

Is remedial reading intervention in first grade more effective than remedial reading intervention in second grade?

Introduction

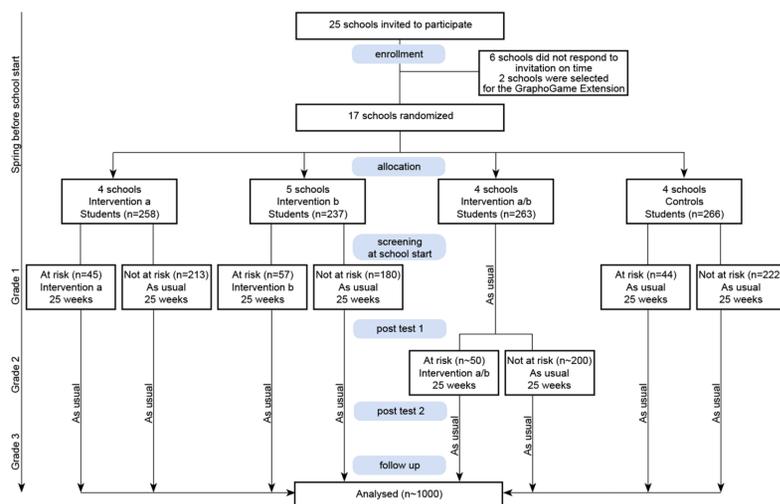
- Reading difficulties can be remediated through early intervention, and early intervention is more effective than later intervention (e.g. Fletcher, Lyon, Fuchs & Barnes, 2007; Schatschneider & Torgesen 2004; Vellutino & Zhang, 2008).
- Reading difficulties (RD) are the most common reason for special education in Norway and the proportion of children receiving special education to remediate RD increases as children progress through school.
- Norwegian educational policy is that children who fall below the national thresholds on literacy assessments at the end of Grade 1 are at risk of RD and should receive reading intervention in Grade 2. Therefore, Grade 2 constitutes the onset of early reading intervention.
- Research on Norwegian reading interventions is scarce; whether early remedial reading interventions are more effective in Grade 1 or Grade 2 is yet to be examined within a Norwegian context.
- The aim of the On Track Project was to develop a novel research-based remedial reading intervention programme for students at-risk of RD that can be implemented by ordinary teachers within the frame of the schools' financial and personal resources
- The On Track intervention has been shown to be effective at improving literacy outcomes for children identified at the beginning of Grade 1 as being at risk of RD. At-risk children who received the On Track intervention in Grade 1 made significantly more literacy progress than at-risk control children, and they showed parallel reading growth over Grades 2 and 3 with typically developing children (Solheim, Lundetræ, Uppstad, Frijters, in prep).

Research Questions for current study

- Is the On Track intervention more effective at ameliorating RD when delivered in Grade 1 or Grade 2 in terms of:
 - Immediate intervention effects by reducing the proportion of children falling below national literacy thresholds at the end of Grades 1 or 2?
 - Long term effects by reducing the proportion of children falling below national literacy thresholds at the end of Grades 2 or 3 (one year later)?

Design of On Track project

- Intervention is delivered for 45 minutes a day, four days a week over 25 weeks in groups of 3-7 students. Randomized to group at the school level.



At-risk children at the beginning of Grade 1

- Children below 30th percentile at school start on three of the following: letter-sound knowledge, RAN, first sound identification, phoneme blending OR falling below the 30th percentile on two of the above skills AND having familial risk for RD (parental self-report).
- 19% of the children identified as being at "at-risk" of RD (n = 96) and received intervention in Grade 1.

On Track intervention programme

Lesson	Learning objectives	Materials
ABC (a) 10 min. OR	Letter knowledge, linking graphemes and phonemes, word-reading skills	GraphoGame, a highly adaptive play-like app with mastery level set to 80% of tasks.
ABC (b) 10 min.	Letter knowledge, linking graphemes and phonemes, word-reading skills	The "On Track" app, a non-adaptive play-like app with 5 mini games. Levels chosen by child/teacher.
Guided Reading 10 min.	Word-reading skills, decoding, word recognition, reading comprehension, awareness of challenging orthographic patterns	Easy readers of increasing difficulty and a new book each session. Each child receives copy of same book.
Free Spelling 10 min.	Promote reading skills through writing, enhance phonemic analysis, spelling skills & letter knowledge	Writing software on the tablet. The children heard letter sounds and full words. Writing tasks linked to books used in Guided Reading or Shared Reading sessions. The texts were printed on paper after each session.
Shared Reading 10 min.	Experiences with children's literature, written language, text structure, and comprehension strategies, promote positive reading attitudes	Children's picture books, poetry and chapter books. Suggestions for how teachers could talk about the texts and words were given in the teacher's manual.

Does Grade 1 intervention reduce RD?

- Those who received intervention in Grade 1 were 3.33 times less likely to be categorised as having RD at the end of Grade 1.

	B	s.e. B	OR	95% CI
School 1	0.41	0.58	1.51	(0.49-4.69)
School 2	0.81	0.54	2.25	(0.78-6.54)
School 3	-0.56	0.59	0.57	(0.18-1.83)
School 4	1.75	0.52	5.75**	(2.08-15.88)
School 5	0.82	0.68	2.27	(0.60-8.56)
School 6	0.86	0.64	2.36	(0.67-8.32)
School 7	0.21	0.90	1.23	(0.21-7.16)
School 8	0.02	0.70	1.02	(0.26-4.03)
School 9	-0.62	0.71	0.54	(0.13-2.15)
School 10	1.26	0.52	3.53*	(1.26-9.85)
School 11	0.20	0.67	1.22	(0.33-4.51)
Emergent literacy	-1.44	0.19	0.24***	(0.16-0.34)
RAN	0.04	0.01	1.04***	(1.03-1.06)
Family risk RD	0.53	0.28	1.69 ^a	(0.98-2.92)
Intervention year 1	-1.19	0.40	0.30**	(0.14-0.66)

Note. *p<.05, **p<.01, ***p<.001, ^ap = 0.06 Nagelkerke R² = 37.4%

At risk children at beginning of Grade 2

- Four schools initially randomised to receive intervention in Grade 2.
- 34 children (out of 263) scored below national literacy thresholds at end of Grade 1 and received the On Track intervention in Grade 2.

Does Grade 2 intervention reduce RD?

	B	s.e. B	OR	95% CI
Literacy skills end of Grade 1	-0.67	0.19***	0.51	(0.35-0.74)
Intervention Grade 2	-0.34	0.52 ^a	0.71	(0.26-1.96)

Note. ***p<.001, ^ap = 0.51. Controls were matched on school, RAN, STM, literacy skills, home language, mother's education, fam. risk for RD, and age.

Long term effect of Grade 1 intervention on RD

	B	s.e. B	OR	95% CI
School 1	0.48	0.59	1.62	(0.51-5.14)
School 2	1.74	0.53	5.71**	(2.03-16.12)
School 3	0.80	0.55	2.23	(0.75-6.58)
School 4	2.00	0.53	7.38***	(2.62-20.79)
School 5	1.10	0.67	3.00	(0.80-11.22)
School 6	1.59	0.61	4.92**	(1.49-16.21)
School 7	1.58	0.68	4.87*	(1.27-18.58)
School 8	0.10	0.71	1.11	(0.28-4.45)
School 9	1.48	0.55	4.38**	(1.48-12.96)
School 10	1.23	0.54	3.43*	(1.19-9.92)
School 11	0.97	0.63	2.63	(0.77-8.96)
Emergent literacy	-0.89	0.15	0.41***	(0.31-0.55)
RAN	0.03	0.01	1.03***	(1.02-1.05)
Fam. risk	0.60	0.25	1.82*	(1.11-2.99)
Intervention Grade 1	-0.07	0.37	0.94	(0.46-1.93)

Note. *p<.05, **p<.01, ***p<.001

Discussion and conclusions

- The On Track intervention was highly effective in reducing the likelihood of having RD at the end of Grade 1. Children who received intervention in Grade 1 were 3.33 times less likely to fall below national literacy thresholds and be categorized as having RD at the end of Grade 1.
- The On Track intervention was more effective in Grade 1 than Grade 2 as receiving intervention in Grade 2 did not significantly reduce the risk of falling below national literacy thresholds at the end of Grade 2. This could be because the Grade 2 intervention group was much smaller since fewer children than expected in the control schools were "at risk" by the end of Grade 1. The control schools turned out to be some of the best schools and we plan to find out more about literacy instruction practices in these schools.
- There was no significant long-term effect of receiving Grade 1 intervention on reducing the risk of RD one year after end of intervention (at end of Grade 2). This could be due to the issues associated with using RD classifications as some children drop in and out of classifications over time. In addition, we had no control over what the schools were doing in Grade 2 and the intervention children did not receive any On Track maintenance in this period.
- These results show that early and intensive intervention is effective in reducing the risk of RD in Grade 1 within a Norwegian context but they also highlight the need for ongoing intervention for children at risk of RD.