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Effort Self-Talk Benefits the Mathematics Performance of Children With Negative Competence Beliefs

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Children with negative competence beliefs often achieve below their potential in school. This randomized field experiment tested whether engaging in positive self-talk may benefit these children's mathematics performance. Participants ($N = 212$, Grades 4–6, $M_{\text{age}} = 10.6$) worked on the first half of a standardized mathematics test, engaged in effort self-talk ("I will do my very best!"), ability self-talk ("I am very good at this!"), or no self-talk, and worked on the second half of the test. Compared to both the conditions, effort self-talk benefited the performance of children holding negative competence beliefs: It severed the association between negative competence beliefs and poor performance. By internally asserting that they will deliver effort, children with negative competence beliefs can optimize their achievement in school.

Children who hold negative beliefs about their competence often underachieve in school (Huang, 2011; Weidinger, Steinmayr, & Spinath, 2018). We tested whether a relatively simple mental activity—silently saying favorable, encouraging things to oneself, or *positive self-talk*—could benefit these children's achievement. Parents and teachers are often advised to encourage children to repeat positive self-statements (e.g., "I'll do well!"), such as when working on an academic test (Pears, Kim, Healey, Yoerger, & Fisher, 2015; Snyder, Lopez, Shorey, Rand, & Feldman, 2003). For example, the parenting advice web site theottoolbox.com (Kids Positive Self-Talk, n.d.) recommends to let children pick positive self-statements that speak to them (e.g., "I can do this," "I am smart," or "Yes, I can"), and help them mentally repeat these statements. And indeed, children themselves report that they make use of positive self-talk (Berk, 1986; Lee & McDonough, 2014; Rohrkemper, 1986). Still, an empirical understanding of whether positive self-talk can benefit children's school achievement is lacking. In the current randomized field experiment, we examined whether positive self-talk benefits children's performance on a standardized mathematics test, especially for those who seem to need it the most: the

ones who think negatively of their own competence.

Self-Talk

From young age, children talk to themselves. Toddlers and preschoolers often do so out loud. As Vygotsky (1934/1962) observed, such private speech helps young children self-regulate (e.g., focus their attention, guide their behavior), especially when they work on challenging tasks (Diaz & Berk, 2014; Harris, 1990; Winsler, 2009). From early to middle childhood onward, children continue to talk to themselves, but they increasingly do so internally, in silence. We refer to such mental speech as *self-talk* (also known as *inner speech* or *internal dialogue*; Alderson-Day & Fernyhough, 2015; Sokolov, 2012). As documented using questionnaires, experience sampling, and thought-listing techniques, children engage in self-talk for various reasons, such as to express their inner experience

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("oh no!"), regulate their inner experience ("stay calm now"), enliven their imaginative play ("Messi dribbles, shoots, . . . and scores!"), guide their everyday action ("turn left here"), or structure their schoolwork ("I need to check my work"). Here we focus on *positive* self-talk—self-talk that serves as self-validation (i.e., endorsement of one's positive qualities) or self-encouragement.

Two lines of research have explored children's positive self-talk in domains other than school achievement. One line has shown that engaging in positive self-talk can improve children's performance in sports such as handball (Zourbanos, Hatzigeorgiadis, Bardas, & Theodorakis, 2013a), soccer (Zourbanos, Hatzigeorgiadis, Bardas, & Theodorakis, 2013b), and swimming (Zetou, Nikolaos, & Evaggelos, 2014). Another line of research has shown that children who habitually engage in positive self-talk experience higher levels of subjective well-being. Conversely, those who habitually engage in more negative self-talk (e.g., self-talk that emphasizes incompetence, failure, or personal harm) experience elevated symptoms of anxiety and depression (Ronan & Kendall, 1997; Rudy, Davis, & Matthews, 2012; Safren et al., 2000).

Still little is known as to whether or how positive self-talk may impact children's school achievement. Although correlational work suggests that children's use of positive self-talk is associated with higher levels of academic self-concept (Burnett, 1999, 2003), research that addresses associations with actual school achievement is lacking. Furthermore, from correlational work, we cannot be sure whether positive self-talk actually causes or merely follows from (or happens to be associated with) school adjustment—experimental designs are needed to address this question.

Effort Versus Ability Self-Talk

We propose that positive self-talk may have differential effects on children's school achievement, depending on its contents. One form of positive self-talk, which we label *ability self-talk*, validates children's competence or efficacy on a task (Rohrkemper, 1986). Children engage in ability self-talk when they say such things to themselves as "I can do this" or "I'm very good at this." Popular self-help parenting books (e.g., Bloch & Merrit, 2003), parenting advice web sites (e.g., theotttoolbox.com), and parent training programs (Pears et al., 2015) advise parents to encourage children to use ability self-talk. The assumption is that, in performance settings, ability self-talk imbues children

with the sense of competence that they need to achieve up to their potential.

However, psychological and educational theory suggest that ability self-talk may not benefit children's achievement. In particular, the implicit theories literature shows that, when children focus on the importance of their inherent ability while working on tasks, they may become afraid of failure and are more likely to underperform (Dweck & Leggett, 1988; Mueller & Dweck, 1998; Paunesku et al., 2015; Pomerantz, Ng, & Wang, 2006). For example, when they are praised for their ability, children may be more likely to avoid challenges and give up in the face of setbacks (Mueller & Dweck, 1998). This may be especially true for children with negative competence beliefs, who fear that failure would reveal their low ability (Ahmed, Minnaert, Kuyper, & van der Werf, 2012; Brummelman, Crocker & Bushman, 2016). Thus, by making ability salient, ability self-talk may fail to benefit children's performance.

What, then, might be a helpful alternative? One possibility would be for children to engage in forms of positive self-talk that steer them away from focusing on their ability, and toward task-relevant strategies, such as effort. *Effort self-talk* encourages children to try their best and work hard on a task. For example, children engage in effort self-talk when they say such things to themselves as "I'll do my very best" or "I'll try hard." Because children with negative competence beliefs are concerned that failure may reveal their low ability, challenging tasks may lead them to worry, to use ineffective strategies, or even to give up, resulting in deteriorating performance (Dweck & Leggett, 1988; Krapp, 2005). By emphasizing effort instead of ability, effort self-talk may lead children with negative competence beliefs to be less concerned about their ability, instead becoming more focused on effective strategies, and thus sustaining on-task performance.

Present Experiment

In this randomized field experiment, we examined, for the first time, the causal effects of positive self-talk on children's mathematics performance. We studied children in Grades 4–6. In late childhood, negative self-perceptions of competence on school tasks, including mathematics, become increasingly prevalent (Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002), and contribute to underachievement (Guay, Marsh, & Boivin, 2003; Weidinger et al., 2018). We studied the effects of positive self-talk in terms of children's mathematics performance—not only because of the central

importance of mathematics to the curriculum, but also because mathematics performance is known to be compromised by negative competence beliefs (Ambady, Shih, Kim, & Pittinsky, 2001; Beilock, 2008; Skaalvik & Skaalvik, 2008).

Children first reported their competence beliefs, and worked on the first half of a standardized mathematics test. They were then randomly assigned to engage in either effort, ability, or no self-talk. Immediately after, they completed the remainder of the standardized mathematics test. We predicted that effort self-talk, but not ability self-talk, would benefit the mathematics performance of children with negative competence beliefs. To explore whether these effects were unique to negative competence beliefs (rather than negative self-beliefs more broadly), we contrasted the putative moderating role of competence beliefs with that of global self-worth.

This experiment was part of a larger research project on self-talk and children's task performance. We report all data exclusions (if any) and all manipulations. We report all measures included to answer the current research question. No other data from the project have been published thus far.

Method

Participants

Participants were 212 children (44% girls), aged 9–13 years ($M = 10.60$, $SD = 1.08$), and 91.5% were of Dutch origin. They were recruited from Grades 4–6 of four primary schools serving middle class communities in the Netherlands. Of the 235 children who were eligible for participation (i.e., those who were in the relevant grade levels at the participating schools), 16 were absent on at least one of the 2 days that the study took place, five did not receive informed parental consent, and two did not complete the mathematics test.

Procedure

A few days prior to the experiment, we administered a self-report survey in children's classrooms. We assessed competence beliefs using two scales: (a) the three-item *Self-Concept in Mathematics* subscale (sample item: "I have always done well in mathematics") of the Organization for Economic Cooperation and Development's Student Approaches to Learning questionnaire (Marsh, Hau, Artelt, Baumert, & Peschar, 2006; $0 = disagree$, $3 = agree$; $M = 1.62$, $SD = 0.92$, $\alpha = .89$); and (b) the

six-item *Scholastic Competence* subscale (sample item: "Some kids feel that they are very good at their school work") of the Self-Perception Profile for Children (Harter, 1985; $0 = I am not like these kids at all$, $3 = I am exactly like these kids$; $M = 1.70$, $SD = 0.53$, $\alpha = .70$). Given that the scales were highly correlated ($r = .64$, $p < .001$), we standardized their scores and aggregated them into a composite competence beliefs score. To examine the specificity of our findings, we also assessed children's global self-worth using the six-item *Global Self-Worth* subscale (sample item: "Some kids like the kind of person they are") of the Self-Perception Profile for Children ($0 = I am not like these kids at all$, $3 = I am exactly like these kids$; $M = 2.33$, $SD = 0.53$, $\alpha = .76$).

The experiment proper was conducted in children's regular classrooms. The experimenter asked children to place their desks away from each other, so they could not see each other's work. She then handed out sealed envelopes containing (a) the baseline mathematics problems, (b) the written instructions to guide children through the manipulation, and (c) the postmanipulation mathematics problems. Children were verbally instructed when they could work on each of these materials, and they were kept blind to the fact that there were multiple conditions. The experimenter and the regular class teacher, who were unaware of condition assignment, remained in class during the test to ensure children were on-task.

The mathematics problems comprised grade-appropriate versions of the CITO-test—a national standardized test used in Dutch primary schools to monitor students' mathematics performance (Jansen, Scheltens, & Kraemer, 2005). All grade-versions of the test cover addition and subtraction, multiplication and division, and mathematics application problems. The Grade 5 and 6 versions of the test additionally cover measurement and proportion problems.

Children completed the first 16 mathematics problems (i.e., baseline performance; $M_{\text{correct answers [between-grade range]}} = 10.28$ – 11.08 , $SD = 2.69$ – 3.39 , $\alpha = .67$ – $.79$). Next, the written instructions invited children to sit back and make themselves comfortable. Children were randomly assigned (on an individual basis, within their class) to engage in effort self-talk ($N = 69$), ability self-talk ($N = 73$), or no self-talk ($N = 70$). In the self-talk conditions, children were requested to "think of the second part of the test and quietly say to yourself [I WILL DO MY VERY BEST!]/[I AM VERY GOOD AT THIS!]," in the effort and ability self-talk

conditions, respectively. They were then instructed to “keep thinking about the second half of the test (say, for about 30 s) and quietly repeat [I WILL DO MY VERY BEST!]/[I AM VERY GOOD AT THIS!].” Next, children were requested to write down the phrase they had just said to themselves, and they were encouraged to quietly repeat the phrase while working on the second part of the test, “especially if you find a problem challenging.” In the control condition, children were simply requested to think of the second part of the test, and they received no other instructions. Finally, children completed the remaining 16 mathematics problems (i.e., postmanipulation performance, $M_{\text{correct answers}}$ [between-grade range] = 10.52–11.24, $SD = 2.74$ – 3.62 , $\alpha = .71$ – $.80$). For each grade level, children’s performance at baseline and postmanipulation was the same, $ps \geq .452$, $\eta_p^2s \leq .008$. After all children had completed the problems, they were debriefed, and thanked for participation.

Data Analysis

We conducted our primary analyses using hierarchical multiple regression. Postmanipulation mathematics performance (i.e., correctly solved mathematics problems, grade-level standardized) served as the dependent variable. We entered baseline mathematics performance in Step 1, and the competence beliefs aggregate in Step 2. In the first analysis, we entered the effort versus no self-talk contrast in Step 3, and its interaction with competence beliefs in Step 4. In the second and third analyses, we replaced the main and interactive effects for this contrast with those for the ability versus no self-talk contrast, and the effort versus ability self-talk contrast, respectively. We conducted separate analyses to avoid multicollinearity problems.

Children who had not followed self-talk instructions (i.e., those who failed to write down the self-talk phrase in which they were requested to engage: two children in the effort self-talk condition and one in the ability self-talk condition) were excluded from the analyses. There were no univariate outliers ($z > 3.29$) on competence beliefs, global self-worth, or postmanipulation mathematics performance. There was one on baseline mathematics performance; however, exclusion of this outlier did not affect the findings, so we retained it. Furthermore, there were no multivariate outliers (Cook’s distance > 1.00) in predicting mathematics performance.

Results

Preliminary Analyses

Table 1 presents descriptive statistics for the variables. We found no differences between conditions in children’s baseline mathematics performance, self-beliefs (i.e., competence beliefs, global self-worth), age, and sex distribution. Random assignment to conditions was effective.

There were no sex differences in children’s mathematics performance (i.e., aggregated across baseline and postmanipulation performance) but, replicating previous findings (Harter, 2015; Marsh, 1989), boys held more favorable competence beliefs, $F = 17.145$, $p = .005$, $\eta_p^2 = .076$, and tended to have higher global self-worth, $F = 3.505$, $p = .063$, $\eta_p^2 = .017$. None of the main findings were moderated by sex.

Primary Analyses

Children’s baseline mathematics performance and competence beliefs were associated with better postmanipulation mathematics performance, $t = 15.810$, $p < .001$, $b = .742$, and $t = 5.077$, $p < .001$, $b = .148$, respectively.

The effort versus no self-talk contrast main effect (i.e., first analysis) was significant, $t = 2.254$, $p = .025$, $b = .122$. Separate analyses by condition showed that, in the effort self-talk condition, children’s mathematics performance improved from baseline to postmanipulation (i.e., within-person change), $\Delta = .158$, $SD = 0.643$, $F = 4.021$, $p = .049$, $\eta_p^2 = .057$. In the no self-talk control condition, it did not, $\Delta = -.128$, $SD = 0.748$, $F = 2.041$, $p = .158$, $\eta_p^2 = .029$. The other self-talk contrast main effects (i.e., second and third analyses) were not significant. Table S1 presents descriptive statistics for mathematics performance (baseline and postmanipulation) in each of the self-talk conditions.

More important, the predicted interaction of the effort versus no self-talk contrast with competence beliefs was significant, $t = -2.471$, $p = .014$, $b = -.077$ (Figure 1). We probed the interaction using simple slopes (Holmbeck, 2002) and regions of significance analyses (Hayes, 2017; Johnson & Neyman, 1936). As hypothesized, engaging in effort self-talk (compared to no self-talk) benefited the performance of children holding negative competence beliefs (1 SD below the mean, $t = 3.353$, $p = .001$, $b = .245$), but not that of children holding positive competence beliefs (1 SD above the mean, $t = -0.412$, $p = .681$, $b = -.034$). Specifically, the effect of effort self-talk on mathematics performance

Table 1
Descriptive Statistics and Zero-Order Correlations

	Range	M	SD	Zero-order correlations						
				1.	2.	3.	4.	5.	6.	7.
1. Self-concept in mathematics	0.00 to 3.00	1.61	0.92	—	.65**	.91**	.21*	.57**	.63**	-.10
2. Perceived scholastic competence	0.33 to 3.00	1.70	0.53	—	—	.91**	.39**	.43**	.46**	-.10
3. Competence beliefs (aggregate)	-4.35 to 3.96	0.00	1.82	—	—	—	.33**	.55**	.60**	-.11
4. Global self-worth	0.83 to 3.00	2.33	0.52	—	—	—	—	.08	.10	.03
5. Math performance, baseline (grade-level standardized)	-3.30 to 1.84	0.00	1.00	—	—	—	—	—	.74**	-.07
6. Math performance, postmanipulation (grade-level standardized)	-2.98 to 1.76	0.00	1.00	—	—	—	—	—	—	-.08
7. Age	9.82 to 13.14	10.60	1.08	—	—	—	—	—	—	—

* $p < .01$. ** $p < .001$.

was significant for children whose competence beliefs were at the 49th percentile or lower.

Furthermore, whereas the interaction of the ability versus no self-talk contrast and competence beliefs was not significant, $t = -0.541$, $p = .589$,

$b = -.016$, the analogous interaction involving the effort versus ability self-talk contrast was, $t = -2.084$, $p = .038$, $b = -.064$ (Figure 1). Engaging in effort self-talk (compared to ability self-talk) benefited the performance of children holding negative

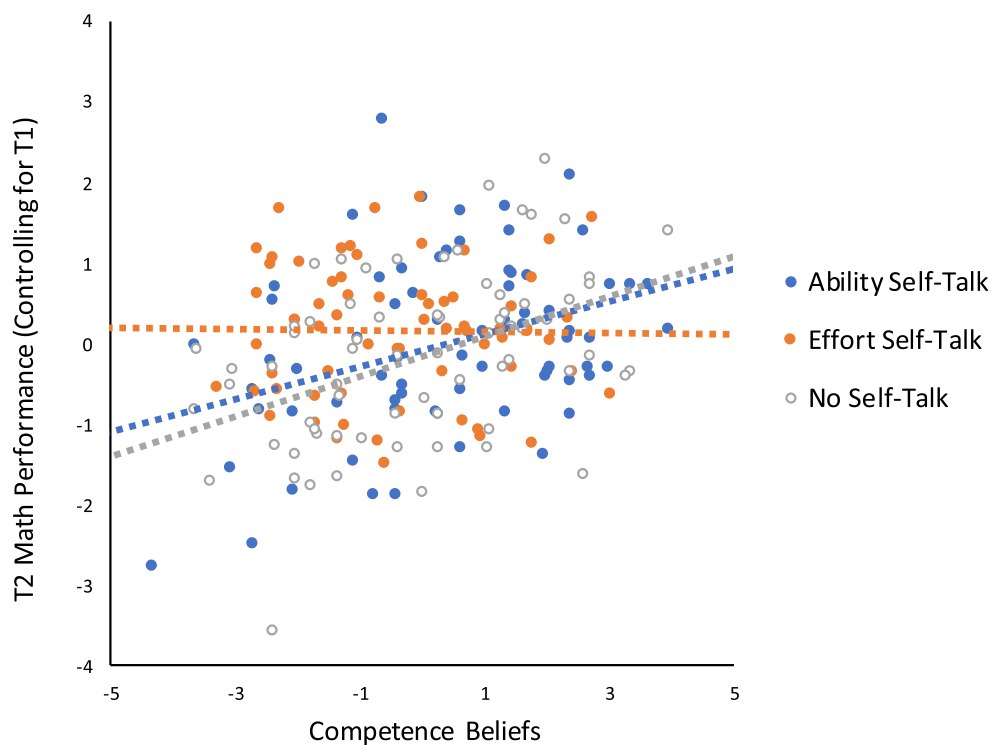


Figure 1. The effects of self-talk condition on children's mathematics performance (i.e., standardized residual change from baseline to postmanipulation), depending on children's competence belief levels. There were no multivariate outliers for these variables. Exclusion of the univariate baseline mathematics performance outlier did not affect our findings. Table S2 presents the predicted mathematics performance means for children with low and high levels of competence beliefs (1 SD below and above the mean, respectively) in each condition.

competence beliefs (1 *SD* below the mean, $t = 2.798$, $p = .006$, $b = .215$), but not that of children holding positive competence beliefs (1*SD* above the mean, $t = -0.230$, $p = .818$, $b = -.018$). Specifically, the effect of effort self-talk was significant for children whose competence beliefs were at the 47th percentile or lower.

To explore further the nature of these interactions, we ran regressions testing associations between competence beliefs and change in mathematics performance separately for conditions. In the ability and the no self-talk control conditions, more negative competence beliefs were associated with worsened overtime performance, $t = 3.569$, $p = .001$, $b = .189$ and $t = 4.514$, $p < .001$, $b = .214$, respectively. In the effort self-talk condition, however, children's competence beliefs were unrelated to their task performance, $t = 0.251$, $p = .802$, $b = .013$. Thus, effort self-talk (but not ability self-talk) benefited the mathematics performance of children with negative competence beliefs, to the extent that it allowed them to keep their performance up to par.

Specificity Analyses

To explore the specificity of our findings, we repeated our primary analyses, but replaced the competence beliefs aggregate with global self-worth (which correlated moderately with competence beliefs, $r = .328$, $p < .001$). Neither the main effect of global self-worth, $t = 1.028$, $p = .305$, $b = .092$, nor its interactions with any of the self-talk contrasts, $ts \leq |1.240|$, $ps \geq .216$, $bs \leq |.136|$, were significant. Thus, effort self-talk specifically benefits the mathematics performance of children who think negatively of their competence, not of children who hold more general negative self-belief.

Robustness Analyses

To ease interpretation, we aggregated the highly correlated measures of self-concept in mathematics and self-perceived scholastic competence. Importantly, when analyzed separately, the component measures yielded similar results. The main effects of self-concept in mathematics and self-perceived scholastic competence were significant, $ts \geq 3.270$, $ps \leq .001$, $bs \geq .166$, and so were the interactions of these measures with the effort versus no self-talk contrast, $ts \leq -2.475$, $ps \leq .014$, $bs \leq -.134$, and the effort versus ability self-talk contrast, $ts \leq -2.019$, $ps \leq .045$, $bs \leq -.118$. Thus, the findings do not hinge on aggregation of the moderator, attesting to their robustness.

Discussion

We examined whether positive self-talk can benefit children's mathematics performance. We found that engaging in effort self-talk—silently repeating self-statements that encourage investment or hard work—can improve children's mathematics performance. The benefits of effort self-talk were especially pronounced for children who held negative competence beliefs: Engaging in effort self-talk helped these children sustain their level of performance, and prevented deteriorating performance that otherwise occurred. By contrast, engaging in ability self-talk—silently repeating self-statements that validate one's competence—did not benefit children's mathematics performance, regardless of their competence beliefs. These findings suggest that effort self-talk may be an effective tool that children with negative competence beliefs may implement in their everyday lives to help self-regulate their task performance.

Explanations and Implications

What accounts for these findings? When children with negative competence beliefs work on mathematics problems, they are prone to anticipate and worry about failure. They experience challenge (e.g., a difficult problem to solve) as a signal that they lack ability, triggering disengagement from the task and worsening performance (Dweck & Leggett, 1988; Schunk & Pajares, 2005). Effort self-talk may counter this process. By engaging in effort self-talk, children shift their attention away from their perceived (lack of) ability—a quality that is beyond their control—toward a quality that they can control: investing effort. Of course, this does not mean that self-talk focusing on effort is necessarily *unique* as a helpful alternative to ability self-talk—self-talk that encourages children to try out new learning strategies, for example, may be equally helpful (Dweck, 2015). Our research does illustrate, however, how a temporal, self-initiated focus on effort allows children who doubt their ability to keep their performance up to par.

We note that youth occasionally hold counterproductive beliefs about effort—they may think that individuals who work hard have low ability. Such beliefs seem especially prevalent among adolescents, perhaps because secondary schools often value innate ability and adolescents are aware of ability stereotypes (Amemiya & Wang, 2018). In our sample of primary school children, however, we found no indication that engaging in effort

self-talk had any counterproductive effects in terms of children's performance.

Why did *ability* self-talk—which directly challenges negative competence beliefs—fail to confer any benefits? We argue that, in line with social judgment theory (Sherif & Hovland, 1961; Wood, Perunovic, & Lee, 2009), children with negative competence beliefs, who are prone to experiencing self-doubt and stress, dismissed the core message that ability self-talk seeks to convey (i.e., I am competent). Instead, by engaging in ability self-talk, these children kept focusing their attention on their (presumed lack of) ability, allowing deteriorating performance to occur. Interestingly, although children with *positive* competence beliefs may be more likely to accept ability self-talk as realistic (i.e., ability self-talk is more consistent with their habitual beliefs and thus more likely to be within their “latitude of acceptance;” Sherif & Hovland, 1961), they did not benefit from it either. This suggests that self-talk benefits mathematics performance to the extent that it removes a psychological barrier that otherwise hinders performance; we found no evidence that self-talk further enhances the performance of children who already perform up to their potential.

Our findings concur with a broader line of research on how messages that focus on the *process* (e.g., effort, strategies) underlying performance may benefit children's achievement. For example, research has shown that when children are praised for their effort on a task, this may help them bounce back from setbacks (Mueller & Dweck, 1998; Xing, Gao, Jiang, Archer, & Liu, 2018), and that teaching parents to deliver more effort praise benefits children's reading and writing achievement over time (Andersen & Nielsen, 2016). Interestingly, there is some evidence that the benefits of such a process focus may be especially pronounced for students with negative competence beliefs (Pomerantz et al., 2006)—consistent with our finding that effort self-talk benefits those with negative competence beliefs, who, without intervention, performed worse than others. What sets self-talk aside from known process-focused strategies is that it is a self-regulation strategy which children can implement spontaneously in their everyday lives, without adult intervention.

Our research contributes to a growing body of literature on how targeted psychological interventions—including interventions that steer children away from focusing on the importance of “being able” and “performing well”—can raise achievement in mathematics and other academic subjects

(Hulleman & Harackiewicz, 2009; Paunesku et al., 2015; Ramirez & Beilock, 2011; Yeager & Walton, 2011). These interventions exert their effects by precisely targeting the thoughts, feelings, or beliefs that otherwise hamper the performance of underperforming students (e.g., mathematics anxiety, or the belief that ability is fixed). Our work builds on this literature by providing a proof-of-concept technique that may help counter the mathematics underperformance of students holding negative competence beliefs.

Strengths, Limitations, and Future Directions

We tested, for the first time, the causal effects of effort and ability self-talk on children's mathematics performance. We did so via a randomized field experiment, conducted in the natural context of children's regular classrooms, and targeting children's performance on a standardized mathematics test. Our findings speak to how educators and parents can help students who doubt their ability to do well in school.

An important question for future research is to identify the boundary conditions under which self-talk exerts its effects. For example, we tested children in Grades 4–6, a time when negative competence beliefs are relatively prevalent and known to contribute to underperformance. We do not know whether self-talk exerts similar effects among children of other ages. It is possible that self-talk already influences mathematics performance from the moment children begin to form the first conceptions of their mathematics ability, in the early school years (Marsh, Ellis, & Craven, 2002). Research will need to test this possibility.

Similarly, research could test potential cultural differences in the performance benefits of self-talk. For example, the ways in which adults tend to respond to children's performance differs across cultures. In some cultures, such as China (Ng, Pomerantz, & Lam, 2007), adults tend to emphasize children's failures more than their successes (e.g., by talking about children's lack of ability or effort). It seems possible that the effects of effort self-talk may be especially pronounced in such “failure-focused” cultures, if it helps children with negative competence beliefs overcome the imminent and salient threat of failure that otherwise puts a strain on their performance.

We invited participants to engage in self-talk from a first-person (“I”) perspective. Research in adults has shown, however, that engaging in self-talk from a nonfirst-person perspective (e.g., by

using one's own name to refer to the self) can help people control their thoughts and feelings under stress, by means of the psychological distance it creates (Kross et al., 2014). An important question is whether the effects of effort self-talk generalize, or may be amplified, when engaged in from a non-first-person perspective.

Finally, our research was not designed to identify the exact working mechanism that drives the benefits of effort self-talk. A valuable direction for future work would be to test whether it is the act of engaging in effort self-talk per se, or rather the moment of reflection on effort that it instigates, which accounts for its beneficial effects.

Conclusion

Saying is believing—or is it? One might think that, when children with negative competence beliefs internally assert their ability while they work on a task, they will feel more competent, which should benefit their performance. Instead, the present research found that these children's mathematics performance benefits from internally asserting that they will deliver effort. The findings contribute to our understanding of how children with negative competence beliefs can self-regulate and optimize their learning and achievement in school.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Table S1. Descriptive Statistics for Baseline and Post-Manipulation Mathematics Performance, Separated by Condition

Table S2. Predicted Means for Mathematics Performance (i.e., Standardized Residual Change from Baseline to Post-Manipulation) at Low and High Levels of Competence Beliefs, Separated by Condition