Reading intervention with a growth mindset approach improves children's skills

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Laboratory experiments have shown that parents who believe their child's abilities are fixed engage with their child in unconstructive, performance-oriented ways. We show that children of parents with such "fixed mindsets" have lower reading skills, even after controlling for the child's previous abilities and the parents' socioeconomic status. In a large-scale randomized field trial ($N_{classrooms}$ = 72; $N_{children}$ = 1,587) conducted by public authorities, parents receiving a reading intervention were told about the malleability of their child's reading abilities and how to support their child by praising his/her effort rather than his/her performance. This low-cost intervention increased the reading and writing achievements of all participating children—not least immigrant children with non-Western backgrounds and children with low-educated mothers. As expected, effects were even bigger for parents who before the intervention had a fixed mindset.

education | parent intervention | randomized controlled trial | reading intervention | parental beliefs

Across the world, family background explains a substantial variation in children's abilities (1), and there is substantial variation in how and how often parents spend time with their children (2). There may, therefore, be a large potential in supporting parents in helping their children to learn, especially compared with the effect of increasing the time that children spend with teachers in school, where evidence is mixed (3). Unfortunately, many large-scale parent interventions turn out to be ineffective, particularly for socioeconomically disadvantaged families (4–6).

One reason for the ineffectiveness of some parent interventions may be that some parents do not believe that they can make much of a difference to their child's abilities. They may, therefore, interact with the child in unconstructive ways. Laboratory experiments show that parents who tend to believe that their child's ability to learn is innate [that is, parents with a "fixed mindset" (7, 8)] interact with their child in a more controlling way, focusing on the performance rather than the effort of the child, compared with parents with a more incremental or "growth mindset" (9). Furthermore, parents praising performance rather than effort induce a fixed mindset in the child (10–12), and parent praise to 1 to 3 y olds predicts the child's motivational framework 5 y on (13).

Only recently have social–psychological or academic mindset interventions been tested in ways that are potentially scalable (14–17). However, growth approach interventions—that explain to parents that reading abilities are malleable and reward effort rather than performance—may be very effective in large scale. They address the problem that parents with a fixed mindset may not comply with ordinary interventions, precisely because they do not believe that it will make much of a difference.

We show that a reading intervention with a growth mindset approach delivered by public authorities had large average intention to treat effects on childrens' reading achievements in three domains and childrens' skills in writing their own narrative. As expected, effects were strongest for children whose parents had a more fixed mindset before the intervention.

Materials and Methods

A large-scale classroom-randomized trial included 72 classrooms with 1,587 second-grade children in Aarhus Municipality in Denmark (Fig. S1). The randomized, controlled trial was approved by the municipality. The Danish Data Protection Agency approved the collection and treatment of all data for the project (approval no. 2013-41-1793). All schools were informed about the trial and data collection before enrolling on a voluntary basis. It was voluntary for parents and children to read together and to use the books provided (see below). Parents were informed in five different languages that it was voluntary to participate in the survey. They were also informed that if they participated in the survey their responses would be treated anonymously and confidentially.

We rank-ordered the classrooms on mean child language skills, and then, we created strata of four classrooms and randomized two to treatment and two to control within each stratum. Table S1 shows baseline characteristics and balance between treatment and control groups.

The treatment was designed based on the mindset research showing links between (*i*) parents' growth mindsets, (*ii*) constructive, mastery-oriented interaction with the child, and (*iii*) praising child effort rather than performance and results. Recent research also shows that parents do not automatically pass on their growth mindsets to their children (12), which suggests that interventions should not only cultivate growth mindsets in parents but also, provide scaffolding for parents so that they learn how to put their growth mindset into practice. Parents in the reading intervention group were, therefore, provided with a booklet and access to an online video (all information translated into 10 languages) that underpin each of these three components. (*i*) The information emphasized a growth theory of abilities by explaining to the parents that their child's reading ability can be improved, no matter whether the child is already good or bad at reading (7, 8). (*ii*) The material encouraged parents to take a constructive, mastery-oriented approach, supporting the child's autonomous engagement with the books (4, 9) by asking the parent to talk to the child about the content before, during, and after reading it; pose open questions to the child; take time to answer the child's questions; and make sure that it was an enjoyable experience. The parents were encouraged not to correct their child's reading mistakes unless they affected the child's

Significance

Many large-scale parent interventions turn out to be ineffective, particularly for socioeconomically disadvantaged families—possibly because some parents believe that their children's reading skills are relatively fixed and unresponsive to practicing. This study shows large and consistent effects on both reading and writing skills of second-grade children whose parents received a few children's books and information about the value of supporting children when learning to read. Effects are at least as large for children with immigrant background or low-educated mothers as for other children—and biggest for those children whose parents before the intervention believed reading abilities to be relatively fixed. The study thereby shows a direction for effective parent interventions.

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Table 1. Average intention to treat effects for all children and subgroups

Sample	Reading test, 2 mo				Reading test, 7 mo				
	Total score	Language comprehension	Decoding	Text comprehension	Total score	Language comprehension	Decoding	Text comprehension	Writing test, 7 mo: NAP
All children	0.257***	0.187***	0.231***	0.272***	0.121**	0.0418	0.153**	0.127**	0.158*
	(0.0687)	(0.0684)	(0.0676)	(0.0661)	(0.0575)	(0.0523)	(0.0619)	(0.0565)	(0.0837)
Subgroups									
Danish background	0.242***	0.144*	0.222***	0.284***	0.104*	0.0306	0.152**	0.0940	0.144
	(0.0751)	(0.0738)	(0.0749)	(0.0731)	(0.0623)	(0.0600)	(0.0655)	(0.0626)	(0.0896)
Immigrant background	0.335***	0.413***	0.268**	0.218*	0.203*	0.105	0.162	0.274**	0.250**
	(0.113)	(0.119)	(0.106)	(0.115)	(0.111)	(0.122)	(0.122)	(0.110)	(0.116)
Mother high education	0.223**	0.179*	0.193*	0.225**	0.0565	−0.00901	0.104	0.0551	0.142
	(0.0902)	(0.0904)	(0.0978)	(0.0847)	(0.0728)	(0.0644)	(0.0847)	(0.0774)	(0.105)
Mother low education	0.320***	0.223***	0.288***	0.346***	0.204***	0.119	0.222***	0.201***	0.193**
	(0.0870)	(0.0814)	(0.0839)	(0.0911)	(0.0746)	(0.0758)	(0.0725)	(0.0730)	(0.0816)

SEs are clustered at the classroom level. Covariates and constants are included in all models. Two-sided test (*$P < 0.1$; **$P < 0.05$; ***$P < 0.01$). NAP, Narrative Assessment Protocol.

understanding of what had been read. (*iii*) To encourage parents to praise their child's effort rather than performance (10, 11), parent and child could use a logbook, noting down every reading session. The logbook thereby endorsed child effort, not performance or results (not the speed or accuracy of the reading). After 10 reading sessions, children could bring the logbooks to their school teacher, and the class would get a sticker. The class with the most stickers received a prize.

It was not mandatory for teachers to use the logbook system; 13 of 36 classrooms in the treatment group made use of the logbooks. According to the logbooks, parents were, on average, reading 89.2 times with their children during the intervention period. (The available data only recorded the number of reading sessions at the classroom level.) The class competition might, on the one hand, have crowded out some intrinsic motivation for some children—or directly demotivated children who felt that they could not match their classmates. On the other hand, the competition was not based on how fast children were reading but on how often they were reading. This design should ideally motivate all or most students to contribute. Also, the logbooks were an aspect of the intervention that was voluntary for the teachers to use to not interfere with teachers' existing work plans and cooperation with parents. This fact may imply that only teachers who found the competition beneficial to their particular students used it. Future research should examine the isolated effect of using classroom competition to motivate children's reading.

Children in the treatment group also received three books to get them started and information on how to find other reading material at the library, at the school, in the newspaper, etc. School authorities and schools implemented the treatment without any researcher involvement.

To estimate the effect of this combined reading intervention with a growth mindset approach compared with treatment as usual in the control group, we use regression analyses with SEs clustered at the classroom level to account for the hierarchical structure of the dataset (children within classrooms). We obtain similar results using a hierarchical linear model. Additional information on materials and methods is in *SI Materials and Methods*.

Results

The treatment improved reading in three domains (language comprehension, decoding, and text comprehension) after 3 mo and again, after 7 mo—although with smaller changes after 7 mo (Table 1). The treatment not only improved the children's achievements in reading and understanding a text, it also improved their expressive language skills as measured in the writing test. Looking at subgroups (Table 1), effects are at least as strong for immigrant children with non-Western backgrounds and children with low-educated mothers (less than medium-cycle higher education). Differences between subgroups are not statistically significant but presented to show that the average intention to treat effect is not driven only by children with high socioeconomic status. The reading intervention with a growth approach thereby succeeded in supporting groups of children who normally spend less time with their parents (2).

The children in the control group progressed, on average, 0.12 SD per month between the first and second reading tests. The effect on the total reading scores after 2 mo of intervention, therefore, corresponds to about 2 mo of additional gain in reading score in the treatment group. After 7 mo of intervention, the effect is reduced to about 1 mo of additional gain.

Based on mindset research, we expected the effect of the treatment to be higher the more fixed the parents' mindset was before the intervention, because the potential for improvement is higher in these families. The treatment may make them not only read more with their children but also, do this in more constructive ways. We examine this by combining the treatment indicator with

Table 2. How the intention to treat effect depends on parents' fixedness beliefs

Variable	Reading test, 2 mo				Reading test, 7 mo				
	Total score	Language comprehension	Decoding	Text comprehension	Total score	Language comprehension	Decoding	Text comprehension	Writing test, 7 mo: NAP
Treatment	0.202***	0.150**	0.174**	0.216***	0.0990	0.0235	0.163**	0.0765	0.168*
	(0.0695)	(0.0725)	(0.0671)	(0.0684)	(0.0613)	(0.0663)	(0.0653)	(0.0595)	(0.0889)
Fixedness beliefs, preintervention	−0.126*	−0.157**	−0.0659	−0.114*	−0.0837*	−0.126**	−0.0699	−0.0269	−0.0508
	(0.0642)	(0.0716)	(0.0661)	(0.0595)	(0.0490)	(0.0512)	(0.0516)	(0.0532)	(0.0439)
Treatment × fixedness beliefs	0.205**	0.232***	0.114	0.205**	0.186***	0.136*	0.193***	0.167**	0.144**
	(0.0842)	(0.0873)	(0.0903)	(0.0809)	(0.0625)	(0.0792)	(0.0656)	(0.0686)	(0.0677)
Observations	686	686	686	686	791	791	791	791	625
R^2	0.343	0.281	0.313	0.300	0.325	0.258	0.308	0.273	0.450

SEs are clustered at the classroom level. Covariates and constants are included in all models. Two-sided test (*$P < 0.1$; **$P < 0.05$; ***$P < 0.01$). NAP, Narrative Assessment Protocol.

the measure of parental beliefs about child ability fixedness collected before the intervention. (Table S2 shows the operationalization of parental beliefs. Table S3 shows that response rates of the parent survey differ between treatment and control groups. These results apply only to parents responding to the survey.)

Table 2 presents the results. First, we note that, in this interaction model, the variable "fixedness beliefs, preintervention" estimates the association in the control group between fixedness beliefs and the outcomes when controlling for all covariates, including the pretest writing score, parents' level of education, and income. The results show that children whose parents had higher fixedness beliefs had lower reading skills after the intervention than children with similar writing skills before the intervention and otherwise similar parental backgrounds. Although causal inference cannot be made from these observational data without additional assumptions, we do conclude that this supports the theory that parents with fixed mindset are less able to support the academic progress of their children.

Second, the interaction variable in Table 2 shows—as expected—that the treatment had greater effect for parents with higher fixedness beliefs. Effect sizes are substantial. Parents with fixedness beliefs 1 SD above the mean showed an estimated effect of the reading intervention of about 0.3 SD (0.106 + 0.193) after 7 mo of intervention, which corresponds to 2.4 mo of additional progression in reading.

Discussion

The results support the notion that the reading intervention with a growth approach—which explains to parents that they can make a difference to their child's reading abilities and shows how to do so—has a large potential for supplementing schools' efforts to teach children to read well and express themselves in writing. This extra potential is especially present for parents who do not already have a growth mindset. The growth approach intervention in this study was combined with delivery of books and encouragement to read together with the child. We cannot isolate the effect of the growth mindset approach from the other elements of the intervention. Furthermore, the results do not show whether the heterogeneous effects for parents with high and low fixedness beliefs are caused by these beliefs or whether they are related to other parental characteristics associated with fixedness beliefs. However, we note that we do not find the same degree of heterogeneous effects for the other parental characteristics in Table 1 (ethnic background or education).

The effect of the reading materials may be age-dependent. For preschool children, parents may have to read aloud to their child. Older children may read themselves. Therefore, activities may be age-specific, but the parental growth approach will most likely be relevant across a broad span of age groups.

The fact that effects are smaller after 7–8 mo than after 3 mo may be taken to suggest that a growth approach intervention may be even more effective if it is combined with interventions that make parents sustain their efforts.

From the perspective of public expenditures, engaging parents in reading with their child directly is much cheaper than increasing the time that the child spends with teachers in school. Two recent randomized trials that use the same reading test as the outcome but increased the time that children spent with adults by either increasing the number of lessons per week or having two adults in the classroom (coteachers) found effect sizes of similar magnitude; however, public expenditures were at least twice as high (18, 19). This observation supports the efficiency of a growth mindset parental reading intervention—even when implemented in realistic settings without full compliance.

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