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Group Creativity in Children and Adolescents

RUNNING HEAD: GROUP CREATIVITY IN CHILDREN AND ADOLESCENTS

Group Creativity in Children and Adolescents
Pinar Oztop* & Michaela Gummerum

1 CogNovo, School of Psychology, University of Plymouth, UK
2 School of Psychology, Cognition Institute, University of Plymouth, UK

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Abstract

In the landscape of continuous change and technological innovations, educational settings need constant reforms to support children acquiring the skills that are necessary for adaptation to the future. In this research we investigated one of those skills, namely the collaborative creativity of children and adolescents. The first aim of this study was to understand whether group creativity progressed from childhood to adolescence. The second aim was to assess potential mechanisms behind developmental differences in collaborative creativity. We particularly explored the role of intersubjectivity, social perspective coordination, as well as intrinsic motivation in group creativity. Forty-eight students from primary school years 5 and 6 and forty-five students from secondary school years 9 and 10 formed three person groups. Group members collaboratively wrote stories that were rated by three independent subject teachers. Stories written by secondary school students were rated as more creative compared to stories of primary school students. Social perspective coordination was found as a positive predictor of group creativity. Moreover, social perspective coordination mediated the positive relation between age and group creativity. Intersubjectivity variables were not significantly related with creativity of groups. Finally, there was a weak negative association between group creativity and intrinsic task motivation. These results indicate that similar to individual creativity group creativity also progressed with development and one explanatory mechanism was the advancement in social perspective coordination.

Keywords: Group creativity, children, adolescents, intersubjectivity, social perspective coordination, intrinsic motivation
During one of his lectures at Colombia University in the 1940s, the educator John Dewey pointed out that “the world is moving at a tremendous rate; going no one knows where. We must prepare our children, not for the world of past, not for our world, but for their world - the world of the future.” (Little, 2012, p.87). His inspiring words still resonate today. Key to dealing with such continuous changes are innovation and creativity (Sawyer, 2007), collaborative knowledge construction, and team problem solving (Billett, 2006; Hämäläinen & Vähäsantanen, 2011).

Creativity is often defined as the generation of novel and useful ideas, solutions, or insights (Runco, 2004). According to Amabile’s (1996) componential theory, individual creativity emerges from the intersection of three necessary components: domain-relevant skills (i.e., technical, procedural and intellectual expertise in a domain), creativity-relevant skills (e.g., cognitive flexibility, taking alternative perspectives, risk-taking, self-discipline, ambiguity tolerance), and intrinsic motivation. Following Amabile (1996), we explored developmental differences in group creativity between children and adolescents. Specifically, we investigated how the creative outputs of child and adolescent groups are affected by creativity-relevant skills and intrinsic motivation. Concerning creativity-relevant skills, we focused particularly on variables that might be key for supporting group creativity and collaboration, namely intersubjectivity and transactional dialogue (which we measured at the group level) and social perspective coordination, a skill measured at the individual level.

According to a seminal paper by Glaveanu (2011), two approaches to studying collaborative creativity can be broadly differentiated. The sociocultural perspective conceptualizes creativity as a fundamentally social process, which emerges through collaboration, intersubjectivity, and the co-construction of knowledge. The sociocognitive perspective regards group creativity as the sum of individuals’ skills and contributions. In his own cultural approach to creativity, Glaveanu (2010) extends the sociocultural perspective and
Group Creativity in Children and Adolescents proposes a new framework that emphasises creativity as a sociocultural process, which is born through dynamic relations between self, community and new as well as existing artefacts of creativity. His approach places creativity “…as a complex socio-cultural-psychological process that, through working with ‘culturally-impregnated’ materials within an intersubjective space, leads to the generation of artifacts that are evaluated as new and significant by one or more persons or communities at a given time.” (Glaveanu, 2010, p.11).

Much of the research on group creativity in children (e.g., Miell & Littleton, 2004, 2008; Vass, Littleton, Miell, & Jones, 2008) has followed a sociocultural approach, whereas research on adults’ group creativity has tended to employ a sociocognitive perspective (e.g., De Dreu, Nijstad, Bechtold, & Baas, 2011). The current research builds on the sociocognitive approach to group creativity. It conceptualizes the creative collaborations of children as a group phenomenon that is shaped by the developing skills and contributions of individual group members.

1.1. The Development of (Individual) Creativity

Creativity, like other cognitive-developmental abilities, is expected to increase with age. Older children have access to better search processes, have more social experience, and thus are expected to produce more creative solutions to problems compared to younger children (Mouchiroud & Lubart, 2002). Indeed, individual creativity increases particularly between preschool/early elementary school and middle adolescence (Besancon & Lubart, 2008; Claxton, Pannells, & Rhoads, 2005; Smith & Carlsson, 1985). However, Torrance (1968; see also Daugherty, 1993; Lubart & Lautrey, 1995; Urban, 1991) suggested that individual creativity starts decreasing from around age 6 until fourth grade (9-10 years) and then increases again in (early) adolescence. This “fourth grade slump” might be due to increased conformity pressure that students experience in school, which makes them fearful of expressing their creative potential (Lau, Li, & Chu, 2004). However, developmental differences in group creativity and
the (individual) skills contributing to group creativity have received relatively little attention so far, and the current research aims to fill this gap.

1.2. Peer Collaboration and Group Creativity

Peer collaboration involves a group of children working together on a task to produce shared meaning or solve a problem (De Lisi & Golbeck, 1999; Fawcett & Garton, 2005; Ladd et al., 2014). Research in psychology and education has explored peer collaboration through various constructs, such as the construction of knowledge, co-argumentation (Baker, 2002), exploratory talk, critical discussion techniques (Mercer, 1996), coordination (Barron, 2000), group cognition (Stahl, 2006), shared meaning (Miell & Littleton, 2004, 2008), collaborative reasoning (Anderson, Chinn, Waggoner & Nguyen 1998), and co-elaboration (Hamilton, 1997). Generally, children working collaboratively have been shown to obtain a higher performance and better outputs than children working individually (Fawcett & Garton, 2005; Samaha & De Lisi, 2000) in domains such as learning (Rogoff, Turkanis, & Bartlett, 2001), moral reasoning (Kruger, 1992), and problem solving in academic and scientific topics (Azmitia & Montgomery, 1993; Phelps & Damon, 1989). However, collaboration is a demanding process, which may not always provide the optimal environment of working or learning for children. Some studies even pointed that it is not always beneficial to collaborate (Minson & Mueller, 2012; Sampson & Clark, 2009). Collaborations are efficient and genuine only when they built on a joint effort, which would achieve more than the sum of individual performances (Littleton, 2011).

Only a few studies have focused on peer collaboration in creative tasks such as joint music making or creative writing (e.g. Staarman, Aarnoutse, & Verhoeven, 2003; Miell & Littleton, 2004, 2008; Vass, 2004; 2007; Vass et al., 2008; Rojas-Drummond et al., 2008). For instance, Vass et al. (2008) explored how peer collaboration would nourish the collaborative creativity of children in different stages of writing. They observed ongoing classroom activities of selected pairs of children aged 7-9 over a year and found that collaborative flow moments
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were one of the key processes underlying children’s collaborative writing. MacDonald, Miell and Mitchell (2002) investigated the effect of age and friendship on the quality of musical collaborations in 40 girls aged either 8 or 11 years. For 11-year-olds, being paired with a friend or non-friend made little difference to the quality of the performance. However, for 8-year-olds, pairs of friends produced better-quality musical compositions than pairs of non-friends. The authors suggested that collaboration is a cognitively demanding process. Hence, younger children can benefit more from collaborating with friends rather than non-friends (see also Hartup, 1996).

Understanding and exploring aspects of children’s collaboration in creative domains is crucial, as creative collaborations do not necessarily share the same factors as scientific collaborations. In creative tasks, there is often no “correct solution” to the problem (MacDonald et al., 2000). Thus, skills that might underlie collaboration and performance in scientific tasks (e.g., learning skills, insights into concepts) might not be as important for creative collaborations. We built on Amabile’s (1996) componential model of creativity and explored the role of intrinsic task motivation as well as creativity-relevant skills on children’s and adolescents’ group creativity. We explored creativity-relevant skills both in terms of competence (social perspective coordination) and the application of this competence (transactive dialogue, meta-communication) in creative collaborations of children and adolescents.

1.3. Intrinsic Task Motivation

Self-determination Theory (Deci & Ryan, 1985) distinguishes two main types of motivation: Intrinsic motivation refers to doing something purely due to interest and enjoyment; extrinsic motivation refers to doing something on the basis of an expected outcome (Ryan & Deci, 2000). Intrinsic motivation is a vital part of the individual creative process (Amabile, 1996). People are more creative when they approach a task with intrinsic than extrinsic motivation, and “it is task motivation that determines the extent to which domain-relevant skills
and creativity-relevant skills can be fully and appropriately engaged in the service of creative performance” (Amabile, 1996, p. 133; see also Conti, Coon & Amabile, 1996; Ruscio, Whitney, & Amabile, 1998). Previous studies showed that intrinsic motivation directly affects individual and group creativity (Amabile, 1985; Cooper & Jayatilaka, 2006; Hennessey & Amabile, 1998): It pushes individuals to be curious, to take more risks, and allows them to be cognitively flexible (Zhou & Shalley, 2003).

Amabile, Hennessey and Grossman (1986) assessed the effect of reward as an extrinsic motivator on the individual creativity of 5- and 10-year-old children. In a reward condition, participants were offered a Polaroid camera as a reward if they wrote a story later. In the no-reward condition, children were allowed to use the Polaroid camera, but it was not offered as a reward. After taking photographs with the cameras, children were asked to tell a story using the pictures they took. This storytelling task was either labelled as “work”, as “play”, or no label was given. While labelling did not affect the creativity of the story, children told more creative stories in the no-reward condition. The current study has explored whether intrinsic motivation also facilitates children’s and adolescents’ group creativity.

1.4. Creativity-relevant Skills: Social Perspective Coordination and Intersubjectivity

Social perspective coordination, the ability to differentiate and integrate the perspectives of self and other, might be a key individual skill that helps children to coordinate with others (Miell & MacDonald, 2000), to be better communicators and problem solvers (Selman & Schultz, 1990), and thus to succeed at collaborative creativity. According to Selman et al. (1986), social perspective taking develops through five developmental levels: At level 0 (egocentric; 3-5 years) children are unable to distinguish the perspectives of self and other; at Level 1 (one way; 6-7 years) children recognize others’ perspectives but are unable to consider them simultaneously with their own perspective; at Level 2 (reciprocal; 7-8 years) children understand that each person has a unique perspective based on his/her values and reciprocally take into
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account perspectives of self and other; at Level 3 (mutual, 12-14 years) children can coordinate the perspectives of self and other and can see all perspectives from a general point of view; at Level 4 (interdependent; 15-18 years) children understand both personal and broader societal, cultural or global perspectives.

Perspective taking has been shown to be a key process in adult group creativity studies as it can enhance group members’ motivation to acknowledge diverse perspectives and increases the chances of developing novel and useful ideas (Hoever, Knippenberg, Van Ginkel & Barkema, 2012; Perry-Smith & Shally, 2003). As of yet, no study investigated the role of social perspective coordination in children’s and adolescents’ group creativity, which was another aim of the current research.

Being able to take and coordinate with another’s perspective might not be enough for performing effectively as a group; the quality of the social interaction is crucial (Samaha & De Lisi, 2000). According to Rogoff (1990), active engagement in the group and reasoned dialogue helps the group to establish a shared reality, which then helps productivity. Intersubjectivity is a key feature that facilitates the formation of shared reality and understanding. Rogoff (1990) defined intersubjectivity as a process of ‘creating joint shared meaning’ in which different perspectives of participants are merged in mutual understanding (p. 67). As a broad concept, intersubjectivity has been investigated in joint attention and engagement as well as shared meaning making (Goncu, Patt & Kouba, 2002; Trevarthen & Aitken, 2001). Efficient peer collaboration is characterized by high intersubjectivity; group members coordinate their actions well by reading emotional and attentional cues (Whitington & Floyd, 2009). As a result, children would produce new information and extend their ways of thinking (Rogoff, 1990). Thinking together, a program that aims to develop primary school children’s joint working and reasoning skills, built on that idea of creating quality social interaction for children’s group work (Dawes, Mercer, & Wegerif, 2004). The program facilitates the collaborative process with the use of
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exploratory talk, through which children are encouraged to take part in dialogue, to be critical
towards others’ ideas, and offer constructive feedback or alternatives with justifications (Dawes
et al., 2004).

Intersubjectivity in collaboration was found to be more prevalent in older than younger
age groups. For instance, Gummerum, Leman and Hollins (2013; 2014) showed that 7-year-olds
engaged in intersubjective interactions significantly less than 9-year-olds. Likewise, Leman
(2015) found that 13-year-olds had more intersubjective interactions during collaborative work
than 8-year-olds. Whether intersubjectivity helps or hinders (the outcomes of) peer collaboration
has received mixed results so far. On the one hand, Gummerum et al. (2013) found that
intersubjectivity had detrimental effects on groups’ productivity in a collaborative recall task. On
the other hand, Garton, Harvey and Pratt (2003) showed that the total number of joint utterances
used during peer collaboration was a significant predictor of reasoning and problem solving.
However, creativity tasks and collaborative processes do not require a single solution and thus
rely on different demands and dynamics than collaborative-recall and problem-solving tasks.
According to McDonald et al. (2000) joint engagement through dialogue might be particularly
useful in creative tasks where partners are aiming to find novel ideas. Relatedly, Ligorio,
Talamo and Pontecorvo (2005) found that 10- and 11-year-old children tried to consciously build
intersubjectivity during a distance collaborative writing task. Thus, the current research assessed
whether intersubjectivity might positively affect the creative output of collaborating groups.

Intersubjectivity can also be expressed through transactive dialogue, the "spontaneously
produced critiques, refinements, extensions or significant paraphrasing of ideas" (Kruger, 1992,
p. 169) between peers. Transactive dialogue resembles but also extends the concepts of
exploratory talk (Dawes et al., 2004), as transactive additionally refers to the attitude of
elaborating or extending on each other’s ideas in a collaborative context (Sangiorgio, 2015).
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Higher use of transactive dialogue was associated with successful collaborations, better learning in areas such as moral, mathematical and scientific reasoning, and problem solving (Kruger, 1992; Rogoff, 1990; Teasley & Roschelle, 1993). Similarly, primary-school children who used more exploratory talk with others in classrooms showed better cognitive-developmental and curriculum-related outcomes (Wegerif, Mercer, & Dawes, 1999). Higher levels of transactive dialogues were related to creation of better musical compositions in 11- and 12-year-olds’ musical collaborations (MacDonald et al., 2000; Miell & MacDonald, 2000). Accordingly, we also investigated the role of transactive dialogue in children’s and adolescents’ group creativity.

1.5. The Present Research

This study investigated age differences in group creativity and the role of intrinsic task motivation as well as creativity-relevant skills (i.e., intersubjectivity, social perspective coordination) on children and adolescents’ group creativity. As such, we examined creativity-relevant skills in two ways: first, on the individual level, as social perspective coordination; second, on the group level, as intersubjectivity (transactive dialogue and meta-communication) (Goncu, 1993).

We expected that collaborative creativity would increase with age and that adolescents would collaboratively produce more creative outputs than children (Hypothesis 1). We hypothesized that groups composed of individuals with higher intrinsic task motivation (Hypothesis 2) and groups composed of individuals with higher social perspective coordination (Hypothesis 3) should show more creative outputs. Since social perspective coordination increases between childhood and adolescents, we also tested whether adolescents in our study showed higher social perspective taking skills than children (Hypothesis 4) and whether social perspective taking would mediate the relationship between age and group creativity (Hypothesis 5). Additionally, we proposed that creative outputs should be positively associated with the intersubjectivity (measured as meta-communication and transactive dialogue) between group
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members (Hypothesis 6). Given previous developmental research, we expected higher intersubjectivity in adolescents than child groups (Hypothesis 7).
2. Method

2.1. Participants

The study involved 48 students from primary school years 5 and 6 (\(M_{\text{age}} = 10.42\) years, \(SD = .68\), 24 females) and 45 students from secondary school years 9 and 10 (\(M_{\text{age}} = 14.71\) years, \(SD = .51\), 23 females), who were assigned to 31 three-person groups. In order to control for possible gender effects groups were composed of either groups of boys (\(N=16\)) or girls (\(N=15\)). Students were recruited from schools serving working and middle-class communities in South-West England. The majority of pupils were British except for one student with a Central European and one with an Asian background.

2.2. Procedure

The study received ethical approval from the university’s Human Ethics Committee and only students who received parental consent took part.

Upon arrival, three participants were seated at a round table at equal distance from each other so they could see and hear each other clearly. Before the task started they were informed about the anonymity of the data and their right to withdraw. After assenting to take part in the study, all participants were instructed to the task. All group interactions were video-taped.

Collaborative writing (Miell & Littleton, 2008; Vass, 2007; Vass et al., 2008) and collaborative music making (Dillon, 2004; MacDonald et al., 2002) have been the common methods of exploring collaborative creativity. The current research adopted a collaborative story writing task, inspired by Hennessey and Amabile’s (1988) story-telling technique which has proven to be a valid and practical way of assessing children’s (individual) creativity. Especially by middle childhood, children have been found to be skilful in writing about others’ worlds, beliefs and behaviours (Fox, 1991). The method was also chosen because writing a story would allow children not only to practice creating original ideas but also to elaborate on them (i.e., elaborating characters, the plot, dialogue) (Mouchiroud & Lubart, 2002). For the purposes of this
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research, the task was modified to make it more appropriate for evaluating group instead of individual creativity.

Children were provided with nine story cubes (Rory’s story cubes, see Figure 1) which were to assist them in creating the stories. Each face of the cubes contained a different image of a simple object (e.g., flower, ball, hat) which could be used as a cue to create the stories. Groups were told to roll the cubes and integrate the object depicted on the side of the cube lying face-up into their story. Groups were not given any rules and were free to use the cubes in the most convenient way. For example, some groups preferred to roll all nine cubes at the same time, while others took turns in rolling them. Before they started the task, all groups were instructed to write the most original story. They were also asked to structure their story with a beginning, middle, and end as well as to form at least one character in the story. Finally, they were also free to create a story in any genre.

![Rory’s Story Cubes](image.png)

*Figure 1. Rory’s Story Cubes used in the story-telling task, © The Creativity Hub.*

All groups had 20 minutes in total to create the stories, including the time allocated to write the stories on the sheets provided to them. The researcher left the room during the task and
only came in to remind groups about the remaining time (when 10 and 2 minutes were left). Participants’ collaborative story writing was video-recorded.

Afterwards, participants were given standardized questionnaires on social perspective coordination and intrinsic task motivation. At the end, participants were thanked, debriefed, given a small gift (suitable for the respective age group), and accompanied to their classrooms.

2.3. Measures

2.3.1. Creativity Judgement. Amabile (1982) proposed that defining an ultimate objective criterion for evaluating creativity would be impossible since this evaluation depends on the social context. She suggested that the most valid way of measuring creativity was the subjective assessment of experts in the particular domain, a method labelled as “consensual assessment technique.” Briefly, in consensual assessment, experts rate creativity by using their own, subjective definition of creativity rather than using an established objective criterion.

Using this consensual assessment technique, we asked two primary-school and one secondary-school English subject teachers to rate each story on the basis of their own, subjective definition of creativity. To mask the identities of students, digitally typed copies of stories were provided to the raters. The only information raters were given was the grade and gender composition of groups. Previous research found that writing development is a function of grade level as writing skills develop over school years (Crossley et al., 2011). Therefore, teachers were provided with the grade information, in order to avoid disadvantaging children in primary school, especially when teachers were rating the technical aspects of the stories. Moreover, previous research also found gender related differences in students’ narrative writing (Gray-Schlegel & Gray-Schlegel, 2010). For instance, boys’ writing can be more characterized by conflict resolution through violence and there are more male characters in the plot. Girls’ writing tends to have more gender diversity in characters and conflict resolution is brought about through collaboration rather than violence (Peterson, 1998). Therefore, providing the groups’ gender
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allowed raters to see whether the stories had any gender related characteristics and whether children were able to go beyond those.

A rating guideline was prepared based on the evaluation criteria adapted from Hennessey and Amabile (1988), Alhusaini, Maker and Deil-Amen (2014), and Pople (2014). Teachers rated the stories on eight dimensions on a 10-point scale. Dimensions were presented with short definitions: Creativity (“using your own subjective definition of creativity, please rate the degree to which the story is creative”); Imagination (“rate the degree to which subject/plot is imaginative”); Novelty (“rate the degree to which subject/plot is novel”); Liking (“using your own subjective criteria, how well do you like the story?”); Emotionality (“rate the amount and depth of emotion the story conveys”); Voice (“rate the level of use of voice in the story, the sense of audience”); Characterization (“rate how well characters are written”) and Elaboration (“rate the level of elaboration of details in the story”). Teachers’ ratings of the 31 stories correlated highly (rs = .61 - .86) indicating a good level of inter-rater reliability.

Considering the very high level of correlations between all the dimensions (r = .90-.95), we conducted an exploratory factor analysis on the ratings of the eight dimensions using direct oblimin rotation. The Kaiser-Meyer-Olkin measure of sampling adequacy was .90, above the commonly recommended value of .6, and Bartlett’s test of sphericity was significant, $\chi^2(28) = 548, p= .000$. The analysis yielded a single factor solution with loadings between .93-.96 on a first factor, which explained 90% of the variance (eigenvalue = 1). Hence, all the rating dimensions were combined and averaged into one overall creativity score for each story.

2.3.2. Demographics Form. We prepared a short demographics form that asked children to report their age, gender, year of education and whether they were bilingual.

2.3.3. Social Perspective Coordination. The Social perspective coordination of children was measured with subscales of the Relationship Questionnaire (REL-Q; Schultz et al., 2003). Higher cumulative scores on this questionnaire indicate higher social perspective coordination.
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skills. The REL-Q is a multiple-choice measure designed for fourth-grade through twelfth-grade students. It consists of 24 questions grouped into five subscales: understanding of interpersonal relationships (6 items), perspective-taking (4 items), hypothetical interpersonal negotiation (4 items), real-life interpersonal negotiation (4 items) and awareness of personal meaning (6 items). Items pose dilemmas or common situations with peers or adults, and there are four response options which represent the four theoretical levels of social perspective coordination: egocentric (level 0), unilateral (Level 1), reciprocal (Level 2), and mutual (Level 3). In the current study the focus was to understand the role of interpersonal skills in collaborative creativity including negotiation strategies and coordination of perspectives. Thus, we only used three of the subscales: perspective taking (interpersonal understanding), hypothetical interpersonal negotiation (hypothetical negotiation strategies needed to make and maintain good relationships), and real-life interpersonal negotiation (real-life negotiation strategies used to make and maintain good relationships).

The following example question presents a hypothetical negotiation about a conflict which is followed by four response options that the protagonist of the situation can take:

“Gladys, who has a ten o’clock curfew, goes to a party one Saturday night. She gets home at 12:00 and her father is waiting up for her. He is very angry and grounds her for a month. Gladys feels that the punishment is too severe and thinks she is old enough to stay out past 10:00. Gladys could

a. Storm out of the room
b. Tell her father he can’t tell her what to do
c. Ask her father to work with her on an agreement, which would allow her to stay out later on weekends
d. Explain to her father why she feels she’s old enough to stay out late”
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Children rated each of the four responses on a four point Likert scale (poor, OK, good, or excellent) and were then asked to choose the best of these four responses. In this way, each item received two scores: A “response rating” score which is calculated by summing student’s evaluations of the four responses and a “best choice” score which is based on the response which they choose as the best. Best choice scores were calculated for perspective taking, interpersonal negotiation and real-life interpersonal negotiation subscales by averaging the best choice scores for each item in the particular dimension. Likewise, a response rating score was computed for each subscale by averaging the scores of items of each domain. The overall best choice and response rating scores are calculated by averaging the best choice and response rating scores of three subscales. Overall, the scale had an acceptable level of reliability both for best choice score (α = .60) and for response rating score (α = .80). According to Schultz et al. (2003), since both response rating and best choice have similar developmental progression, a composite score can be calculated by averaging each. Considering the high correlation between best choice and response rating scores (r = .67, p < .001, n = 31), a composite social perspective-taking score was thus computed.

2.3.4. Intrinsic Task Motivation. Task motivation was measured with two subscales of the shorter version of the Intrinsic Motivation Inventory (IMI); interest/enjoyment and perceived competence. The IMI is a multidimensional scale designed to measure intrinsic motivation and as well as its predictors in lab studies and can be modified for the specific activity (Ryan, 1982). The interest/enjoyment subscale is a self-report measure of intrinsic motivation, and perceived competence is theorized to be a positive predictor of both self-reported and behavioural measures of intrinsic motivation. We used an adaptation of the interest/enjoyment subscale, which was more suitable for children and adolescents (Van Dijk, Lingnau & Kockelkorn, 2012). Participants responded on a 5-point Likert scale from “Strongly disagree” (1) to “Strongly agree” (5). The Interest subscale consists of seven items (e.g., “I would describe the task as very
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enjoyable.”, “I would describe this activity as very interesting”). The Perceived Competence subscale consists of five items all of which are positively stated (e.g., “I think I am pretty good at this task”, “After working at this task for a while, I felt pretty competent”). Both the Interest (α = .88) and Perceived Competence (α = .83) subscales demonstrated a high level of reliability.

2.3.5. Intersubjectivity. Group interactions were coded in terms of the meta-communication aspect of intersubjectivity (Goncu, 1993; Gummerum et al., 2013). Meta-communication is defined as the communications between group members that initiate, maintain and terminate collaborative activities (Gummerum et al., 2013), such as invitations (e.g., “Let’s write now”), making plans for collaboration (e.g., “Should we roll the dices first?”), or ending a collaboration (e.g., “We don’t have much time left, let’s wrap up”). For each group, the frequency of these three meta-communication aspects was coded from the groups’ conversations.

One of the videos from primary school groups were incomplete due to technical problems. Therefore, two independent coders watched and coded 10 videos; Interrater reliability for the three elements of metacommunication was good (invitations, κ = .67, making plans, κ = .70, end of collaboration, κ = .66). Invitation frequency had a considerable correlation with making plans (r = .31, n=30, p= .09) and a significant correlation with end of collaborations (r = .65, n=30, p< .001). The correlation between making plans and end of collaborations were also considerable (r = .33, n=30, p = .08). Due to these correlations between the three aspects of meta-communication, they were all summed into one group meta-communication score.

2.3.6. Transactive Dialogue. Transactive dialogue was coded following Kruger (1992), Miell and MacDonald (2000) and Hewitt (2008). Transactive dialogues are those in which participants extend or elaborate an idea that has been developed by themselves or their partners (Miell & MacDonald, 2000). To be transactive, an interaction must move forward (through talk) specific ideas for the task (Kruger, 1992). Therefore, dialogues where peers work together but not take cooperative actions are not counted as transactive. Following previous research, transactive
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communications were those that indicated collaboration, while non-transactive communications were not seen as a sign of collaboration, and thus were not coded in the current study. Three aspects of transactive dialogue were coded: (1) Transactive statements, where the child offered a critique, extension, or elaboration of previously presented ideas, either raised by the child or others in the group (e.g., “We could add these cubes, too”); (2) Transactive questions, where the child “spontaneously produced requests for justification, elaboration, or clarification” (Kruger, 1992, p. 196), related to own or others’ ideas (e.g., “How can a spaceship be in the air without no one in it?”); and (3) Transactive responses, where the child presents clarification, elaboration or justification for a transactive questions made either by themselves or others (e.g., “Yes, we have already opened it and we can’t open another one.”). Interrater agreement for 8 videos coded independently by two judges for the three elements of transactive dialogue was good (transactive statements, $\kappa = .71$, transactive questions, $\kappa = .64$, transactive responses, $\kappa = .68$). The frequency of each aspect of transactive dialogue was coded for each group. Transactive responses were significantly correlated with transactive statements ($r = .67, n=30, p<.001$) and transactive questions ($r = .53, n=30, p< .01$). Considering these high correlations, the three aspects of transactive dialogue were summed into one group score.

3. Results

3.1. Correlations Between Study Variables

Table 1 indicates that group creativity ratings were significantly positively correlated with social perspective coordination. Intrinsic task motivation was negatively correlated with group creativity with marginal significance, and perceived competence had a significant negative correlation with group creativity. Transactive dialogue and meta-communication scores were not significantly correlated with any of the variables with the exception of the rather considerable (but non-significant) correlation between social perspective coordination and meta-
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communication. Moreover, intrinsic task motivation and perceived competence were highly correlated; hence they were averaged into one composite score, intrinsic task motivation.

Table 1.

Correlations among group creativity, social perspective coordination, intrinsic task motivation, perceived competence, transactive dialogue, and meta-communication

<table>
<thead>
<tr>
<th></th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
<th>6.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Group creativity</td>
<td>1</td>
<td>.69**</td>
<td>-.32</td>
<td>-.36*</td>
<td>-.11</td>
<td>.20</td>
</tr>
<tr>
<td>2. Social perspective coordination</td>
<td></td>
<td>1</td>
<td>-.15</td>
<td>-.14</td>
<td>-.12</td>
<td>.30</td>
</tr>
<tr>
<td>3. Intrinsic task motivation</td>
<td></td>
<td>1</td>
<td>.59**</td>
<td>.13</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td>4. Perceived competence</td>
<td></td>
<td>1</td>
<td>.03</td>
<td>-.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Transactive dialogue</td>
<td></td>
<td>1</td>
<td>-.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Meta-communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01

3.2. Age Differences

Independent samples t-tests confirmed our expectation in Hypothesis 1 and revealed that the adolescent groups’ stories received significantly higher creativity ratings than those created by child groups, t(29)= -5.47, p < .001. A more fine-grained analysis of differences in creativity ratings across grades can be found in the Supplementary Materials. Hypothesis 4 was also confirmed. Compared to primary-school groups, groups of adolescents scored significantly higher on social perspective coordination, t(29) = -4.70, p < .001 (see Table 2).

An examination of normality with Shapiro-Wilk normality tests revealed that the data distribution was non-normal only for intrinsic task motivation, W(30)= .90, p=. .01, transactive
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dialogue, \( W(30) = .81, p = .00 \), and meta-communication, \( W(30) = .90, p = .00 \). Therefore, we used non-parametric Mann-Whitney U-tests to test for age group differences. \(^1\)

Intrinsic task motivation scores were significantly higher among children than adolescents, \( U (31) = 48.5, Z = -2.92, p = .00 \), but there were no significant age differences in transactive dialogue, \( U (30) = 94, Z = - .77, p = .45 \) and meta-communication, \( U (31) = 87, Z = -1.06, p = .30 \) (see Table 2). Since neither age differences nor the correlation analyses produced significant effects with regards to transactive dialogue and meta-communication, these variables were not included in further analyses and hence, *Hypothesis 6* and *Hypothesis 7* were not confirmed.

### 3.3. Predicting Group Creativity

A multiple linear regression analysis was conducted to investigate the effect of social perspective taking (*Hypothesis 3*) and intrinsic motivation (*Hypothesis 2*) on group creativity after controlling for the effects of age. Preliminary analyses were conducted to ensure there was no violation of the assumptions of normality, linearity, and homoscedasticity (Tabachnick & Fidell, 2007). A dummy variable was created for age group and entered in the first step. Social perspective coordination and intrinsic task motivation were added at Step 2.

As shown in Table 3, at Step 1 the contribution of age was significant, \( F (1, 29) = 29.99, p < .001 \) and accounted for 51\% of the variance in group creativity. Groups from secondary school received significantly higher creativity ratings than groups from primary school. At Step 2, the total variance explained by the model as a whole was 60\%, \( F (2, 27) = 13.56, p < .001 \). Social perspective coordination and intrinsic task motivation explained additional 9\% of the

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\(^1\) We also explored gender differences for each variable (see Supplementary Materials). There were no effects of gender, hence we dropped it from further analyses.
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Table 2

*Group Creativity, social perspective coordination, motivation, transactive dialogue and meta-communication means for primary and secondary school groups*

<table>
<thead>
<tr>
<th></th>
<th>Primary</th>
<th></th>
<th>Secondary</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>N</td>
<td>M</td>
<td>SD</td>
<td>N</td>
<td>Min-Max</td>
</tr>
<tr>
<td>Age</td>
<td>10.50</td>
<td>.52</td>
<td>16</td>
<td>14.73</td>
<td>.46</td>
<td>15</td>
<td>10.00-15.00</td>
</tr>
<tr>
<td>Group creativity</td>
<td>4.39</td>
<td>1.44</td>
<td>16</td>
<td>7.01</td>
<td>1.21</td>
<td>15</td>
<td>4.67-6.50</td>
</tr>
<tr>
<td>Social perspective coord</td>
<td>5.38</td>
<td>.37</td>
<td>16</td>
<td>5.99</td>
<td>.35</td>
<td>15</td>
<td>2.38-8.79</td>
</tr>
<tr>
<td>Intrinsic task motivation</td>
<td>4.50</td>
<td>.63</td>
<td>16</td>
<td>3.87</td>
<td>.52</td>
<td>15</td>
<td>3.00-5.00</td>
</tr>
<tr>
<td>Transactive dialogue</td>
<td>7.80</td>
<td>8.97</td>
<td>15</td>
<td>5.06</td>
<td>5.06</td>
<td>15</td>
<td>0-32.00</td>
</tr>
<tr>
<td>Meta-communication</td>
<td>18.87</td>
<td>13.56</td>
<td>15</td>
<td>19.87</td>
<td>8.10</td>
<td>15</td>
<td>6.00-58.00</td>
</tr>
</tbody>
</table>

Note. *M*= Mean, *SD*= Standard Deviation, *N*= Number of participants
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variance in group creativity, and this change in $R^2$ was marginally significant, $F(2, 27) = 3.14, p = .06$ (see Table 3). The effect of age was controlled in Step 2 and was no longer a significant predictor. Higher social perspective coordination was significantly predicting higher group creativity. However, intrinsic motivation was not a significant predictor of group creativity.

Table 3

Summary of hierarchical regression analysis predicting group creativity from age, social perspective coordination and intrinsic task motivation

<table>
<thead>
<tr>
<th></th>
<th>Step 1</th>
<th></th>
<th>Step 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$B$</td>
<td>$SE$ $B$</td>
<td>$\beta$</td>
<td>$B$</td>
</tr>
<tr>
<td>Age</td>
<td>2.63</td>
<td>.48</td>
<td>.71**</td>
<td>1.38</td>
</tr>
<tr>
<td>Social perspective coordination</td>
<td>1.69</td>
<td>.68</td>
<td>.43*</td>
<td></td>
</tr>
<tr>
<td>Intrinsic task motivation</td>
<td>- .31</td>
<td>.48</td>
<td>-.10</td>
<td></td>
</tr>
</tbody>
</table>

Note. $B =$ Unstandardized coefficient, $\beta =$ Standardized coefficient.

*, $p < .05$, **, $p < .001$.

Next, a mediation analysis was conducted to examine whether social perspective coordination mediated the effect of age on group creativity ratings (Hypothesis 5). The Preacher and Hayes bootstrap method (Preacher & Hayes, 2008) was used to test for mediation which allows for a powerful testing of single and multiple mediation hypotheses in smaller samples.

Based on 10,000 bootstraps it was found that the direct path from age to creativity, also called the total effect, was significant ($B = .64, t(31)=6.26, p < .001$). Age significantly predicted social perspective coordination ($B = .03, t(31)= 4.75, p < .001$), and social perspective
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coordination significantly predicted group creativity ratings ($B = .60$, $t(31) = 2.21$, $p = .04$). The direct effect of age on creativity, when controlled for social perspective coordination was still significant yet there was a decrease in the p value ($B = .13$, $t(31) = 3.54$, $p = .001$). Finally, bootstrap result for the indirect effect of social perspective coordination between age and creativity was significant ($B = .10$) with bias corrected 95% CI [.05, .47], an indicator for the existence of proposed mediation. Age was associated with .110 points higher group creativity as mediated by social perspective coordination (see Figure 2).

Figure 2. Results of Bootstrap Mediation Analysis for the indirect of age on group creativity (N = 31). Standardized regression coefficients are presented. *, $p < .05$, **, $p < .01$, ***, $p < .001$

4. Discussion

The skills that drive a successful group creativity in children and adolescents are not well understood, with only a few studies focusing on this topic (e.g. Miell & Littleton, 2004; Miell & Littleton, 2008; Vass et al., 2008; Vass, 2007; Rojas-Drummond et al., 2008). The present study adopted a sociocognitive perspective to contribute to our understanding of developmental differences in the group creativity of children and adolescents working on a collaborative story
writing task. Drawing on Amabile’s (1996) componential model, we examined the influence of intrinsic task motivation and creativity-relevant skills (i.e., intersubjectivity, transactive dialogue, social perspective coordination) on children and adolescents’ group creativity.

4.1. Developmental Differences in Group Creativity

Based on previous research on the development of individual creativity (e.g. Besancon & Lubart, 2008; Claxton et al., 2005), we predicted that collaborative creativity would increase with age. The results of this study confirmed these expectations: The collaboratively created stories by adolescents were rated as significantly more creative than the stories produced by children. These findings are in line with studies showing that collaboration (on creative and non-creative tasks) might be more cognitively demanding and challenging for younger children (Azmitia & Perlmutter, 1989). The current study not only assessed age differences in collaborative creativity, but also which developing psychological factors might underlie these differences.

4.2. Intrinsic Task Motivation and Group Creativity

This is the first study that explored the role of group members’ intrinsic motivation for children’s and adolescents’ group creativity. The role of motivation in individual creativity received significant attention, and higher levels of intrinsic motivation is argued to be an advantage for the individual creative process (see Amabile, 1996). Previous studies showed that intrinsic motivation directly affects individual and group creativity (Cooper & Jayatilaka, 2006; Hennessey & Amabile, 1998). However, some researchers have shown a weak or non-significant link between intrinsic motivation and creativity in different domains (Amabile et al., 1986; Dewett, 2007; Eisenberger & Aselage, 2009; Perry-Smith, 2006). For instance, Amabile et al. (1986) asked elementary-school children to individually make collages, write stories, and solve puzzles. They found that self-reported intrinsic motivation was not significantly correlated with
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teacher-rated creativity of collages, stories or puzzles. Only children’s choice to spend time on
the task a week later correlated with the creativity of the stories, but not collages or puzzles.

Our results showed that, overall, intrinsic motivation did not predict children’s and
adolescents’ group creativity. There can be several reasons for this. First, although Amabile et al.
(1996) emphasized the critical role of intrinsic motivation for creativity, they also acknowledged
that extrinsic motivation can bring additional benefits. In her theory of “motivational synergy”,
Amabile (1993) differentiated between two types of extrinsic motivation; synergistic extrinsic
motivators (e.g., rewards, recognition, and receiving constructive feedback) and non-synergistic
motivators (e.g., constraints, sense of being controlled, and deadlines). In the current study,
students were told that their stories would be judged by experts and the best story would be
chosen. Hence, rather than intrinsic task motivation, a synergistic extrinsic motivation (i.e., the
drive to get recognition from judges and sense of competition) might have operated more
prominently on group performance. Second, participants’ ages spanned the mid-childhood and
early adolescence years, a transition period associated with many social and emotional changes
(Wigfield et al., 1991), among others a decline in motivation in academic contexts (Anderman &
Maeher, 1994). During that time, adolescents start doubting their competence in school, question
the value of academics, and start putting in less effort (Anderman & Maehr, 1994; Eccles &
Midgley, 1989; Eccles et al., 1993). Thus, participants’ general motivational decline at school
might have negatively affected their motivation towards collaborative story writing.

Theoretical and empirical research proposed that perceptions about skills and competence
have a positive influence on motivation in educational settings (Deci & Ryan, 1985; Eccles &
Wigfield, 1995; Gottfried, 1990), and that this association increases with age (Fredricks &
Eccles, 2002; Wigfield et al., 1997). For instance, Fortier, Vallerand and Guay (1995) tested
Ryan and Deci’s self-determination motivation model with Grade 9 students and found that
higher levels of academic competence were associated with higher levels of academic
motivation. In the current study, both intrinsic motivation and perceived competence were negatively associated with group creativity. Perceived competence level is particularly important for creativity. Beghetto, Kaufmann and Baxter (2011) explored the relation between primary school students’ creative self-efficacy and teachers’ ratings of students’ creativity. While students’ creative self-efficacy declined with age, teachers’ ratings were not changing. We observed a similar trend in the present research as older children reported lower levels of task motivation and perceived competence.

4.3 Creativity-relevant Skills and Group Creativity

In line with our predictions and previous research with adults (Hoever et al., 2012), social perspective coordination, that is, a person’s competence to differentiate and integrate perspectives (Selman et al., 1986) was a positive predictor of participants’ group creativity in a collaborative story writing task. Advancing in psychosocial maturity (i.e., perspective coordination) is a major determinant in how children and adolescents approach and understand others and how they integrate different perspectives (Schultz et al., 2003). Perspective coordination specifically has been shown to play a role in understanding peer relationships (Selman, Watts & Schultz, 1997), risk taking behaviour (Selman et al., 1992), and children’s writing (Dray, Selman & Schultz, 2009).

There might be two reasons why social perspective coordination helps group creativity in children and adolescents. First, good mind reading skills can be helpful in terms of cooperation (Paal & Bereczkei, 2007). Specifically, as children display sophisticated interpersonal understanding towards others’ thoughts, feelings, and motivations, they become capable of moderating their relationships (Selman & Schultz, 1990). This creates a supportive environment within the group (Wolff et al., 2002) and boosts the generation of novel ideas (Taggar, 2002). Second, the creative story writing task requires creative thinking as well as language skills. Some researchers argued that perspective taking is essential in writing narratives as it requires
understanding and persuading an audience about characters’ actions, beliefs and mental states (Eaton, Collis & Lewis, 1999; Fox, 1991). For instance, Fox (1991) showed that 9- to 13-year-olds’ developmental progression of social cognition was depicted in their narratives. Older children and adolescents were able to depict characters’ inner worlds and expressive behaviours with increasing sophistication. Dray et al. (2009) found that 10-year-old children’s social perspective taking and the depth of social awareness conveyed in their narratives were positively associated. Thus, adolescents’ creative story writing might have benefitted from their more advanced social perspective coordinating skills in the current study.

Furthermore, social perspective coordination mediated the relation between age and group creativity. In other words, as children grow, they advance in coordinating perspectives in social relations and hence, groups combined of children with better perspective coordinating skills achieve more creative collaborations. These findings are in line with previous research showing that taking the perspective of others develops with age (Selman & Schultz, 1990). Young children first need to learn how to discuss and how to collaborate (Berkowitz & Gibbs, 1982), and social perspective coordination is a facilitator of that process. Children move from perceiving interactions as a collection of competing views to a perspective where only the validity of knowledge matter (Leman & Duveen, 1996). Once children have become more attentive and inclusive towards others’ ideas, there is more room to generate and share ideas in a group and arrive at novel solutions.

In addition to assessing the relation between group creativity and creativity-relevant skills at the individual level (as social perspective coordination), we were interested in how participants would apply this competence in their interactions. We examined this in two ways in the current study: as transactive dialogue and metacommunication (Goncu, 1993; Kruger, 1992). In contrast to previous findings, our findings displayed no association between transactive dialogue and meta-communication and group creativity. For instance, Azmitia and Montgomery
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(1993) found a positive relation between group transactive statements during scientific problem-solving and children’s individual scientific reasoning skills (measured after group work). Likewise, MacDonald et al. (2000) showed that children’s transactive statements were positively related to the quality of the collaborative musical compositions. The current study was conducted in a different (creative) domain, namely collaborative creative writing, and it is possible that transactive dialogue and metacommunication affect creative collaborations differently in different domains. The topic of domain specificity in (group) creativity is a highly debated topic in research with adults (e.g., Baer & Kaufman, 2005). Han and Marvin (2002) investigated 7- to 8-year-old children’s creative performances in three domains; storytelling, collage making, and math-word problems. The only positive (but not very substantial) association was between storytelling and math-sword problem. Thus, similar to adults, children’s creative abilities might be domain-specific and different processes might underlie group creativity in different domains.

Moreover, surprisingly, younger children were found to use more transactive statements than adolescents, unlike previous research. This finding could be due to age differences in children’s attitudes towards group work. As Leman (2015) suggested, younger children perceive other group members as information sources, while older children approach groups as units that require a cohesive dynamic rather than merely being sources of information. Thus, in the current study, younger children might have merely relied on group members as information sources and therefore might have displayed more transactive communication during group work.

Furthermore, the relationship between group members could be another potential area affecting the use of transactive dialogue. In the current research, although children knew each other before, most groups were composed of class mates rather than close friends, which might affect the frequency of transactive communication. In their study with same gender pairs of 11-12 year olds, Miell and MacDonald (2000) found that best collaborations occur between friends which are characterized by transactive talk. They concluded that: “Asking children with no
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history of relating to each other to work productively together will not be as likely to lead to high quality interactions, perhaps since there will be less transactive communication, at least in their initial work together.” (p.365).

The finding that some aspects of intersubjectivity are negatively related to the outcomes of group collaboration is not without precedent. Some authors (e.g. Gummerum et al., 2013, 2014; Leman, 2015; Leman & Oldham, 2005) found that increased intersubjectivity in children’s interactions was associated with less optimal group collaborative outcomes. Intersubjective exchanges particularly negatively affected performance in tasks where group members had to state and integrate unique information in collaborative recall and group decision-making tasks. Therefore, it appears that intersubjective interactions might affect the sharing and integration of novel information negatively.

Future research should more thoroughly investigate when and why aspects of transactive dialogue and metacommunication affect the development of group creativity. While group work is a key component of many educational curricula, the Thinking Together project (e.g., Dawes et al., 2004) has shown that children need to be systematically instructed in how to work together and construct effective dialogue and exploratory talk to collaborate successfully. Very often, mainstream schools (from which we recruited our participants) tend to not foster the communication and collaboration skills of their pupils.

4.4. Limitations and Implications

While this study revealed important indicative findings concerning the nature of collaborative creativity in children and adolescents, future research is needed to overcome several limitations of the current work. First, taking groups as units of analysis is a challenge for sample size and future research in this area should be based on larger group numbers. Second, in order to maintain experimental control of the research, we did not assist participants during the story writing task. However, especially with younger children, scaffolding particularly their
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dialogue and collaboration skills might be helpful to reveal their creative and collaborative potential (Dawes et al., 2004; Vygotsky, 1997). Yet another limitation is that researching creativity by solely adopting a sociocognitive perspective might not be enough to grasp the complex nature of this concept and underlying processes. Glaveanu (2010) suggested adopting a sociocultural approach and exploring collaborative creativity as a dialogical process. Thus, such an approach would focus on the emerging relationships between group members and their mutual understanding arising from the group process, with relationships, rather than the group product, as the unit of analysis. Finally, an ongoing debate in the field of creativity is teachers’ approach to students’ creative potential. Some researchers stated their concerns about teachers’ incomplete understanding about creativity as well as their inaccurate judgements when characterizing creative students (Karwowski, 2010; Runco & Johnson, 2002). This is why research on children’s creativity should also consider judges with different backgrounds instead of relying solely on teachers.

The findings of the current study have several implications in terms of children’s’ collaboration, especially in educational settings. Simply assigning children to groups is not sufficient to promote cooperation or productivity since collaboration is a demanding process which does not always create the optimal environment of working or learning for them. The Thinking Together project (Dawes et al., 2004) was designed to help children overcome the challenges of collaboration and to develop a positive collaborative environment in primary school classrooms. Similar intervention programs, with a particular focus on creativity, perspective coordination as well as motivation for creativity, could be developed to help children and adolescents. In that sense, a program modelling Thinking Together could also be helpful in understanding the emergence of intersubjectivity in the group and its role within creative collaborations of children.
Both the current and past findings show that especially younger children do not benefit as much from collaboration as older children or adolescents (Berkowitz & Gibbs, 1982). Creative collaborations between younger children might need extra attention of educators. Peer tutoring could be one effective strategy to boost group creativity among children (Cohen, Kulik & Kulik, 1982). Children with different levels of skills can be encouraged to collaborate and teach others simultaneously. Peer tutoring is particularly beneficial for creative writing tasks as it eases the information processing demands of the writing process (Yarrow & Topping, 2001). Moreover, the important role of social perspective coordination skills in group creativity points to the necessity of training children in perspective taking. Educators can try to form groups of children and direct them to integrate others’ thoughts, feelings and needs.

Another area that needs further attention is the motivational aspects of children’s creativity. Especially adolescents in the current research reported lower levels of intrinsic motivation and perceived competence. As mentioned above, children have a tendency to underestimate their creative skills and this can further influence their motivation towards creative tasks. In that sense, facilitating children’s creative self-efficacy could boost their task motivation as well as creative performance. Beghetto (2006) found that students’ creative self-efficacy was positively associated with the feedback they receive from teachers regarding their creative abilities and was negatively associated with students’ perceptions that their teachers did not listen to or gave up on them. Thus, more supportive teachers and inclusive classroom environments would help students reaching their actual creative potential.

4.5. Conclusion.

In conclusion, the results from the current work contributes to the field by highlighting several main points. First, there are age differences in group creativity with groups of adolescents producing more creative outcomes than groups of children. Second, social perspective coordination skills, might be one of the important individual-level processes that underlies
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groups’ creative performance. Third, intrinsic motivation had a weak and negative association with the group creativity of children and adolescents. Further research is required to replicate these findings with different creativity tasks and larger samples. Moreover, both experimental as well as research within the sociocultural approach is needed to understand under what conditions the development of collaborative creativity can be facilitated.
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