. For instance, in the divergent thinking composite score, normative group students decreased at a small effect size. That result contrasts with what should be expected from a developmental science perspective (Dahl et al., 2018). Gains in knowledge and associative and evaluative skills during that period would suggest that youth in early adolescence should show an acceleration of divergent thinking ability. According to Kleibeuker et al. (2013), divergent thinking in the visuo-spatial domain may peak around age 15–16. However, as a general trend, our results found divergent thinking to be flat or slightly declining for most students from age 10–14. These results raise concerns about adverse school environments that pressure students toward greater conformity and convergent thinking (Kim, 2011, 2017). However, because this study represents one of the few longitudinal studies following the same cohort of students, the existence of varying developmental patterns suggests general trends identified in past research may be misleading.

Undoubtedly, typical environmental pressures found in middle school could encourage greater conformity. Potential pressures include (a) an increasingly intense academic setting (Eccles & Roeser, 2011; Juvonen et al., 2004) and curriculum

narrowing in schools with high concentrations of poverty; (b) a homogenous notion of student success (Zhao & Gearin, 2016) alongside greater self-consciousness and need for acceptance in early adolescence (Dahl et al., 2018); (c) a push toward teaching for *sameness* that can be found in the leading approaches to instruction and curriculum (Glaveanu & Beghetto, 2017), and (d) a broader social and political context that has increased segregation in schools when the evidence of benefits of racial and ethnic diversity in school continues to grow (Graham, 2018). It is important to note that identification in special education did not always predict student membership in the normative group. Though both environmental and individual factors played a role in a sustained low normative trend, differences from normative neurological, cognitive, or behavioral development were not consistently determinants. In sum, I found substantial variation in the development of a domain-general creative potential. It is likely that even more variation would be detected if I had used more domain-specific (e.g., engineering- or arts-based) or task specific divergent thinking measure.

Gender differential. From a developmental science perspective, the rapid physiological development during the early adolescent period from age 10–14 begins earlier for girls than boys (Dahl et al., 2018). That difference could explain some of the differences in divergent thinking output detected in this study, where female middle school students were more likely to be in the higher trajectory groups than male students. Beyond biological differences, what other social and cultural conditions could exert an influence on differences in creative development between male and female adolescents? Part of that gender difference in divergent thinking output could be due to the greater concerns for conformity expressed by male students at Grade 6—a medium effect size.

Though the interaction effect of conformity and gender was not statistically significant, that result may be due to insufficient analytic power. The social pressures experienced by young males to conform to ideas about masculinity has come under focus in the past two decades (Connell, 2005; Marasco, 2018). Though speculative, that pressure could have contributed to lower production of divergent ideas. Conversely, the efforts toward gender equality at the societal level may be contributing to a particular resilience in the creative development of female adolescents (Abraham, 2016).

In its extreme form, the social construct of what it means to be a "real man" in contemporary society has been described as hegemonic masculinity—the "oppressive characteristics of masculinity boys and men must assume and perform to be considered a 'real man'" (Marasco, 2018, p. 227). Given that hegemonic masculinity includes features such as toughness, aggression, and being emotionally restrictive, the expression of unusual ideas could be equated to being feminine or *too different* by adolescent boys (Kiselica & Englar-Carlson, 2010). Pressures of hegemonic masculinity requires that adolescent boys remain hyper-aware of their performance among peers to avoid any subtle perception of femininity (Marasco, 2018). As such, for early adolescent boys, thinking too divergently may feel like too much of a threat to the image of masculinity that maintains their social status. Could early adolescent boys actively restrict their idea generation to avoid behaviors and thinking that might feel too risky? Or could adolescent boys be exerting less effort on these tasks because they do not value creative thinking in this format? Both questions are speculative and provide an important direction for future research. Deviation from an ideal of masculinity can lead to social ostracism, so artistic and creative thinking and behaviors may be deemed to be insufficiently masculine. It is

possible that many adolescent boys do not have a model of masculinity to refer to that portrays an image of manhood alongside emotive and creative curiosity and expression. Logically, such pressures could stymie creative development in adolescence. As such, modeling of creative thinking and behaviors in adult men in the school setting may be and important consideration for educators and youth development professionals.

The Competing Polarities of Creative Confidence and Conformity

The findings to my second research question illustrated that some competing antecedent factors shaped creative development. From an evolutionary perspective (Puccio, 2017), every human holds potential for creative mind, and for that creative potential to be realized the polarity partner of conformity is just as necessary. In this sense, conformity is "the tendency to adopt and repeat established norms and behaviors" (Puccio, 2017, p. 331) and blending originality and conformity in thinking is necessary in the creative process (Beghetto, 2017). However, the results from this study indicate that valuing social conformity to a greater extent during early adolescence contributes to suppressed creative development. In this study, valuing conformity was operationalized as the drive to be liked and accepted by teachers and peers, even if that meant changing ideas or hiding differences (see items in Appendix B). In adolescence, there appears to be a threshold at which valuing conformity—more fully adopting the set of expectations and values of others over one's own set—diminishes an individual's creative potential during this key phase of identity formation. Valuing conformity was one of the most consistent predictors to distinguish the normative group from higher trajectories of creative development. Even for the 18 students who composed Group 5 in originality holding less value for conformity was a statistically significant antecedent.

That result points to the potential for divergent thinking capacity to be one pathway through which identity formation in adolescence links to creativity (Barbot & Heuser, 2017). Both the role of conformity in shaping creative development trajectories and the fact that higher levels of divergent thinking contributed to higher levels of creative self-concept in school are important to note. Higher capacity for divergent thinking and the antecedent factors that shaped that creative development supported stronger creative identity formation for students. As an undergirding dimension of identity, creative self-concept measured both a social and affective sense of one's creative self in the school setting, and, linked strongly to academic agency and engagement in school as well as creative production on a situated task.

Agentic action in creative development. When considering a sense of agency in school, self-efficacy and sense of control over performance contributes to stronger school performance and lower disengagement during secondary school (Anderson et al., 2019). A sense of personal agency around creativity, including self-beliefs and values, also contributes to greater creative activity for middle school students (Karwowski & Beghetto, 2018). In adolescence, a sense of autonomy is a fundamental need for school engagement (Ryan & Deci, 2000) and, biologically, one of the powerful drivers of human development in this growth period (Dahl et al., 2018). Results from this current study illustrate a contrasting picture between conformity and agency. Valuing conformity in Grade 6 contributed to lower divergent thinking across middle school, while higher levels of divergent thinking development associated with enhanced agency in Grade 8.

In the model of creative behavior as a form of agentic action (Karwowski & Beghetto, 2018), an individual's latent creative potential becomes creative behavior, in

part, through their creative self-beliefs and valuation of creativity. Several of the findings in this current study reinforce the potential strength of this model for adolescence. First, creative ideational confidence influenced higher trajectories. Second, a state of flow is characterized by deep concentration with less interruption of negative self-talk (Csikszentmihalyi, 1997; Csikszentmihalyi & Rathunde, 1993), and our results demonstrated that flow in everyday learning also predicted stronger divergent thinking trajectories. Third, valuing social conformity can be considered a polarity force to valuing expression of personal differences and creative interpretations. Fourth, a perception of support for creativity in school predicted higher levels of creative development. In sum, a lower valuation of conformity alongside a higher level of creative ideational confidence, more flow in everyday learning, and a sense of support for creativity contributed to consistent creative action by groups of stronger creative development. Those results suggest that creative potential may become creative behavior through agentic action.

Though the results of my study fit model of creative behavior as agentic action, it is impossible to rule out the explanation that lower divergent thinking scores did not, in part, result from a lack of effort and interest in the task. Recent research suggests that students pursue and engage in creative activities outside of school at twice the level they do in school (Runco, Acar, & Cayirdag, 2017). For students in the normative trend, the school setting in general, regardless of the task, may motivate much less demonstration and development of creative potential than for others. Students in the normative group may have held higher levels of creative potential than their divergent thinking performance suggests. However, that creative potential did not translate into actual production, even in a low-stakes divergent thinking task. If creative confidence in ideas

was too low, value of social conformity was too high, and the task felt uninteresting, the effort required to try to produce creative ideas may have felt overwhelming. Given the predictors that contributed to higher trajectory groups of originality, flexibility, and fluency, these domain-general divergent thinking tasks are approximating some aspect of creative potential for most students. However, in different domains (e.g., athletics, engineering, or the arts) students identified in the low normative group may have demonstrated different levels of creative potential. For middle school students, domain-general divergent thinking tasks likely draw forth a composite of creative resources, beyond just cognitive creative ideation, such as risk-taking, growth mindset, self-confidence, and resistance to premature closure of thinking, among others.

Response to these tasks could be considered a creative act in the social setting of a classroom, where the self-beliefs and valuation of creativity shape a students' capacity to perform to their potential. Given the paucity of creative opportunities in a typical day of middle school (Katz-Buonincontro & Anderson, 2018a), students may feel unfamiliar pressures when responding to these tasks. It is highly possible that some students *chose* not to pursue divergent ideas, for a variety of reasons, beyond any limiting factors of cognitive capacity for generative original and flexible thinking. Though original ideas generated in divergent thinking exercises represent a single measure of creative potential (Runco & Acar, 2012), results from this study suggest that performance in the social classroom may feel consequential to middle school students. Though the usefulness of divergent thinking tasks to creativity research continue to be debated, my findings suggest these tasks capture important elements of creative potential and agentic action.

The importance of diversity. This study's results illustrate the power of valuing diversity—a polarity opposite to conformity. Valuing individual differences and diversity may influence adolescents' capacity for and value of creative ideation and dictate the choice to put effort toward thinking and acting creatively. In the small group of students representing the consistently highest levels of originality and composite divergent thinking, multiracial students were represented at almost four times the level of their proportion in the sample. Though speculative, the diversity of perspectives and experiences and the multiple cultural and racial identities that multiracial students naturally navigate may be a protective factor for their creative development and a boost for their creative potential in adolescence. That finding presents an important pathway for developmental research.

Logic would suggest that exposure and experiences to diverse perspectives would naturally play a role in creative potential and recent research supports that proposition. A recent series of studies indicates that reflection on experiences in intercultural relationships compared to experiences in same-culture relationships led to greater creative production of individuals (Lu et al., 2017). Creativity in work and life for adults benefits from the experience of cultural diversity. There is no reason why that same benefit would not serve creative development in early adolescence, as well. The creative potential of diverse, multiracial students who carry complex identities and perspectives on the world, should be considered an asset to schools and communities and woven into culturally diverse and responsive instruction and curriculum.

Socioeconomic inequities of creative development. This study's findings provide a multi-faceted ecological explanation for the limited development in normative

trends of divergent thinking. Developmentally, this period of early adolescence includes a heightened need for social acceptance and recognition (Dahl et al., 2018), and that need occurs within schools that generally provide less and less creative opportunities across the curriculum. However, the additional influence of access to financial resources at home suggests that inequitable opportunities in students' childhood and adolescence contributes to developmental differences in creative potential. The Grade 6 starting level of divergent thinking originality, fluency, and flexibility highlights the influence of learning opportunities in and out school that preceded middle school and the stressors that students face living in adverse circumstances of poverty.

No trajectory group emerged from the data to illustrate a trajectory that began at the low, normative level but ended in the mid-to-high range of divergent thinking by Grade 8. An ecological framework for opportunity to learn would suggest that the resources, modeling, and support that students access at home for creative development also relates to what resources will likely be available to them in the neighborhood in which they live and go to school (Brofenbrenner, 1977). As the results demonstrate, those ecological factors of socioeconomic access likely influence the cognitive, affective, motivational, and environmental factors that played a role in trajectory group membership. Moreover, the self-system of motivation that students carry from one academic setting, such as elementary school, to another, such as middle school, may affect the creative dimension of their development as powerfully as it affects academic, social, and emotional dimensions (Skinner, Furrer, Marchand, & Kindermann, 2008).

The Challenge of Schoolwide Change: Arts Integration is No Exception

The results indicated that exposure to arts integration in half of the schools did not increase the likelihood of students' being classified into higher trajectory groups of divergent thinking originality, flexibility, and fluency. There are several reasons to explain this finding. First, the fact that students who began Grade 6 with higher levels of originality, flexibility, and fluency mostly sustained divergent thinking above the normative trend indicates that students' opportunities in and out of school prior to entering middle school played a considerable role. Second, the positive correlation between arts integration treatment and socioeconomic disadvantage (r = .18) and the negative correlation between socioeconomic disadvantage and divergent thinking (r = -.10) indicates that any potential effect of arts integration would have needed to overcome that systemic disadvantage. Third, implementation levels may have differed between schools considerably, where arts integration efforts by some teachers may have been offset by an overarching school climate that devalued creative development. Fourth, results indicate that students' affect and self-beliefs likely played a substantial role in their creative idea generation and arts integration would have needed to shift those influences as well. Fifth, it is possible that the theory of change undergirding the arts integration training for teachers was not well-aligned to affect the underlying thinking processes of creative ideation. Future research should investigate specific mechanisms for school-based interventions with consideration to competing forces that exist.

Another highly plausible explanation is that teachers' skill development to leverage creative resources through arts integration takes time. Perhaps, interventions need to begin with small steps, such as the idea of *unplanning* structured uncertainty into

existing lessons (Beghetto, 2019). Students in this study who received arts integration exposure worked with teachers who were in their first year of embedded training. Moreover, the development of teachers' capacity to support creative development of students depends on the working conditions of the school environment. In early phases, teachers expressed little encouragement in their environment to focus on creative development (Anderson, 2019). Additionally, it's possible that positive effects from arts integration would emerge for the next group of students they teach when those teachers would need to be independently responsible for the creative experience. Future efforts in arts integration training and implementation in middle school may need to focus as much on the beliefs and values of teachers and students as on the approach to creative ideation.

Regardless of how educators, specialists, or intervention researchers seek to develop the creative potential of early adolescents, the cues and conditions of the environment matter. Educators teaching in schools with concentrations of poverty work under the duress of unrelenting test-based accountability and bureaucratic control over their instructional curricular choices (Berliner, 2011; Darling-Hammond, 2010). Undoubtedly, that pressure contributes to decreased quality and quantity in creative opportunities in everyday learning for students (Pitts, Anderson, & Haney, 2017; Schater et al., 2006). Given the general lack of research on creativity in education in the most prominent journals, it is unlikely that pre-service teachers receive much, if any, training and coursework on this topic in undergraduate and graduate programs. If the opportunity for teachers to develop this understanding is rare in their pre-service and in-service training, it may be unrealistic to expect immediate effects after their initial exposure.

It is also possible that some school environments may not be ready for the shift toward teaching for creativity and arts integration. The isolation of subject areas and an increasingly broad amount of content typical to middle and high school curriculum creates a difficult isolation, scope, and sequence to disrupt. Past research found that, for some teachers, their training experience in arts integration design was the first real interdisciplinary collaboration they experienced, professionally (Anderson et al., 2019). Interdisciplinary cross-pollination is key to generating new ideas, perspectives, and solutions to the complexity of our world and early adolescence marks a period of enormous growth and potential. However, given that students report more creative engagement outside of school (Runco et al., 2017), venues outside of school may be more successful in cultivating creative development with arts integration.

Arts integration continues to struggle to find consistent implementation and effects on the outcomes that schools prioritize and measure (Ludwig et al., 2017). The results from this study suggest a clear theory of change in program design should (a) target multiple dimensions of creative thinking, behaviors, beliefs, and attitudes and (b) begin with small integration steps to weave artistic practices and experiences with care.

Intervention Targets: Malleable Factors of Creative Development

This study revealed potential malleable factors undergirding creative growth, which school-based interventions for creative development should consider. Middle school students have articulated beliefs about their own creativity that include both entity (fixed) and incremental (growth) theories, simultaneously (Anderson et al., 2019)—a finding that reflects recent research about creative mindsets in older students (Hass, Katz-Buonincontro, & Reiter-Palmon, 2016). Different creative mindsets—fixed versus

growth—influenced the risks students were willing to take in front of their peers and how they approached making mistakes—an inevitable and vital experience in creative work (Anderson et al., 2019). In this current study, a self-theory mindset oriented toward growth and potential in one's abilities predicted membership in the only steady growth trajectory group in originality as well as in other higher trajectories. If interventions focus on messaging, modeling, and metacognition through the processes of supported failure they may cultivate and reinforce students' growth-oriented theories about their own creative potential (Estabrooks & Couch, 2018; Manalo & Kapur, 2018). Learning about the countless mistakes experienced by recognized creative professionals may produce similar effects to those found in studies examining the effect of stories about scientists and their struggle on students' motivation in science (Lin-Siegler, Ahn, Chen, Fang, & Luna-Lucero, 2016). Evidence suggests that shifting students' mindset about intelligence toward an incremental perspective may attenuate some of the systemic disadvantages they face living in poverty (Claro et al., 2016). My results suggest that the same positive effect could be found for a growth mindset on creative development.

Relatedly, students who reported more flow experiences in learning had higher levels of creative development; conversely, greater disengagement in school led to weaker creative development. Flow experience lives in the optimal zone between the right level of challenge and the right level of skill. To arrive at the flow zone in a middle school classroom likely depends on a student's confidence to take risks and mindset about effort and growth. Because students' disengagement can increase as a result of reduced self-efficacy during adolescence (Anderson et al., 2019), students' interest and persistence to achieve flow in unfamiliar creative tasks is likely compromised by weaker

disengagement and lower confidence. Those maladaptive factors suppress their situated agency for creative action. Given that higher trajectories of creative development contributed to lower levels of disengagement by Grade 8, the relationships between, disengagement, flow, and creative development may be cyclical or reciprocal.

Results from this study support the potential role that creative self-beliefs and valuation of creativity play in transforming creative potential into creative action (Karwowski & Beghetto, 2018). Alongside other identities that students bring to the school context, creative identities are likely not fixed nor static (Oyserman et al., 2017). Identity-based motivation theory would suggest that contextual cues from adults and peers in the school environment play a role in how students' creative identities are activated in school, or not. For instance, if cues suggest that being artistic and creative is feminine or certain types of creative behavior, such as gaming and tinkering, are not valued as highly as other types, boys may be less likely to experience the activation of a creativity identity in school. Students' creative self-confidence and whether they value conformity over expression of individuality are crucial factors that shape identity, based on past experiences and influences. To cultivate adaptive creative self-beliefs takes scaffolded experiences, cultural responsiveness, and a broader view on what optimizes the creative process for the creative person. Consistency in those efforts across a whole school could result in activating and reinforcing diverse creative identities in early adolescence to boost students' creative development, more equitably.

In some cases, how students perceived support for creativity in their school contributed to their creative development. In this way, the fit of the environment to the individual may depend on the different ways that adolescents express and pursue their

creative development in and out school and which are prioritized or valued above others. For instance, students who reported higher frequency of creative ideation about invention and tinkering perceived teacher support and interest at half the rate of students who reported higher frequency of creative ideation about literary and artistic creativity (Anderson et al., 2017). Teachers' unexamined implicit theories and biases about creativity likely dictate their attention and response to students and may be an important focal point for future intervention efforts. Shifting those beliefs may be build a stronger sense of support for students who carry creative potential typically undervalued in school.

The Role of Creative Development on Outcomes of Preparedness

Results from my third research question indicate that students demonstrating higher levels of creative development consistently across middle school years also demonstrated higher levels of agentic, academic, creative, and school engagement outcomes at the end of middle school. Those findings indicate that creative strengths during the middle school years are likely intertwined with holistic healthy adolescent development and help to prepare students for success in high school and beyond. Six decades of research illustrate the overarching benefits of individuals' creative resources across the lifespan to both survival and fulfillment (Carlsson, 2002; Guilford, 1968; Puccio, 2017; Runco, 1991). The findings of this current study suggest that these creative resources may be powerful during the turbulence of adolescence. It's possible that students' creative potential during this phase supports their development of agency to flexibly create learning conditions that work best for them. Higher levels of *agentic engagement* in learning (Reeve, 2013) occurs when students proactively and strategically shape their experience in school to fit their interests and needs, and that form of

engagement contributes uniquely to stronger outcomes. Developing and demonstrating creative potential is likely no exception.

Students who performed at the highest levels of divergent thinking fluency and originality consistently demonstrated higher levels of creative performance and creative self-concept at the end of Grade 8. Those findings could be the result of isolating a group of students with exceptional creative talents; however, two aspects of the group composition suggest that is not the case. The highest level in originality, for instance, included students with racial, ethnic, ability-level, and socioeconomic diversity, which is not typical in gifted and talented programs due to a variety of inequities (Peters & Engerrand, 2016). Moreover, students in those high groups were not consistently more adaptive based on mostly statistically non-significant predictors.

The single predictor in Grade 6 that distinguished that highly creative group from the normative group at a statistically significant level was that they valued social conformity less. More than any other group, those students cared less about changing their ideas and expectations for themselves to fit the norms, expectations, and acceptance of others. The power of valuing differences, diverse perspectives, and one's own personal and creative expression appears to be paramount to creative development, performance, and self-concept in early adolescence. Middle school students have shared this sentiment in recent research—feeling welcome to both express and witness unique expressions of creativity felt invaluable (Anderson et al., 2019). Given the adaptive nature, potential maturities, and contributing role of creative development in adolescence, the learning middle schools need to become more supportive to take advantage of this important dimension of learning and personal growth.

Limitations

This study was exploratory and contains limitations important to discuss. First, this sample represents one region of the country with a specific demographic composition, so generalizing the trajectory patterns beyond this sample should be done with caution. This sample was mostly students who were white and disadvantaged by poverty. Second, the reliability of divergent thinking factors ranged between factors and across waves of data within factors. Stimulus dependency explaining change over time may have been especially problematic for flexibility scores. The spike in scores for some of higher groups between Wave 1 and 2 could be explained by stimulus dependency rather than developmental fluctuations in skill and approach. Methodological weaknesses associated with divergent thinking tasks (Barbot, 2018) may result in patterns that would not replicate with different forms. Though group-based trajectory modeling deals with measurement error, measurement variance across waves could have biased results. The flat trajectory of a majority of the sample for each factor attenuates some of that concern but it remains relevant considering issues detected in past research. Though changes were detected for small groups of students, the flat trajectory for the normative group raises questions about the sensitivity of the divergent thinking measures to detect change in adolescence. Relatedly, questions about the usefulness of measures of divergent thinking to the advancement of theory and practice are important to note. The distinct adolescent profiles that emerged from the group-based trajectory modeling offer some support for the validity of this measure; yet, limitations remain about predictive validity of creative activities and accomplishments.

Third, some of the trajectory groups were as small as 1% of the sample, which greatly limits the statistical power to detect statistical significance of effects. Fourth, the number of variables included in the adaptive, maladaptive, and environmental predictor sets could increase the likelihood of Type 1 error. The inclusion of demographic variables with each set attenuates that concern, to a degree. Finally, the missing data issues in this study highlight the difficulty of conducting longitudinal research in schools with vulnerable student populations, who often face high mobility due to economic hardship. The sample was selected specifically due to reasons for which missingness became more of a problem. Students were more likely to be missing data due to participation in special education and economic disadvantage. As many as 45% of the sample (in Wave 4) were missing data at each wave. Though model fit and adequacy was very good for all four model solutions and full-information maximum likelihood estimation has demonstrated robustness with missing data, the large amount of missing data at some waves could have biased student classification to groups and explained some of the between-group differences found on outcomes. The results from this study need to be replicated with other samples and different creativity assessments to understand how well the trajectory profiles identified represent creative development in early adolescence.

Conclusion

The results of this dissertation study highlight potential contributions of students' creative resources to healthy adolescent development and preparation for success in high school and beyond. Trajectories of creative development during this crucial period of human growth can take different forms. Though the general trend appears to be a gradual decline as others have found, growth or stable high levels of performance were also

evident, as smaller groups of students demonstrated. Specifically, students in early adolescence can become more flexible and original in their ideation, increasing the quality of their creative ideas. That potential for growth is dependent, in part, on affective and agentic qualities and the valuation of conformity. As those factors can be malleable through modeling, metacognition, and messaging, schools and educators can take immediate action to support students growing through the turbulence of adolescence. Perhaps, the transformation of youth into creative agents during this pivotal period of human development can become a central objective for the middle school experience. Their personal health and the health of communities may depend on it.

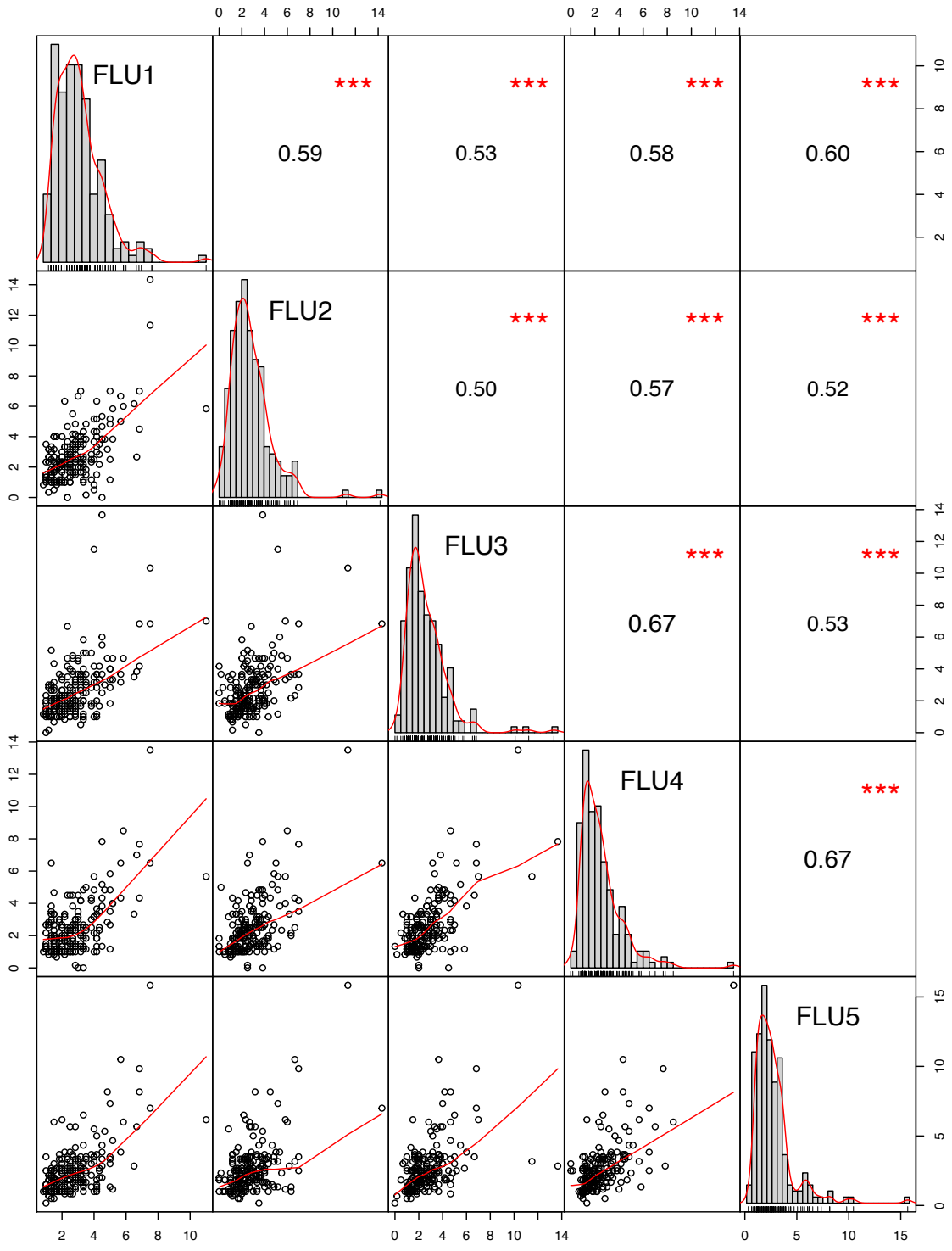

Figure 8. This figure illustrates the distribution of fluency scores in five histograms along the diagonal for Waves 1–5. Below the diagonal are scatterplots of correlations depicted between the intersecting waves; numerical correlations are included above the diagonal.

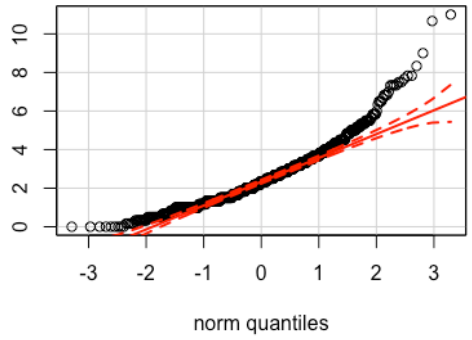

Figure 9. This qq plot for Wave 1 of fluency illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

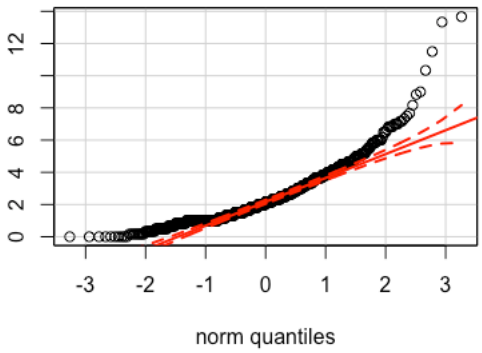

Figure 10. This qq plot for Wave 2 of fluency illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

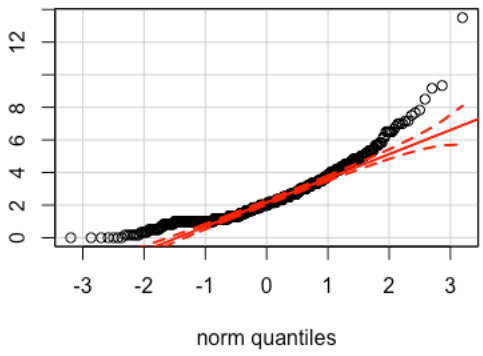

Figure 11. This qq plot for Wave 3 of fluency illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

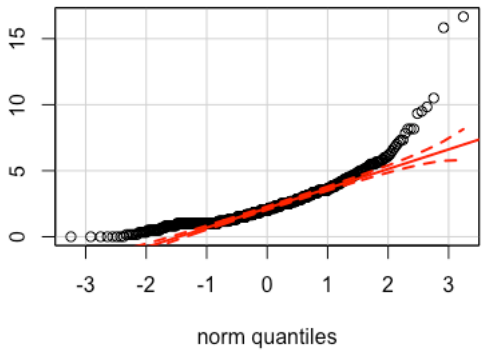

Figure 12. This qq plot for Wave 4 of fluency illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

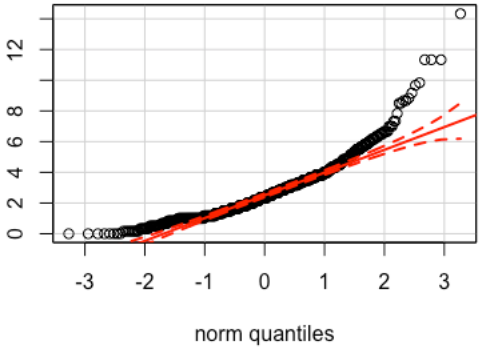

Figure 13. This qq plot for Wave 5 of fluency illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

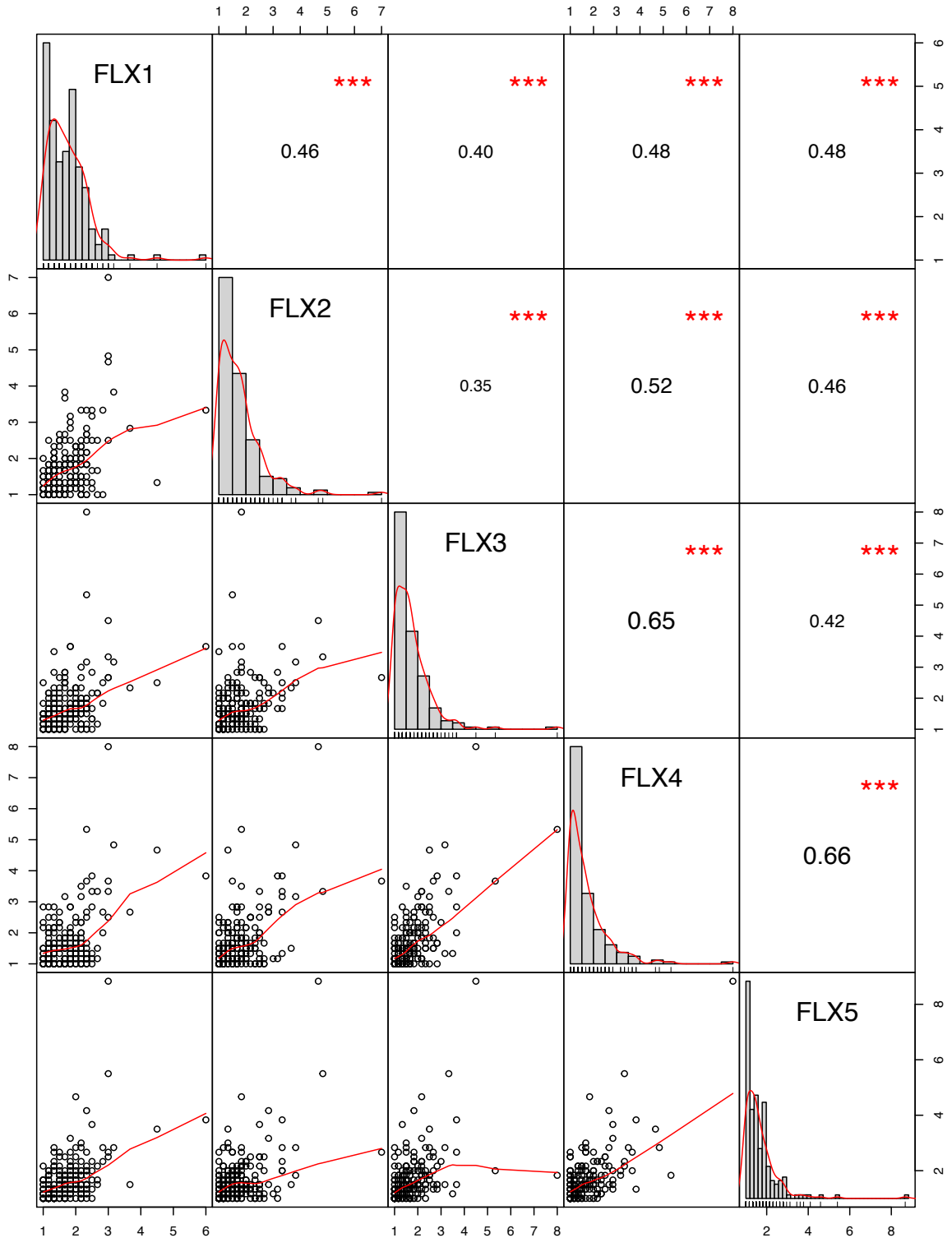

Figure 14. This figure illustrates the distribution of flexibility scores in five histograms along the diagonal for Waves 1–5. Below the diagonal are scatterplots of correlations depicted between the intersecting waves; numerical correlations are included above the diagonal.

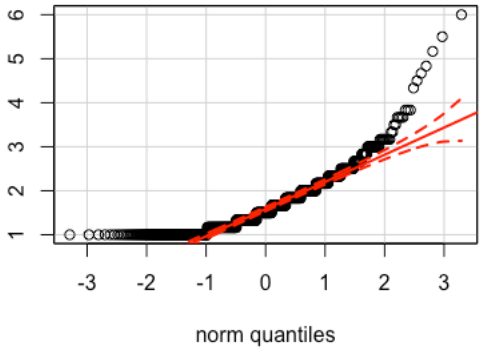

Figure 15. This qq plot for Wave 1 of flexibility illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

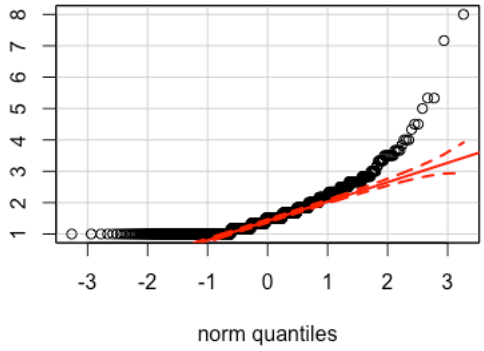

Figure 16. This qq plot for Wave 2 of flexibility illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

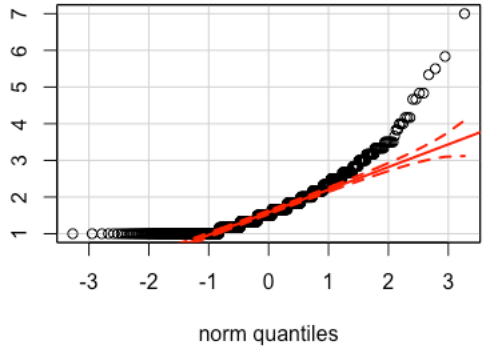

Figure 17. This qq plot for Wave 3 of flexibility illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

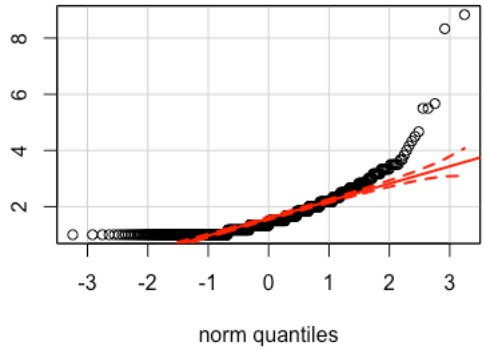

Figure 18. This qq plot for Wave 4 of flexibility illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

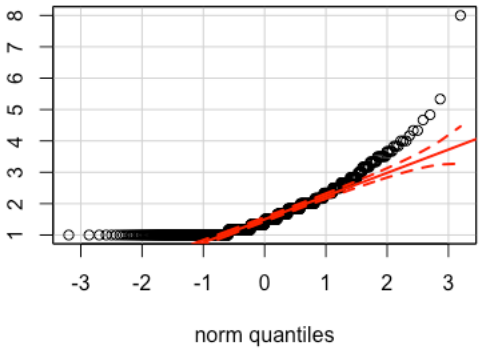

Figure 19. This qq plot for Wave 5 of flexibility illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

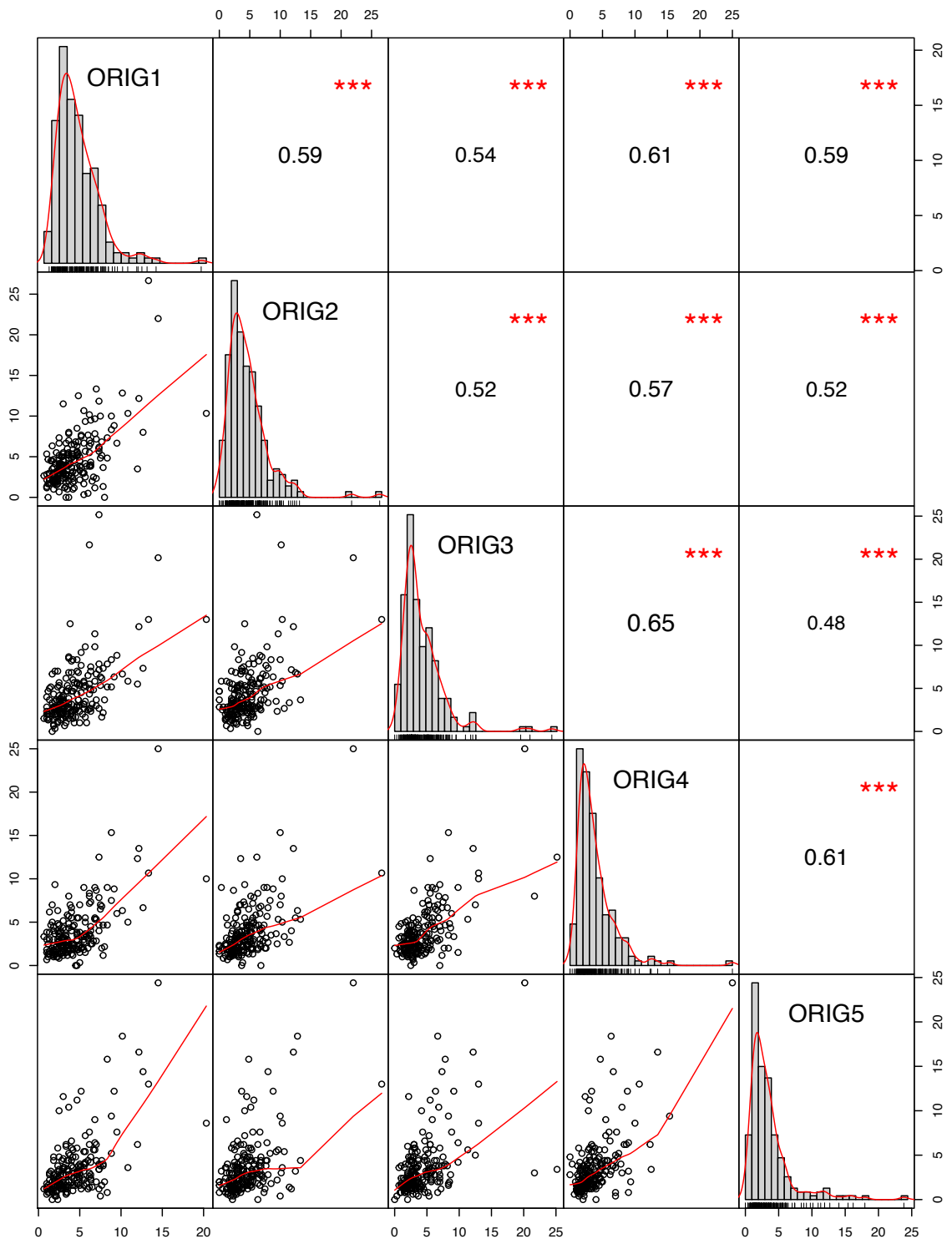

Figure 20. This figure illustrates the distribution of originality scores in five histograms along the diagonal for Waves 1–5. Below the diagonal are scatterplots of correlations depicted between the intersecting waves; numerical correlations are included above the diagonal

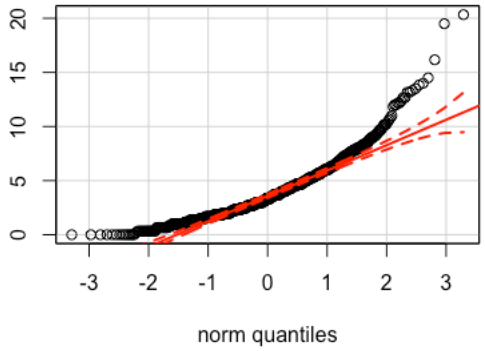

Figure 21. This qq plot for Wave 1 of originality illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

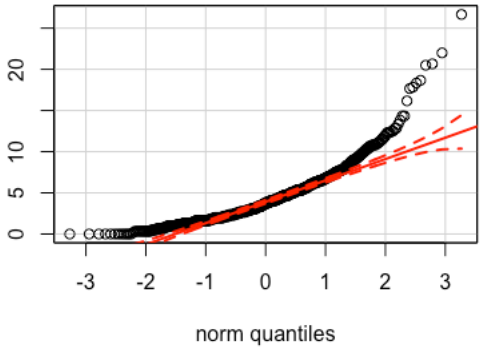

Figure 22. This qq plot for Wave 2 of originality illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

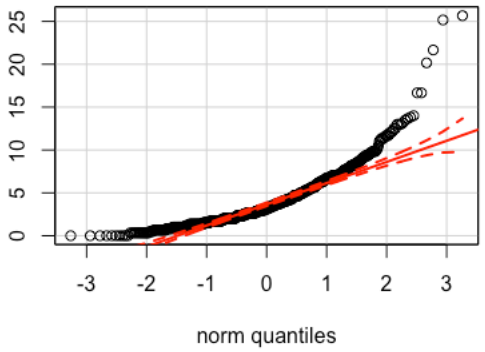

Figure 23. This qq plot for Wave 3 of originality illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

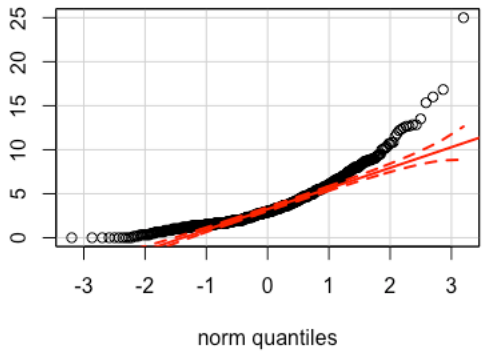

Figure 24. This qq plot for Wave 4 of originality illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

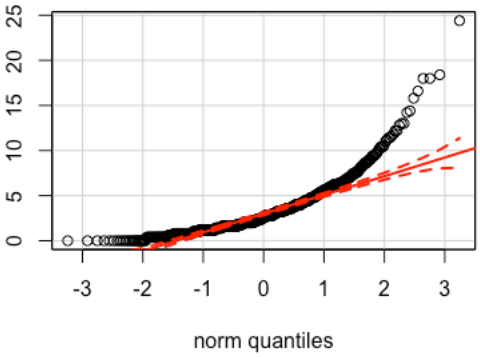

Figure 25. This qq plot for Wave 5 of originality illustrates the plotting of two sets of quantiles, which demonstrates skewness away from a normal distribution.

APPENDIX B: MEASURES AND ITEMS

Table 17

Items and Internal Consistency of Measures Included in this Study

Constructs, Measures, and Items	Items	Cronbach's Alpha
Creative ideation		
Divergent thinking fluency	6	.83–.86
1. Three figural items		
2. Three verbal items (e.g., many uses for shoelace, tire, spoon, etc.)		
Divergent thinking originality	6	.79–.87
1. Three figural items		
2. Three verbal items (e.g., many uses for shoelace, tire, spoon, etc.)		
Divergent thinking flexibility	6	.60–.75
1. Three figural items		
2. Three verbal items (e.g., many uses for shoelace, tire, spoon, etc.)		
Adaptive predictors of creative development		
Creative ideational self-confidence	4	.72
1. I have a lot of good ideas.		
2. I am good at coming up with new ideas.		
3. I like my ideas even if others don't.		
4. I have a good imagination.		
Fixed mindset (Reverse-coded to approximate growth mindset)	5	.76
1. I can learn new things, but I can't really change my basic intelligence.		
2. My intelligence is something about me that I can't change very much.		
3. I have a certain amount of intelligence and I really can't do much to change it.		
4. Challenging myself won't make me smarter.		
5. There are some things I am not capable of learning.		
Flow experiences in learning	4	.73
1. When I work on projects and subjects that interest me, I lose track of time.		
2. I find that some school work really excites me.		
3. When I work long and hard on something I enjoy, I feel good.		
4. Sometimes I get so focused on my work that I forget what I was going to do next.		
Maladaptive predictors of creative development		
Valuing of Conformity (from Creative Attitudes and Values)	8	.71

1. Its good to change your ideas so that other people like them and use them.		
2. It is usually not good to be different than others.		
3. The important thing in school is to find out what gets my teachers to like me.		
4. The important thing in school is to find out what gets other students to like me.		
Affective disengagement in school	3	.77
1. Each week I'm trying less and less at school.*		
Performance anxiety in school	3	.66
1. When I have a project to do, I worry about it a lot.*		
Environmental predictors of creative development		
Support for creativity from teachers	4	.82
1. My teachers reward creative thinking and openness.		
2. My teachers give us free time to think and use our imaginations.		
3. My teachers teach us different ways of thinking about things.		
4. My teachers encourage inventive thinking.		
Outcomes of preparedness		
Sense of agency in school	8	.85
Uncertain control (reverse-coded for analyses)*		
1. In school, when I get a good grade I often don't know how I'm going to get that grade again.		
General self-efficacy in school		
1. If I try hard, I can master the hardest topics in my classes.*		
Creative self-concept	6	.90
1. Compared to other students in my school, I am good at being creative in my school work.		
2. I have been told I am creative in my school work by others.		
3. When I think about my school work, I consider myself creative.		
4. I enjoy coming up with creative ideas in my school work.		
5. When I am being creative in school, I feel good.		
6. Being creative is one of my best ways to learn.		
Creative illustration and description task		
1. Students were asked to invent their own mythological creature, then draw and describe it. Students' responses were evaluated for overall creativity using consensual assessment technique with three raters.	1	.80
Academic achievement		
1. Smarter Balanced Assessment Consortium English language arts assessment	N/A	.72

2.	Smarter Balanced Assessment Consortium math assessment	N/A	.79

Note. An asterisk (*) denotes that the measure is copyrighted, so only one item is included because the license to use this measure in the current study restricts reproducing the items in print.

REFERENCES CITED

Abraham, A. (2016). Gender and creativity: An overview of psychological and neuroscientific literature. *Brain Imaging and Behavior*, *10*(2), 609–618.

Acar, S., & Runco, M. A. (2019). Divergent Thinking : New Methods , Recent Research , and Extended Theory. *Psychology of Aesthetics, Creativity, and the Arts*, *13*(2), 153–158.

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

Anderson, R. C. (2017). Thinking divergently and finding a flow: Does a supportive school setting matter? In *American Education Research Association Annual Meeting*, San Antonio, TX.

Anderson, R. C. (2018). Creative engagement: Embodied metaphor, the affective brain, and meaningful learning. *Mind, Brain, and Education*, *12*(2), 72–81.

Anderson, R. C., Graham, M., Kennedy, P., Nelson, N., Stoolmiller, M., & Baker, S. (2019). Student agency at the crux: Mitigating disengagement in middle and high school. *Contemporary Educational Psychology*, *56*, 205–217.

Anderson, R. C., & Haney, M. (2018). Feeling, producing, reflecting: An approach to studying creative self-beliefs and production. In *American Psychological Association's Annual Meeting*. San Francisco, CA.

Anderson, R. C., Haney, M., Pitts, C., Porter, L., & Bousselot, T. (in press). " Mistakes can be beautiful": Creative engagement in arts integration for early adolescent learners. *Journal of Creative Behavior*.

Anderson, R. C., & Pitts, C. (2017). Cultivating school culture. In R. Rajan & I. O'Neal (Eds.), *Arts evaluation and assessment: Measuring impact in schools and communities* (pp. 117–146). Switzerland: Palgrave MacMillan.

Anderson, R. C., Pitts, C., & Smolkowski, K. (2017). Creative ideation meets relational support: Measuring links between these factors in early adolescence. *Creativity Research Journal*, *29*(3), 244–256.

Anderson, R. C., Porter, L., & Adkins, D. (in press). A dramatic confrontation of frames: Arts- integration teacher development, organizational learning, and school change. *Leadership and Policy in Schools*.

Armstrong, T. (2016). *The power of the adolescent brain: Strategies for teaching middle and high school students*. Alexandria, VA: ASCD.

Baer, J. (2011). How divergent thinking tests mislead us: Are the Torrance Tests still relevant in the 21st century? The Division 10 debate. *Psychology of Aesthetics, Creativity, and the Arts*, *5*(4), 309–313.

Baer, J. (2015). The importance of domain-specific expertise in creativity. *Roeper Review*, *37*(3), 165–178.

Baer, J. (2016). Creativity doesn't develop in a vacuum. *New Directions for Child and Adolescent Development*, 151, 9–20.

Baer, J., & McKool, S. S. (2016). Assessing creativity using the consensual assessment technique. In C. Schreiner (Ed.) *Handbook of Research on Assessment Technologies, Methods, and Applications in Higher Education* (pp. 65–77). Hershey, PA: Information Science Reference.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Science*, *9*(3), 75–78.

Barbot, B. (2018). The dynamics of creative ideation: Introducing a new assessment paradigm. *Frontiers in Psychology*, *9*, 1–8.

Barbot, B. (2019). Measuring creativity change and development. *Psychology of Aesthetics, Creativity, and the Arts*, *13*(2), 203–210.

Barbot, B., & Heuser, B. (2017). Creativity and identity formation in adolescence: A developmental perspective. In M. Karwowsi & J. Kaufman (Eds.), *The creative self: Effect of beliefs, self-efficacy, mindset, and identity* (pp. 87–98). London, UK: Academic Press.

Barbot, B., & Hunter, S. R. (2012). Developmental changes in adolescence and risks for delinquency. In E. Grigorenko (Ed.) *Handbook of juvenile forensic psychology and psychiatry* (pp. 11–34). New York, NY: Springer.

Barbot, B., Lubart, T. I., & Besancon, M. (2016). Peaks, slumps, and bumps: Individual differences in the development of creativity in children and adolescents. *New Directions for Child and Adolescent Development*, 151, 33–45.

Beghetto, R. A. (2006). Creative self-efficacy: Correlates in middle and secondary students. *Creativity Research Journal*, *18*(4), 447–457.

Beghetto, R. A. (2010). Creativity in the classroom. In J. C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity* (pp. 447–463). Cambridge, UK: Cambridge University Press.

Beghetto, R. A. (2016). Creative learning: A fresh look. *Journal of Cognitive Education and Psychology*, *15*(1), 6–23.

Beghetto, R. A. (2017). Creativity and conformity. In J. A. Plucker (Ed.), *Creativity and innovation: Current understandings and debates* (pp. 267–275). Waco, TX: Prufrock.

Beghetto, R. A. (2019). Structured uncertainty: How creativity thrives under constraints and uncertainty. In C. A. Mullen (Ed.), *Creativity under duress in education?* Switzerland: Springer.

Beghetto, R. A., & Dilley, A. E. (2017). Creative aspirations or pipe dreams? Toward understanding creative mortification in children and adolescents. *New Directions for Child and Adolescent Development*, (151), 79–89.

Beghetto, R. A., & Karwowski, M. (2017). Toward untangling creative self-beliefs. In M. Karwowski & J. C. Kaufman (Eds.), *The creative self: Effect of beliefs, self-efficacy, mindset, and identity* (pp. 3–22). London, UK: Academic Press.

Beghetto, R. A., & Kaufman, J. C. (2014). Classroom contexts for creativity. *High Ability Studies*, *25*(1), 53–69.

Beketayev, K., & Runco, M. A. (2016). Scoring divergent thinking tests by computer with a semantics-based algorithm. *Europe's Journal of Psychology*, *12*(2), 210–220.

Berliner, D. (2011). Rational responses to high stakes testing: The case of curriculum narrowing and the harm that follows. *Cambridge Journal of Education*, *41*(3), 287–302.

Besancon, M., Fenouillet, F., & Shankland, R. (2015). Influence of school environment on adolescents' creative potential, motivation and well-being. *Learning and Individual Differences*, *43*, 178–184.

Brofenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, *32*(7), 513–531.

Burger, K., & Walk, M. (2016). Can children break the cycle of disadvantage? Structure and agency in the transmission of education across generations. *Social Psychology of Education*, *19*(4), 695–713.

Burnaford, G., Brown, S., Doherty, J., & McLaughlin, J. (2007). *Arts integration frameworks, research, and practice: A literature review*. *A literature review* (Vol. 1). Washington, DC: Arts Education Partnership.

Carlsson, I. (2002). Anxiety and flexibility of defense related to high or low creativity. *Creativity Research Journal*, *14*(3–4), 409–426.

Carson, D. K., & Runco, M. A. (1999). Creative problem solving and problem finding in young adults: Interconnections with stress, hassles, and coping abilities. *The Journal of Creative Behavior*, *33*(3), 167–188.

Catterall, J. S. (2012). *The Arts and achievement in at-risk youth: Findings from four longitudinal studies*. Washington, DC.

Catterall, J. S., & Peppler, K. A. (2007). Learning in the visual arts and the worldviews of young children. *Cambridge Journal of Education*, *37*(4), 543–560.

Chen, Q., Luo, W., Palardy, G. J., Glaman, R., & McEnturff, A. (2017). The Efficacy of common fit indices for enumerating classes in growth mixture models when nested data structure is ignored: A Monte Carlo study. *SAGE Open*, *7*(1), 1–19.

Claro, S., Paunesku, D., & Dweck, C. S. (2016). Growth mindset tempers the effects of poverty on academic achievement. *Proceedings of the National Academy of Sciences*, *113*(31), 8664–8668.

Cohen, L. M. (1989). A continuum of adaptive creative behaviors. *Creativity Research Journal*, *2*(3), 169–183.

Connell, R. W. (2005). Growing up masculine: Rethinking the significance of adolescence in the making of masculinities. *Irish Journal of Sociology*, *14*(2), 11–28.

Cook, T. D., Campbell, D. T., & Shadish, W. (2002). *Experimental and quasi-experimental designs for generalized causal inference*. Boston, MA: Houghton Mifflin.

Csikszentmihalyi, M. (1997). *Finding flow: The psychology of engagement with everyday life.* New York, NY: Basic Books.

Csikszentmihalyi, M., & Rathunde, K. (1993). The measurement of flow in everyday life: Toward a theory of emergent motivation. In J. Jacobs (Ed.), *Current theory and research in motivation: Nebraska symposium on motivation 1992: Developmental perspectives on motivation, vol. 40.* (pp. 57–97). Lincoln, NE: University of Nebraska Press.

Dahl, R. E., Allen, N. B., Wilbrecht, L., & Suleiman, A. B. (2018). Importance of investing in adolescence from a developmental science perspective. *Nature*, *554*(7693), 441–450.

Dai, D. Y., Tan, X., Marathe, D., Valtcheva, A., Pruzek, R. M., & Shen, J. (2012). Influences of Social and Educational Environments on Creativity During Adolescence: Does SES Matter? *Creativity Research Journal*, *24*(2–3), 191–199.

Darling-Hammond, L. (2007). Race, inequality and educational accountability: The irony of "No Child Left Behind." *Race Ethnicity and Education*, *10*(3), 245–260.

Darling-Hammond, L. (2010). *The flat world and education: How America's commitment to equity will determine our future*. New York, NY: Teachers College Press.

De Castella, K., & Byrne, D. (2015). My intelligence may be more malleable than yours: The revised implicit theories of intelligence (self-theory) scale is a better predictor of achievement, motivation, and student disengagement. *European Journal of Psychology of Education*, *30*(3), 245–267.

Deasy, R. J. (2002). *Critical links: Learning in the arts and student academic and social development*. Washington, DC: Arts Education Partnership.

Dewey, J. (1934). *Art as experience*. New York, NY: Capricorn Books.

Dweck, C. S. (2016). *Mindsets: The new psychology of success*. New York, NY: Random House.

Dwyer, C. (2011). *Reinvesting in arts education: Winning America's future through creative schools.* Washington, DC: President's Committee on the Arts and Humanities.

Ebert, M., Hoffmann, J. D., Ivcevic, Z., Phan, C., & Brackett, M. A. (2015). Teaching emotion and creativity skills through art: A workshop for children. *The International Journal of Creativity and Problem Solving*, *25*(2), 23–35.

Eccles, J. S., & Roeser, R. W. (2011). Schools as developmental contexts during adolescence. *Journal of Research on Adolescence*, *21*(1), 225–241.

Eisner, E. W. (2002). *The arts and the creation of mind*. New Haven, CT: Yale University Press.

Erbas, A. K., & Bas, S. (2015). The contribution of personality traits, motivation, academic risk-taking and metacognition to the creative ability in mathematics. *Creativity Research Journal*, *27*(4), 299–307.

Estabrooks, L. B., & Couch, S. R. (2018). Failure as an active agent in the development of creative and inventive mindsets. *Thinking Skills and Creativity*, *30*, 103–115.

Every Student Succeeds Act, Pub. L. No. 1177 (2015). United States: U.S.C.

Eye, A. von, & Bogat, G. A. (2006). Person-0riented and variable-oriented research: Concepts, results, and development. *Merrill-Palmer Quarterly*, *52*(3), 390–420.

Fermoso, J. (2018, May 22). Why speaking Spanish is becoming dangerous in America. *The Guardian*.

Florida, R. (2002). The rise of the creative class. And how it's transforming work, leisure and everyday life. New York, NY: Basic Books.

Florida, R. (2014). *The Rise of the Creative Class--Revisited: Revised and Expanded*. New York, NY: Basic Books.

Gadja, A., Beghetto, R. A., & Karwowski, M. (2017). Exploring creative learning in the classroom: A multi-method approach. *Thinking Skills and Creativity*, *24*, 250–267.

Gajda, A., Karwowski, M., & Beghetto, R. A. (2016). Creativity and academic achievement: A meta-analysis. *Journal of Educational Psychology*, *109*(2), 269–299.

Glaveanu, V. P., & Beghetto, R. A. (2017). The difference that makes a 'creative' difference in education. In R. A. Beghetto & B. Sriraman (Eds.), *Creative contradictions in education: Cross Discinplary Paradoxes and Perspectives* (pp. 37–54). Switzerland: Springer.

Glaveanu, V. P., Hanson, M., Baer, J., Barbot, B., Clapp, E., Corazza, G., … Sternberg, R. (in press). Advancing creativity theory and research: A socio-cultural manifesto. *Journal of Creative Behavior*, 1–5.

Government Accountability Office. (2009). *Access to arts education: Inclusion of additional questions in education's planned research would help explain why instruction time has decreased for some students*.

Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, *60*(1), 549–576.

Graham, S. (2018). Race/ethnicity and social adjustment of adolescents: How (not if) school diversity matters. *Educational Psychologist*, *53*(2), 64–77.

Gralewski, J., & Karwowski, M. (2016). Are teachers' implicit theories of creativity related to the recognition of Their Students' Creativity? *Journal of Creative Behavior*, *52*(2), 156–167.

Gralewski, J., Weremczuk, E., & Karwowski, M. (2012). Intelligence and creativity of polish middle-school students: Looking for the threshold hypothesis. *New Educational Review*, *29*(3), 328–340.

Gray, D. L. L., Hope, E. C., & Matthews, J. S. (2018). Black and Belonging at School: A Case for Interpersonal, Instructional, and Institutional Opportunity Structures. *Educational Psychologist*, *53*(2), 97–113.

Greene, M. (1995). *Releasing the imagination: Essays on education, the arts, and social change. The Jossey-Bass Education Series.* San Francisco, CA: Jossey-Bass, Inc.

Grimm, K. J., Mazza, G. L., & Mazzocco, M. (2016). Advances in methods for assessing longitudinal change. *Educational Psychologist*, *51*(3–4), 342–353.

Guignard, J., & Lubart, T. I. (2017). Creativity and reason: Friends or foes? In J. C. Kaufman & J. Baer (Eds.), *Creativity and reason in cognitive development. The Cambridge Companion to Creativity and Reason in Cognitive Development (2nd ed.)*. New York, NY: Cambridge University Press.

Guilford, J. P. (1950). Creativity. *The American Psychologist*, *5*(9), 444–454.

Guilford, J. P. (1968). *Creativity, intelligence, and their educational implications*. San Diego, CA: EDITS/Knapp.

Hammond, Z. (2015). *Culturally responsive teaching and the brain*. Thousand Oaks, CA: Corwin.

Hass, R. W., Katz-Buonincontro, J., & Reiter-Palmon, R. (2016). Disentangling creative mindsets from creative self-efficacy and creative identity: Do people hold fixed and growth theories of creativity. *Psychology of Aesthetics, Creativity, and the Arts*, *10*(4), 436–446.

He, W. & Wong, W. (2015). Creativity slump and school transition stress: A sequential study from the perspective of the cognitive-relational theory of stress. *Learning and Individual Differences*, *43*, 185–190.

Hennessey, B. A. (2015). If I were secretary of education: A focus on intrinsic motivation and creativity in the classroom. *Psychology of Aesthetics, Creativity, and the Arts*, *9*(2), 187–192.

Hennessey, B. A., & Amabile, T. M. (1987). *Creativity and learning: What research says to the teacher.* Washington, DC: ERIC.

Hennessey, B. A., & Amabile, T. M. (2010). Creativity. *Annual Review of Psychology*, *61*(1), 569–598.

Hetland, L., Winner, E., Veenema, S., & Sheridan, K. (2013). *Studio thinking 2: The real benefits of visual arts education* (2nd ed.). New York, NY: Teachers College Press.

Hidi, S., & Ann Renninger, K. (2006). The four-phase model of interest development. *Educational Psychologist*, *41*(2), 111–127.

Housen, A. C. (2001). Aesthetic thought, critical thinking and transfer. *Arts and Learning Research Journal*, *18*(1), 99–132.

Huang, F. L., & Cornell, D. G. (2019). School teasing and bullying after the Presidential election. *Educational Researcher*, *48*(2), 69–83.

IBM. (2010). *IBM 2010 Global CEO study: Creativity selected as most crucial factor for future success*. Hillsboro, OR: IBM.

Jewitt, C., & Kress, G. (2003). *Multimodal literacy*. Switzerland: Peter Lang.

Jewitt, C., Kress, G., & Ogborn, J. O. N. (2001). Exploring learning through visual, actional and linguistic communication: The multimodal environment of a science classroom, *Educational Review, 53*(1), 5–18.

Jindal-Snape, D., Davies, D., Collier, C., Howe, A., Digby, R., & Hay, P. (2013). The impact of creative learning environments on learners: A systematic literature review. *Improving Schools*, *16*(1), 21–31.

Jones, B. L., & Nagin, D. S. (2007). Advances in group-based trajectory modeling and an SAS procedure for estimating them. *Sociological Methods Research*, *35*, 542–571.

Jones, B. L., Nagin, D. S., & Roeder, K. (2001). A SAS procedure based on mixture models for estimating developmental trajectories. *Sociological Methods & Research*, *29*, 374–393.

Jung, T., & Wickrama, K. A. S. (2008). An introduction to latent class growth analysis and growth mixture modeling. *Social and Personality Psychology Compass*, *2*(1), 302–317.

Juvonen, J., Le, V.-N., Kaganoff, T., Augustine, C. H., & Constant, L. (2004). *Focus on the wonder years: Challenges facing the American middle school*. Santa Monica, CA: Rand Corporation.

Karwowski, M. (2014). Creative mindsets: Measurement, correlates, consequences. *Psychology of Aesthetics, Creativity, and the Arts*, *8*(1), 62–70.

Karwowski, M., & Barbot, B. (2016). Creative self-beliefs: Their nature, development, and correlates. In *Creativity and Reason in Cognitive Development* (pp. 302–326). New York, NY: Cambridge University Press.

Karwowski, M., & Beghetto, R. A. (in press). Creative Behavior as Agentic Action. *Psychology of Aesthetics, Creativity, and the Arts*.

Katz-Buonincontro, J., & Anderson, R. C. (in press). A review of articles using observation methods to study creativity in education (1980 – 2018). *Journal of Creative Behavior*.

Katz-Buonincontro, J., & Anderson, R. C. (2018). How do we get from good to great? The need for better observation studies of creativity in education. *Frontiers in Psychology*, *9*, 1–5.

Kim, K. H. (2011). The Creativity Crisis: The Decrease in Creative Thinking Scores on the Torrance Tests of Creative Thinking. *Creativity Research Journal*, *23*(4), 285–295.

Kim, K. H. (2017). *The creativity challenge: How we can recapture American innovation*. Amherst, NY: Prometheus Books.

Kim, K. H., & Hull, M. F. (2012). Creative personality and anticreative environment for high school dropouts. *Creativity Research Journal*, *24*(2–3), 169–176.

Kiselica, M. S., & Englar-Carlson, M. (2010). Identifying, affirming, and building upon male strengths: The positive psychology/positive masculinity model of psychotherapy with boys and men. *Psychotherapy Theory, Research, Practice, Training*, *47*(3), 276–287.

Kleibeuker, S. W., De Dreu, C. K. W., & Crone, E. A. (2013). The development of creative cognition across adolescence: Distinct trajectories for insight and divergent thinking. *Developmental Science*, *16*(1), 2–12.

Kleibeuker, S. W., De Dreu, C. K. W., & Crone, E. A. (2016). Creativity development in adolescence: Insight from behavior, brain, and training studies. *New Directions for Child and Adolescent Development*, *2016*(151), 73–84.

Kliebard, H. M. (2004). *The struggle for the American curriculum, 1893-1958 (3rd ed.)*. New York, NY: Routledge Falmer.

Kozbelt, A., Beghetto, R. A., & Runco, M. A. (2010). Theories of creativity. In J. C. Kaufman & R. J. Sternberg (Eds.), *The Cambridge handbook of creativity* (pp. 20–47). New York, NY: Cambridge University Press.

Lee, B. K., Patall, E. A., Cawthon, S. W., & Steingut, R. R. (2015). The Effect of Drama-Based Pedagogy on PreK-16 Outcomes: A Meta-Analysis of Research From 1985 to 2012. *Review of Educational Research*, *85*(1), 3–49. https://doi.org/10.3102/0034654314540477

Lench, S., Fukuda, E., & Anderson, R. C. (2015). *Essential Skills and Dispositions: Developmental Frameworks for Collaboration, Communication, Creativity, and Self-Direction*. Lexington, KY: Center for Innovation in Education.

Lepper, M. R. (1988). Motivational considerations in the study of instruction. *Cognition and Instruction*, *5*(4), 289–309.

Lin-Siegler, X., Ahn, J., Chen, J., Fang, F., & Luna-Lucero, M. (2016). Even Einstein struggled: Effects of learning about great scientists' struggles on high school students' motivation to learn science. *Journal of Educational Psychology*, *108*(3), 314–328.

Lu, J. G., Hafenbrack, A. C., Eastwick, P. W., Wang, D. J., Maddux, W. W., & Galinsky, A. D. (2017). " Going out " of the box: Close intercultural friendships and romantic relationships spark creativity, workplace innovation, and entrepreneurship. *Journal of Applied Psychology*, *102*(7), 1091–1108.

Ludwig, M., Boyle, A., & Lindsay, J. (2017). *Review of evidence: Arts integration research through the lens of the Every Student Succeeds Act*. Washington, DC: Americans Institute for Research.

Manalo, E., & Kapur, M. (2018). The role of failure in promoting thinking skills and creativity: New findings and insights about how failure can be beneficial for learning. *Thinking Skills and Creativity*, *30*, 1–6.

Marasco, V. M. (2018). Addressing hegemonic masculinity with adolescent boys within the counseling relationship. *Journal of Child and Adolescent Counseling*, *4*(3), 226–238.

Martin, A. J. (2011). *The Motivation and Engagement Scale*. Sydney, Australia: Lifelong Achievement Group.

McNeil, L. (2002). *Contradictions of school reform: Educational costs of standardized testing*. New York, NY: Routledge.

Milgram, R. M., & Milgram, N. A. (1976). Creative thinking and creative performance in Israeli students. *Journal of Educational Psychology*, *68*(3), 255–259.

Nagin, D. (2005). *Group-based modeling of development*. Cambridge, MA: Harvard University Press.

National Association of Colleges and Employers (2014). *The Class of 2014 Student Survey Report*. Bethlehem, PA: National Association of Colleges and Employers.

Niu, W. (2007). Individual and environmental influences on Chinese student creativity. *The Journal of Creative Behavior*, *41*(3), 151–175.

Noblit, G. W., Corbett, H. D., Wilson, B. L., & McKinney, M. B. (2009). *Creating and sustaining arts-based school reform: The A+ schools program*. New York, NY: Routledge.

Nylund-Gibson, K., & Choi, A. Y. (2018). Ten frequently asked questions about latent class analysis. *Translational Issues in Psychological Science*, *4*(4), 440–461.

Orfield, G. (2014). Tenth annual Brown lecture in education research: A new Civil Rights agenda for american education. *Educational Researcher*, *43*(6), 273–292.

Oyserman, D., Lewis, N., Yan, V. X., Fisher, O., Casey, S., Donnell, O., … Horowitz, E. (2017). An identity-based motivation framework for self-regulation an identity-based motivation framework for self-regulation. *Psychological Inquiry*, *28*(2–3), 139–147.

Peng, S. L., Cherng, B. L., Chen, H. C., & Lin, Y. Y. (2013). A model of contextual and personal motivations in creativity: How do the classroom goal structures influence creativity via self-determination motivations? *Thinking Skills and Creativity*, *10*(162), 50–67.

Peppler, K. A., & Davis, H. (2010). Arts and learning: A review of the impact of arts and aesthetics on learning and opportunities for further research. In K. Gomez, L. Lyons, & J. Radinsky (Eds.), *2010 Learning in the Disciplines Conference Proceedings* (Vol. 1, pp. 1000–1007). Chicago, IL: International Society of the Learning Sciences.

Peppler, K. A., Powell, C. W., Thompson, N., & Catterall, J. (2014). Positive impact of arts integration on student academic achievement in English language arts. *The Educational Forum*, *78*(4), 364–377.

Peters, S. J., & Engerrand, K. G. (2016). Equity and excellence: Proactive efforts in the identification of underrepresented students for gifted and talented services. *Gifted Child Quarterly*, *60*(3), 159–171.

Pitts, C., Anderson, R., & Haney, M. (2017). Measures of instruction for creative engagement: Making metacognition, modeling and creative thinking visible. *Learning Environments Research*, *21*(1), 1–17.

Puccio, G. J. (2017). From the dawn of humanity to the 21st century: Creativity as an enduring survival skill. *Journal of Creative Behavior*, *51*(4), 330–334.

Putwain, D. W., Kearsley, R., & Symes, W. (2012). Do creativity self-beliefs predict literacy achievement and motivation? *Learning and Individual Differences*, *22*(3), 370–374.

R Core Team. (2016). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation and Statistical Computing.

Ram, N., & Grimm, K. J. (2009). Growth mixture modeling: A method for identifying differences in longitudinal change among unobserved groups. *International Journal of Behavioural Development*, *33*(6), 565–576.

Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of Educational Psychology*, *105*(3), 579–595.

Reiter-Palmon, R., Forthmann, B., & Barbot, B. (2019). Scoring divergent thinking tests: A review and systematic framework. *Psychology of Aesthetics, Creativity, and the Arts*, *13*(2), 144–152.

Richardson, C., & Mishra, P. (2018). Learning environments that support student creativity: Developing the SCALE. *Thinking Skills and Creativity*, *27*, 45–54.

Robinson, A. H. (2013). Arts Integration and the Success of Disadvantaged Students : A Research Evaluation. *Arts Education Policy Review*, *114*(4), 191–204.

Roeser, R. W., Eccles, J. S., & Sameroff, A. J. (1998). Academic and emotional functioning in early adolescence: Longitudinal relations, patterns, and prediction by experience in middle school. *Development and Psychopathology*, *10*(2), 321–352.

Rosenblatt, E., & Winner, E. (1988). The art of children's drawing. *Journal of Aesthetic Education*, *22*(1), 3–15.

Rubenstein, L. D., McCoach, D. B., & Siegle, D. (2013). Teaching for Creativity Scales: An instrument to examine teachers' perceptions of factors that allow for the Teaching of Creativity. *Creativity Research Journal, 25*(3), 324–334.

Runco, M. A. (1991). *Divergent thinking*. Noorwood, NJ: Ablex Publishing Corporation.

Runco, M. A. (2007). *Creativity: Theories and themes: Research, development, and practice.* Burlington, MA: Elsevier.

Runco, M. A. (2011). *Figural divergent thinking test*. Athens, GA: Creativity Testing Services.

Runco, M. A. (2012). *The Many Uses Games*. Athens, GA: Creativity Testing Services.

Runco, M. A. (2015). *Runco Creativity Assessment Battery*. Athens, GA: Creativity Testing Services.

Runco, M. A. (2016). Commentary: Overview of developmental perspectives on creativity and the realization of potential. *New Directions for Child and Adolescent Development*, *2016*(151), 97–109.

Runco, M. A., & Acar, S. (2012). Divergent thinking as an indicator of creative potential. *Creativity Research Journal*, *24*(1), 66–75.

Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity Research Journal*, *24*(1), 92–96.

Runco, M., Acar, S., & Cayirdag, N. (2017). A closer look at the creativity gap and why students are less creative at school than outside of school. *Thinking Skills and Creativity*, *24*, 242–249.

Ryan, R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation. *American Psychologist*, *55*(1), 68–78.

Ryzin, M. J. Van, Chatham, M., Kryzer, E., Kertes, D. A., & Gunnar, M. R. (2009). Identifying atypical cortisol patterns in young children: The benefits of group-based trajectory modeling, *Psychoneuroendocrinology, 34,* 50–61.

Sawyer, R. K. (2004). Creative teaching: Collaborative discussion as disciplined improvisation. *Educational Researcher*, *33*(2), 12–20.

SBAC. (2016). *Smarter Balanced Assessment Consortium: 2013–14 Technical Report*. Santa Clara, CA.

Schater, J., Thum, Y. M., & Zifkin, D. (2006). How much does creative teaching enhance elementary school students' achievement?. *The Journal of Creative Behavior*, *40*(1), 47–72.

Schmidt, J. A., Kafkas, S. S., Maier, K. S., Shumow, L., & Kackar-Cam, H. Z. (2018). Why are we learning this? Using mixed methods to understand teachers' relevance statements and how they shape middle school students' perceptions of science utility. *Contemporary Educational Psychology*, *57*, 9–31.

Scott, C. (1999). Teachers' biases toward creative children. *Creativity Research Journal*, *12*(4), 321–328.

Scott, G. M., Leritz, L. E., & Mumford, M. D. (2004a). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal*, *16*(4), 361–388.

Scott, G. M., Leritz, L. E., & Mumford, M. D. (2004b). Types of creativity training: Approaches and their effectiveness. *The Journal of Creative Behavior*, *38*(3), 149–179.

Seashore, K., Anderson, A., & Reidel, E. (2003). *Implementing arts for academic achievement: The impact of mental models, professional community, and interdisciplinary teaming*. Minneapolis, MN: Center for Applied Research and Educational Improvement.

Sica, L. S., Ragozini, G., Di Palma, T., & Aleni Sestito, L. (in press). Creativity as identity skill? Late adolescents' management of identity, complexity and risk-taking. *The Journal of Creative Behavior*.

Silvia, P. J., Christensen, A. P., & Cotter, K. N. (2016). Commentary: The Development of Creativity-Ability, Motivation, and Potential. *New Directions for Child and Adolescent Development*, 151, 111–119.

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology*, *100*(4), 765–781.

Smith, G. J. W., & Carlsson, I. (1983). Creativity in early and middle school years. *International Journal of Behavioral Development*, *6*(2), 167–195.

Snyder, H. T., Hammond, J. A., Grohman, M. G., & Katz-Buonincontro, J. (2019). Creativity measurement in undergraduate students from 1984–2013: A systematic review. *Psychology of Aesthetics, Creativity, and the Arts*, *13*(2), 133–143.

Thomas, M. K., Singh, P., & Klopfenstein, K. (2015). Arts education and the high school dropout problem. *Journal of Cultural Economics*, *39*(4), 327–339.

Torrance, E. P. (1968). A longitudinal examination of the fourth grade slump in creativity. *Gifted Child Quarterly*, *12*(4), 195–199.

Torrance, P. (1972). Can we teach children to think creatively. *Journal of Creative Behavior*, *6*(2), 114–143.

US Department of Education. (2018). *Common Core of Data: Search for public school districts*. Washington, DC: US Department of Education.

Wang, M.-T., & Degol, J. L. (2016). School climate: A review of the construct, measurement, and impact on student outcomes. *Educational Psychology Review*, 28, 315–352.

Weinstein, E. C., Clark, Z., DiBartolomeo, D. J., & Davis, K. (2014). A Decline in Creativity? It Depends on the Domain. *Creativity Research Journal*, *26*(2), 174–184.

Wigfield, A. (1994). Expectancy-value theory of achievement motivation: A developmental perspective. *Educational Psychology Review*, *6*(1), 49–78.

Winner, E., Goldstein, T. R., & Vincent-Lancrin, S. (2013). *Art for art's sake? The impact of arts education*. Paris, France: OECD Publishing.

Winner, E., & Hetland, L. (2008). Art for our sake school: Arts classes matter more than ever but not for the reasons you think. *Arts Education Policy Review*, *109*(5), 29–32.

Woodward, M. (2017, July). How to thrive in a VUCA world: the psychology of navigating volatile, uncertain, complex, and ambiguous times. *Psychology Today*.

Yenawine, P. (2003). Jump starting visual literacy: Thoughts on image selection. *Art Education*, *56*(1), 6–12.

Yi, X., Hu, W., Plucker, J. A., & McWilliams, J. (2013). Is there a developmental slump in creativity in China? The relationship between organizational climate and creativity development in Chinese adolescents. *Journal of Creative Behavior*, *47*(1), 22–40.

Zhao, Y. (2009). *Catching up or leading the way: American education in the age of globalization*. Alexandria, VA: ASCD.

Zhao, Y., & Gearin, B. (2016). Squeezed out. In D. Ambrose & R. J. Sternberg (Eds.), *Creative intelligence in the 21st century* (pp. 121–138). Rotterdam: SensePublishers.