Reflection in the Creative Process of Early Adolescents:

The Mediating Roles of Creative Metacognition, Self-efficacy, and Self-Concept

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Abstract

Generally, the self-perceptive and self-reflective dimension of creative production have received less attention than the cognitive factors that contribute to the development of an individual's creative process and production. A growing evidence base suggests that creative self-beliefs play a pivotal role in different aspects of the creative process. Moreover, metacognition about the creative process may bridge the self-perceptive to the cognitive through aspects of self-awareness, strategy selection, self-evaluation, and contextual knowledge. In the two studies reported here, we aimed to describe the nature of creative self-beliefs and metacognition in early adolescence and test their relationships in the model of creative behavior as agentic action. Results indicated strong evidence of reliability and validity of students' scores to investigate these different dimensions of adolescents' creative self. Different factors of creative potential predicted creative self-beliefs, metacognition, and production; however, all effects on creative production were mediated by creative metacognition and self-beliefs. Results provide new support for the model of creative behavior as agentic action, underscoring the important role of metacognition and both personal and socially mediated modes of agency. Arts integration experience contributed to the cultivation of creative production, metacognition, and self-beliefs. Middle school students' creative strategy selection and self-regulation were the most salient of creative metacognitive components.

Keywords: creative metacognition; creative self-beliefs; adolescence; agency; structural equation modeling

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"He looked just like I imagined. I thought about something that would be funny, then I laughed, so I drew it, and he came out AMAZING!"

"Adding different animals together creates another living organism."

"I would've wanted to have a more creative mind, so I would have more ideas."

- Reflections of Grade 8 Students

As William James (1890) suggested, the self is comprised of content—what one thinks about when thinking of oneself—and the metacognitive process of what one experiences in that thinking. The self-reflective and self-perceptive dimensions of creative production have received less attention than the cognitive process that contributes to an individual's creative potential and development (Hennessey, 2015; Silvia, Christensen, & Cotter, 2016). However, recent contributions from the creativity field have provided greater clarity about the creative self-beliefs and metacognition at work (Beghetto & Karwowski, 2017; Karwowski, 2016; Karwowski & Barbot, 2016; Karwowski & Beghetto, 2018), encouraging new approaches to research about these processes. Moreover, the role these factors play during adolescent development—a formative period of accelerating metacognition and self-awareness (Dahl, Allen, Wilbrecht, & Suleiman, 2018; Flavell, 1979)—should be of substantial interest.

Evidence supports the model of creative behavior as agentic action, where creative self-beliefs (CSBs) shape the creative process by mediating the link between creative potential and creative behavior (Karwowski & Beghetto, 2018). Creative metacognition, as a CSB, can be

thought of as the knowledge and awareness of creative thinking and the regulation of that thinking and action (Lizarraga & Baquedano, 2013); however, creative metacognition should also be conceptualized as the feelings experienced during the creative process that lead to the creative self-efficacy and enjoyment underlying creative potential (Puente-Diaz & Cavazos-Arroyo, in press). Metacognition in the creative process may bridge the more affective aspects of self-beliefs—how we feel about ourselves—to the cognitive dimension of selecting strategies in context (Beghetto & Karwowski, 2017). In early adolescence social-emotional and metacognitive capacities are accelerating forward, alongside other key cognitive and conative creative resources (Barbot, Lubart, & Besancon, 2016), but the relationships between self-perceptions and performance are contextually situated and domain-specific (Barbot, in press). Moreover, a key developmental task of adolescence is identity formation—creative self-beliefs, creative commitments, and creative expression link to the often divergent process of identity exploration and formation (Barbot & Heuser, 2017). How a young person thinks and feels about their creative self can shape their creative performance in different domains (Barbot, in press) and the identity formation process they inevitably face. Thus, the thinking and feeling that occurs in the creative process is key.

In what follows, we report on two exploratory studies that present a framework for assessing and understanding CSBs in early adolescence and their role in harnessing individual creative resources for agentic creative action. The studies described report (a) the development and pilot evaluation of an assessment framework for CSBs and creative production in adolescence and (b) a longitudinal study on the relationships between CSBs, actual creative production, and a set of predictive person-level and environmental factors—including an evaluation of the influence of arts integrated instruction using a quasi-experimental research

design. Further, we explore how early adolescent learners apply and describe creative metacognition in a creative task.

It has been uncommon for studies to measure and analyze creative production while also evaluating and theorizing about the self-beliefs and metacognitive processes at work (Barbot, in press; Silvia et al., 2016). Creativity literature details various traits and conative characteristics associated with creativity (e.g., non-conformity and tolerance for ambiguity) but has explored the perceptions and awareness that form the creative *self* less often. Those self-reflective and self-perceptive processes affect creative outcomes when ordinary people undertake a creative endeavor (Amabile, 2017) and may mediate how creative potential becomes creative behavior (Karwowski & Beghetto, 2018). In this study, we test and expand on the model of creative behavior as agentic action with an early adolescent sample.

The Agentic Nature of Creative Self-Beliefs

Generally, creativity is judged by both the novelty and effectiveness or appropriateness of a solution or idea, given task constraints and the specific sociocultural context (Runco & Jaeger, 2012). In addition to novelty and appropriateness, the creativity of an idea or product may also depend on how surprising and compelling it may be (Simonton, 2012; Sternberg, 2017). In the context of educational opportunities, creative production becomes the interaction between aptitude, process, and the environment for an individual or group (Plucker, Beghetto, & Dow, 2004). Though theories about the role of self-beliefs in motivating behavior have been proposed in other fields for decades (e.g., social-cognitive theory), the field of creativity studies has only recently intensified its focus on the role of self-beliefs and mindsets in creative experiences, development, and production (e.g., Beghetto & Karwowski, 2017; Karwowski & Barbot, 2016).

The field understands creative self-beliefs (CSBs) as an individuals' views and convictions about their creative abilities regarding specific tasks or domains and in life, more generally (Karwowski & Barbot, 2016). Those types of views and convictions, though linked, are distinct from the sense of self-worth or self-esteem (Barbot, in press). Past research indicates that CSBs are fairly malleable and responsive to environmental conditions, training experiences, the influence of others, and certain personality traits (Karwowski & Lebuda, 2016). Although research has yielded mixed results about the role of CSBs in production and achievement (e.g., Beghetto, Kaufman, & Baxter, 2011), an expanding nomological network related to the creative self (Barbot, in press) may indicate a lack of conceptual precision, indicating a need for more work on definitional and conceptual clarity (Karwowski & Beghetto, 2017). Moreover, little research has been conducted in this area with the adolescent population (e.g., Karwowski & Beghetto, 2018; Karwowski, Gralewski, & Szumski, 2015).

Beghetto and Karwowski's (2017) framework presents three key CSBs, including (a) *creative self-efficacy*, or sense of confidence in creative production on a specific task; (b) *creative metacognition*, the combination of creative self-awareness, strategy, and contextual understanding; and (c) *creative self-concept*, a general sense of creative ability in a context (e.g., school). Beghetto and Karwowski asserted that these three key self-beliefs work as a system together to form a person's creative identity in context and influence how a person will engage in a creative opportunity, their level of effort, degree of creative production and achievement, and future self-evaluation of creative potential as a person and in specific contexts or domains. To illustrate, we can imagine a middle school student facing the task to come up with a novel word problem that requires basic algebra to solve, which they will then need to give to a peer to try out. If they don't feel confident in their ability to come up with a new idea for a problem, they

don't feel creative, generally, in school, and they have little awareness and regulation of their creative thinking and action, their low creative self-efficacy, self-concept, and metacognition will stymie their creative production of a new algebraic word problem.

Given the high salience of social comparison and increasing self-awareness underway, adolescence in the school context may fit the CSB perspective well; yet, no studies to date have measured creative self-concept and creative self-efficacy alongside creative metacognition and creative production in adolescence. However, recent findings did support the model of creative behavior as agentic action with a large sample of Polish middle school students, where creative confidence and valuing creativity mediated the link between creative potential and creative activity (Karwowski & Beghetto, 2018).

Creative self-concept. Creative self-concept (CSC) follows the self-concept motivation literature (Bong & Skaalvik, 2003) as a domain-general self-belief. CSC is retrospective of past production and appraisal in a context, rather than prospective of future production (self-efficacy) or value of self-worth (creative self-esteem). In early adolescence, CSC encompasses a student's holistic, global judgement about both their cognitive and affective engagement and ability in creativity across domains but within a specific context. During the impressionable developmental stage of early adolescence, CSC may be shaped by specific incidents and experiences, such as a harsh public critique (Beghetto & Dilley, 2017) but is considered less malleable than other CSBs.

Creative self-efficacy. In contrast to CSC, creative self-efficacy (CSE) follows Bandura's concept of efficacy beliefs (Bandura, 1986) as a future-oriented, prospective, malleable, and task- or context-specific self-belief. CSE can be activated in any type of production situation, influence immediate engagement in a task, and determine sustained effort (see Beghetto & Karwowski, 2017). Though some research has proposed a domain-general

approach to CSE (Beghetto, 2006), social-cognitive theory urges a domain-specific approach, which this study followed. As such, a student's CSE recalls one's memory in engaging with similar tasks and can serve as a comparison between one's expectations and actual performance.

Creative metacognition. Metacognitive knowledge consists primarily within three major categories, the person's self-awareness, knowledge of the task or strategy, and how individuals regulate their behavior to fit the demand (Flavell, 1979). Each of those types of knowledge, forethought, self-regulation of behavior, and reflective thought develop and mature during adolescence. From a social cognitive theory (SCT) perspective on human agency, "the metacognitive capability to reflect on oneself and the adequacy of one's capabilities, thoughts, and actions is the most distinctly human core property of agency" (Bandura, 2018, p. 131). As such, creative metacognition (CMC) may play a substantial role in the creative behavior as agentic action model. Kaufman and Beghetto (2013) suggested that self-knowledge must be separated from contextual knowledge in conceptualizing CMC. CMC plays a role in appraisal of oneself, one's production, and the situation and in how one regulates thinking and behavior in that context—including when not to be creative (Beghetto & Karwowski, 2017; Kaufman & Beghetto, 2013). CMC takes cognitive strategies beyond strategic knowledge and regulation by incorporating the role of self-beliefs in determining self-awareness of that knowledge and one's real or imagined state of understanding.

Creative potential and creative self-beliefs. In sum, recent research suggests a mediating role of CSBs (Karwowski & Beghetto, 2018) where CSC, CSE, and CMC should explain, in part, how creative resources, both conative and cognitive, enable creative behaviors through agentic action. However, to date, few empirical studies have described and examined the role of creative metacognition in practice for this age group. In what follows, we present two

studies with analyses guided by the CSBs framework and the model of creative behavior as agentic action to explore the role, relationships, and development of CSBs. The first aim (Study 1) was to understand how the measures work in an early adolescent context. The second aim (Study 2) was to test how CSBs and creative production fit the model of creative behavior as agentic action, considering creative potential through both cognitive and conative predictors that undergird creative behavior (see Csikszentmihalyi, 1997; Lubart, Zenasni, & Barbot, 2013). Additionally, we aimed to extend that model to include a socially mediated mode of agency for creative behavior—perceived support for creativity in school. Given the paucity of empirical work on CSBs in early adolescence, the theoretical model depicted in Figure 1 drove our exploration of potential factors that undergird creative potential in creative self-beliefs and production. Though we test the role of cognitive and conative factors as predictors at Time 1 and creative self-beliefs and production at Time 2 (five months later) it is theoretically possible that reciprocal influence or reversed directionality exists; however, disentangling that possibility is beyond the scope of these current studies.

Though exploratory, these studies sought to evaluate the influence of an arts integration middle school program under development. Four of the eight schools involved in this study were selected by district leadership in four different districts, based on district-specific reasons, to participate in three years of training, development, and implementation of arts integration strategies in visual arts and theater techniques. Teachers were trained one grade level at a time working with one entire grade level of students from Grades 6–8. The program followed the research-based strategy of designing arts integration as a curricular connections process to learn through and with the arts in conjunction with other academic content (Burnaford, Brown,

Doherty, & McLaughlin, 2007). English language arts, mathematics, science, and social studies teachers were trained by an arts integration specialist for up to 80 hours (Anonymous, 2017).

Teachers were trained to integrate visual arts and embodied process drama techniques into math, English language arts, social studies, and science classroom learning. As past research on that program describes (Anonymous, 2017a; Anonymous, 2017b; Anonymous, 2019a; Anonymous, 2019b), the arts integration specialists focused more on making the creative process visible for students through reflective practices than on the completion of artistic products that integrated learning in the paired academic domain. Most creative products included a reflective artist statement where students made their intentions explicit and also identified areas of personal growth. Additionally, at the end of most classes, teachers facilitated group reflections, asking students to share creative challenges they faced, strategies they used to overcome them, and what they learned about themselves. Only half of the middle schools included in this research received this training, and the other half of the schools were included as non-equivalent comparison sites for evaluation purposes within a quasi-experimental design (Cook, Campbell, & Shadish, 2002).

Context of Present Studies

Together the two studies reported below aimed to develop and test an effective approach to study the relationships among, and distinctions between, CSBs and creative production, organized within the model of creative behavior as agentic action. The following research question guided pilot Study 1: Did students' scores of creative production and CSBs appear to demonstrate adequate reliability? As described further, the research questions guiding Study 2 focused on testing two theoretical models using structural equation modeling techniques: (a) confirmatory factor analysis of the measurement model of CSE, CSC, CMC, and creative

production and (b) a regression model of creative production at Time 2 predicted by creative potential factors from five months prior at Time 1, with effects mediated by CSBs at Time 2.

Study 1

The primary goal of this pilot was to identify any issues with the assessment protocol and scoring process and to make improvements for complete implementation and analyses in Study 2 with a larger sample and two time points allowing for predictive analyses. We report quantitative results of inter-rater reliability from two rounds of scoring and key takeaways from a descriptive analysis of facilitated rater calibration, using facilitator notes as the primary data source.

Method

Befitting a socially and culturally situated approach to assessing the creative self, the consensual assessment technique (CAT), first introduced by Amabile (1982), served as an appropriate method to evaluate the creativity of a product or idea through the consensus of several raters with domain-specific experience (Baer & McKool, 2016). We prepared the protocol (see supplemental Appendix) to assess students' CSE, CMC, and creative production.

Participants. In Study 1, we assessed a pilot sample of students in Grade 7 (n = 245) during the 2015–16 school year from three diverse middle schools in the Pacific Northwest using the prototype assessment. All Study 1 participants experienced arts integration in Grade 6. This group of students were a grade level ahead of the students included in Study 2 but attended the same schools. Demographic information about Study 1 students was not obtained due to resource constraints in the study, but we expect the characteristics of the sample to be very similar to the reported sample in Study 2. Participating students attended two middle schools in two districts, participating as development sites in a federally funded research and development project for arts

integration innovations (Anonymous, 2017a; Anonymous, 2017b). Those schools included fringe rural and urban locales in small and mid-size Pacific Northwest towns and cities.

Creative self-efficacy measure. We designed the protocol so that students considered their CSE prior to beginning the creative task. We followed Bandura's (2005) recommendations to construct a CSE scale that would align to the task and be developmentally appropriate for adolescents. We designed five creative self-efficacy items using a broad scale (0-10) for students to self-report their confidence to invent a unique mythological creature. Five questions asked students to rate their confidence to invent a creature, think of details, complete a drawing, and produce something unique and creative.

Creative production measure. The creative task included both illustration and written components to ensure accessibility for students with diverse abilities in drawing and writing and to offer a more complex look at their creative production. We designed the content of the task (i.e., inventing a mythological creature) to be open-ended and imaginary—similar to tasks in past research (e.g., Ward, 1994)—and relevant and accessible to middle school students, offering broad cultural and personal interpretation. We adhered to guidelines for the CAT (Amabile, 1982; Baer & McKool, 2016). The CAT technique recommends that raters have some level of expertise in the domain of interest (Amabile, 1982; Kaufman, Baer, Cole, & Sexton, 2008). Raters were recruited from the teaching artists participating in the arts integration program. We assumed an adequate level of expertise in the domain of K-12 arts education and youth creative development because all raters had at least five years of experience producing artistic works in visual, musical, and/or theatrical domains and at least five years of experience or formal training in teaching artistic practices to K-12 students. The task prompted for an illustrated and written

response from students to ensure that detecting students' creative ideas did not rely entirely on drawing or writing skills, alone.

Scoring calibration. We recognize the calibration steps followed are not typical to the CAT; thus, the protocol we share in this study represents a modified CAT approach. Given the study aims to score for creative production, CSBs, and creative metacognition, the calibration process aimed at ensuring a fair and clear student assessment and understandable scoring procedure for raters; the aims were not to homogenize the raters' approach to evaluating creativity. Raters were asked to use their expertise to make valid scores for the overall creativity of the written and illustrated products combined and were reminded to consider both novelty and appropriateness of students' responses. A team of seven raters began with a randomly selected sample of 20 products from the pool of 245, scoring creativity of students' illustrations and descriptions on a 1–5 scale (1 = low creativity and 5 = high creativity). Next, each rater completed a reflective task, responding to three open-ended questions about their creativity rating: (a) What questions did you ask yourself as you reviewed a drawing to determine a score? (b) What questions did you ask yourself as you read a description to determine a score? (c) What designated the difference in ratings (i.e., 0–2) for scoring CMC of students' written reflection?

Additionally, raters read a list of ideas related to creativity in drawing and writing, ranking each idea for its importance to creativity. Ideas came from criteria used in past work with the CAT (Amabile, 1996), which included originality, innovation, novelty, beauty, detail, and clarity. For written description, ideas came from middle school standards, including complete sentences, correct grammar, completeness, ingenuity, penmanship or handwriting, and clear relationship to image (Council of Chief State School Officers, 2010). This modified approach relates to Amabile's (1982) third suggested step of asking raters to consider and

evaluate factors beyond just the creativity of the product. Raters joined for a brief dialogue to pose questions about the process, discuss their thinking, and to identify any possible improvements to the student assessment protocol. The first round of calibration resulted in the addition of scoring participants' written description of their creature, separate from the drawing prior to giving a combined score. The authors facilitated the calibration discussion and requested a second round of trial scoring from raters to ensure improved clarity and reliability before conducting Study 2, while maintaining subjectivity of rater scoring. The authors conducted a thematic analysis of the discussion notes to identify commonalities in approach and challenges to inform changes for Study 2. The same seven raters scored 50 more randomly selected student responses; we used the intraclass coefficient to assess reliability before advancing to Study 2.

Creative metacognition measure. Immediately after completing the creative task, the assessment protocol drew on students' CMC to record reflections about what worked well, why it worked, and what could be improved. Specifically, students responded to two broad reflection questions targeting creative metacognition: (a) to think about their approach and describe what worked well and (b) to think about what they would do differently to make their creature more creative. These broad questions assessed students' self-awareness, self-regulation, contextual knowledge, and strategy selection. Creative metacognition of student reflections was scored following the same procedures and calibration process on a scale from 0–2, with 0 meaning incomplete response, 1 meaning a partial response, and 2 meaning a complete response. Changes to the scoring approach from calibration are reported in the results. If a student responded to the reflection prompts, raters evaluated if it reflected at least one of the following categories (Beghetto & Karwowski, 2017): creative strategy selection, self-regulatory monitoring, self-awareness of strengths or weaknesses, and contextual knowledge about the challenge. The

difference between a rating of 1 and 2 indicated the strength and depth of the response as well as the inclusion of multiple CMC categories.

Procedures. Students completed the full assessment protocol in a 45-minute normal class period on their own using pencil and paper. Teachers read aloud specific instructions to ensure that students were prompted in a consistent way across classrooms and schools. Instructions asked students to respond to five creative self-efficacy questions, and then invent a mythological creature and draw it without adding color. After drawing their creature, they were instructed to describe the creature in writing, then reflect on the experience of creating their creature, thinking about what worked well and what they might change next time. Raters were given digital scans of each of the student responses selected for Rounds 1 and 2 along with a rating sheet to record their scores, independently.

Results

For Round 1, we computed the intraclass coefficient (ICC) in a two-way random model to determine the "real" variance observed in the mean of the raters (Shrout & Fleiss, 1979)—an established measure of inter-rater consistency. We used established recommendations to interpret the ICC reliability (Landis & Koch, 1977), where a range of 0.61–0.80 indicates substantial reliability and 0.81–1.00 indicates nearly perfect reliability. With $n = 20$ responses and $k = 7$ raters, each of the scored elements showed promising results: (a) ratings of only the illustration reached an ICC (2, 7) = 0.86; (b) illustration and description rated together reached an ICC (2, 7) = 0.94; (c) ratings for creative metacognition reached an ICC (2,7) = 0.85. During calibration discussion, the raters shared details about their thinking during the scoring process. We analyzed notes from the discussion to pull out the most common themes: (a) students' balance of attention to the form of the task and uniqueness of response were key for raters, (b) use of space, (c)

complexity, (d) playfulness, (e) story, (f) emotion, and (g) completeness. Facilitators provided examples of high agreement for both low and high creativity across all seven raters (see example in Figure A1 in Appendix), and the group discussed the qualities of the work that likely led to high agreement without input from facilitators. After analyzing the points of agreement, examples with low agreement on the level of creativity were discussed (see example in Figure A2 in Appendix) to try to clarify ambiguities that arose in the scoring process but not to eliminate the subjectivity of the ratings.

Student examples in the Appendix illustrate the key takeaway from the calibration process. Inter-rater agreement appeared to breakdown for this group of raters when the intentions of the student were not clear, creating ambiguity that allowed for raters to make interpretations about the meaning behind student work. For instance, facilitator notes described that high agreement for Figure 2 appeared to result from several explicit features: the student (a) made up a name for their creature, (b) described a plan, (c) added texture to their drawing, (d) showed a comfort with lack of *perfection*, (e) used an unbroken line, and (f) created a novel combination of known creatures appropriately for the task. Raters described the lack of agreement about the student response in Figure 3 with (a) the limitations that the dodo bird is not original, the description is lacking in detail, and the drawing is not effective for task criteria, and (b) identified strengths that illustration represents an interesting and elaborate narrative and setting, the creature has creative features, and the student demonstrated commitment to their creature's story.

The raters also discussed the ambiguities that arose when scoring for CMC, specifically, what distinguished a "2" from a "1". Raters clarified together that a complete response of CMC had to go beyond description and self-praise or critique and demonstrate a more sophisticated awareness of strategy and context or self-regulation and strengths and limitations. Raters

suggested the reflection questions become consolidated into two open-ended items: (a) *Think about the approach you took to invent and draw your own mythological creature*. *What worked well?* and (b) *What would you do differently next time to make your creature more creative?* The second round of scoring $n = 50$ random responses from the same sample with $k = 7$ raters demonstrated ICCs in the nearly perfect range again with illustration only (ICC = 0.91); description only (ICC = 0.96); illustration and description together (ICC = 0.92); and creative metacognition (ICC = 0.95). When reduced to three raters, randomly selected, the internal consistency remained strong (ICC = .81–.90). The CSE items on a 1–10 scale showed good internal consistency at $\propto > .86$.

Discussion

Study 1 demonstrated a high degree of internal consistency in the CSE items and inter-rater consistency in the judgement of creative production in written and illustrated work, as well as in the creative metacognition of student reflections. Where agreement was weakest revealed important distinctions in how different raters perceived students' intention and ideation, which could be a meaningful area of inquiry for future research—*what can the breakdown in CAT ratings tell us about the subjectivity of creativity?* Study 1 results indicated that three raters would likely be adequate for scoring of a much larger sample to achieve the aims of Study 2.

Study 2

Study 2 built from refinements in Study 1 to implement and evaluate the assessment approach and test the underlying theoretical framework of CSBs in creative production (see Figure 1). Study 2 included a large sample of $n = 872$ students, who were in Grade 8 during the 2017–2018 school year, attending eight middle schools. The study includes two measurement occasions—Time 1 in winter of Grade 8 and Time 2 in the late spring of Grade 8, five months

after Time 1. The majority of students in the four intervention schools experienced at least two years of approximately 40 hours of arts integration per year.

Distinguishing Creative Self-Beliefs and Creative Production

To explore the validity of the proposed assessment approach and the role of CSBs, a confirmatory approach in structural equation modeling (SEM) evaluated the structural validity of the CSB framework with CSE, CSC, and CMC. Next, evaluation of the distinct role of those CSBs began with an exploration of the convergent validity of conative, cognitive, environmental, and demographic predictors at Time 1 with CSB and creative production outcomes at Time 2. Conative predictors at Time 1 reflect multivariate person-level creative resources that shape how an individual's attitude influences their creative potential in a task or context (Lubart et al., 2013). We included (a) the general confidence to come up with creative ideas, which should relate to task-specific CSE and production (Beghetto, 2006); (b) students' self-perceived persistence through challenges, which should relate to greater effort in creative production and metacognition (Martin, 2011); and (c) a contraindicative factor of valuing conformity to the expectations of others (Anonymous, 2019c).

The cognitive factors of creative potential at Time 1 included: (a) the generation of original and uncommon ideas in figural and verbal divergent thinking, which should relate to stronger creative production and CSBs (Karwowski & Beghetto, 2018); (b) students' self-reported general creative ideational fluency for literary ideas, which should relate to creative production of a mythological creature and CSBs (Anonymous, 2017); and (c) students experience of concentration and enjoyment in learning (e.g., flow state), which should relate to ease in creative production (Csikszentmihalyi & Rathunde, 1993). The environmental factors of

perceived support for creativity in school (Anonymous, 2019) and arts integrated learning should support CSBs and creative production.

Demographic variables at Time 1 were important to include, based on prior research. First, though past research shows mixed results for the role of gender in creative development during adolescence (He & Wong, 2011; Karwowski et al., 2016), male and female adolescents experience different developmental and sociocultural processes (Dahl et al., 2018; Marasco, 2018). Second, U.S. schools are driven by white cultural norms and expectations (Darling-Hammond, 2010); therefore, research about individual creative differences should investigate whether cultural and racial dominance and advantage may play a role (Race-ethnicity was included as a dichotomous variable for white or non-white).

In sum, the conative, cognitive, environmental, and demographic characteristics we included illustrate important person-level and environmental factors and resources that should contribute to both CSBs and creative production of early adolescents in school. The following research questions guided analysis and reporting in Study 2.

1. Does the theoretical model of creative production, metacognition, self-efficacy, and self-concept demonstrate good fit, structural validity, and composite reliability?
2. How do the latent factors of outcomes relate across constructs, and how do relationships of each CSB with creative production differ?
3. In the longitudinal predictive model (Time 1 predictors and Time 2 outcomes), do the conative, cognitive, environmental, and demographic factors predict creative production and CSBs, as expected? Did CSBs mediate these effects on creative production?
4. Descriptively, which dimensions of creative metacognition were most salient for early adolescent students?

Method

To address Research Questions 1–2, we used confirmatory factor analysis, and to address the exploratory Research Question 3, testing both direct and indirect effects, we used a structural regression model (Kline, 2016) in M*Plus* software version 1.31 (Muthén & Muthén, 2010). To explore creative metacognition in Research Question 4, we report a descriptive count of students' CMC in four categories.

Participants. The sample for Study 2 included $N = 872$ students attending eight middle schools. The sample was diverse for the region, with 65.9% of students identified as white, 12.6% receiving special education services, and 54.4% of students marginalized economically. Of the non-white students, 21.3% were identified as Hispanic, 8.1% multiracial, and between 0.3–1.6% Pacific Islander/Native Hawaiian, Black, Asian, or Alaska Native/American Indian. Fifty-one percent ($N = 445$) of students participated in the arts integration program. Demographic characteristics were very similar across the arts integration and non-arts integration samples with slightly higher rates of economic disadvantage and racial diversity evident in the arts integration sample.[1]

Procedures. Procedures followed those detailed in Study 1. The research team collected student responses from all schools and intermixed them from arts integration and non-arts integration schools to create 17 total batches of 50 responses each. Likert scale responses to CSE and CSC items were added separately to a spreadsheet linked to the student ID. To manage the workload, two teams of three raters from Study 1 (one rater from the original seven was not available) scored half of the batches each (~425 responses or 8–9 batches for each team of three raters). This process ensured that raters were blind to the school origin of each response. To

[1] The sample in Study 2 is the same sample reported in previous studies (Anderson et al., 2017), except for attrition due to moving out of participating schools or absences from school.

categorize creative metacognition, efficiently, one rater per team identified the category or categories that each reflection fit best, including: (a) self-awareness of strengths, (b) self-regulatory, (c) contextual knowledge, and (d) creative strategy selection. Those categories were derived from the guiding CSB framework (Beghetto & Karwowski, 2017).

Measures. The creative production prompt and CSE items were the same as detailed in Study 1. Predictor measures and additional outcome measures are described further.

Outcome measures. We followed recommendations from (Beghetto & Karwowski, 2017) and past self-concept research (Bong & Skaalvik, 2003) to develop six CSC items contextualized to this study (see Appendix for complete items; e.g., "Compared to other students in my school, I am good at being creative in my school work"). Students responded using Likert ratings on a 5-point scale. All self-reported items from subscales were included in structural regression models.

Predictors. All subscales used as predictors underwent a preliminary confirmatory factor analysis to judge the adequacy of their reliability and structural validity with this sample (reliability coefficients, items, and scales are reported in the Appendix). Items from the Runco Behavior Ideational Scale for Children, used in previous research (Anonymous, 2017c), were used to target creative ideational fluency in literary arts (3 items) on a frequency scale from 1–5, where 1 indicates "never" and 5 indicates "always". Originality in divergent thinking, was measured using three incomplete figural stimuli (e.g., image of a spiral) and three concrete verbal stimuli (e.g., many uses for a shoelace; Runco, 2011, 2012). Originality was scored by comparing responses within the study sample using a semantic-based algorithmic (SBA) process to identify infrequency of the response; recent research demonstrates SBA scoring is efficient, accurate, and comparable to traditional methods (Beketayev & Runco, 2016). Students received

1 point for every idea produced that was unique to less than 10% of the sample and 2 points for every idea unique to less than 5% of the sample. Flow in learning was measured with four items on a 5-point Likert scale, built from previous work (Csikszentmihalyi & Rathunde, 1993) to suit the middle school context, appropriately. Those items demonstrated adequate reliability in past research (Anonymous, 2017). Creative ideational confidence (4 items) applied items used in prior research with adequate reliability (Beghetto, 2006). Persistence in learning (4 items) was measured with a subscale from the validated Motivation and Engagement Scale (Martin, 2011). Valuing of social conformity (4 items) was measured using items from the Runco Attitudes and Values Scale (Runco, 2015a). Students' perceived support for creativity in school (4 items) was measured with items from the Evaluation of Creative Setting scale (Runco, 2015b) used in past research (Anonymous, 2019c).

Analytic approach. To begin, we conducted confirmatory factor analysis of the self-reported CSE and CSC scales and rater-scored creative production and CMC. We tested a 5-factor model and two second-order factor models to understand how the three factors previously conceptualized as CSBs would fit best. After conducting factor analysis of all predictor items, we retained the best-fitting model (discarding problematic items). Next, we tested a predictive regression model, that included conative, cognitive, and environmental and demographic factors. If predictors had a statistically significant estimate on both CSBs and creative production, we tested mediation by estimating the indirect effects using bootstrapped standard errors with 500 iterations in M*Plus* version 1.31, using the MLR estimator (Muthén & Muthén, 2010).

Results

Correlations among CSB variables and predictors are reported in Table 1 and demonstrate relationships and directionalities aligned to expectations. Given that the sample of

responses was randomly split in half and rated by two groups of three raters, we report the ICC for each component for both Group 1 (G1) and Group 2 (G2) All ICCs demonstrated strong reliability: (a) creative illustration (G1 ICC = 0.88; G2 ICC = 0.87), description (G1 ICC = 0.92; G2 ICC = 0.90), combined rating (G1 ICC = 0.91; G2 ICC = 0.90), and creative metacognition (G1 ICC = 0.81; G2 ICC = 0.82). Confirmatory factor analyses included (a) the combined rating of students' illustration and description as a latent factor of creativity judgment from three independent raters; (b) the creative metacognition as a latent factor of the ratings from three raters, (c) creative self-efficacy as a latent factor of five self-reported items; and (d) creative self-concept as two latent factors of three affective and three cognitive items.

Confirmatory factor analysis. In response to Research Question 1, we used confirmatory factor analysis (Kline, 2016) on all five scales together. The goodness of fit (GOF) of the initial CFA was evaluated based on Hu and Bentler's (1999) strict criteria for close fit—specifically CFI > .95, Root Mean Square Error of Approximation (RMSEA) < .06, and Standardized Root Mean Residual (SRMR) < .04. (Significant χ^2 values are common in larger samples; as such, we ignored the statistical significance of χ^2.) GOF for the five-factor model reached a SRMR = .032, CFI = .97, and RMSEA = .047 (see Table 2). Given these results met the strict criteria for close fit, we concluded that the data provided a satisfactory fit to the model. We tested a second-order factor model, accounting for creative metacognition, creative self-efficacy, creative self-concept (social), and creative self-concept (affective), which resulted in worse fit. As Table 2 indicates, the next second-order factor model of CSE and CSC only, and CMC on its own, reached GOF indices nearly identical to the original first-order model. To test direct and indirect effects, we chose to use the second-order factor model without CMC. Though the first-order model demonstrated comparable fit, we chose the second-order model for further

analyses to be able to distinguish the role of highly related CSBs (i.e., CSE and CSC) from the distinct CMC, most efficiently. (Factor coefficients reported in Table A2 in the Appendix demonstrate evidence of strong construct validity for each factor.)

In response to Research Question 2, we used Cohen's (1992) effect size system for *r* estimates (small at $r > .10$; medium at $r > .30$; large $r > .50$) of Pearson correlation coefficients among CSBs, CMC, and creative production. Figure 2 illustrates correlations between factors, showing a large effect between CMC and creative production ($r = .61$), a medium-to-large effect between creative production and CSBs ($r = .42$) and a small-to-medium effect between CMC and CSBs ($r = .25$). To report reliability of each factor consistent with the factor analysis approach, we used Composite Reliability (CR; Kline, 2016), which incorporates the sum of pattern coefficients for each factor, the factor variance, and the sum of residuals. The following results for the four factors indicate very good reliability for all five factors: (a) *creative production* (CR = .93), (b) *creative metacognition* (CR = .86), (c) *creative self-efficacy* (CR = .91), and (d) *creative self-concept–social* (CR = .82), and (e) *creative self-concept–affective* (CR = .86).

Predictive regression model. To address Research Question 3, we first used a CFA to test the seven conative, cognitive, and environmental subscales together. CFA tested the seven-factor model; GOF reached good fit—SRMR was just above the threshold for close fit—with SRMR = .052, CFI = .95, and RMSEA = .034 (see Table 2). Though reaching good fit, we conducted local fit-testing at the item level and removed one divergent thinking item and one valuing of conformity item, which fell below the acceptable factor loading threshold (.50) and were removed. The resulting composite reliability of each latent factor was good: (a) *conformity* (CR = .75), (b) *creative ideational flexibility* (CR = .82), (c) *creative ideational fluency in literary arts* (CR = .75), (d) *originality in thinking* (CR = .87), (e) *persistence* (CR = .85), (f)

creative ideational confidence (CR = .77), (g) *flow in learning* (CR = .82), and (h) *teacher support for creativity* (CR = .85).

With measurement reliability and validity established, we addressed Research Question 3 with a regression model that included the second order factor for CSBs and all of the predictors, including student sex, minority Race/ethnicity, and participation in the arts integration program. In order to include all predictors and outcome variables in a single model, to account for overlap in shared variance, we used composite scores for predictors and outcomes, greatly reducing the complexity of the model and the number of parameters to estimate. Model fit results are in Table 2 and the results of direct and indirect effects are detailed in Table 3. We tested for the mediating role of CSBs and CMC in the relationship between statistically significant predictors of creative production. Figure 3 illustrates the direct and indirect effects of this model with path coefficients and R^2 to represent that explained variance of each endogenous variable. We use Cohen's (1992) effect size for percent of variance in each outcome explained by each model (i.e., $R^2 = .01$ (small), $R^2 = .09$ (medium), and $R^2 = .25$ (large) to describe the findings.

The explained variance for CMC was a medium effect ($R^2 = .15$), for creative performance a large effect ($R^2 = .40$), and for CSBs a large effect ($R^2 = .34$). Table 3 and Figure 3 illustrate how the small effect of being female on creative production was mediated by an indirect effect through CMC (i.e., the coefficient to creative production was no longer statistically significant). The arts integration program had a small effect on creative production, metacognition, and self-beliefs, and the effect on creative production was fully mediated by CMC and CSBs. Creative ideational confidence had a medium effect on CSBs, only, and flow in learning had a small effect on CSBs, only. Originality in divergent thinking had a small-to-medium effect on creative production, metacognition, and self-beliefs, and that effect on creative

production was almost fully mediated by CMC and CSBs. Students' perceived ideational fluency in the literary arts had a small effect on creative production and CSBs, and the effect on creative production was fully mediated by CSBs. Students being identified as minority Race-ethnicity demonstrated a weak negative effect on creative production, only. Persistence and valuing conformity did not demonstrate a statistically significant effect on any outcome.

Facets of creative metacognition in early adolescence. In total, 82% of students demonstrated capacity and willingness to engage in at least one category of creative metacognition. Of the four categories of creative metacognition scored, creative strategy selection was evident for 47% of students (407 counts), self-regulatory for 38% of students (331 counts), self-awareness of strengths for 23% (198 counts), and contextual knowledge for 19% (160 counts). In terms of repeat categories, 46% of students (n = 399) demonstrated one category; 28% of students (n = 242) demonstrated two categories of creative metacognition; 7% of students (n = 62) demonstrated 3 categories; and 1% of students (n = 7) demonstrated all four categories. Among creative metacognition dimensions scored in this study, students were most likely to report creative strategy selection and self-regulatory awareness. Self-awareness of strengths and contextual knowledge appeared to be less present for early adolescent creators.

Identifying patterns within each category, self-awareness of strengths included reflections of what and how students did something well or not well, often in relation to a specific strength or weakness (e.g., being able to find a flow, drawing from own experience, recognizing limitations of drawing ability). Creative strategy selection included reflections about using a certain prompt or technique to support their approach (e.g., making it strange, thinking of different combinations of animals, making something scary, adding details). Contextual knowledge related to strategy selection revealing an understanding of what the objectives of the

assessment were (e.g., trying to make something new, building off of existing mythological creatures, or understanding the importance of naming their creature). Self-regulatory reflections revealed an awareness of conditions, both internal and external, that supported their creative process and activating what helps them to be more creative (e.g., slowing down and taking time, thinking through multiple ideas, having a quiet space to work, and letting go of expectations).

Discussion

Our findings from SEM suggested strong evidence for reliability and validity of students' scores for creative self-beliefs, metacognition, and production. We found that CMC and creative production were strongly related, while CSBs were more strongly related to creative production than CMC. Though predictors generally supported construct validity of measures, all but a single, weak predictor of creative production—minority Race-ethnicity—were mostly or fully mediated by CMC or CSBs. Those findings contribute new support for the model of creative behavior as agentic action (Karwowski & Beghetto, 2018), where creative potential becomes creative behavior through positive self-beliefs and valuation of creative potential and effort. Moreover, the role of perceived support for creativity in school on CMC and CSBs illustrates the role of environmental determinants, such as modeling and encouragement (e.g., *proxy* agency), in the social cognitive theory of agency (Bandura, 2018). The findings also suggest that creative metacognition in early adolescence may play an even more critical role in how individual creative resources and environmental supports contribute to creative action and production.

Characteristics of the creative adolescent *self*. According to our results from a large early adolescent sample completing Grade 8, higher CSBs related to experiences of flow states in learning earlier that year. The relationship between flow states and creative production has been well-documented in adulthood (Csikszentmihalyi, 1997), and our results suggest this relationship

may be more salient for early adolescents in school regarding their self-beliefs, directly. Originality in divergent thinking and self-reported fluency of ideational behaviors in the literary arts influenced the level of creativity of student's invented mythological creature. Those relationships were mostly or fully explained by CMC and CSBs. Though previous research is mixed on how divergent thinking relates to actual creative production (Baer, 2011; Runco & Acar, 2012), our results suggest originality in divergent thinking contributes to students' capacity for domain-specific creative production, such as inventing a mythological creature, in early adolescence. Regarding effects of originality on creative production, CMC was a stronger mediator than CSBs, which might suggest common strategies that contribute to divergent thinking tasks and the invention of a mythological creature.

Students' perception of support for creativity from their teachers also influenced students' level of creative metacognition and self-beliefs (with a small effect on creative production that was trending toward statistical significance). This environment-fit challenge (Eccles & Roeser, 2011) suggests that teachers' instructional approach may align to some students' creative process more than others. Indeed, past research has found that teachers carry biases about who is creative in their class and how students' express creativity (Gralewski & Karwowski, 2016). Socially-mediated forms of agency (see updated conceptualization in Bandura, 2018), such as modeling and encouragement of creative thinking and behavior, should be considered in the model of creative behavior as agentic action. Students from non-dominant (non-white) race-ethnicities demonstrated slightly lower levels of creative production—potentially a cultural mismatch in the creative task. This finding should raise the concern that creativity research consider how assessments are culturally accessible, sensitive, and responsive for diverse student populations. Though all students in the sample received instruction about

Greek mythology in middle school, the task to invent a mythological creature may represent a Euro-centric topic less relevant to culturally diverse students. Early adolescent female students demonstrated higher levels than male students on all outcomes, which could relate to developmental differences (Dahl et al., 2018), differences based on the literary-based domain, or the unique social pressures that adolescent boys face to conform to social norms (Marasco, 2018). Students who reported higher fluency of ideational behaviors to think of different endings or titles to books also reported a stronger CSE in the task and stronger CSC in school. Not surprisingly, students' general creative ideational confidence related only to students' CSBs at a medium effect.

In this study, creative metacognition reflected an agentic perspective and was measured by student's active reflection of their creative process and production in the task, not their accurate evaluation of the creativity of their product. The CMC score included students' investment of effort and willingness to reflect on their approach as well as their capacity to call forth self-awareness and strategic choices. Importantly, the small effect of students' persistence in learning was fully mediated by CMC. The reflective process to think about self-awareness, self-regulation, strategy selection, and contextual knowledge appeared to be challenging for early adolescent students, requiring some choice to engage and persist. Indeed, metacognition is just beginning to flourish at this age (Flavell, 1979). Relatedly, experience in arts integration had the largest effects on levels of creative metacognition. CMC explained most of the small effect of arts integration on creative production. Observation research indicates that those integrated experiences focused on metacognitive capacities in the creative process through consistent reflection and modeling (Anonymous, 2017c), which emphasized CMC over creative production

and, in part, explains this finding. It may be important for arts integration design in the future to focus equally on metacognitive and technical aspects of the creative process.

Creative metacognition during this early adolescent phase concentrated on students' strategy selection and self-regulation, including aspects of the learning environment. Though self-awareness and contextual knowledge was evident, they were half as frequent as the other two components. The development of contextual knowledge requires explicit instruction and modeling in the school setting in order to develop students awareness of when and how to apply the creative process and creative strengths (Beghetto & Kaufman, 2014). Moreover, self-awareness about creative strengths and limitations requires prior opportunities for reflection in the school setting, which evidence suggests is limited in typical middle school instruction (Anonymous, 2017c). These results reinforce Flavell's (1979) encouragement for schools to develop the full array of metacognitive knowledge and monitoring in early adolescence through explicit instruction, modeling, practice, and feedback in the classroom context. Puente-Diaz and Cavazos-Arroyo (in press) suggest the importance of making metacognitive feelings explicit.

General Discussion

Together, the design of these studies set out to explore and test a comprehensive assessment approach, extend understanding about CSBs during a crucial period of human development, and further test the model of creative behavior as agentic action with a focus on creative metacognition. We set out to provide additional clarity about creative self-beliefs in response to growing interest in the field (Beghetto & Karwowski, 2017; Karwowski & Barbot, 2016). We used structural equation modeling techniques to test the fit of different theoretical models and to achieve a high degree of precision in parameter estimates. CMC demonstrated an important role in explaining the link between creative potential and creative production. Indeed,

by blending self-awareness of creative strengths and self-regulation of how and when to be creative in a task, CMC may be more complex than other CSBs and perhaps the most indicative of the agentic action required to be creative (Beghetto & Karwowski, 2017).

Supporting the Creative Self of Adolescents

Results from this study suggest that schools can proactively support the development of adolescents' creative self and that such support matters for creative production, self-beliefs, and metacognition. Fostering students' capacity for original and flexible thinking within and across domains is possible through intentional curricular and instructional decisions (Beghetto & Kaufman, 2014). Carefully designed arts integration experiences showed promise as one type of support and approach. Arts integration techniques that focus on students' unique creative process across content areas appears to contribute to students' creative development, holistically, with the greatest emphasis on creative metacognition. Given the lack of technical training in artistic domains of most non-arts educators, focusing their professional development on understanding the creative process and CMC may be key. To establish a strong environment-fit for creative development of diverse adolescents, schools will need to go beyond fostering creative idea generation and learn more about supports students need. For instance, male and female adolescents may experience different pressures to conform (Anonymous, 2019c); therefore, educators may need to nurture and model creative development, adaptively. The importance of culturally responsive techniques to support healthy adolescent development (Hammond, 2015) may relate to creativity as well, especially regarding how creative production is framed and prompted by educators for culturally and racially non-dominant groups. Establishing culturally responsive creative assessments will be an important next step in research as well.

Creating conditions in learning opportunities for students to reach a flow state of concentration and enjoyment, consistently, may support their CSBs, and arts integration may be a promising approach to establish those conditions (Anonymous, 2019b). Similarly, educators may be able to nurture students' CMC by supporting awareness of self-regulatory choices and acknowledging the effort to persist through challenging experiences, rather than acknowledging or praising the product, only. Opportunities for structured uncertainty, where students have to face ambiguity in the steps or expectations (Beghetto, 2019), can fuel that growth. The assessment approach developed in this study could be applied to the classroom setting, easily, and make visible to both students and educators the diverse creative self each learner carries. Moreover, using the comprehensive and reflective format of this assessment may be a key support to support the development of students' creative metacognition.

Future Research on the Adolescent Self and Creative Agentic Action

This study suggests the increasing importance of learnimg how students feel, think, and reflect in the creative process and supporting adaptive development in all three areas. For this sample of early adolescent students, each facet—creative production, metacognition, and self-beliefs—illustrated distinct patterns of predictive and mediating characteristics. The results integrate the social and personal modes of human agency and the role of metacognition in the model of creative behavior as agentic action. It will be important to research how the creative and agentic self develops and performs in different contexts. For instance, how might the nature and domain of the task prompt draw out different potential for creative performance, metacognition, and self-beliefs? Understanding the barriers that may stymie this agentic action, such as the newly validated construct of creative anxiety (Daker, Cortes, Lyons, & Green, in press), will be critical to converting creative potential into creative behavior.

Limitations

Several limitations of this study require cautionary interpretation and generalization. All of the effects reported represent regression paths between predictors measured in the winter of Grade 8 with outcomes measured five months later in the spring. Though it is beyond the scope of this study, opposite directionality between factors could be in play, theoretically. For instance, high creative metacognition and production could influence greater originality in divergent thinking. The variable indicating experience in arts integration during middle school reflects a comparison between students selected into conditions through a quasi-experimental design without prior levels of creative outcomes available to include in analyses. The creative task was completed individually, which ignores the social and participatory nature of creativity in school (Clapp, 2016) and may reinforce a perspective that upholds the individual as the *creator* decontextualized from the sociocultural context of the classroom where that creativity happens. This study explored CMC through student reflection prompts, which may have posed more difficulty to complete for some students than others. Additional approaches to investigating, measuring, and analyzing CMC will be important for future research. Moreover, due to time constraints, descriptive coding and analysis of CMC categories were scored by a single rater.

Conclusion

Recent work theorized and demonstrated the link between creative potential and creative behavior as a matter of agentic action. Additionally, recent conceptual work clarified that creative self-efficacy, self-concept, and metacognition are inter-related but distinct aspects that likely undergird that agentic step in creative behavior. Results from the studies presented illustrate the large but distinct role that creative self-beliefs and creative metacognition play in the creative process of adolescents, mediating the influence of conative, cognitive,

environmental, and personal factors that contributed to creative production. The effort to support students' creative development in school should include, not only the typical creative thinking often associated with creative potential, but also the self-beliefs and metacognitive capacities that fuel the agency to create and give shape to the possible.

References

Anonymous (2015)

Anonymous (2017a)

Anonymous (2017b)

Anonymous (2017c)

Anonymous (2018)

Anonymous (2019a)

Anonymous (2019b)

Anonymous (2019c)

Amabile, T. M. (1982). Social psychology of creativity: A consensual assessment technique. *Journal of Personality and Social Psychology*, *43*(5), 997–1013. https://doi.org/10.1037//0022-3514.43.5.997

Amabile, T. M. (1996). *Creativity in context*. New York, NY: Westview Press.

Amabile, T. M. (2017). In pursuit of everyday creativity. *Journal of Creative Behavior*, *51*, 335–337. https://doi.org/10.1002/jocb.200

Anderson, R. C., Haney, M., Pitts, C., Porter, L., & Bousselot, T. (2019). " Mistakes can be beautiful": Creative engagement in arts integration for early adolescent learners. *Journal of Creative Behavior*. https://doi.org/10.1002/jocb.401

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*. 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. https://doi.org/10.1080/10400419.2017.1360057

Anderson, R. C., Porter, L., & Adkins, D. (2019). A dramatic confrontation of frames: Arts-integration teacher development, organizational learning, and school change. *Leadership and Policy in Schools*, 1–21. https://doi.org/10.1080/15700763.2018.1554157

Baer, J. (2011). How divergent thinking tests mislead us: Are the Torrance Tests still relevant in the 21st century? The Division 10 debate. *Psychology of Aesthetics, Creativity, and the Arts*, *5*(4), 309–313. https://doi.org/10.1037/a0025210

Baer, J., & McKool, S. S. (2016). Assessing creativity using the consensual assessment technique. *Handbook of Research on Assessment Technologies, Methods, and Applications in Higher Education*, (April), 65–77. https://doi.org/10.4018/978-1-60566-667-9.ch004

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

Bandura, A. (2005). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents* (pp. 307–337). Greenwich, CT: Information Age Publishing.

Bandura, A. (2018). Toward a psychology of human agency: Pathways and reflections. *Perspectives on Psychological Science*, *13*(2), 130–136. https://doi.org/10.1177/1745691617699280

Barbot, B. (2019). Creativity and Self-esteem in Adolescence: A Study of Their Domain-Specific, Multivariate Relationships. *Journal of Creative Behavior*. https://doi.org/10.1002/jocb.365

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., 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*, *2016*(151), 33–45. https://doi.org/10.1002/cad.20152

Beghetto, R. A. (2006). Creative self-efficacy: Correlates in middle and secondary students. *Creativity Research Journal*, *18*(4), 447–457. https://doi.org/10.1207/s15326934crj1804_4

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. https://doi.org/10.1002/cad

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. https://doi.org/10.1016/B978-0-12-809790-8.00001-7

Beghetto, R. A., & Kaufman, J. C. (2014). Classroom contexts for creativity. *High Ability Studies*, *25*(1), 53–69. https://doi.org/10.1080/13598139.2014.905247

Beghetto, R. A., Kaufman, J. C., & Baxter, J. (2011). Answering the unexpected questions: Exploring the relationship between students' creative self-efficacy and teacher ratings of creativity. *Psychology of Aesthetics, Creativity, and the Arts*, *5*(4), 342–349. https://doi.org/10.1037/a0022834

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. https://doi.org/10.5964/ejop.v12i2.1127

Bong, M., & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? *Educational Psychology Review*, *15*(1), 1–40.

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. Retrieved from http://209.59.135.52/files/publications/arts_integration_book_final.pdf

Clapp, E. (2016). *Participatory research: Introducing access and equity to the creative classroom*. New York, NY: Routledge.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155.

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.

Council of Chief State School Officers. (2010). *Common Core State Standards*. Washington, DC.

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. https://doi.org/10.1038/nature25770

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. https://doi.org/10.1080/10400419.2012.677338

Daker, R.J., Cortes, R.A., Lyons, I.M., & Green, A. E. (2019). Creativity anxiety: Evidence for anxiety that is specific to creative thinking, from STEM to the arts. *Journal of Experimental Psychology: General*.

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.

Eccles, J. S., & Roeser, R. W. (2011). Schools as developmental contexts during adolescence. *Journal of Research on Adolescence*, *21*(1), 225–241. https://doi.org/10.1111/j.1532-7795.2010.00725.x

Flavell, J. H. (1979). Metacognition and Cognitive Monitoring: A New Area of Cognitive-Developmental Inquiry. *American Psychologist*, *34*(10), 906–911.

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. https://doi.org/10.1002/jocb.140

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

He, W., & Wong, W. (2011). Gender differences in creative thinking revisited: Findings from analysis of variability. *Personality and Individual Differences*, *51*(7), 807–811.

https://doi.org/10.1016/j.paid.2011.06.027

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. https://doi.org/10.1037/aca0000012

James, W. (1890). *The principles of psychology*. London: MacMillan.

Karwowski, M. (2016). The dynamics of creative self-concept: Changes and reciprocal relations between creative self-efficacy and creative personal identity. *Creativity Research Journal*, *28*(1), 99–104. https://doi.org/10.1080/10400419.2016.1125254

Karwowski, M., & Barbot, B. (2016). Creative Self-Beliefs: Their Nature, Development, and Correlates. In *Creativity and Reason in Cognitive Development* (pp. 302–326).

Karwowski, M., & Beghetto, R. A. (2018). Creative behavior as agentic action. *Psychology of Aesthetics, Creativity, and the Arts*. https://doi.org/10.1037/aca0000190

Karwowski, M., Gralewski, J., & Szumski, G. (2015). Teachers' Effect on Students' Creative Self-Beliefs Is Moderated by Students' Gender. *Learning and Individual Differences*, *44*(February 2016), 1–8. https://doi.org/10.1016/j.lindif.2015.10.001

Karwowski, M., Jankowska, D. M., Gralewski, J., Gajda, A., Wi??niewska, E., & Lebuda, I. (2016). Greater male variability in creativity: A latent variables approach. *Thinking Skills and Creativity*, *22*. https://doi.org/10.1016/j.tsc.2016.10.005

Karwowski, M., & Lebuda, I. (2016). The Big Five , the Huge Two , and Creative Self-Beliefs : A Meta-Analysis, *10*(2), 214–232.

Kaufman, J. C., Baer, J., Cole, J. C., & Sexton, J. D. (2008). A comparison of expert and nonexpert raters using the Consensual Assessment Technique. *Creativity Research Journal*, *20*(2), 171–178. https://doi.org/10.1080/10400410802059929

Kaufman, J. C., & Beghetto, R. A. (2013). In praise of Clark Kent: Creative metacognition and the importance of teaching kids when (not) to be creative. *Roeper Review*, *35*(3), 155–165. https://doi.org/10.1080/02783193.2013.799413

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). New York, NY: Guilford.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, *33*(1), 159–174.

Lizarraga, M., & Baquedano, M. (2013). How creative potential is related to metacognition. *European Journal of Education and Psychology*, *6*(2), 69–81. https://doi.org/10.1989/ejep.v6i2.104

Lubart, T., Zenasni, F., & Barbot, B. (2013). Creative potential and its measurement. *International Journal for Talent Development and Creativity*, *1*(2), 41–50.

Marasco, V. M. (2018). Addressing hegemonic masculinity with adolescent boys within the counseling relationship. *Journal of Child and Adolescent Counseling*, *4*(3), 226–238. https://doi.org/10.1080/23727810.2017.1422647

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

Muthén, L. K., & Muthén, B. O. (2010). *Mplus: Statistical analysis with latent variables: User's guide*. Los Angeles, CA: Muthén & Muthén.

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. https://doi.org/10.1007/s10984-017-9238-9

Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why isn't creativity more important to

educational psychologists? Potentials, pitfalls, and future directions in creativity research. *Educational Psychologist*, *39*(2), 83–96.

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. (2015a). Runco Creativity Assessment Battery. Athens, GA: Creativity Testing Services.

Runco, M. A. (2015b). Runco evaluation of setting and climate. Athens, GA: Creativity Testing Services.

Runco, M. A., & Acar, S. (2012). Divergent Thinking as an Indicator of Creative Potential. *Creativity Research Journal*, *24*(1), 66–75. https://doi.org/10.1080/10400419.2012.652929

Runco, M. A., & Jaeger, G. J. (2012). The Standard Definition of Creativity. *Creativity Research Journal*, *24*(1), 92–96. https://doi.org/10.1080/10400419.2012.650092

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin*, *86*(2), 420–428. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/18839484

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*, *2016*(151), 111–119. https://doi.org/10.1002/cad.20147

Simonton, D. K. (2012). Taking the U.S. Patent Office criteria seriously: A quantitative three-criterion creativity definition and its implications. *Creativity Research Journal*, *24*(2–3), 97–106. https://doi.org/10.1080/10400419.2012.676974

Sternberg, R. (2017). Whence creativity? *Journal of Creative Behavior*, *51*, 289–292. https://doi.org/10.1002/jocb.199

Ward, T. B. (1994). Structured imagination: The role of category structure in exemplar generation. *Cognitive Psychology*, *27*(1), 1–40.

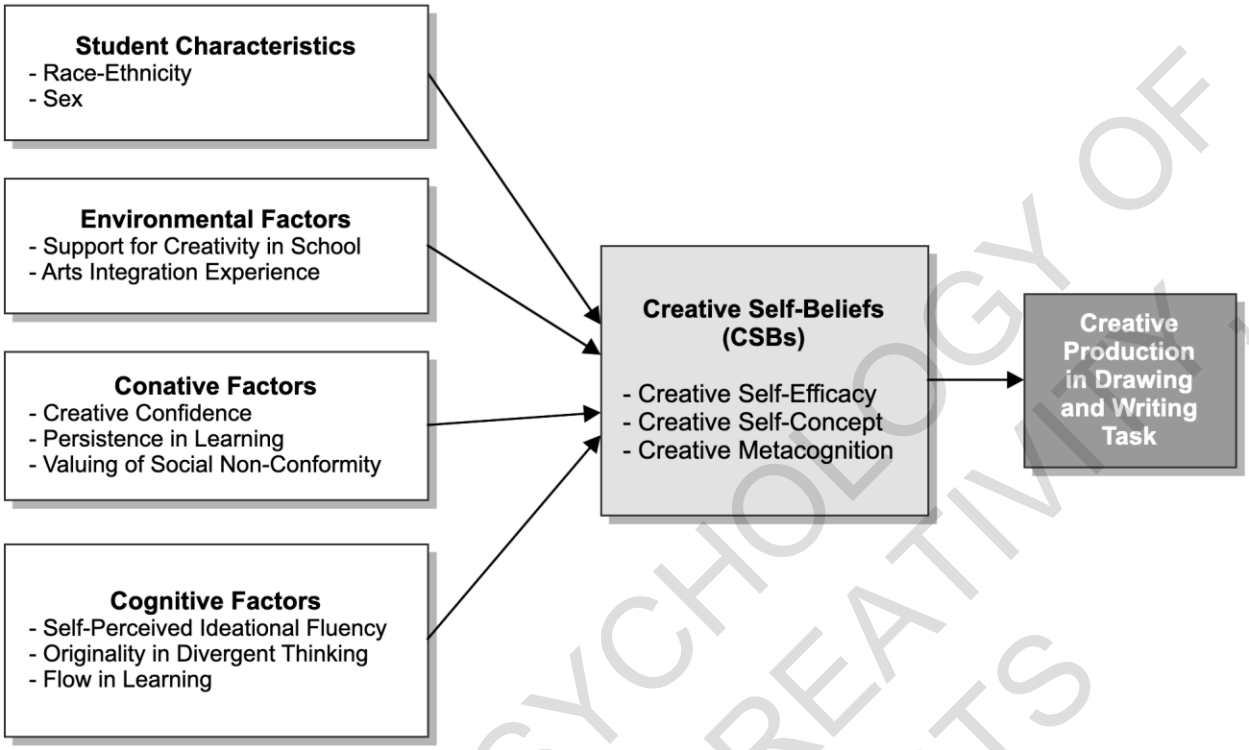

Figure 1. The theoretical model where student characteristics, environmental, conative, and cognitive factors, in part, shape the creative self-concept, creative self-efficacy, and creative metacognition in early adolescence, which undergird creative production.

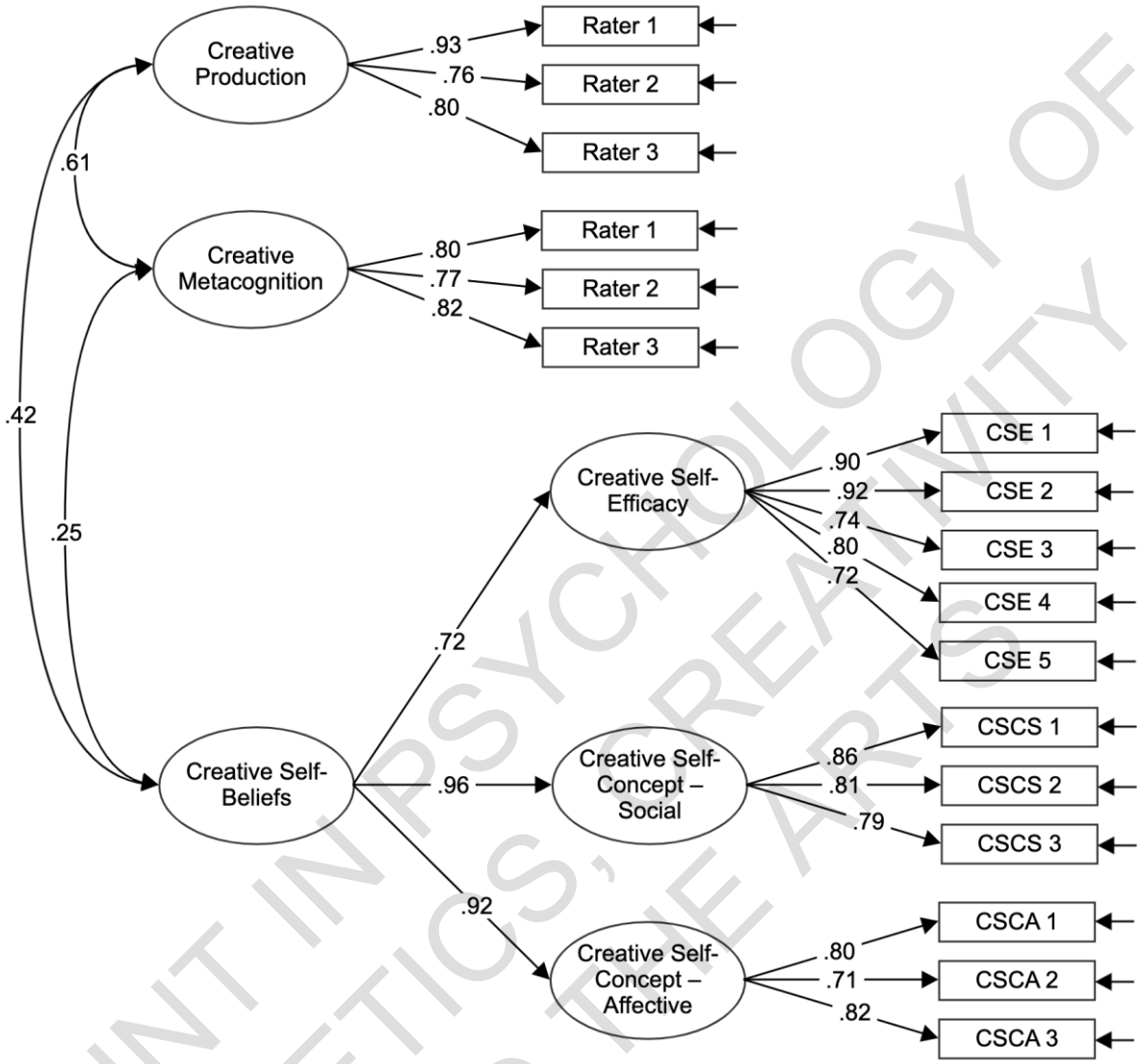

Figure 2. Correlations and factor coefficients for creative production, creative metacognition, and bi-factor model of creative self-beliefs. All correlations and factor coefficients are standardized and statistically significant at $p < .01$.

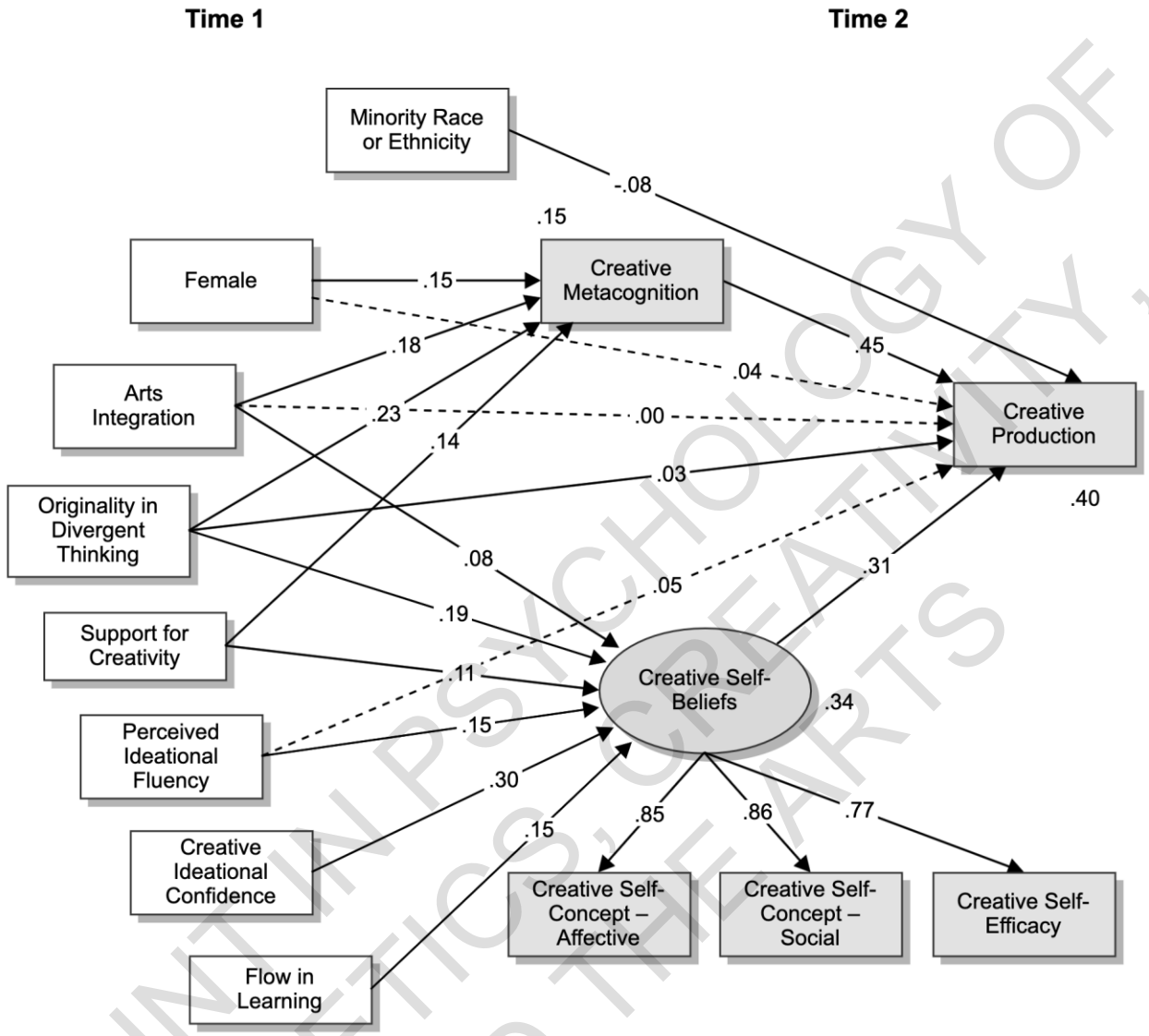

Figure 3. Results of direct and indirect effects of summative scores of predictors at Time 1 (in white rectangles) on creative production mediated by CMC and CSBs at Time 2 (in grey rectangles and ovals). CSB is the only latent variable. Dashed lines illustrate the remaining non-significant direct effects on creative production after mediation. Path coefficients are standardized and R^2 is included outside each endogenous factor in the model.

Table. 2

Bivariate Correlations Between Creative Production, Creative Self-Beliefs, and Predictors and Standard Deviations and Means for All Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. T2: Creative self-efficacy	-											
2. T2: Creative self-concept affect	.58*	-										
3. T2: Creative self-concept social	.62*	.74*	-									
4. T2: Creative metacognition	.18*	.25*	.18*	-								
5. T2: Overall creative production	.32*	.39*	.32*	.53*	-							
6. T1: Flow in learning	.26*	.35*	.30*	.13*	.20*	-						
7. T1: Persistence in learning	.16*	.21*	.25*	.17*	.14*	.47*	-					
8. T1: Creative ideational confidence	.37*	.37*	.43*	.08	.15*	.34*	.36*	-				
9. T1: Ideational fluency-literary arts	.30*	.30*	.29*	.16*	.23*	.40*	.23*	.35*	-			
10. T1: Originality in divergent thinking	.22*	.28*	.25*	.25*	.28*	.37*	.31*	.31*	.28*	-		
11. T1: Value of conformity	-.12*	-.14*	-.08*	-.06	-.12*	-.13*	-.11*	-.13*	-.07	-.10*	-	
12. T1: Support for creativity in school	.25*	.25*	.22*	.16*	.13*	.41*	.41*	.30*	.20*	.12*	-.08*	-
Standard deviation (SD)	2.37	0.98	0.96	0.55	1.05	0.82	0.82	0.75	1.08	3.08	0.85	0.83
Mean	6.21	3.38	3.16	1.18	3.05	3.64	3.57	3.68	3.08	3.47	2.21	3.31

Note. Variables 1–5 are outcomes measured in spring 2018 and variables 6–12 are predictors measured in winter 2018. *$p < .01$.

Table 3.

Goodness-of-Fit Indices of Models for Confirmatory Factor Analysis of Creative Production and Creative Self Beliefs, Predictors, and Regression Model

Model	*df*	χ^2	SRMR	CFI	RMSEA (90% C.I)
Confirmatory Factor Analysis for Creative Production and Creative Self-beliefs					
5-factor (17 items)	109	307.46*	.032	.97	.047 (.04, .05)
CSB second-order model with CM	114	518.49*	.082	.94	.065 (.06, .07)
CSB second-order model without CM	113	329.71*	.037	.97	.048 (.04, .05)
Confirmatory Factor Analysis for Conative, Cognitive, and Environmental Predictors					
7-factor (28 items)	329	569.60*	.052	.95	.034 (.03, .04)
7-factor revised (26 items)	278	485.60*	.045	.96	.034 (.03, .04)
Predictive Regression Models with Indirect Effects					
10-predictor model with CSB second-order factor	25	73.29*	.02	.97	.056 (.04, .07)

Note. CFI = comparative fit index; SRMR = standardized root-mean-square residual; RMSEA = root mean square error of approximation with 90% confidence interval included in parentheses. *$p < .05$.

Table 3.

Regression Coefficients for Predictive Direct and Indirect Effects on Creative Production, Metacognition, and Self-Beliefs

Predictors	Creative Production	Creative Metacognition	Creative Self-Beliefs
Minority	-.08* (.04)	-.02 (.04)	.06 (.04)
Female	.10** (.04)	.15* (.04)	.00 (.04)
Indirect effect of support for creativity through CMC	.07** (.02)		
Arts integration	.11* (.04)	.18** (.04)	.08* (.04)
Indirect effect of support for creativity through CMC	.08** (.02)		
Indirect effect of support for creativity through CSB	.02 (.01)		
Originality in divergent thinking	.24** (.04)	.23** (.04)	.19** (.04)
Indirect effect of originality through CMC	.10** (.02)		
Indirect effect of originality through CSB	.06** (.01)		
Support for creativity in school	.08 (.04)	.14** (.04)	.11** (.04)
Perceived ideational fluency of literary ideas	.13** (.07)	.08 (.04)	.15** (.04)
Indirect effect of ideational fluency through CSB	.05** (.02)		
Creative ideational confidence	-.02 (.04)	-.07 (.04)	.30** (.04)
Flow	.05 (.05)	-.03 (.05)	.15** (.04)
Persistence	-.00 (.05)	.08 (.05)	-.05 (.04)
Value of conformity	-.07 (.04)	.00 (.04)	-.06 (.04)

Note. CMC refers to creative metacognition. CSB refers to creative self-beleifs. All paramter estimates are reported as standardized coefficients. Standard errors are included in parentheses. *$p < .05$; **$p < .01$.