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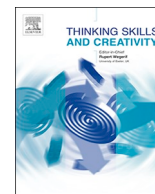
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## A review study about creativity in adolescence: Where is the social context?



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### ABSTRACT

Although adolescent creativity development is a promising area of research in the field, there is still much to be known with respect to the factors involved in adolescent creativity development and the role played by the social context. The purpose of this systematic review study was to identify and summarize factors associated with enhancing or inhibiting adolescent creativity in a sample of 65 published studies. We classified supportive and inhibiting factors into four categories: *individual factors*, *parental factors*, *educational factors*, and *social contextual factors*. Individual factors supportive of adolescent creativity development included: openness to experience, intrinsic motivation, creative self-efficacy, attributing adversity to external factors, and academic achievement. State and trait anxiety were associated with inhibitory factors. Supportive parental factors included parental support and autonomous motivation with maternal involvement. Educational factors supportive of adolescent creativity development included: balancing freedom and necessary guidance; flexible, open-ended activities with clear learning expectations; openness to and encouragement of student ideas; atmosphere of trust and respect; and varied learning resources. Finally, supportive social contextual factors included providing interactions that encourage expression or challenging of ideas; and encouraging adolescents to view issues from multiple global and temporal perspectives. Inhibitory social contextual factors included increased pressures placed on teachers to prepare students to perform well on assessments; and increased emphasis placed on standardized curricula and related assessments. We also noted that the vast majority of studies in our sample ( $n = 61, 94\%$ ) did not take into account the role played by social contextual factors. We conclude by discussing implications for future research.

### 1. Introduction

Adolescents participate in multiple and expanding social contexts, such as their family, school, and peer environments. These social contexts and the interactions of individuals within them play a key role in shaping adolescents' identities, values, and behaviors. In turn, the interactions and development of adolescents also helps to shape those contexts. This dynamic interplay between the social context and adolescent behavior makes adolescence a particularly promising phase for the study of creativity. Indeed, creativity researchers have increasingly started to recognize both the dynamic (Beghetto & Corazza, 2019) and the intertwined nature of the creative action and sociocultural contexts (Glăveanu et al., 2019). Although adolescent creativity development is a promising area

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of research in the field (see Barbot, 2016), there is still much to be known with respect to the factors involved in adolescent creativity development.

The aim of this systematic review study is to shed more light on the factors that seem to enhance or inhibit creativity in adolescence, including the role that the social context plays in adolescent creativity development. Doing so can help researchers focus and expand their efforts aimed at understanding how creativity might be supported during this unique period of human development. We open by providing a brief overview of the concept of creativity and creativity in adolescents. We then provide the details of the study, report on the results, and discuss the implications for future research.

### 1.1. The concept of creativity

Creativity is a dynamic concept that applies to a wide array of human endeavours. Although there are variations in how people think about creativity, creativity researchers generally agree that determinations of creativity are based on the combination of two key attributes: Creativity is a blend of *originality* (newness, novelty) and *usefulness* (worthwhile, meaningful) as defined within a particular context (e.g., Plucker, Beghetto, & Dow, 2004; Runco & Jaeger, 2012). Researchers recognize that the combination of both attributes is necessary for something to be considered creative. Traditionally, research has focused on highly eminent creative persons and creative products and has tended to conceptualize creative persons, products and social contexts as discrete factors. Contemporary researchers have expanded these conceptualizations by recognizing that creative action is a much more dynamic and inconclusive process that takes place in or is even co-constitute with the broader social context (e.g., Amabile, 2017; Beghetto & Corazza, 2019; Glăveanu et al., 2019; Hennessey, 2017; Kaufman & Beghetto, 2009; Kupers & van Dijk, 2020).

These broadened conceptualizations of creativity can be found in several recent frameworks and conceptualizations. The *Four-C model of creativity* (Beghetto & Kaufman, 2007; Kaufman & Beghetto, 2009), for example, highlights how creativity can range from more subjective creative experiences (mini-c creativity) to creative processes and products that are recognized by others as making creative contributions in everyday (little-c), professional (Pro-c), and historical contexts (Big-C).

Glăveanu (2010) has also presented an overview of how expanded conceptions of creativity can help move the field from a *He* paradigm (which is more exclusionary and limited to a few select creators) to an *I* paradigm (which still focuses on individuals, but acknowledges that all people are capable of being creative) and toward a *We* paradigm (which takes a more sociocultural and expansive focus). The *We*-paradigm starts from the idea that 'creativity takes place within, is constituted and influenced by, and has consequences for, a social context' (Westwood & Low, 2003, p. 236).

These more expansive views about creativity are perhaps best illustrated in a recent publication of a group of active creativity scholars that outlines the key assumptions of a socio-cultural conception of creativity (Glăveanu et al., 2019). In this article, the scholars emphasize three key claims that we feel are particularly relevant for studying creativity in the adolescent phase of development: a) creativity is not an isolated act, but individuals are embodied beings who participate in a socio-material world; b) creativity is always relational, constituted by the situation and intertwined with culture; and c) the individual and the context co-constitute each other, which promotes the need for the contextual and situated study of creativity.

As we will discuss in the next section, we feel these perspectives about creativity are particularly relevant for conceptualizing the present study because adolescence is a time where social contexts and interaction with others (i.e., especially peers) become increasingly important in the process of establishing their identities, values, and behaviors.

### 1.2. Creativity in adolescence

Adolescence is typically conceptualized as the transition phase from childhood to (emerging) adulthood, which covers the period of 10–19 years of age. This is often seen as a critical period for creative identity development (Barbot & Heuser, 2017; Beghetto & Dilley, 2016). One reason is because adolescents are undergoing rapid neurodevelopmental changes, including the development of more advanced levels of objective, rational, hypothetical, abstract, and metacognitive thinking (Kleibeuker, De Dreu, & Crone, 2016). Another reason is because young people's creative identities are also emerging and undergoing changes and thereby may be more susceptible to social, emotional, and relational experiences that can help support or potentially suppress creative identity development (Beghetto & Dilley, 2016).

Indeed, the period of adolescence is marked by increased participation in multiple and sometimes conflicting social contexts (e.g., family, school, peer environment, romantic relationships, and workplaces). In and across these contexts, adolescents encounter various and often different values, norms, and social roles. Through identification or disassociation with these values, norms and roles; adolescents' beliefs, values and behavior might change (Taubman & Ari, 2004). Additionally, adolescents also actively influence their school and social contexts (Beghetto & Kaufman, 2014; Schachter, 2005). This means that adolescents and their social contexts are co-constituent, constantly interacting with and influencing each other.

During adolescence, the peer environment can also take precedence over time spent with family. Peer approval often becomes more critical than adult approval, because the desire to belong and to be accepted by peers becomes paramount. For example, in a cross-sectional study with students from grades 1–16, LaFontana and Cillessen (2010) showed that whereas young children are socialized to follow their teachers' rules, adolescents are often willing to break the rules in favor of increasing one's status in the peer group. A recent literature review by Verhoeven, Poorthuis, and Volman (2017) also underscored the social influence of peers highlighting how peers can prohibit adolescents to identify with a particular role for fear of the negative consequences (e.g., disapproval and exclusion).

The strong desire for social belonging during adolescents can result in young people conforming their behavior to the behavior of

individuals with whom they (want to) identify themselves. This can have consequences for their creative identity development. Choi (2012), for instance, reports on the effects peers and instructors have on creativity in a group of undergraduate students (M age = 19.8 years), which is just above the commonly used age limit of adolescence. Choi (2012) found that peer support—and not instructors' support for students' participation and ideas—positively influenced students' creative self-efficacy and attitude toward creativity. It appeared that peer expectations and support to express ideas was more important than instructors' encouragement in shaping students' attitudes and beliefs about creativity. However, the extent to which individuals are susceptible to their social environment likely differs across people and settings. Indeed, Beghetto (2006), for example, reported that adolescent students' creative self-efficacy (M age = 14) was, on average, positively associated with teachers telling them they were creative. As suggested by Runco (2017), we can expect variations in the influence of environmental factors on people. Particular factors can be significant for some individuals whereas they may be perceived as less important by others. For example, highly confident students might express their ideas regardless of the reactions by their peers or the teachers, whereas other students are more sensitive to the expectations and judgments of others (Runco, 2003).

In sum, prior research on social and environmental factors associated with adolescent creativity suggests that perceptions of others and social contexts play a particularly important role. This line of inquiry represents a burgeoning area of research in the field. A systematic overview of current research in this area is needed to help further clarify the factors related to adolescent creativity development. The present study has the aim of addressing this need.

### 1.3. Present study

As has been discussed, adolescence is a key developmental phase in which the social context and perceptions of others become increasingly important. As the developmental and psychosocial processes in adolescents are different from other age groups, it is not appropriate to assume that findings about children or adults can be meaningfully applied to adolescents. Given that adolescent creativity development has served as a growing area of research, we endeavor to systematically review the existing literature in an effort to clarify the supportive and suppressive factors involved in adolescent creativity development. More specifically, we had two goals in the present study. Our first goal was to identify and summarize the factors associated with creativity in adolescence, and our second goal was to examine the role that the social context plays in research focused on adolescent creativity. Given that the social context plays a particularly important role during adolescent development, we also endeavored to examine how researchers have conceptualized and accounted for broader social factors in studies aimed at understanding adolescent creativity.

## 2. Method

### 2.1. Literature search

A systematic literature search was performed using the Education Resources Information Center (ERIC) on July 23, 2018. Articles were searched by combining “creativity” or “creative” with possible keywords that refer to adolescents: “adolescence”, “adolescent\*”, “youth”, “teen\*”, “junior college”, “junior high”, “middle school”, “high school”, “secondary school”, “secondary education”, and possible variations of key words that refer to grade 6, 7, 8, 9, 10, 11, and 12, for example: “6-th grade”, “sixth-grade”, “grade 6”, and “grade six”. The search areas were the title and abstract, and the article search was restricted to journal articles that were peer-reviewed and published from 2010 onwards.

### 2.2. Inclusion and exclusion criteria

The literature search and selection were conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher, Liberati, Tetzlaff, Altman, & Group, 2010). By entering the search terms, 780 articles were identified. To select papers aimed at addressing Goal 1, the titles and abstracts of the initial sample were screened for their relevance on the basis of a number of inclusion and exclusion criteria. More specifically, studies were included if they described relationships between specific variables and creativity (i.e., creative process/product); contained quantitative or qualitative data; and the participants were adolescents within the age range of 12–19.

Articles were excluded if their abstracts indicated that they were written with a methodological purpose (e.g., questionnaire validation), participants were not adolescents (e.g., only elementary school or university students); or they were not empirical in nature. This resulted in a sample of 134 studies. Six articles in this resulting sample were excluded because we were not able to access them online and the authors did not respond to our requests to provide a copy. Once we had access to the full-text of the remaining 128 articles, the full article was reviewed using the same inclusion and exclusion criteria, which resulted in a final sample 65 articles relevant for addressing Goal 1.

In an effort to address Goal 2, we reviewed the studies in our sample (n = 65) in an effort to identify articles that explicitly addressed broader, social contextual factors. Of those articles, only four articles (6 %) of our sample explicitly described this role. Although this is a tiny proportion of our sample, we still feel that summarizing the themes found in these articles is worthwhile given the asserted importance of the social context in adolescence. Moreover, as we will discuss, we feel that it is an important finding in itself to report that 6% of the articles in our sample explicitly discuss social context.

### 2.3. Analysis

We used a multi-step process to systematically analyze the studies in this sample. The first author developed an overview of the following characteristics for each study: author, year of publication, country, research design, participants, definition of creativity, and major findings. The next step involved documenting the major findings with respect to creativity enhancing or inhibiting factors (Goal 1) and then classifying these into three categories, each of which included subcategories: individual factors (demographics, personality and affect, motivation, academic achievement,), parental factors (parental support, parental involvement), and educational factors (freedom & structure, teacher-student relationship; collaborative learning, playful activities, tools). Finally, with respect to addressing Goal 2, the first author reviewed the four relevant articles in the sample in an effort to describe how social contextual factors were taken into account in the study of creativity.

## 3. Results

### 3.1. Goal 1: Factors that relate to creativity in adolescence

As discussed, the major findings of the articles were classified into three major categories, individual factors, parental factors, and educational factors. The key details of the articles in our sample are summarized in [Table 1](#) (individual factors), [Table 2](#) (parental factors), and [Table 3](#) (educational factors). Four articles included multiple factors (e.g., individual and parental factors; [Dai et al., 2012](#); [Gralewski & Karwowski, 2012](#); [Ren, Li, Zhang, & Wang, 2012](#); and [Şener, Türk, & Taş, 2015](#)). For each article, we looked at which factors prevailed to decide in which Table the article fits best. We acknowledge that although our analytic approach may imply that these categories are fixed or discrete, from a sociocultural standpoint it would be problematic to attempt to view these factors as clearly distinguishable.<sup>1</sup> Indeed, different researchers may conceptualize these factors in different ways – ranging from discrete categories to inextricably and co-constitutive features of adolescent creativity.

[Fig. 1](#) provides an illustrative summary of the findings within and across the major factors examined in the sample of studies we reviewed. In the sections that follow, we discuss the summary of findings reported in the articles in our sample and illustrated in [Fig. 1](#). Although we acknowledge that these factors can be conceptualized as interrelated (as illustrated by the bi-directional arrows in [Fig. 1](#)), for the sake of clarity we discuss each of these factors separately in the sections that follow, starting with findings related to individual factors ([Table 1](#)).

#### 3.1.1. Individual Factors

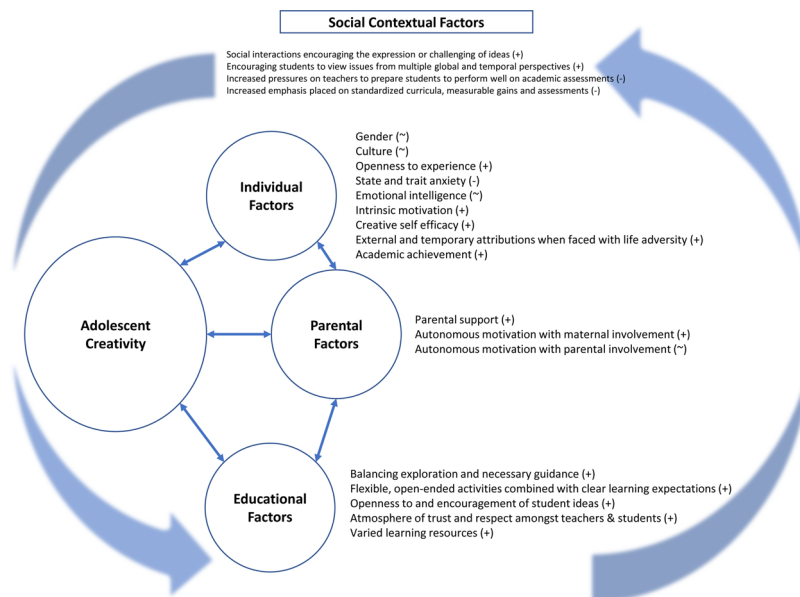
A quarter of the articles (i.e., 16 articles, 25 %) focused analyses on individual factors relevant to adolescent's creativity development, including demographics, personality, affect, motivation, and academic achievement. Demographic analysis focused on potential differences in reported gender, deaf and hearing populations, and country of origin. With respect to gender, the studies in our sample reported mixed findings regarding the relationship between gender and creativity ([Hong, Peng, O'Neill, & Wu, 2013](#); [Okere & Ndeke, 2012](#)). Some studies did not find significant differences ([Sánchez-Hernández & Garber, 2015](#); [Puran, Behzadi, Shahvarani, & Lotfi, 2017](#); [Yi, Hu, Plucker, & McWilliams, 2013](#)). Moreover, [Hong et al. \(2013\)](#) did not find gender differences on domain-general tests of creativity, but did on domain-specific tests. Girls obtained higher scores on fluency, flexibility, and elaboration on domain-specific creativity tests (about school uniforms and healthy food) than boys. Also [Okere and Ndeke \(2012\)](#) reported gender differences on creativity. They found that boys obtained higher levels of scientific creativity in biology than girls. Further, [Gu, Hu, Ngwira, Jing, and Zhou \(2014\)](#) found that girls scored higher on social creativity than boys. These results indicate that specific topics in creativity tests might evoke different (creative) responses from boys and girls.

One study focused on hearing and deaf adolescents ([Stanzione, Perez, & Lederberg, 2012](#)). This study showed that deaf and hearing adolescents are equally creative in figural fluency and originality. In contrast, deaf adolescents showed less creativity in verbal divergent thinking tasks. With respect to differences by country, [Van Harpen and Presmeg \(2013\)](#) reported differences in creativity-related factors between students from China (two groups; Shanghai and Jiaozhou with Confucius culture) and the United States (US). Students from Jiaozhou obtained equal scores for fluency and flexibility as students from the US. Both the US and Jiaozhou students demonstrated higher scores on fluency and flexibility as compared to the Shanghai students. No differences on originality were found across groups.

Personality traits and affect also served as a focus of analysis. [Parveen and Ramzan \(2013\)](#), for instance, found that introversion (i.e., self-reported by students) positively related to creativity. Openness to experience, a factor frequently cited in the creativity studies literature as a key correlate of creativity (see [Feist, 1998](#)), was also reported as being positively associated with creativity in studies in our sample ([Erbas & Bas, 2015](#); [Hong, Peng, & O'Neil, 2014](#)). [Hong et al. \(2014\)](#) further reported that openness to experience was related to creative accomplishments in the domains of music, writing and arts, but not in science and technology. No effects of extraversion, agreeableness, neuroticism, and conscientiousness were found on creativity ([Erbas & Bas, 2015](#); [Hong et al., 2014](#); [Parveen & Ramzan, 2013](#)).

With respect to emotions, studies in our sample provided somewhat mixed findings. Specifically, [Bermejo, Prieto, Fernández, Soto, and Sainz \(2013\)](#) reported that there was no relationship between indicators of emotional intelligence and creativity. However, [Şahin \(2016\)](#) did show positive relationships between scales of emotional intelligence and creativity. Alternatively, [Sanz de Acedo](#)

<sup>1</sup> We want to thank an anonymous reviewer who highlighted this perspective.



**Fig. 1.** Interrelated factors that influence adolescent creativity. *Note.* (+) = positive association with measures of creativity. (-) = negative association with creativity. (~) = inconclusive, no clear conclusions can be drawn from results.

Baquedano and Sanz de Acedo-Lizarraga (2012) reported that trait and state anxiety related negatively to creativity. This finding aligns with previous work examining negative emotions and creativity (e.g., Beghetto & Dilley, 2016; Karwowski, Han, & Beghetto, 2019).

Motivational factors were also a focus of analysis in studies within our sample. This is not surprising given that creativity researchers have long noted the important role that intrinsic motivation plays in students' creative expression (Hennessey, 2010). Within our sample, Erbas and Bas (2015) reported that intrinsic goal orientation related positively to creativity. Similarly, Hong et al. (2014) found that creative self-efficacy and intrinsic motivation contributed to creative activities and accomplishments in the domains of music, writing, arts, and/or science. Also Dai et al. (2012) found that self-confidence and intrinsic motivation related positively to creativity. This is not to say that extrinsic motivation plays no role in creative expression. Indeed, Sánchez-Hernández and Garber (2015) reported that adolescents who make more external and temporary attributions (instead of internal and permanent attributions) when faced with adversities in life tend to have higher scores on divergent production.

Finally, academic achievement served as another area of focus in studies within our sample. Again, this is not surprising given that learning and academic achievement represent the primary aim of schools. Most studies in our sample reported positive relationships between academic achievement and creativity (Dai et al., 2012; Karwowski & Gralewski, 2013; Ren et al., 2012; Şahin, 2016). However, although somewhat different than academic achievement, Hong et al. (2014) showed no association between how adolescents perceive their intellectual ability and creativity. Further, Gralewski and Karwowski (2012) showed that the relationship between academic achievement and creativity differs across schools, as this relationship was stronger in large schools and in schools located in large cities. Taken together, these findings align with previous work in the field of creativity studies, which have, on average, found that although the relationship is often variable, there tends to be a positive association ( $r = .22$ ) between creativity and academic achievement (Gajda, Karwowski, & Beghetto, 2017).

### 3.1.2. Parental Factors

In addition to individual factors, three studies in our sample (5%) also focused on examining parental factors (see Table 2). These studies provided somewhat mixed findings. Cho and Lin (2010) reported that adolescent perceptions of positive family processes (i.e., parental support and involvement) were positively associated with creativity. In addition, Liu et al. (2013) found that autonomous motivation related to creativity, but that the strength of the relationship depended on the level of parental involvement. The effects were stronger for students with high maternal involvement. The role of paternal involvement was more diffuse. For junior high school students (12–15 years old) autonomous motivation positively related to creativity irrespective of the level of paternal involvement. For senior high school students (15–19 years old), the positive effect of autonomous motivation on creativity was stronger for students with low paternal involvement. Further, Dai et al. (2012) also included parental support but specifically focused on parental support for openness to experience and adventurousness. They did not find an effect on adolescent creativity.

Given the seemingly important role that parental factors play in adolescent development, we were somewhat surprised to find that only three studies in our sample focused on examining parental factors. This limited focus, combined with results of the studies in this sample suggesting the positive and differential influence that parental supportive factors seem to play in adolescent creativity, suggests to us that it is an important area for additional attention and research.



**Table 1**

Schematic overview of the articles that concern individual factors.

Author (year)	Country	Research design	N	Definition of creativity	Main findings
Bermejo et al. (2013)	Spain	Questionnaire	1024	Creative thinking (fluency, flexibility, originality, elaboration)	Students with low/average and high emotional intelligence did not differ on creative thinking.
Erbas and Bas (2015)	Turkey	Questionnaire	217	Mathematics creative ability (fluency, flexibility, originality)	Openness to experience and intrinsic goal orientation predicted creative ability in mathematics. Knowledge of cognition and regulation of cognition did not predict creativity. Further, consciousness was significantly correlated with creative ability in mathematics, but extraversion, agreeableness, and neuroticism not.
Gralewski and Karwowski (2012)	Poland	Questionnaire	589	Creative abilities	Creative abilities were not correlated with students' GPA. Differences between schools were found: In some schools, the relations were positive and strong, while in others they were non-existent or negative.
Gu, Hu, Ngwira, Jing, and Zhou (2014)	China	Questionnaires	210	Social creativity (fluency, flexibility, originality, appropriateness, utility)	Girls scored higher on social creativity than boys. Senior high school students obtained higher creativity scores than junior high school students. No differences were found between children with and without siblings. Under the free task choice condition, those with medium/high creative personalities were more likely to exhibit social creativity than those with low creative personalities.
Hong et al. (2013)	China	Questionnaire	512	Domain-general and domain-specific fluency, flexibility, originality, elaboration	Girls scored higher on domain-specific fluency, flexibility, and elaboration than boys. No gender differences were found for domain-specific originality and domain-general creativity.
Hong et al. (2014)	China	Questionnaire	439	Creative accomplishments in the domains of music, visual arts, writing, science, and technology	Openness to experience related to accomplishments in music domain, visual arts, writing, but not in science and technology. Creative self-efficacy was related to accomplishments in music, visual arts, writing, and science. Intrinsic motivation related to accomplishments in visual arts and science activities. Personality or motivation variables were not related to technology activities. Conscientiousness and perceived intellectual ability was not related to any domain.
Karwowski and Gralewski (2013)	Poland	Questionnaire	921	Creative abilities	Intelligence related positively to creative abilities.
Kleibeuker et al. (2017)	The Netherlands	Quasi-experimental pre-post design	32	Divergent thinking	The experimental group showed no change in performance before and after the alternative uses training. The control group (received a training in rule switching) showed a decline in divergent thinking.
Okere and Ndeke (2012)	Kenya	Cross-sectional survey research design	363	Biology scientific creativity (e.g., flexibility, recognition of relationship, sensitivity, planning)	Boys obtained higher scores on scientific creativity in general and all subscales than girls.
Ozdemir and Dikici (2017)	Turkey	Questionnaires	332	Scientific creativity (fluency, flexibility, originality)	Students with better scientific process skills (e.g., formulating hypotheses, data analyses, research design) showed better scientific creativity. The subscale 'testable' mediated this relationship: Students who know that current scientifically-accepted knowledge can be questioned through tests or observations have better scientific creativity.
Parveen and Ramzan (2013)	India	Questionnaire	100	Creativity (fluency, flexibility, originality)	Sociability, verbal intelligence and performance related to scholarly creativity.
Şahin (2016)	Turkey	Questionnaires	178	Domain-specific creativity (scholarly, mechanic/scientific, performance, self/everyday and art)	Self-control, mathematic course score and emotionality related to mechanical creativity. Sociability and mathematic course score related to performance creativity. Well-being, sociability and science course score related to self/everyday creativity. Sociability and mathematic course score related to art creativity.
Sánchez-Hernández and Garber (2015)	Spain	Questionnaire	89	Creative intelligence (= divergent production)	Students who produced more causal explanations in general, and more resilient causal explanations in particular (explain adversity with external, temporary attributions) showed higher creative intelligence. No gender differences on creativity were found.

*(continued on next page)*

Table 1 (continued)

Author (year)	Country	Research design	N	Definition of creativity	Main findings
Sanz de Acedo-Baquedano and Sanz de Acedo-Lizarraga (2012)	Spain	Questionnaire	89	Verbal and graphic creativity (divided in different elements)	Both trait and state anxiety showed negative relationships with creativity. Relationship between trait anxiety and creativity was stronger.
Stanzione et al. (2012)	US	Quasi-experimental design	52	Divergent thinking (fluency, originality, elaboration, the abstractness of titles, resistance of premature closure)	Deaf students were equally or more creative than hearing students in figural fluency and originality. In contrast, deaf students showed limited creativity on the verbal divergent thinking assessment.
Van Harpen and Presmeg (2013)	China and US	3 groups, questionnaire	129	Mathematical problem-posing (fluency, flexibility, originality)	Mathematics content knowledge related to problem-posing fluency and flexibility. The Jiaozhou group performed the same as the US group on fluency and flexibility, and both groups posed more problems than the Shanghai group. No differences on originality.

### 3.1.3. Educational Factors

The majority of the studies (71 %,  $n = 46$ ) in our sample were conducted in educational settings and focused on instructional approaches in the learning environment (see Table 3). This focus is in line with previous work which has explored how K12 learning environments might support student creativity (e.g., Beghetto, 2019a; Beghetto & Kaufman, 2014; Davies et al., 2013). These instructional approaches were quite diverse and sometimes had striking names (e.g., CREAT-based training (Karaca & Koray, 2017), Search Solve Create and Share learning (Yusnaeni, Aloysius, Susilo, & Zubaidah, 2017), and Mobile Science School project (Şener et al., 2015) from which it, at first glance, remained unclear how the prescribed method looked in practice and how it might contribute to adolescent students' creativity. By taking a closer look at the instructional approaches described in the studies in our sample, we noted the following underlying themes: balanced pedagogical approach, supportive and collaborative relationships, and learning materials.

With respect to a balanced pedagogical approach, several studies highlighted the important role that teachers play in providing an adequate balance between freedom and structure to enhance adolescents' creativity. More specifically, this balance refers to teachers providing adolescents with opportunities for exploration and taking risk while at the same time providing them with necessary guidance and direction (Kadir & Satriawati, 2017; Korur, Efe, Erdogan, & Tunc, 2017; Nielsen, 2013; Puran, Behzadi, Shahvarani, & Lotfi, 2017; Tandiseru, 2015). In addition, Vidergor (2018) emphasized the importance of mutual dialogue between the teacher and students in deciding on the content, process, and product. Mutual dialogue involves teachers having an understanding of the basic components that should be addressed but, at the same time, being open to accept students' ideas.

Along similar lines, Meyer and Lederman (2013) and Sullivan (2011) discussed the importance of providing open-ended activities that permit flexibility, while also ensuring clarity in terms of teachers' expectations for those learning experiences. Striking this balance between freedom and structure also included playful approaches within academic learning activities, for example, designing a crane, steamship or algebraic quiz, can be used to promote adolescent students' creativity (Korur et al., 2017; Lou, Chou, Shih, & Chung, 2017; Tabach & Friedlander, 2017). Taken together, the focus on taking a balanced pedagogical approach aligns with previous work in the field, which has emphasized the importance of providing openings for creative expression in an otherwise structured and supportive learning environment (Beghetto, 2019b; Oosterheert & Meijer, 2017; Stokes, 2010).

With respect to supportive and collaborative relationships, studies in our sample described how positive relationships amongst students, teachers and peers can help establish the conditions necessary for adolescent creativity development. More specifically, several studies emphasized that teachers should be open to and encourage the ideas and suggestions of adolescent students (Chesimet, Githua, & Ng'eno, 2016; De Bruin & Harris, 2017; Meyer & Lederman, 2013; Vidergor, 2018; Yi, Hu, Plucker, & McWilliams, 2013). In addition, Kanhai and Singh (2017) described the importance of teachers creating an atmosphere of trust and respect amongst teachers and students.

Instructional methods that focused on collaboration between peers were also noted in multiple studies as important to cultivating adolescent creativity (e.g., Chien, 2017; Hwang, Lai, Liang, Chu, & Tsai, 2018; Kadir & Satriawati, 2017; Lin, Ma, & Kuo, 2015; Lince, 2016; Theodoropoulos, Antoniou, & Lepouras, 2016; Wang, 2018). To illustrate, Hwang et al. (2018) found that communication and collaboration with peers had a positive association with creativity. Further, they found that in order to facilitate effective communication and collaboration, it was important to provide students multiple and relevant learning materials that meet students' needs. Wang and Murota (2016) focused on a slightly different way of peer interaction, namely peer instruction. Their results showed that peer- and teacher-instruction were equally effective in enhancing technical creativity for medium- and higher-level students. However, for lower-level students explicit creativity teaching by the teacher was more effective in increasing their creativity than peer instruction.

Finally, the availability and use of learning resources was another key area of focus within studies in our sample. The types of materials and resources varied from glue and clips to a 3D printer, digital tablets, and computer game development software (Chien, 2017; Eow, Ali, Mahmud, & Baki, 2010; Esjeholm, 2015; Hwang et al., 2018; Leng, Ali, Mahmud, & Baki, 2010). For instance, in the study of Chien (2017), a project-oriented course was developed in which students designed a CO<sub>2</sub> dragster (i.e., a racing car that is



**Table 2**  
Schematic overview of the articles that concern parental factors.

Author (year)	Country	Research design	N	Definition of creativity	Main findings
<a href="#">Cho and Lin (2010)</a>	Korea	Questionnaire	733	Creative problem solving in mathematics and science	Perceived positive family processes (a mix of support, pressure for intellectual development, parents' discussion, fathers' involvement) predicted creative problem-solving in math and science, also indirectly through enhanced confidence in intelligence and intrinsic motivation.
<a href="#">Dai et al. (2012)</a>	China	Questionnaire	234	Creativity (fluency, flexibility, originality)	Students at high-SES schools scored better on creativity than students at low-SES schools. Students from highly educated parents scored better on creativity than students from lower- educated parents. There was a school compensatory effect: Students of lower educated parents who were in the high-SES school district scored better on creativity than students of higher educated parents who were in the low-SES school district. Students who were from suburban schools, who have higher academic achievement, and who were more confident and cognitively motivated performed better on creativity. Perceived teacher and parent support had no effect on creativity.
<a href="#">Liu et al. (2013)</a>	China	Questionnaire	550	Creative thinking (fluency, flexibility, originality)	Autonomous motivation predicted creative thinking. The effects were stronger for students with high maternal involvement than students with low maternal involvement. For junior high school students, autonomous motivation contributed to creative thinking both when paternal involvement was high and low. For senior high school students, autonomous motivation predicted creative thinking with low paternal involvement, but not when paternal involvement was high.

**Table 3**  
Schematic overview of the articles that concern educational factors.

Author (year)	Country	Research design	N	Definition of creativity	Main findings
Barak (2013)	Israel	Quasi-experimental pre-post design	212	Inventive problem solving & attitude towards creativity	Students in experimental classes (who had an inventive problem-solving course for 15 weeks) improved their ability to suggest original solutions to daily life problems and avoided proposing conventional or irrelevant solutions. Students in the control classes, in contrast, did not improve their ability to suggest original solutions and continued to suggest many conventional or irrelevant ideas in both exams.
Chang, Li, Chen, and Chiu (2015)	Taiwan	Quasi-experimental pre-post design	265	Verbal and figural fluency, flexibility, originality	Group 1: creative thinking skill-infused instructions (individual brainstorming); Group 2: creative-and-critical thinking skill-infused instructions (individual brainstorming and Socratic questioning by the teacher); Group 3: unchanged regular instructions. <i>Results:</i> Group 1 and 2 scored better on verbal fluency, verbal flexibility, figural fluency, figural flexibility than group 3. Group 2 scored better on verbal originality and figural originality than the other two groups. Students who were taught using Kolb's experiential learning model (the acquisition of skills and construction of knowledge by the learners is the result of experience) scored higher on mathematical creativity than those taught through the conventional methods.
Chesimet et al. (2016)	Kenya	Quasi-experimental research; Solomon four non-equivalent control group design	168	Mathematical creativity (fluency, flexibility, originality, elaboration)	An 8 weeks digital manufacturing course enhanced the level of novelty and sophistication in student products. No difference in functionality. Pedagogies to facilitate creativity in schools: Questioning between students and teachers; encouragement of students' immersion in problem finding tasks; encouragement of students to articulate their thinking; trusting relationships.
Chien (2017)	Taiwan	Quasi-experimental	182	Novelty, functionality, sophistication	
De Bruin and Harris (2017)	Australia & Singapore	Phenomenological approach; Interviews, focus groups, questionnaires	48 teachers and 717 students	Creative processes, act, products	
Eow et al. (2010)	Malaysia	Quasi-experimental pre-post design	69	Creative perception: What kind of person are you?	Both treatment (appreciative learning approach) and control group (self-paced learning, followed by do-it-yourself session) made progress in creative perceptions. However, treatment group way more.
Esjeholm (2015)	Norwegian	Videotapes from the classrooms, student products	91	Creativity (new and valuable)	For creativity to flourish, prerequisites were that students are acquainted with the basic principles of solutions to the challenges they are given, are encouraged to be creative in terms of using a variety of materials in their construction, and have skills in using the tools needed to accomplish their task.
Fard, Bahador, Maghadam, Rajabi, and Moradi (2014)	Iran	Quasi-experimental pre-post design	50	Divergent thinking (fluency, flexibility, originality, elaboration)	Providing instruction through problem-solving method compared with traditional method resulted in an increase in students' creativity.
Fard, Asgavy, Sarami, and Zarekar (2014)	Not reported	Quasi-experimental pre-post design	50	Creativity (fluency, flexibility, originality, elaboration)	Students provided with the computer-based method of instruction scored higher on creativity than students provided with the problem-solving method of instruction (Polya). Group differences on all four domains; Fluency was higher for problem-solving students; Other three domains for computer-based instruction students.
Fatah, Suryadi, Sabandar, and Turmudi (2016)	Indonesia	Quasi-experimental research using non-equivalent control group	Not reported	Five items, forms of essays	Students who learn through open-ended approach (e.g., several correct ways, open process, product, ways to develop) showed more improvement in mathematical creative thinking than students who learn through conventional way. No interactions with school level.
Hu et al. (2013)	China	Quasi-experimental pre-post design	107	Scientific creativity	After the intervention, the overall level of creativity of students in the experimental group (participated in the Learn to Think program every two weeks for two years) was higher than of students in the control group.

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Table 3 (continued)

Author (year)	Country	Research design	N	Definition of creativity	Main findings
Hwang et al. (2018)	Taiwan	Questionnaires	658	Creative tendency	Continuity and the provision of content that meet students' needs in mobile learning environments related to creativity, mediated by peer interaction processes.
Kadir and Satriawati (2017)	Indonesia	Classroom action research; questionnaires	Not reported	Mathematical creative thinking skills (fluency, flexibility, originality) Mathematical creativity	Learning mathematics by means of an open inquiry approach related positively to mathematical creative thinking.
Kanhai and Singh (2017)	India	Questionnaires	770		Self-concept in mathematics, resource adequacy, and creative simulation best predicted students' creativity. Teachers' class control and students' cohesiveness had small effects on creativity. Social-intellectual involvement among students and educational administration of the schools suppressed creativity. Teachers' support to students did not relate to creativity.
Karaca and Koray (2017)	Turkey	Quasi-experimental pre-post design	39	Creativity (fluency, flexibility, originality, elaboration)	Students who received CREAT-based training scored higher on creativity than students who received traditional curriculum-based training. Regarding the subscales, effects were found for flexibility and originality, but not for fluency and elaboration.
Kim, Park, Yoo, and Kim (2016)	South Korea	Questionnaires	262	Creativity (fluency, originality, elaboration, the abstractness of titles, resistance of premature closure) Creative attitude	Treatment group (Visual Thinking through Tablet-based Classroom Interaction) scored higher on originality, elaboration, and abstractness of title than control group. No effects on fluency and resistance to closure.
Korur et al. (2017)	Turkey	Quasi-experimental pre-post design	65	Creative attitude	Students in the scaffolded design-based learning method increased more in creative attitude scores than students in the traditional teacher-lecture group.
Leng et al. (2010)	Malaysia	Quasi-experimental design	69	Creative process	While developing games, students in the treatment group (appreciative learning approach applied in computer games development) experienced creative process more than students in the control group (self-paced learning with game module as a guide and followed by do-it-yourself session) did.
Lin et al. (2015)	Philippines, Romania, South Korea and Taiwan	Questionnaire, focus groups and observations	163	Creativity	An international online project-based learning program enhanced creative project ideas.
Lince (2016)	Indonesia	Quasi-experimental pre-post design	130	Mathematical creative thinking ability	Students who received Numbered Heads Together (cooperative learning, in the beginning they do not know which group member is going to represent the group) showed higher creativity than students who received conventional learning.
Lou, Liu, Shih, and Tseng (2011)	Taiwan	Text analysis and questionnaire	84	Creativity	Based on the data presented in the "presentation of the creative design of the cup speakers" revealed that team members demonstrated a high level of creativity.
Lou et al. (2017)	Taiwan	Quasi-experimental pre-post design	60	Creativity (adventurousness, curiosity, imagination, challenge) Creative perception	After participating in STEM project-based learning all four aspects of creativity improved.
Marusic and Slisko (2014)	Croatia	Quasi-experimental pre-post design	176		Two classroom methods were compared. 1) Reading, presenting, questioning, and 2) experimenting and discussion (active learning, predict-observe-explain). At post-test students from both groups showed higher creative perception. The growth was largest for the second group.
Meyer and Lederman (2013)	US	Questionnaires, observations, interviews	17	Scientific creativity (fluency, flexibility, originality)	Characteristics of practices that contribute to creativity were: Flexibility VS ambiguity, social influences, questioning, clear behavioral expectations, openness to alternatives

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Table 3 (continued)

Author (year)	Country	Research design	N	Definition of creativity	Main findings
Nielsen (2013)	US	Qualitative case study	2 teachers and 10 students	Creativity perception	Four main themes emerged that influenced the creativity development of students: technology background, musical background, music style preferences, and learning activities of the course.
Peng, Cheng, and Chen (2013)	Taiwan	Between-subject design	142	Creativity (fluency, flexibility, originality)	Students from the enhanced group with mastery classroom goal structure and students from the enhanced group with multiple classroom goal structure outperformed the control group on the creativity indicators.
Puran et al. (2017)	Iran	Quasi-experimental	81	Problem solving with creative thinking	No gender differences on creativity were found. Students with higher educated parents obtained higher creativity scores. Students from the active method had higher problem-solving abilities than students from the traditional group (e.g., teachers present predefined material orally) and heuristic group (e.g., teachers teach problem-solving heuristics).
Rábanos and Torres (2012)	Spain	Quasi-experimental design with non-equivalent control group	48	Divergent thinking (fluency, flexibility, originality, elaboration)	Creativity in the experimental group (who received a training with activities based on generating ideas and solving problems where creative strategies and techniques were applied to develop verbal and figural creative skills) was higher than in the control group.
Ren et al. (2012)	China	Questionnaire	4162	Creative imagination (richness, flexibility, profundity, originality, creativity of titles)	Students with excellent academic performance had higher creative imagination scores than lower performing students. Students with teachers who liked students with good academic performance had higher creative imagination scores. Students with teachers who spend most time in class lecturing had lower creative imagination than other students.
Sak and Oz (2010)	Turkey	One group pre-post design	34	Creative ability in - poem writing, - story writing, - composing and using paradoxes	Taking part in science-related competitions and frequently visiting science venues related to the development of creative imagination. Through CREAT (a new teaching technique based on the theory of Janusian process) students' creative ability in writing poems with paradoxes and paradoxical metaphors improved greatly; Through CREAT, students' creative ability in writing paradoxical and paradoxically metaphorical stories showed great improvement. No differences on the paradoxes task.
Sanz de Acedo-Lizarraga, Sanz de Acedo-Baquedano, and Oliver (2010)	Spain	Quasi-experimental pre-post design	46	Creativity (respondent's generation of questions)	
Şener et al. (2015)	Turkey	One-group pre-post design	50	Creativity (fluency, abstractness, originality)	Five-day long 'Mobile Science School' project had positive effects on creativity. Equal effects for males and females.
Sripongwiwat, Bunterm, Srisawat, and Tang (2016)	Thailand	Quasi-experimental pre-post design	83	Creative thinking	Experimental group (constructionism and neurocognitive-based teaching model) outperformed control group (conventional teaching model) on creativity.
Sriwongchai, Jantharajit, and Chookhampaeng (2015)	Thailand	Quasi-experimental pre-post design	102	Creative thinking	Creative thinking abilities of experimental group students (mathematics learning management model) were higher than those of the pretest scores. Additionally, experimental students scored higher on creative thinking abilities than the control group on posttest.
Sullivan (2011)	US	Video- and audiotapes over a 12-day period as they engaged in the curriculum	3 students & teacher	Collaborative creativity	Four aspects important for creating a creative solution: Open-ended goal-oriented task; Teacher modeling of inquiry techniques; Provision of tools and an environment that allowed students to move between dual modes of interaction (seriousness and play); Provision of tools and an environment that allowed students to jointly develop a shared understanding achieved through communicative interaction.

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Table 3 (continued)

Author (year)	Country	Research design	N	Definition of creativity	Main findings
Tabach and Friedlander (2017)	Israel	Questionnaires	56	Creative mathematical thinking (originality)	Students were required to design an algebraic quiz of multiple-choice questions regarding equivalent algebraic expressions. 1/3 of the students provided equivalent expressions at a low level of originality; 2/3 displayed a medium or high level of originality. Short tasks related to algebraic procedures (make a quiz) related to students' creativity.
Tandiseru (2015)	Indonesia	Quasi-experimental pre-post design	74	Mathematical creative thinking	Mathematical learning by heuristic-KR learning model based on local culture enhanced students' creative thinking.
Theodoropoulos et al. (2016)	Greece	Qualitative	57	Student creativity	Effects of different instructional techniques were compared, namely collaborative learning, peer tutoring and, as a control group, traditional ways of teaching. Teachers believed that creativity was enhanced in the two experimental groups.
Varzaneh and Baharfoolie (2015)	Iran	Quasi-experimental pre-post design	120	Creative thinking (fluency, flexibility, originality, elaboration)	The group who received virtual learning instruction outperformed the group who received traditional classroom instruction in posttest.
Van de Kamp, Admiraal, van Drie, and Rijlaarsdam (2015)	The Netherlands	Quasi-experimental pre-post design	147	Divergent thinking (fluency, flexibility, originality)	Students who received explicit instruction of meta-cognition on divergent thinking generated more (fluency) responses and also used a higher number of different categories (flexibility) than students in the control condition. No effects for originality.
Van de Kamp, Admiraal, and Rijlaarsdam (2016)	The Netherlands	Quasi-experimental pre-post design	219	Divergent thinking (i.e., fluency, flexibility, originality)	Experimental group (focused on enhancing students' knowledge about divergent thinking activities, metacognitive knowledge, and regulation processes skills) outperformed the control group in fluency, flexibility, and originality.
Vidgor (2018)	Israel	Quasi-experimental pre-post design	394	Creative thinking (problem finding and problem-solving)	Students in the intervention group (taught by the multidimensional curriculum model) outperformed the control group in creative thinking.
Wang (2018)	Taiwan	1 group; working on assignment	31	Metaphorical creativity (fluency, flexibility, originality, elaboration)	Participation in the workshop (teacher-centered instruction and learner-centered cooperation) enhanced students' metaphorical creativity.
Wang and Murota (2016)	China	Quasi-experimental pre-post design	127	Technical creativity	Peer instruction (PI) and 'explicit technical creativity teaching' are equally effective in stimulating creativity on average. But for the low achieving students, PI was less effective in increasing students' originality in the creative phase.
Yi et al. (2013)	China	Questionnaire	562 students and 110 teachers	Creative thinking (fluency, flexibility, originality, elaboration)	Direct positive effects of creative organizational climate on divergent thinking (all four domains, verbal and figural). No gender differences on creativity were found.
Yusnaeni et al. (2017)	Indonesia	Quasi-experimental pre-post design	Not reported	Creative thinking ability	Three groups: 1) traditional learning, 2) Search Solve Create and Share learning, and 3) metacognitive strategy implemented in SSCS learning. Creative thinking of the low academic students experiencing SSCS + MS (group 3) learning increased, and even exceeds that of the high academic students.

propelled by CO<sub>2</sub>). One group of students had to design this car by hand and the other group by means of a 3D-printer. The results showed that the cars of students who used the 3D-printer scored higher on novelty and sophistication than the cars of students who designed by hand. In addition, it seems that it is not only the learning resources that play a role in adolescent creativity, its effectiveness also depends on how the learning resource was used by the teacher and embedded in the assignment. [Leng et al. \(2010\)](#) and [Eow et al. \(2010\)](#) showed that students who developed computer games within an appreciative learning approach (i.e., consisting of discover, dream, design, and destiny stages in which the teacher kept encouraging students) perceived themselves as more creative and experience more creative processes than students who had to self-pace their learning with help of a game module and do-it-yourself sessions.

Moreover, two studies emphasize the importance of out-of-school learning resources for adolescent creativity. [Şener et al. \(2015\)](#) showed how a five-day long science project in which students visited a planetarium (3D simulation), observatory, and had a field trip to a delta enhanced their attitudes to science lessons and creative thinking. Additionally, [Ren et al. \(2012\)](#) found that students who participated more often in extra-curricular activities (e.g., visiting science museums and participating in science-related competitions) also showed more creative imagination.

In sum, although the teaching methods in the studies were quite diverse, they emphasized the importance of balanced instruction, supportive and collaborative relationships, and creative use of learning resources in supporting adolescents' creativity. The findings of the studies in our sample suggest that these factors along with the individual and parental factors discussed earlier and illustrated in [Fig. 1](#), seem to work in conjunction to support adolescent student creativity.

### 3.2. Goal 2: The role of the social context in creativity in the adolescent phase

In the previous section, we summarized findings from the studies in our sample focused on factors associated with adolescents' creativity. Those results also point to the importance of the social context, as some studies showed how parents, teachers, and peers can facilitate or impede adolescents' creativity. For Goal 2, we focused only on the articles that specifically took into account social contextual factors in the research questions, methods, or interpretation of the findings. As noted, only a small fraction of the studies (n = 4, 6%) in our sample took this focus. Still, we feel that these four studies did shed light on our second research question and we thereby summarize those studies in what follows.

[Meyer and Lederman \(2013\)](#) used questionnaires, interviews, and observations with science teachers to explore pedagogical factors related to adolescents' creative thinking. As a starting point, they developed a framework that posits how students' creative thinking is influenced by students' knowledge, experiences, perceptions; activity or lesson attributes; and teacher facilitation of the task. [Meyer and Lederman \(2013\)](#) used this framework to analyze the data and, as a result, explicitly focused on the student within the social context of the classroom. They found five characteristics that teachers should take into account in developing classroom activities conducive to student creativity: 1) Flexibility versus ambiguity; 2) Clear behavioral expectations; 3) Social influences; 4) Questioning; and 5) Openness to alternatives. These characteristics can both inhibit or enhance students' creative process, of which [Meyer and Lederman \(2013\)](#) provide different examples.

Students' creativity might be inhibited, for example, when teachers conflate flexibility with ambiguity, thereby designing an ambiguous task which lack clear teacher expectations. This might confuse students as to how they should proceed with the task. Instead of fostering creative expression, teacher-student interactions became focused on clarifying the confusion and concerns of students. In this way, the assignment and culture of the classroom might impede the opportunity for students to demonstrate creativity. On the other hand, students' creativity might be enhanced, for example, when teachers design tasks with an adequate balance of open-endedness and clarity, when social interactions in the classroom focus on questioning to promote further ideas and challenge existing ones, and when both teacher and students are willing to append their ideas. The study of [Meyer and Lederman \(2013\)](#) showed that although most teachers were able to describe activities that could facilitate students' creativity, its effectiveness depended on the pedagogical implementation of these activities in the classroom. This study illustrates how classroom cultures marked by a persistent lack of opportunities or experiences for students to engage in creative learning activities can inhibit adolescent creativity development.

[Vidgor's \(2018\)](#) study provided insight into how an educational intervention in which the broader social context plays a central role might enhance adolescent creativity. Vidgor developed an intervention based on a multidimensional curriculum model. In this model the interconnectedness between the self and the broader social, cultural and historical context takes a central role in promoting adolescents' creative thinking. Students are invited to examine an issue or concept not only from their own point of view, but to take into account how the issue/concept is seen around the world and in the past, present, and future. In the study, [Vidgor \(2018\)](#) investigated the effectiveness of this intervention in promoting students' creative thinking. The results showed that students who participated in the multidimensional curriculum model intervention show higher levels of creative thinking than students who received conventional ways of teaching. This illustrates that adolescent students' creativity can be enhanced by encouraging them to not only look at a subject from their own perspective, but by making connections with the broader social, cultural, and historical context.

Further, [Yi et al. \(2013\)](#) and [De Bruin and Harris \(2017\)](#) described how the broader social context might influence teachers' experiences in promoting students' creativity. [Yi et al. \(2013\)](#), for instance, focused on the social-emotional aspects of teaching for student creativity, examining the relationship between teachers feelings of freedom to express their ideas and take risks in their schools aimed at supporting students' creativity. They investigated this relationship among elementary and middle school teachers and found that teachers in elementary school perceived more freedom to design their lessons in ways that foster students' creativity than teachers in middle school and, in turn, students in middle school were found to have lower levels of divergent thinking than



elementary school students. The authors attributed the differences in perceived freedom between elementary and middle school teachers to the pressure on academic performance, testing, and testing preparation in the middle years. Middle school teachers were thereby described as having few opportunities to design other kinds of teaching methods or curricula to promote students' creativity. This study emphasized the importance of knowledge about the social and educational context when interpreting the research findings.

Finally, De Bruin and Harris (2017) conducted interviews and focus groups with principals, teachers and students to investigate how creativity takes place within secondary schools in Australia and Singapore and how it might be influenced by social contextual factors. In their study, teachers from both countries indicated that increased standardization of both curriculum and assessments hindered development of classroom practices of risk taking and experimentation. Further, parental and students' expectations were also identified as potentially hindering practices that foster student creativity. Teachers reported, for example, that parents tend to focus on measurable gains in academic areas and attribute less value to creativity. De Bruin and Harris (2017) advocated for a creative ecologies approach in which the whole school environment works together to set a culture that supports teachers to take risks with trying new pedagogies, that can in turn affect student learning and creativity.

#### 4. General Discussion

Our aims in conducting this review of literature on adolescent creativity were to help clarify factors that relate to creativity and examine whether and how creativity researchers conceptualize the role of the social context in adolescent creativity. Although there has been prior work focused on examining adolescent creativity, we are not aware of any systematic efforts aimed at synthesizing the results of this work with respect to associated factors and the role of the social context. Our review study thereby provides potentially important insights into previous findings that researchers can build on in developing subsequent work. Prior to discussing these findings and future directions for this work, we want to note a few important limitations in our review.

First, the studies in this review varied by methods, measures, context and details provided. Indeed, even studies that met our inclusion criteria still had somewhat limited details regarding the results. As with all syntheses of the literature, caution should be taken when attempting to generalize themes or insights to particular contexts. Still, such general themes can serve as helpful starting points or points of comparison in subsequent work.

Second, although we sampled a rather large pool of studies, only four articles met our inclusion criteria for addressing our second research goal (broader social context). Again, with such a limited sample it is not appropriate to attempt to generalize insights from those studies to other contexts or settings. That said, it is a finding in itself that so few studies explicitly focused on the relationship between broader social contextual factors and adolescent creativity. With these limitations in mind, we now briefly discuss insights we have drawn from our synthesis and directions for future work. We will not rehash the specific findings again here, rather we will highlight four overarching insights that we gleaned from the results.

##### 4.1. Insight 1: provide rationale for studying adolescents

The first insight concerns the choice of studying adolescent participants. We specially focused this review study on adolescence because of its unique developmental phase (e.g., identity formation, importance of peer status, growing independence from parents) and because currently there is growing, but limited understanding of creativity in this specific age group (as suggested by, for example, Claxton, Pannells, & Rhoads, 2005; Lässig, 2013). In the studies included in this review, only a few specifically discussed their choice for focusing on adolescent participants. Some authors explained this choice by referring to the developmental characteristics of the adolescent phase (e.g., Kleibeuker et al., 2017; Ren et al., 2012). Other researchers explained that they focused on adolescents because the nurturing of creativity is an important educational goal in the school curriculum for adolescents (e.g., Lou et al., 2017; Wang, 2018). Nevertheless, it is worth noting that the overwhelming majority of authors did not specifically discuss the reason for focusing on adolescent participants.

We thereby encourage researchers who design studies on adolescents to provide additional details regarding their choices for studying this phase of development. Further, we encourage researchers to more explicitly situate their studies in the existing and developing literature on adolescent development to help clarify how creativity might be supported or impeded by the unique challenges and opportunities presented by this phase of development.

##### 4.2. Insight 2: Use multiple and more sensitive creativity measures

We noted that in our sample creativity was most often defined and measured in terms of creativity related skills and attributes. Divergent thinking tests were most commonly used as a proxy for creativity (e.g., Torrance Tests of Creative Thinking and Guilford's Test of Divergent Thinking, assessing individuals' fluency, flexibility, originality, and elaboration). Although divergent thinking is one of the most widely used approaches to studying creativity (Gralewski & Karwowski, 2019; Hocevar & Bachelor, 1989; Long, 2014), it only provides a partial measure of creative thought and action. Indeed, it might be better conceptualized as an indicator of creative potential, rather than a measure of creativity itself (see Karwowski & Beghetto, 2019). Moreover, using divergent thinking tests as a sole indicator of creativity, results in a measurement of individual thinking skills in a social vacuum (Glăveanu, 2010).

Given that the majority of studies in our sample defined and assessed creativity in terms of individual cognitive factors (e.g., aspects of divergent thinking), little, if any, attention was paid to the social-emotional aspects of the creative process. As we discussed in our introduction, emotional factors seem particularly relevant to take into account in research among adolescents. Again, there

were some exceptions to this general trend of focusing on individual cognitive factors, but it is worth noting that inclusion of measures that also examine the socio-emotional features of adolescent creativity seems to be an important consideration in the design of future studies.

We are not suggesting that individual cognitive measures (e.g., divergent thinking) have no value. Rather, we encourage researchers to use such measures in conjunction with additional measures and methods that can help provide a more complete picture of adolescent creative thought and development. Designing studies that blend multiple measures in more dynamic designs can go a long way in identifying and clarifying individual and socio-situational nuances of creativity (see Gajda, Beghetto, & Karwowski, 2017).

#### 4.3. Insight 3: Develop more dynamic and complex designs

The third issue concerns the design of the studies included in our sample. Most studies investigated the association of a specific variable or teaching method with adolescent creativity. The majority of these studies ( $n = 29$ ) had a quasi-experimental pre- and post-test design. Consequently, the focus was typically on static or short-term associations of factors related to creativity and not on more dynamic or complex relationships over time. Moreover, studies focused on examining associations or effects, typically do not provide details as to the reasons for these associations. These limited approaches are not specific to studies in our sample. Indeed, researchers, such as Jindal-Snape et al. (2013) and Long (2014), have noted similar trends in their review studies of cultivating creativity in education and research methodologies to study creativity, respectively.

Again, this is not to say that such studies lack value, rather that creativity researchers are increasingly recognizing both the possibility and need for designing more complex studies. Doing so is, of course, methodologically challenging. However, when researchers design studies that attempt to take into account the interdependent and dynamic factors at play in creative thought and action, then they put themselves in a better position to develop a more nuanced, complex, and ecologically viable understanding of creativity (see Beghetto & Corazza, 2019; Glăveanu, 2010, 2015; Said-Metwaly, van den Noortgate, & Kyndt, 2017). There were some examples of studies in our sample that used more complex designs. De Bruin and Harris (2017) and Meyer and Lederman (2013), for instance, used questionnaires, interviews, and observations with principals, teachers, and students in an effort to investigate the factors that enhance or hinder adolescents' creativity.

Given that only a handful of studies adopted a more socially and contextually focused study of creativity, we recommend that researchers engaging in future work take into account the role of the social context *and* use methods and measures that may provide more dynamic, detailed, and nuanced insights into the various factors at play in adolescent creativity development. Moreover, the results of our review also point to the need of studies that represent a broader spectrum of the ways contemporary researchers conceptualize creativity. Different researchers conceptualize creativity from different epistemological and ontological lenses, ranging from those that focus on discrete and isolated factors (e.g., individual | social) to those that examine creativity from a more relational perspective (e.g., individual  $\longleftrightarrow$  social) and, more recently, to those that view creative phenomena as emerging from co-constitutive factors (socio-individual-cultural).

Based on our review, the vast majority of studies we examined focused on more discrete and relational conceptualizations of creativity, rather than co-constitutive sociocultural perspectives. This finding may not be too surprising, given that sociocultural perspectives have only recently been gaining more attention in the literature and studies based on such approaches require new and more complex methodological designs (Glăveanu et al., 2019). Although studies representing broader, sociocultural approaches take extra-effort, it is likely that the investment will payout in more detailed and informative studies of adolescent creativity.

#### 4.4. Insight 4: Provide details of creative teaching approaches

Finally, we noticed that although the majority of studies in our sample focused on the effects of an instructional approach on adolescent creativity, only a few articles described the asserted processes by which these approaches can support creativity or how the method was embedded within the broader curriculum or school culture. It often remained unclear whether the teaching method was a special and isolated occasion or project which is different from everyday practice, what Davies et al. (2013) has called a 'critical event.' There were some studies that did provide these details, including how the approaches were embedded in multiple subjects and lasted over time (e.g., the study of Hu et al., 2013). This type of information is certainly important in order to interpret the results of these studies correctly, especially when different countries are involved (Lin et al., 2015; Van Harpen & Presmeg, 2013).

Indeed, it is important for researchers to open up the proverbial "black box" when reporting on the relationship between particular instructional approaches and activities. This includes going beyond detailed descriptions of the activities and techniques by also providing the theoretical and, when possible, the empirical justification for why such approaches might support or inadvertently suppress creativity. We thereby recommend that researchers who design intervention studies or studies focused on particular pedagogical approaches provided details on the conceptualization, implementation, and outcomes (both anticipated and unanticipated). Doing so can again help clarify how a particular approach may be beneficial in one setting and potentially ineffective or even counterproductive in another context.

In sum, our review of the literature has highlighted several themes and insights that we hope researchers will find useful in developing subsequent studies on adolescent creativity. Taken together, the results from the studies in our sample suggest that next to individual factors, the social context plays an important albeit sometimes overlooked role in adolescent creativity. A key question to guide subsequent work is: *Where is the social context in creativity research in adolescence?* Addressing this question will require the

development of more complex and innovative designs and methodologies. Although this will place additional demands on researchers' own creativity, we feel it is a necessary step toward advancing the field's understanding of creativity in adolescence.

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## CRediT authorship contribution statement

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