

## EMPIRICAL ARTICLE

# Overhearing an adult praise an unseen child for not needing to work hard on an academic task: Implications for belief about effort and ability

Li Zhao<sup>1</sup> | Yi g i g Li<sup>1</sup> | We Qi<sup>2</sup> | Jia ie A e i a<sup>3</sup> | Fa g Fa g<sup>4,5,6</sup> |  
B i a J. C <sup>3</sup> | Gail D. He a <sup>3</sup>

<sup>1</sup>Department of Psychology, Hangzhou Normal University, Hangzhou, P.R. China

<sup>2</sup>Zhejiang Lab, Hangzhou, P.R. China

<sup>3</sup>Department of Psychology, University of California San Diego, La Jolla, California, USA

<sup>4</sup>School of Psychological and Cognitive Sciences and Beijing Key Laboratory of Behavior and Mental Health, Peking University, Beijing, China

<sup>5</sup>Peking-Tsinghua Center for Life Sciences, Peking University, Beijing, China

<sup>6</sup>IDG/McGovern Institute for Brain Research, Peking University, Beijing, China

## Correspondence

Li Zhao, Department of Psychology,  
Hangzhou Normal University, No. 2318  
Yuhangtang Rd, Hangzhou 311121, P.R.  
China.

Email: zhaoli@hznu.edu.cn

Gail D. Heyman, Department of  
Psychology, University of California, San  
Diego, La Jolla, CA 92093, USA  
Email: gheyman@ucsd.edu

Fang Fang, School of Psychological  
and Cognitive Sciences and Beijing Key  
Laboratory of Behavior and Mental  
Health, Peking University, No. 5 Yiheyuan  
Rd, Haidian District, Beijing 100871, P.R.  
China.  
Email: ffang@pku.edu.cn

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## Abstract

This research examined the effects of overhearing an adult praise an unseen child for not needing to work hard on an academic task. Five-year-old Han Chinese children (total  $N = 270$  across three studies; 135 boys, collected 2020–2021) who heard this low effort praise tended to devalue effort relative to a baseline condition in which the overheard conversation lacked evaluative content. In Study 3, low effort praise increased children's endorsement of essentialist beliefs about ability and their interest in becoming the kind of person who does not need to work hard to succeed. The findings show that overhearing evaluative comments about other people, a pervasive feature of daily life, can have a systematic effect on young children's beliefs about achievement.

Developing academic competence requires sustained effort, and children's reasoning about effort and ability has important implications for their willingness to make such an investment in their future success (Muenks et al., 2018; Oyserman & Dawson, 2021). For example, if children treat low-effort success as a marker of high ability (a perspective linked to essentialist beliefs about ability), they may be less willing to persist when they encounter obstacles (Dweck, 2006). To promote adaptive beliefs about achievement it will be necessary to understand

what factors are shaping children's achievement-related beliefs. Here we test the hypothesis that one way ability-related beliefs are transmitted to young children is via overheard comments about others.

Researchers have long recognized that there are distinct patterns of reasoning about the relation between effort and ability that have important implications for achievement motivation (Heyman et al., 2003; Muenks et al., 2018; Rattan et al., 2012). According to what we will refer to as the essentialist view of ability (also known

as the entity, or fixed mindset view), ability is a stable capacity that limits the effectiveness of effort, so effort itself is devalued because it serves as an indicator that one lacks the ability to succeed with ease. In contrast, according to what we will refer to as the non-essentialist view of ability (also known as the incremental, or growth mindset view), ability is a malleable quality, and effort is highly valuable because it allows people to build upon existing skills and acquire new ones. A number of studies have found that the essentialist view of ability is associated with maladaptive motivational responses, such as giving up quickly in the face of obstacles (Blackwell et al., 2007; Robins & Pals, 2002; see Dweck, 2006).

Some prominent achievement motivation researchers have argued that there is no need to be concerned with the negative effects of an essentialist view of ability among young children because children are not intellectually capable of reasoning about ability in this way before about age 10 (see Cimpian, 2017). Much of the evidence for this position comes from research by Nicholls and colleagues (e.g., Nicholls & Miller, 1984), who found that younger children judge individuals who appear to work hard to achieve an outcome to be smarter than individuals who appear to achieve the same outcome without working hard, which is the reverse of the pattern seen among older children. Nicholls and colleagues concluded that young children view effort and outcomes as indistinguishable, or think that effort alone determines outcomes. According to this account, young children are unable to conceive of ability as limiting the effectiveness of effort, and this protects them from negative motivational outcomes associated with an essentialist conception of ability (Nicholls & Miller, 1984).

More recent findings with less cognitively demanding methodologies suggest that rather than being a late-emerging developmental phenomenon, children begin to show essentialist reasoning about ability by age 5 (Heyman & Compton, 2006; Heyman et al., 2003; Muradoglu & Cimpian, 2020; see Cimpian, 2017). For example, by this age children consider someone who completes a task with ease to be smarter than someone who completes the same task with difficulty (Heyman et al., 2003; Heyman & Compton, 2006; Muradoglu & Cimpian, 2020), which indicates they understand that needing to exert greater effort than others to complete a task has negative implications for one's level of ability. Furthermore, many young children endorse the idea that "some children could never be smart at school," which suggests they believe there are individual differences that can limit the effectiveness of effort (Heyman & Compton, 2006; Muradoglu & Cimpian, 2020). The evidence that young children appear to be capable of reasoning about ability in both essentialist and non-essentialist ways raises questions about what factors determine the mode of reasoning they will adopt.

Social learning theory posits that children are influenced by attitudes that adults convey (Bandura, 1971;

Ma et al., 2018; Rhodes et al., 2012), and linguistic cues are an important mode of transmission of essentialist beliefs about people (Gelman & Heyman, 1999; Gelman et al., 2010; see Dunlea & Heiphetz, 2021). For example, Gelman and Heyman (1999) found that 5- and 7-year-old children judged novel descriptions of people (such as that someone eats carrots) in a more essentialized way when identified with a noun label (e.g., *she is a carrot-eater*) than with a verbal predicate (e.g., *she eats carrots whenever she can*). The use of generic language also facilitates essentialist reasoning. For example, when Rhodes et al. (2012) gave 3- to 5-year-olds generic statements about novel beings called Zarpies, they were more likely to infer that a property they learned about one Zarpie could be generalized to other Zarpies if they had first heard a generic statement (e.g., *Zarpies are scared of ladybugs*) as compared to a non-generic statement (e.g., *this Zarpie is scared of ladybugs*).

There is evidence of linguistic effects on children's reasoning about ability (Cimpian et al., 2007; Gunderson et al., 2013; Mueller & Dweck, 1998; Pomerantz & Kempner, 2013; Zentall & Morris, 2010). For example, in the Mueller and Dweck (1998) study, an experimenter told fifth graders they had done well on a matrix task regardless of how they had actually performed. Children who were praised with reference to their ability (*you must be smart at these problems*) were more likely to later report viewing intelligence in an essentialist way than were children who were praised with reference to their effort (*you must have worked hard at these problems*). A study by Gunderson et al. (2013) suggests that sensitivity to self-relevant evaluations emerges early. They examined the types of praise parents spontaneously gave to their 14- to 38-month-old children, and found that process praise (e.g., *nice try*) was associated with the same children holding a less essentialist view of ability years later, when they were age 7 or 8.

These studies that investigated linguistic influences on children's achievement-related beliefs all focused on a relatively narrow range of contexts, in that the participant was the subject of the message, and the message was communicated to him or her directly. Such messages are likely to be highly salient to children as they try to make sense of their own experiences. In addition, messages that take this form may implicitly communicate that the speaker considers the information to be meaningful and relevant to the child's life (Sperber & Wilson, 1987). Whether evaluative comments that are not overtly self-relevant can also impact children's achievement-related beliefs remains to be seen. This possibility is important to assess, because many and perhaps most of the evaluative comments that children are exposed to concern others, such as relatives, classmates, or strangers. A primary goal of this study is to determine whether evaluative comments must be self-relevant for them to systematically affect children's achievement-relevant beliefs.

Theoretical accounts of gossip and language socialization (Baumeister et al., 2004; Miller et al., 2012;

Sperry et al., 2019) suggest that evaluative comments can be rich sources of social information even if they are not directly self-relevant. In line with this possibility, recent experimental research suggests that young children's moral behavior and beliefs can be influenced by overhearing evaluative comments about others (Lane et al., 2020; Qin et al., 2020; Sai et al., 2020). For example, Lane et al. (2020) found that 4- to 9-year-old children who overheard an experimenter making negative comments about a novel social group developed more negative attitudes about the group.

The present research examines whether evaluative comments that lack any obvious self-relevance also have implications for children's achievement-related beliefs. We addressed this issue among a population of children in China. This population was chosen to examine the development of these beliefs in non-Western cultures. We were particularly interested in examining children in China in light of prior work on the moral significance of learning in Chinese culture (Li, 2005; Ng et al., 2013).

In each of three studies, we addressed this question among a sample of 5-year-olds by looking at the effects of praising someone for completing a task without needing to work hard. Our primary hypothesis was that hearing this statement would lead children to view the need to exert effort more negatively, which is consistent with holding an essentialist view of ability. We tested this hypothesis by comparing children's responses in a low effort praise condition to the responses of children in a baseline overheard conversation condition that did not contain any effort-related information. In addition, we were interested in exploring the effects of praise for high effort. We thought that high effort praise might lead children to value effort to a greater extent because it might persuade children to view effort as more praiseworthy.

## STUDY 1

At the beginning of the experimental session, children overheard a phone conversation in which the experimenter discussed a child who had been tested earlier. The conversation took place as participants were led to believe that they were waiting for the session to begin, and the content of the conversation was manipulated between subjects. For the children who were assigned to the experimental *low effort praise* condition, the conversation described the earlier participant as correctly answering many hard math problems, finding the problems easy, and not having to work hard. Two other conditions were also included. One was a *baseline* condition, which was included for purpose of comparison to allow us to assess our hypothesis that the low effort praise condition would lead to more negative views of effort exertion. In this baseline condition, the conversation was similar in length but there was no mention of effort or achievement. The other was a *high effort praise* condition, which

was included for exploratory purposes. In this condition, the conversation was the same as in the *low effort praise* condition except that the earlier participant was described as finding the problems hard and having to work hard to complete them.

After the experimenter completed the phone call, she told the participant that it was time for the study to begin, and she told them about two different children: one who completed a jigsaw puzzle effortlessly, and one who worked hard to complete the same task. She asked the participant to identify which of these children is more deserving of a reward, and which is smarter. See the Online Supplementary Materials: Part 1 for manipulations and measures in both English and Chinese.

## Method

### Participants

The research plan for all studies in this paper was approved by the Scientific Research Ethics Committee of Hangzhou Normal University. Parents or legal guardians gave informed consent to allow their children to participate, and children gave their oral assent prior to participating in the study.

To determine the sample size we conducted a power analysis in which we focused on the question of key theoretical interest: the contrast between the experimental low effort praise condition and the baseline condition. Our primary dependent measure was the percentage of children who identified the hardworking student as more deserving of a reward, and we estimated it as 75% in the experimental condition and 40% in the baseline condition. These estimates were based on previous findings regarding the effects of overheard conversation on children's generosity (Qin et al., 2020). The analysis yielded a minimum of 30 participants per condition to achieve a condition effect with a power of 0.80, an alpha at 0.05, and an enrollment ratio of 1.

In Study 1, as well as in the other studies, all eligible children in each classroom who were in attendance on testing days were given the opportunity to participate. The only exception was that data collection was stopped as soon as we reached the planned number of participants in each study. The final sample consisted of 90 5-year-old children ( $M = 66.68$  months,  $SD = 2.73$  months; range = 62.89 to 72.59 months; 45 boys) who attended a preschool in Hangzhou, a city located in eastern China, with 30 children randomly assigned to each of the three conditions. An additional six children were excluded from the study because they failed a manipulation check concerning the contents of the overheard conversation. All participants were Han Chinese and from a school that served children from middle socioeconomic status backgrounds. The sessions were conducted in Modern Standard Mandarin Chinese. Data collection for Study

1 took place from November 3, 2020, to November 24, 2020.

## Procedure

Children were tested in individual sessions by an adult female experimenter in a quiet area of their school. After the experimenter introduced herself to the child her phone rang, and she pretended to take the call. In each condition, the experimenter began the call by saying, "Hi! I am playing games with a child... I'm doing well. You mean this piece of paper? I'm holding this paper right now." What she said next varied by condition.

### *Effort manipulation*

In the low effort praise condition, the experimenter finished the call by saying, "You know, I gave a kid so many hard math problems today, and that kid got all of the questions right. That kid thought the questions were so easy and didn't even have to work hard. That kid is so awesome." In the baseline condition she finished the call by saying, "You know, the kid who has just finished these math problems moved here from a faraway place. That kid's family just moved here six months ago." Finally, in the high effort praise condition she finished the call by saying, "You know, I gave a kid so many hard math problems today, and that kid got all the questions right. That kid thought the questions were really difficult and worked so hard to solve them. That kid is so awesome."

### *Differential effort story*

After the experimenter completed the phone call, she explained that it was time to begin the study. She then told the child about two students who successfully completed the same jigsaw puzzle with differing levels of effort. She illustrated the story with two color photos that showed a pair of students whose gender matched the participant's gender (note: all of the descriptions of measures in this paper assume that the participant is female). Both the order of the photos and names of the two children were counterbalanced. For example, girls were told, "These girls both did a puzzle with me. I gave them ten minutes, and they both finished the puzzle. This is Lili [pointing to one of the photos]. Lili worked very hard to complete the puzzle. This is Honghong [pointing to the other photo]. Honghong did not work hard to complete the puzzle. Because both Lili and Honghong completed the puzzle, they both received a sticker as a reward." See Online Supplementary Materials: Figure S1 for an illustration of the stimuli that participants were shown.

### *Test of story details*

The experimenter then asked the child three questions that were designed to confirm that they understood the details of the story: (1) "Which student worked hard to complete the puzzle and which child did not work hard

to complete the puzzle? (2) "Did both students complete the puzzle?" (3) "Did they get the same reward?" The majority (94.4%) of participants correctly answered all three questions on their first attempt. When children gave an incorrect response, the experimenter went over the story with them again and repeated the questions. At that point all participants were able to answer the questions correctly.

### *Dependent measures*

Next, the child was presented with two dependent measures: the *effort-reward assessment* and the *effort-intelligence assessment*. Because children often use merit cues when they distribute rewards in ways that benefit some individuals over others (Baumard et al., 2012), we used a reward distribution measure as an index of whether children would consider low-effort achievement or high-effort achievement to be more meritorious. Specifically, the experimenter presented two identical envelopes and placed one next to each photo. She said, "Look, I have an extra sticker here. I want to make this extra sticker a bonus. Will you please help me decide which of the two students to give it to? Because this is an extra sticker, you can give it to either student. It's totally up to you. When you decide which student will get the sticker. Please put the sticker into the envelope next to the photo, and then I will send it to the child you choose." For the effort-intelligence assessment, participants were asked: "Which of these two students do you think is smarter?" Participants responded by pointing to one of the two photos or by saying the student's name.

### *Effort manipulation check*

Participants were asked a series of questions at the end of the session about what they overheard the experimenter say on the phone. Children in the baseline condition were asked, "What did I say on the phone? When I mentioned the kid who did math problems, did I say that kid moved here from a faraway place, or did I say that kid has been studying here?" Ba.6 (n19g2.6 (i.3 )-172 Td)-31.6 (1 (a)-21.3625 Tm

the IRB review committee determined that there was not sufficient evidence that such an intervention would be helpful to children in a Chinese context.

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Preliminary analyses indicated no significant main effects or interactions involving gender in this study, or in either of the subsequent studies ( $ps > .10$ ), so the data were collapsed across this factor. We then conducted a set of binary logistic regression analyses that were both confirmatory (because they tested our hypothesis regarding the baseline and low effort praise conditions) and exploratory (because they allowed us to explore the effect of high effort praise). SPSS 25.0 (IBM Corp.) was used to conduct all of the following data analyses.

### Effort-reward assessment

As shown in [Figure 1](#), 76.7% of children in the low effort praise condition gave the extra sticker to the student who did not have to work hard. This rate was greater than the rate for children in the baseline condition (40%), but surprisingly it was similar to the high effort praise condition (63.3%).

To test whether the rates in the two effort praise conditions were significantly different from the rate in the baseline condition, we conducted a binary logistic regression analysis on the effort-reward assessment (0 = the student who worked hard, 1 = the student who did not have to work hard), with condition (specified as a categorical variable and dummy coded automatically in SPSS) entered as the only predictor. The regression model was significant,  $\chi^2(2, N = 90) = 8.74, p = .013$ ,

$-2\text{Log likelihood} = 112.41$ , Nagelkerke  $R^2 = 0.13$ , as was the condition effect ( $Wald = 8.15, df = 2, p = .017$ ). A priori comparisons with the baseline condition as reference showed that children in the low effort praise condition were significantly more likely than those in the baseline condition to give the extra sticker to the student who did not have to work hard (76.7% vs. 40%,  $\beta = 1.60, SE \beta = 0.57, Wald = 7.82, df = 1, p = .005, OR = 4.93, 95\% CI = 1.61\text{--}15.07$ ). The difference was marginally significant when comparing the high effort praise condition to the baseline condition (63.3% vs. 40%,  $\beta = 0.95, SE \beta = 0.53, Wald = 3.21, df = 1, p = .073, OR = 2.59, 95\% CI = 0.91\text{--}7.34$ ).

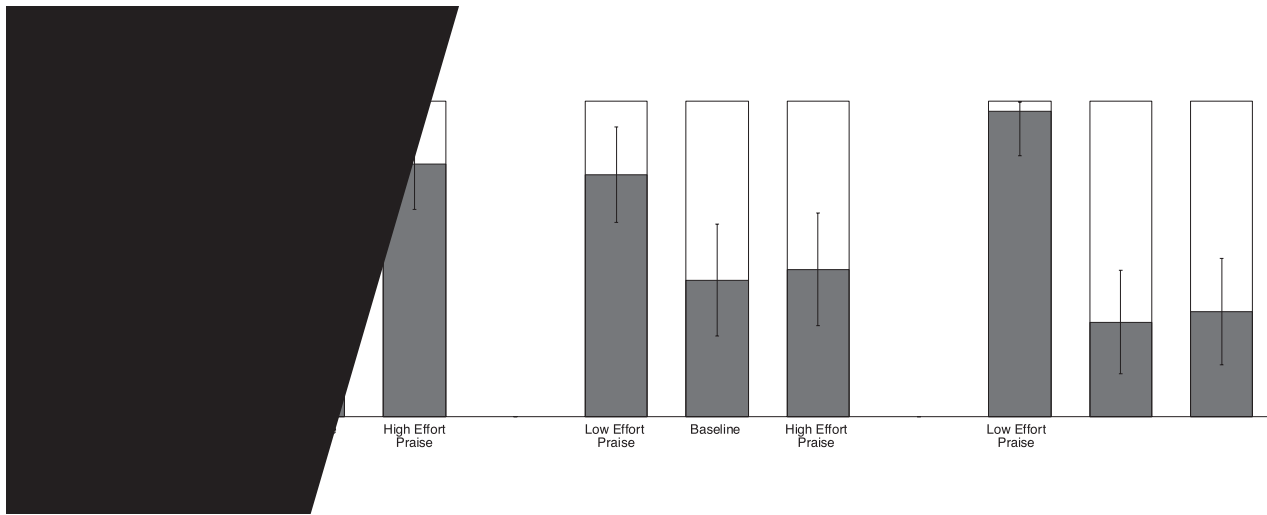
We then specified a post hoc test to compare between the two effort praise conditions. However, it revealed that there was no significant difference between the two effort praise conditions (76.7% vs. 63.3%,  $\beta = 0.64, SE \beta = 0.57, Wald = 1.25, df = 1, p = .263, OR = 1.90, 95\% CI = 0.62\text{--}5.86$ ).

### Effort-intelligence assessment

As shown in [Figure 2](#), results of the effort-intelligence assessment resembled the pattern that was seen in the effort-reward assessment. Specifically, 83.3% of the children in the low effort praise condition rated the student who did not have to work hard as smarter. This rate was greater than the rate for children in the baseline condition (56.7%), but again it was comparable to the rate for children in the high effort praise condition (80%).

A binary logistic regression analysis yielded results that were similar to those seen for the effort-reward assessment. The model was significant,  $\chi^2(2, N = 90) = 6.27, p = .043, -2\text{Log likelihood} = 98.11$ , Nagelkerke  $R^2 = 0.10$ , as was the condition effect ( $Wald = 6.15, df = 2, p = .046$ ).

**FIGURE 1** Results of the effort-reward assessment in Studies 1, 2, and 3, showing the percentage of children in each condition who gave the sticker to the student who did not have to work hard. Error bars: 95% CI. \*Denotes  $p < .05$ , \*\*denotes  $p < .01$



**FIGURE 2** Results of the effort-intelligence assessment in Studies 1, 2, and 3, showing the percentage of children in each condition who judged the student who did not have to work hard to be smarter. Error bars: 95% CI. \*Denotes  $p < .05$ , \*\*\*denotes  $p < .001$

A priori comparisons with the baseline condition as reference showed that children in the low effort praise condition were more likely to judge the student who did not have to work hard as smarter (83.3% vs. 56.7%,  $\beta = 1.34$ ,  $SE \beta = 0.61$ ,  $Wald = 4.79$ ,  $df = 1$ ,  $p = .029$ ,  $OR = 3.82$ , 95% CI = 1.15–12.71). This difference was marginally significant when the high effort condition was compared to the baseline condition (80% vs. 56.7%,  $\beta = 1.12$ ,  $SE \beta = 0.59$ ,  $Wald = 3.63$ ,  $df = 1$ ,  $p = .057$ ,  $OR = 3.06$ , 95% CI = 0.97–9.66).

Again, a post hoc test was then conducted to compare between the two effort praise conditions, which yielded no significant difference between the two conditions (83.3% vs. 80%,  $\beta = 0.22$ ,  $SE \beta = 0.67$ ,  $Wald = 0.11$ ,  $df = 1$ ,  $p = .739$ ,  $OR = 1.25$ , 95% CI = 0.34–4.64).

In sum, in line with our hypothesis, participants showed the predicted low effort praise effect, at least when compared with the baseline condition: those in the low effort praise condition, who heard a child being praised for succeeding with ease, demonstrated a more negative view of effort than did children in the baseline condition. This was the case even though the conversation children heard was about a different task (math problems) than the one they were asked to reason about (a jigsaw puzzle). This condition difference was observed on both of the dependent measures, and it is consistent with our predictions. However, the experimenter explicitly mentioned that the student perceived the math problems to be easy, and this information about perceived difficulty might have scaffolded children's ability to reason in essentialist ways (Heyman et al., 2003; Heyman & Compton, 2006; Muradoglu & Cimpian, 2020).

In contrast, the results of our exploratory examination of the effects of high effort praise were not expected: children in this condition showed a devaluation of effort that was comparable to the effects observed in response to low effort praise. One possible explanation is that both effort praise manipulations included comments about

the student's successful performance, and it is possible that these comments prompted children to focus on the importance of appearing smart rather than the evaluative comments about effort (see Good & Shaw, 2021).

## STUDY 2

Study 2 was designed to assess whether the low effort praise effect in Study 1, in which children in the low effort praise condition showed evidence of more essentialist reasoning than children in the baseline condition, would replicate without any explicit reference to perceived difficulty in the low effort praise condition. A second goal was to determine whether low effort praise and high effort praise would have systematically different effects if the manipulation made no overt reference to the previous child's actual level of performance.

## Method

### Participants

Following the preregistration for this study (<https://aspredicted.org/blind.php?x=2ub883>), we tested 90 5-year-old children from the same preschool as in Study 1, ( $M = 69.66$  months,  $SD = 3.31$  months; range = 63.45 to 75.35 months; 45 boys), with 30 children randomly assigned to each of the three conditions. An additional two children were excluded for failing a manipulation check question concerning the contents of the overheard conversation. Data collection took place from December 28, 2020, to January 20, 2021. We also collected data from an additional sample of 60 4-year-olds, and the results showed a similar but weaker pattern (see Online Supplementary Materials: Part 2 for details).

## Procedure

The procedure was the same as in Study 1, except for the wording of the effort manipulation portion of the overheard conversation, in which references to perceived difficulty and the performance outcome were eliminated. The *low effort praise* manipulation was, “Yeah, I played with another kid earlier. I gave that kid some math problems. You know what—that kid never even had to work hard. That kid didn't have to try at all. That kid is awesome.” The *baseline* condition was identical to the one used in Study 1 except that it did not specify when the child's family moved from a faraway place. The *high effort praise* manipulation was, “Yeah, I played with another kid earlier. I gave that kid some math problems. You know what—that kid worked so hard. That kid tried and tried. That kid is awesome.” The manipulation check was the same as the one used in Study 1. On the test of story details, 93.3% got all three questions right the first time, and all children who did not get them all right the first time passed the check the second time.

## Results

As in Study 1, we conducted a set of binary logistic regression analyses that were both confirmatory (because they tested our hypothesis regarding the baseline and low effort praise conditions) and exploratory (because they allowed us to explore the effect of the new high effort praise condition).

### Effort-reward assessment

As shown in [Figure 1](#), 66.7% of the children in the low effort praise condition gave the extra sticker to the student who did not have to work hard, which was higher than in the baseline condition (23.3%) and the high effort praise condition (40.0%).

We conducted a binary logistic regression analysis with condition as the only predictor. The model was significant,  $\chi^2(2, N = 90) = 11.99, p = .002$ ,  $-2\text{Log likelihood} = 111.17$ , Nagelkerke  $R^2 = 0.17$ , and that the condition effect was also significant ( $Wald = 10.84, df = 2, p = .004$ ). A priori comparisons with the baseline condition as reference showed that children in the low effort praise condition were more likely than those in the baseline condition to give the extra sticker to the student who did not have to work hard (66.7% vs. 23.3%,  $\beta = 1.88, SE \beta = 0.58, Wald = 10.54, df = 1, p = .001, OR = 6.57, 95\% CI = 1.03-11.85$ ).

## STUDY 3

The primary goal of Study 3 was to examine whether children might make an even broader set of inferences about ability and effort based on overhearing praise for a student who did not have to work hard. To this end, we included the same dependent variables as in first two studies and added two new ones. In one new measure, we more directly assessed essentialist beliefs about ability by asking participants whether they believe that some students can never achieve at the highest levels no matter how hard they try (Heyman & Compton, 2006). In a second new measure, we asked participants whether they want to be the kind of person who achieves success by working hard, or the kind of person who achieves success without needing to work hard. This allowed us to assess whether children are capable of using comments they hear about someone else to change how they think about themselves (Meltzoff, 2013).

We also explored two additional questions. One examined the effects of performance praise, given our speculation that the lack of a difference between the low effort praise and high effort praise conditions in Study 1 might be due to the explicit reference to the student's performance on math problems in the overheard conversation.

A final goal of Study 3 was to explore the possibility that the low effort praise effect might be driven by children's desire to gain the experimenter's approval (see Heyman et al., 2021). To address this question, we modified the effort-reward assessment to make it appear that the experimenter would not be able to see how children had responded.

We expected that children in the low effort praise condition would still show more negative views of effort on the measures included in the previous studies and also respond in ways associated with more negative views of ability on the new measures (i.e., more likely to report that some students can never achieve at the highest levels no matter how hard they try, and more likely to want to be the kind of person who achieves success without needing to work hard).

## Method

### Participants

Following the preregistration for Study 3 ([https://aspre-dicted.org/95J\\_7B4](https://aspre-dicted.org/95J_7B4)), we tested 90 5-year-olds from the same preschool as in Studies 1 and 2 ( $M = 67.02$  months,  $SD = 2.65$  months; range = 62.04 to 71.77 months; 45 boys), with 30 children randomly assigned to each condition. An additional three children were tested but excluded from the study because they failed a manipulation check concerning the contents of the overheard conversation. Data collection took place from October 25, 2021 to November 12, 2021.

### Procedure

The procedure was the same as that of Study 2, except for three changes. First, the high effort praise condition was replaced by a *performance praise alone* condition. Second, the effort-reward assessment measure was revised so that children would believe they were responding anonymously. Third, two new dependent measures were added to assess whether the low effort praise manipulation would have a greater effect on children's essentialist and self-relevant beliefs than the baseline manipulation.

In the performance praise alone condition, the effort manipulation was, "Yeah, I played with another kid earlier. I gave that kid some math problems. You know what—that kid got all the questions right. That kid is awesome."

In the revised effort-reward assessment, the task was the same as in the first two studies, except that participants were led to believe their response would be anonymous. Specifically, just before the participant made the sticker allocation the experimenter said that she needed to leave the room to deal with an emergency. Before she left, she instructed the participant to put the sticker into the envelope corresponding to the student that the participant wanted to give it to, seal it with tape, and put both envelopes in an opaque box. The experimenter then said, "Later today another teacher I don't know will come in and take the box away and give the envelopes to the children. Therefore, neither the teacher nor I will know who you gave the stickers to. Also, neither of the students will know you were the one who sent the envelopes, and the two students don't even know each other, so they won't know what is in each other's envelope."

As a comprehension check, children were asked: (1) "Will I know who you gave the stickers to?" (2) "Will the two children know who gave them the stickers?" (3) "Will anyone know who you give the stickers to?" Almost all of the children (95.6%) answered these questions correctly, and the others got them right after a second attempt. Next, the experimenter left the room for 2 min and immediately after returning she asked a new *essentialist belief assessment*: "Do you think that anyone who works hard could be one of the smartest in the class or that some kids can try and try and never be one of the smartest in the class?" Finally, the experimenter asked the new *self-relevant assessment*: "Would you rather be the kind of kid who works hard to get things right or the kind of kid who gets things right without having to work hard?"

At the end of the session, participants were asked a series of manipulation check questions. In the baseline condition and the low effort praise condition, the questions were identical to those in Studies 1 and 2. In the new performance praise alone condition, they were asked, "What did I say on the phone? When I mentioned the kid who did math problems, did I say that kid got all the questions right or did not get all the questions right?" On the test of story details, 96.7% got all three questions right the first time,



and the children who did not get all of them right the first time got all of them right the second time.

## Revisiting the additional

As in Studies 1 and 2, we conducted a set of binary logistic regression analyses that were both confirmatory (because they tested our hypothesis regarding the baseline and low effort praise conditions) and exploratory (because they allowed us to explore the effect of the new performance praise condition).

### Effort-reward assessment

As shown in Figure 1, 70.0% of the children in the low effort praise condition gave the extra sticker to the student who did not have to work hard, as compared to only 26.7% in the baseline condition and 43.3% in the performance praise alone condition.

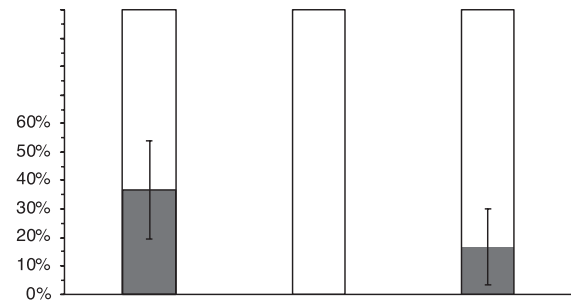
We conducted a binary logistic regression analysis with condition as the only predictor. The model was significant,  $\chi^2(2, N = 90) = 11.87, p = .003$ ,  $-2\text{Log likelihood} = 112.50$ , Nagelkerke  $R^2 = 0.17$ , and that the condition effect was also significant ( $Wald = 10.72, df = 2, p = .005$ ). A priori comparisons with the baseline condition as reference showed that children in the low effort praise condition were more likely than those in the baseline condition to give the extra sticker to the student who did not have to work hard (70% vs. 26.7%,  $\beta = 1.86, SE \beta = 0.57, Wald = 10.50, df = 1, p = .001, OR = 6.42, 95\% CI = 2.08\text{--}19.76$ ). In contrast, there was no significant difference between the performance praise alone condition and the baseline condition (43.3% vs. 26.7%,  $\beta = 0.74, SE \beta = 0.55, Wald = 1.80, df = 1, p = .179, OR = 2.10, 95\% CI = 0.71\text{--}6.22$ ).

We then conducted a post hoc test, which showed that children in the low effort praise condition were significantly more likely than those in the performance praise alone condition to give the sticker to the student who did not have to work hard (70% vs. 43.3%,  $\beta = 1.12, SE \beta = 0.54, Wald = 4.23, df = 1, p = .040, OR = 3.05, 95\% CI = 1.05\text{--}8.84$ ).

### Effort-intelligence assessment

As shown in Figure 2, 96.7% of the children in the low effort praise condition judged the student who did not have to work hard to be smarter, as compared with only 30% in the baseline condition and 33.3% in the performance praise alone condition.

Following the preregistration for this study, we ran a binary logistic regression analysis. The model was significant,  $\chi^2(2, N = 90) = 40.76, p = .001$ ,  $-2\text{Log likelihood} = 83.61$ , Nagelkerke  $R^2 = 0.49$ , as was the condition



**FIGURE 3** Results of the essentialism belief measure, showing the percentage of participants who believed that some children can never be one of the smartest in the class. Error bars: 95% CI. \*\*\*Denotes  $p < .001$

effect ( $Wald = 15.46, df = 2, p = .001$ ). A priori comparisons with the baseline condition as reference showed that children in the low effort praise condition were more likely than those in the baseline condition to judge the student who did not have to work hard to be smarter (96.7% vs. 30%,  $\beta = 4.22, SE \beta = 1.09, Wald = 14.89, df = 1, p = .001, OR = 67.67, 95\% CI = 7.95\text{--}575.68$ ), but there was no such difference between the performance praise alone condition and the baseline condition (33.3% vs. 30%,  $\beta = 0.15, SE \beta = 0.56, Wald = 0.08, df = 1, p = .781, OR = 1.17, 95\% CI = 0.39\text{--}3.47$ ).

We then did a post hoc comparison, which showed that children in the low effort praise condition were also significantly more likely than those in the performance praise alone condition to judge the student who did not have to work hard to be smarter (96.7% vs. 33.3%,  $\beta = 4.06, SE \beta = 1.09, Wald = 13.92, df = 1, p = .001, OR = 58, 95\% CI = 6.87\text{--}489.58$ ).

### Essentialist belief assessment

As shown in Figure 3, 36.7% of the children in the low effort praise condition agreed that some kids can never be one of the smartest in the class no matter how hard they try, as compared to 0% in the baseline condition and 16.7% in the performance praise alone condition.

As specified in our preregistration, because a logistic regression model failed to converge, we ran a chi-squared analysis to test the condition effect, and it revealed that children in the low effort praise condition endorsed an essentialist view of ability more than children in the baseline condition ( $\chi^2 [1, N = 60] = 13.47, p = .001$ ). In contrast, responses in the baseline condition did not significantly differ from the performance praise alone condition ( $\chi^2 [1, N = 60] = 3.49, p = .062$ ) and there was no significant difference between the performance praise alone condition and the low effort praise condition ( $\chi^2 [1, N = 60] = 3.07, p = .080$ ).

## Self-relevant assessment

As shown in Figure 4, 73.3% of the children in the low effort praise condition reported that they want to be the kind of kid who gets things right without having to work hard, as compared to 10% in the baseline condition and 20% in the performance praise alone condition.

We conducted a binary logistic regression analysis to examine the condition effect. The model was significant,  $\chi^2(2, N = 90) = 31.59, p = .001$ ,  $-2\text{Log likelihood} = 84.32$ , Nagelkerke  $R^2 = 0.41$  as was the condition effect ( $Wald = 24.95, df = 2, p = .001$ ). A priori comparisons with the baseline condition as reference showed that children in the low effort praise condition were more likely than those in the baseline condition to report that they would rather succeed without having to work hard (73.3% vs. 10%,  $\beta = 3.21, SE \beta = 0.74, Wald = 19.04, df = 1, p = .001, OR = 24.75, 95\% CI = 5.86\text{--}104.61$ ), but there was no significant difference between the performance praise alone condition and the baseline condition (20% vs. 10%,  $\beta = 0.81, SE \beta = 0.76, Wald = 1.14, p = .29$ ).

to a greater extent. The fact that in Study 3, children who were only exposed to praise for performance showed similar views of effort as those in the baseline condition further suggests that overt references to performance cannot explain children's response to high effort praise.

It is likely that to account for the effects of both high effort and low effort praise we will need to consider how children draw upon their beliefs and experiences to interpret information that is conveyed by others (Amemiya & Wang, 2018; Qin et al., 2020; see also Harris et al., 2018; Marble & Boseovski, 2020). We propose that overheard conversation is likely to change children's beliefs only in a narrow set of circumstances. For example, it is unlikely to change their beliefs if the information being communicated is already widely assumed to be the predominant belief (e.g., that punching people for no reason is bad) or one that almost everyone would reject (e.g., that punching people for no reason is good). We also propose that overheard conversation can activate certain concepts without stating them directly, just as the statement "girls are as good as boys at math" can activate a preexisting belief that boys are better at math than girls are (Chestnut & Markman, 2018). In the context of the present research, it may well be that because children already know that teachers highly value effort, our manipulation gives them little new information. However, when combined with praise for another child's success, it may activate their preexisting understanding that it is good to be able to perform without having to work hard, by indicating that some adults treat positive outcomes differently when they are achieved with a high versus a low level of effort. These ideas will need to be tested in future research.

The low effort praise effect that we found is consistent with evidence of social learning via overheard conversation that has recently been documented among 4- and 5-year-olds in other domains (Lane et al., 2020; Qin et al., 2020; Sai et al., 2020; Zhao et al., 2020). For example, Qin et al. (2020) found that overhearing an adult praising a peer's generosity led 5-year-old children to show a higher level of generosity, and Lane et al. (2020) found that overhearing an adult make negative comments about a novel social group led 4- to 9-year-old children to develop more negative attitudes about the group. The present findings show that this form of learning can also shape achievement-relevant beliefs in systematic ways.

Our findings also provide evidence that young children can make rich inferences and generalizations in the achievement domain. To demonstrate the observed low effort praise effect, children not only had to attend to information that was not directed at them, but also use the information they had overheard regarding another child's math achievement to inform their judgments of different students on a different task.

Our findings have significant theoretical implications. First, they link social learning theory (Bandura, 1971)

to theoretical work positing that evaluative comments about other people dramatically expand the opportunities for social learning beyond what can be experienced or observed directly (Baumeister et al., 2004). Second, they add to our understanding of the types of linguistic cues that promote psychological essentialism (Gelman, 2004). Finally, the results of Study 3 regarding the effect of low effort praise on children's aspirations contribute to theoretical work in social cognitive development on the role of generalizations from others to the self (Meltzoff, 2013).

The present results, along with other evidence regarding drawbacks of exposing children to ability praise (Mueller & Dweck, 1998; Zhao et al., 2017), have practical implications as well. They suggest that praising a child for his or her ability, or for not having to work hard, may lead that child as well as any observers to be more likely to adopt essentialist beliefs, which are linked to maladaptive patterns of motivational response (e.g., Blackwell et al., 2007). It seems reasonable to caution parents and educators that the effects of evaluative comments they make can extend beyond the child they are addressing. These findings also suggest that it is important for researchers who are investigating the effects of evaluative comments to conduct targeted debriefings to address any possible maladaptive beliefs that might be introduced by the experimental manipulations.

Our findings have implications for children's social interactions, achievement motivation, and identity development (Cimpian, 2017; Good & Shaw, 2021). As noted by Oyserman and Dawson (2021), a norm of a succeeding

diligence in Chinese culture may make a difference, but other cultural factors are likely to matter as well. One such factor is the strong emphasis on academic achievement in Chinese culture, with academic achievement having strong implications for social status (Li & Wang, 2004), and learning being viewed as having moral significance (Li, 2005; Ng et al., 2013). Starting in early childhood, Chinese parents tend to convey high expectations for their children's performance, and these expectations have important implications for parent–child interactions (Ng & Wei, 2020). For example, Chinese mothers are more likely than mothers in the United States to adjust the level of warmth they express toward their children based on their academic performance (Ng et al., 2019). Such cultural factors may motivate children to pay close attention to cues about what is valued in this domain (Heyman et al., 2021).

Future research will also be needed to determine the effects of presenting low effort praise in other forms, such as praising participants directly for not having to work hard. Recent studies suggest that this form of praise might have an even stronger effect on children's beliefs than overheard comments (Lane et al., 2020; Li & Koenig, 2020). However, it is possible that the opposite pattern might be seen in some cases, such as when direct communication leads a child to suspect that the speaker has an ulterior motive.

The ability to learn from testimony vastly expands children's opportunities for social learning beyond what is available from direct experience alone (Gelman, 2009; Harris et al., 2018; Skinner et al., 2020). The present research demonstrates the breadth of these learning opportunities by showing that children can make broad and systematic inferences based on overhearing an unfamiliar adult comment on the performance of an unseen child they have never met. These comments influence children's beliefs about exerting effort and what it means to be smart, as well as the kind of person they strive to be, and therefore are likely to shape how they weigh the costs and benefits of exerting the sustained effort that developing academic competence requires.

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University, No. 5 Yiheyuan Rd, Haidian District, Beijing 100871, PR China (Email: ffang@pku.edu.cn), Co-first author: Y. Li (Email: liyingying@stu.hznu.edu.cn).

## DATA AVAILABILITY STATEMENT

The dataset of this study will be published in *Data in Brief*.

## ETHICS STATEMENT

This research was approved by the Scientific Research Ethics Committee of Hangzhou Normal University, China (IRB 2019-010).

## ORCID

Li Zhao  <https://orcid.org/0000-0003-3286-4041>

Jamie Amemiya  <https://orcid.org/0000-0001-6946-4717>

Gail D. Heyman  <https://orcid.org/0000-0001-7764-3205>

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## SUPPORTING INFORMATION

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