Brief Report

The opportunity to collaborate increases preschoolers' motivation for challenging tasks

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ABSTRACT

Collaborating on challenging endeavors is a foundation of human society. Recent research suggests that young children are not only motivated to cooperate with others—for instance, to help others accomplish their goals—but may also be motivated to collaborate with others—to pursue shared goals. However, a primary reason why collaboration is so important is because opportunities to collaborate can bring people together to work hard to overcome challenges. Two studies ($N = 70$) tested whether the collaborative nature of an activity itself can cause preschoolers to enjoy challenging tasks more and to persist longer on them. To isolate the psychological feeling of collaboration, we tested this hypothesis by manipulating purely psychological cues of collaboration; in all cases, children worked while physically alone. Both studies found that such cues substantially increased preschoolers' motivation on a challenging puzzle, including their persistence on and liking for the puzzle, relative to two non-collaborative control conditions. We suggest that an early emerging drive to engage in shared collaborative activities leads children to find collaborative activities to be intrinsically motivating. This may represent an important basis of motivation as children embark on formal schooling.

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Introduction

The tendency to collaborate—to work toward shared goals—is fundamental to human achievement, facilitating everything from everyday business and social transactions to the development of systems

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of math, science, and law (Asch, 1952; Axelrod, 1984; Tomasello, 2009; Vygotsky, 1978). Past research suggests that a drive to collaborate emerges early in life, motivating young children to engage in collaborative social games (Ross & Lollis, 1987; Warneken, Chen, & Tomasello, 2006). We hypothesized that if children have this drive, opportunities to collaborate with another child may inspire young children to work hard on and enjoy challenging tasks. Such a finding would suggest the early emergence of a mechanism that brings humans together to accomplish difficult tasks. Moreover, if this mechanism exists, cues of collaboration may facilitate children's learning and motivation as they begin formal schooling. To identify the causal effect of the experience of collaboration precisely, we tested whether this hypothesis holds even when the cues that signal the opportunity to collaborate are merely symbolic and children work physically alone.

Substantial evidence indicates that young children are motivated to engage in activities with others. For instance, 12-month-olds point informatively to make others aware of something new (Liszkowski, Carpenter, & Tomasello, 2007) or to locate hidden objects (Liszkowski, Carpenter, & Tomasello, 2008), and 14-month-olds imitate others' goal-directed actions (Meltzoff, 1995) and help others to achieve their goals (Over & Carpenter, 2009; Warneken & Tomasello, 2006, 2007). In addition, 2-year-olds are motivated to engage in collaborative social games (Ross & Lollis, 1987; Warneken et al., 2006), urging partners to continue participating even when they can accomplish the task alone (Warneken, Gräfenhain, & Tomasello, 2012).

These findings reflect a family of prosocial motives present early in life. For instance, young children are motivated both to help others—to prosocially facilitate another person's goal pursuit (Warneken & Tomasello, 2006)—and to collaborate—to work toward goals that are shared (Warneken & Tomasello, 2007). As an example of collaboration, 2- and 3-year-olds coordinate their actions to solve simple problems collaboratively; one child may manipulate a handle so another can retrieve an object for both children (Ashley & Tomasello, 1998; Brownell & Carriger, 1990). Suggesting that this behavior relies on the ability to pursue shared goals in a coordinated fashion, the better 2-year-olds understand their own and others' goals (measured by facility with joint attention and language about self and other), the better they coordinate their actions (Brownell, Ramani, & Zerwas, 2006). Notably, collaboration involves helping; people help one another achieve a joint goal. But collaboration goes beyond helping in that people represent the goal as shared and may pursue this goal in their private behavior without overt requests for help (e.g., Carr & Walton, 2013).

Human collaboration differs from related behavior in other primates. Chimpanzees, for instance, may work with others toward mutually beneficial endpoints, but only when it serves their individual interests and a cooperative partner is necessary for success (Warneken et al., 2006). Moreover, nonhuman primates generally do not expect the rewards of cooperative behavior to be shared equally, suggesting that they might not represent this behavior as in pursuit of shared goals (Hamann, Warneken, Greenberg, & Tomasello, 2011).

We hypothesized that as the motivation to collaborate emerges during childhood, not only do children simply want to engage in collaborative activities (e.g., social games) for the sake of doing things "together" (see Tomasello, 2009; Warneken et al., 2012), but also that the collaborative nature of activities can make such activities more enjoyable and worthy of sustained pursuit. If this is the case, opportunities to collaborate may increase young children's motivation for challenging tasks. To test this hypothesis, the current studies assessed classic indexes of achievement motivation: freely chosen persistence on a challenging task and reported enjoyment of the task (see Walton, Cohen, Cwir, & Spencer, 2012). We examined this hypothesis among 4- and 5-year-old children. Children of this age understand the perspectives and goals of others—factors that contribute to their ability to collaborate (Brownell et al., 2006). In addition, such children are about to enter formal schooling, where they will encounter more difficult academic challenges. Thus, identifying factors that can enhance children's motivation for challenging tasks at this age is critical.

To test the effect of opportunities to collaborate, we isolated the psychological experience of collaboration from its physical aspects (see Carr & Walton, 2013). This distinction is critical. If the power of collaboration lies fundamentally in the act of sharing and pursuing a joint goal and this makes tasks more appealing in and of themselves, this should be evident even when the collaborative partner is absent from the child's physical environment and the cues that signal that the activity is collaborative are only symbolic. In contrast, if collaboration is motivating only because of its physical aspects—such

as the pleasure of social interaction or the benefits for task performance—no effect of collaboration should be evident when the collaboration is purely psychological. We do not deny the important role that physical aspects of working together surely play in children's motivation and behavior (see Ramani, 2012). Instead, our focus was on whether the psychological experience of collaborating can itself motivate young children while holding constant physical factors.

To this end, two studies isolated the psychological *sense* of collaboration, manipulating whether children were told that they were working "with" another child on a challenging task or that the other child was working separately from themselves (see Carr & Walton, 2013, for related work with adults). This manipulation holds constant both the physical presence of other children (children worked alone in all cases) and the knowledge that another child had worked on the same task. We predicted that these psychological cues to collaboration would increase children's enjoyment of and motivation for the task.

Experiment 1

In Experiment 1, preschoolers worked alone on a difficult puzzle. We manipulated cues that conveyed either that children were working on the puzzle with another child or simply that the other child had worked on the puzzle previously. We assessed both their freely chosen persistence on the puzzle and self-reported liking of the puzzle (Thomas & Pashley, 1982; see also Master & Walton, 2013).

Method

Participants

Participants were 30 children (4; 0–5; 3 [years; months], M_{age} = 4; 7, 16 girls and 14 boys) at a university preschool. Children were randomly assigned to condition using a stratified procedure based on age and gender. An additional 4 children were excluded (3 in the Psychologically Together condition and 1 in the Psychologically Separate condition) either because of experimenter error (e.g., aberrations in the script) or because they did not pay attention to the video (described below).

Pretest play with puzzles

Children vary in their level of interest in puzzles. Following past research (Master & Walton, 2013), we assessed these individual differences so that we could control for this variability and more accurately assess the effects of the manipulation. We made age-appropriate jigsaw puzzles available to children during free-play time in their classrooms on 3 consecutive school days approximately 2 weeks before children participated in the study, and we recorded how long (if at all) each child worked on the puzzles and how many pieces (if any) each child completed. Confirming the success of random assignment, there was no condition difference on either measure ($ts < 1$). These variables correlated ($r = .90$, $p < .001$), so we standardized and averaged them to create a composite measure of pretest play with puzzles. This measure was positively skewed ($Z = 2.26$, $p = .024$); many children had relatively low levels of interest in puzzles, and a few had more interest. Following standard procedures (Tabachnick & Fidell, 2013), we reduced skew using a natural log transformation ($Z < 1$).

Procedure

Children took part individually. In the Psychologically Together condition, the participating child was shown a photograph of an unfamiliar child approximately 4½ years old and was told that this child (referred to as "Michael" or "Kira," matched to the participant's gender) was working on the puzzle in another room "right now" and that they would do the puzzle "together." The participant then watched a supposedly live (but in fact prerecorded) video of the other child doing a challenging jigsaw puzzle and putting one piece in. The participant was then told that another experimenter was bringing the puzzle over. The experimenter went outside the testing room, "thanked" the other experimenter within earshot of the participant, brought the puzzle into the room, showed the participating child

that the other child had put the first piece in, and reiterated that they were doing the puzzle "together."

In the Psychologically Separate condition, the participating child watched the same video but was told that the other child had worked on the puzzle "a few weeks ago" and that the participant would do the same puzzle. The experimenter then brought out the puzzle and told the child, "This puzzle starts with one piece already in." Thus, in both conditions, the participant began with one piece in.

The primary measure of motivation was participants' freely chosen persistence on the puzzle. This 20-piece puzzle was rated as very difficult for children of this age by preschool staff and had never been seen by participants before the study (i.e., it was an old rare puzzle and was not among the puzzles made available to children during free-play time in their classroom). It was chosen to allow us to assess a standard measure of motivation—time spent working on a difficult task (Thomas & Pashley, 1982). Before beginning, children in both conditions were told, "You can work on the puzzle for as long as you like. Do you see the stop sign? When you're ready to stop and move on to something else, just point to the stop sign." Children were not offered any rewards or incentives for their success on the puzzle. This procedure was designed to ensure that children's persistence—how long they worked on the puzzle before asking to stop—was driven by their own motivation to finish as much of the puzzle as possible rather than by external pressures or expectations (see Master & Walton, 2013). The experimenter sat in the corner of the room. Every 3 min, the experimenter reminded children of the option to stop and added either "You are doing the puzzle together" or "You are doing the puzzle." Only 1 child finished the puzzle in the allotted 10 min; this child was allowed to continue working on a second puzzle.

After children chose to stop or worked for 10 min, the experimenter asked them, "How much did you like the puzzle—not at all, a little, or a lot?" Children's responses were coded from 0 to 2. As a manipulation check, the experimenter then asked whether "Michael" or "Kira" (depending on the gender of the participant) had worked on the puzzle "today or another day." Finally, the experimenter and children completed the puzzle together.

Results

Manipulation check

The manipulation proved to be effective, with 79% of children in the Psychologically Together condition reporting that the other child had done the puzzle "today" and all children in the Psychologically Separate condition reporting that the other child had done the puzzle "another day."

Motivation for puzzles

Outcomes were examined in analyses of covariance (ANCOVAs) controlling for the composite measure of pretest play with puzzles. There was no main or interactive effect of age or gender.
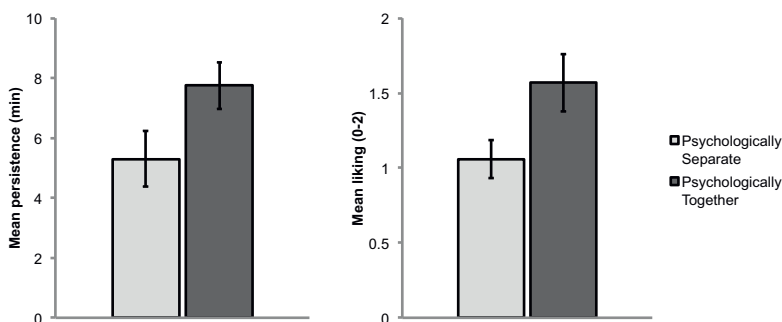

Fig. 1. Children's motivation for the challenging puzzle in Experiment 1. Mean time persisting on the puzzle (left) and mean self-reported liking for the puzzle (right) by condition in Experiment 1 are shown. Error bars represent ±1 standard error.

Persistence. Children persisted more than 2 min longer in the Psychologically Together condition ($M = 7.76$, $SD = 3.03$) than in the Psychologically Separate condition ($M = 5.31$, $SD = 3.55$), a 46% increase, $F(1, 27) = 5.07$, $p = .033$, $d = 0.74$ (see Fig. 1).[1]

Liking. Children reported liking the puzzle more in the Psychologically Together condition ($M = 1.57$, $SD = 0.51$) than in the Psychologically Separate condition ($M = 1.06$, $SD = 0.77$), $F(1, 27) = 6.01$, $p = .021$, $d = 0.78$.

Discussion

In Experiment 1, all children worked alone on a challenging puzzle. But children led to believe that they were working on the puzzle with another child persisted 46% longer and reported liking the puzzle more than children led to believe that they were working separately from the other child. The results suggest that the mere perception of collaboration, even without actual joint activity, motivates young children to work hard on and enjoy challenging tasks. The parallel effects along the measures of persistence and liking provide convergent evidence that the effect reflects an increase in motivation, not alternative processes.

Experiment 2

Experiment 2 sought to replicate this effect while holding constant theoretically incidental aspects of the manipulation such as participants' belief that the other child had worked on the puzzle immediately before them and that the puzzle was being brought to the testing room by the other experimenter. To hold constant such features, Experiment 2 employed a "turn-taking" control condition. The only difference between conditions was whether children were told that they and the other child were "taking turns" or "working together." Notably, all children thus thought that they were engaged in an overarching joint activity with another child—either collaborating or taking turns—but only children in the Psychologically Together condition thought that they were working together toward a shared goal.

Method

Participants

Participants were 40 children (4; 0–5; 5, $M_{age} = 4$; 8, 20 girls and 20 boys). An additional 2 children (both in the Psychologically Together condition) were excluded because of experimenter error.

Pretest play with puzzles

The same pretest measures assessing baseline level of interest in puzzles—time spent and pieces completed—were assessed. There was no condition difference on either ($ts < 1$). As in Experiment 1, these two variables correlated ($r = .96$, $p < .001$) and so were standardized and averaged. The composite measure was again positively skewed ($Z = 3.65$, $p < .001$); skewness was reduced using a natural log transformation ($Z = 1.21$, $p = .23$).

Procedure

Children were randomly assigned to either the Psychologically Together condition used in Experiment 1 or the Turn-Taking condition. The conditions were identical except that children in the Psychologically Together condition were told that they were "doing the puzzle together" and children in the Turn-Taking condition were told that they were "taking turns." All other aspects were identical; each participating child was told that the video was live, the experimenter retrieved the puzzle from

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[1] This analysis and all subsequent analyses were also conducted excluding children who did not pass the manipulation check. All effects remained significant ($p < .05$), with comparable effect sizes.
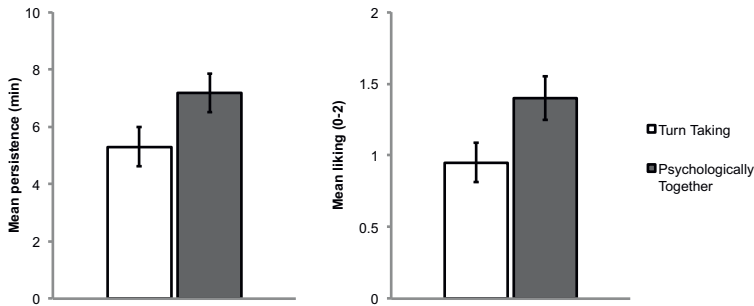
Fig. 2. Children's motivation for the challenging puzzle in Experiment 2. Mean time persisting (left) and mean self-reported liking (right) by condition in Experiment 2 are shown. Error bars represent ±1 standard error.

outside the room and "thanked" the other experimenter within earshot of the participant, and the puzzle always started with the other child having already put one piece in.

Results

Manipulation check

In both conditions, participants understood that the other child had worked on the puzzle immediately prior to themselves, with 85% of children in the Psychologically Together condition and 95% of children in the Turn-Taking condition saying that the other child had worked on the puzzle "today."

Motivation for puzzles

As in Experiment 1, there were no main or interactive effects of age or gender.

Persistence. Children worked on the puzzle nearly 2 min longer in the Psychologically Together condition ($M = 7.18$, $SD = 2.93$) than in the Turn-Taking condition ($M = 5.30$, $SD = 3.03$), a 36% increase, $F(1, 37) = 4.88$, $p = .033$, $d = 0.63$ (see Fig. 2).[2]

Liking. Children reported liking the puzzle more in the Psychologically Together condition ($M = 1.40$, $SD = 0.68$) than in the Turn-Taking condition ($M = 0.95$, $SD = 0.61$), $F(1, 37) = 4.90$, $p = .033$, $d = .70$.

Discussion

Using a second control condition, Experiment 2 replicated the results of Experiment 1. Children told that they were working on a challenging puzzle with another child showed heightened motivation—persisting longer and liking the puzzle more—than children led to believe that they were taking turns. These results provide convergent evidence that opportunities to collaborate increase children's motivation for challenging tasks.[3]

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[2] Note that as in Experiment 1, children were told that they could work on the puzzle for as long as they liked, thereby precluding the notion that children in the Turn-Taking condition might be expected to put only one piece in. Children completed an average of more than five pieces in both conditions, and only 2 children (one in each condition) stopped after completing only one piece.

[3] Although it was not the focus of the current research, an important question concerns whether opportunities to collaborate improve children's task performance. The very difficult puzzle task used here was designed to measure motivation (i.e., persistence), not performance. Nonetheless, when we examined the number of pieces children correctly inserted, the effect was in the same direction as persistence in both studies and, although not significant in either study (Experiment 1: $p = .098$; Experiment 2: $p = .29$), was marginally significant meta-analyzing across studies ($Z = 1.89$, $p = .059$, $d = 0.45$).

General discussion

Two studies demonstrated that merely representing a challenging task as collaborative increases children's enjoyment of and motivation for that task. Preschoolers told that they were collaborating with another child chose to work longer on a challenging puzzle and reported liking it more than children led to believe that they worked separately from the other child. This was the case even though in all cases children worked alone and the cues that evoked the experience of collaboration were purely psychological. Thus, the benefits of collaboration for motivation can arise from just the psychological experience of collaboration.

Several aspects of the studies suggest the robustness of the findings. First, we found effects relative to two different control conditions: one when children were told that another child had worked on the puzzle several weeks previously and another when children were told that they were taking turns on the puzzle with another child. These complementary control conditions help to rule out alternative explanations that could apply to one but not the other (e.g., a mere sense of working on an activity at the same time as another child could contribute to the effect in Experiment 1 but not in Experiment 2). Second, in both studies, the Psychologically Together condition yielded parallel increases in children's behavioral persistence and self-expressed liking for the task, suggesting that the effect involves an increase in motivation rather than alternate processes (e.g., a felt obligation to work hard, which could increase persistence but not liking).

What psychological mechanisms underlie these results? Young children are motivated to and readily develop socially shared goals (Tomasello, Carpenter, Call, Behne, & Moll, 2005). We suggest that the opportunity to collaborate allows a child to pursue a shared goal, which motivates their engagement on the task. Although not directly tested here, several factors support this interpretation. Merely doing the same task as another child did not boost motivation to the same degree, nor did a shared activity that did not involve working together (taking turns). The belief that they were working on the same task as another child was motivating specifically when children felt their engagement to be *shared*— when the task was represented as though it was done together (see also Carr & Walton, 2013). This distinction is consistent with prior research, which also finds that children are highly sensitive to whether a task done in proximity to another child is shared and collaborative or not and shows that this recognition has important consequences for children's expectations about the other child's future behavior (e.g., how fairly they will share resources obtained through the "shared" activity; Hamann et al., 2011). In addition, recent research finds that perceived membership in a social group can lead to similar increases in young children's motivation for shared group-relevant activities (Master & Walton, 2013). Taken together, these findings suggest that as early as 4½ years of age, symbolic cues that evoke an opportunity to collaborate with peers create in children a shared goal that motivates them to work hard on challenging tasks.

One contribution of the current research is to establish a reliable paradigm to investigate the psychological and behavioral effects of collaboration among young children. This opens opportunities for future research. We have suggested that the experience of pursuing shared goals drives increased motivation for collaborative activities. Future research is needed to further investigate the mechanisms underlying this process. For instance, collaboration affords children the opportunity to help another person, which children are highly motivated to do (e.g., Warneken & Tomasello, 2006). Opportunities to collaborate may also allow children to share in and take some credit for each other's successes, leading them to feel a greater sense of enjoyment and accomplishment when they work together. These and other factors may be an important part of this process. Another exciting direction for future research involves moderators. For instance, are opportunities to collaborate across gender, age, and group status lines as motivating for young children as opportunities to collaborate with in-group peers? And might the opportunity to collaborate be as motivating for other types of tasks children might face (e.g., tasks of varying levels of interest, challenge, or complexity)? Finally, how long might the impact of opportunities to collaborate persist, and might continued opportunities to collaborate have positive long-lasting effects?

The power of opportunities to collaborate to affect children's motivation carries important applied implications. Given the recursive nature of school where early outcomes have cascading effects on la-

ter outcomes (Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009; Lepper & Greene, 1978; Obradović, Burt, & Masten, 2010; Yeager & Walton, 2011), it is essential to identify factors that reliably foster motivation in the face of challenge as children enter formal schooling (Heckman, 2006; Master & Walton, 2013). Indeed, sustained effort on challenging tasks leads to continued learning opportunities, better skills and expertise, and greater achievement, which in turn further boosts motivation (Ames & Archer, 1988; Heyman & Dweck, 1992; Hong, Chiu, Dweck, Lin, & Wan, 1999; Lepper & Greene, 1978).

During recent years, much attention has been paid to preschool programs targeting cognitive and self-regulatory development (e.g., Tools of the Mind; Diamond, Barnett, Thomas, & Munro, 2007; Diamond & Lee, 2011; Duckworth, 2011). Although it is not their theoretical focus, these interventions also capitalize on the intrinsically motivating nature of shared activities to encourage children's engagement in enrichment activities such as cooperative learning and role-playing games. It is intriguing to imagine what a preschool program combining a focus on cognitive and self-regulatory development with explicit attention to social relational processes that motivate children to take on challenges—for instance, a spirit of collaboration, perhaps "Tools of Our Minds"—could accomplish.

Acknowledgments

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