Nudging or Nagging?
Conflicting Effects of Behavioral Tools

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March 2023

Outline

- Motivation

- PACT (Results and Limitations)

- CAPER Design

- CAPER Results and Discussion

Motivation

Early-life gap in skills

- Low-income children enter school behind advantaged classmates (Cunha et al. 2006, Heckman 2008).

- Advantaged parents spend more time on educational activities with their children (Guryan et al. 2008, Kalil et al. 2012).

- Causal links between parent engagement and child outcomes (Price 2010; Villena-Rodán and Ríos-Aguilar 2012)

Motivation

Interventions to increase engagement

- Home visiting programs have modest impacts on a small set of outcomes and are very expensive

- Behavioral economics literature tells us that if present bias is an issue, tools such as reminders and goal-setting can help

- Recent efforts with light touch messaging show some promise (York et al. 2019; Mayer et al. 2019)

Background on PACT

Parents and Children Together (PACT):
Mayer, Kalil, Oreopoulos, Gallegos (2019). Using behavioral insights to increase parental engagement the parents and children together intervention. *Journal of Human Resources*, 54(4):900-925.

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- Sample of low-income parents and children (N=169)
- Parents assigned to treatment or control
    - Meant to address present bias
    - Bundle of four behavioral tools
        - Reminders, Goalsetting, Social Rewards, Peer competition

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- Finding: Behavioral tools ↑ reading (1 SD)

PACT Results - Reading Time

PACT results (N=169):
The Number of Minutes Parents Read to Their Child Over 6 Weeks
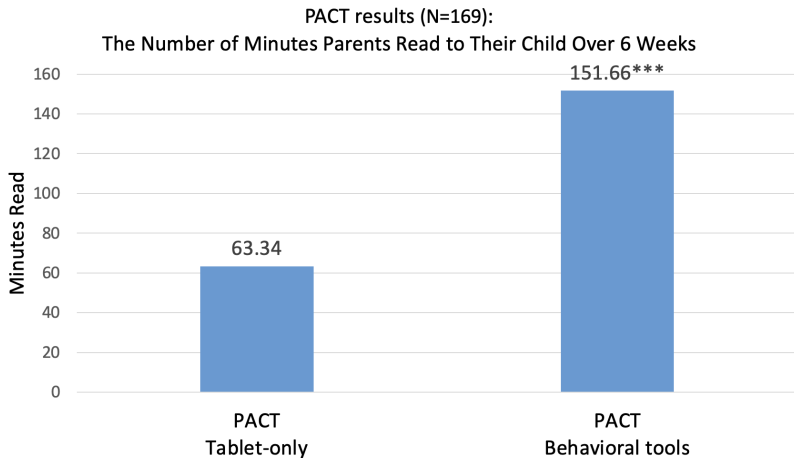
PACT led to "Children and Parents Engaged in Reading"

PACT's Limitations:

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To address these issues, we designed CAPER

1. 11 month intervention (extended from 3 months due to COVID)
2. Measured literacy skills (CELF-P) at baseline and follow up
3. Unbundled the intervention
   - Reminders and Goal Setting as separate arms
4. Included a no-tablet control group to measure efficacy of tablet

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- Parental reading time
- Literacy skills of young children

CAPER Research Questions

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Our Approach: Design a field experiment where we track both reading time and child literacy scores. Four treatment conditions:

1. Control (reading time not available)
2. Tablet Only
3. Tablet + Reminder text messages
4. Tablet + Goal Setting & Feedback messages

CAPER Experiment Details:

- Tablet given to low-income parents of pre-k children
- Loaded with 207 books (149 English 58 Spanish)
- No other apps allowed on tablet
- Reading time recorded by the app (in seconds)

Four Experimental Arms:

- Control (No Tablet)

- Tablet Only

- Tablet + Reminder text messages
  - Sent 4x week
  - EX: "Does [child] have a favorite CAPER book? Read it tonight!"; "The weekend is coming, don't forget to read to your child!"

- Tablet + Goal Setting and Feedback
  - Used data from tablet to provide feedback
  - Given new goal = Avg of last 2 weeks + 20%
  - Increasing goals by a reasonable amount has shown to lead to higher performance, Landers et al. (2017) and Tondello et al. (2018)

Sample Details

Sample: 13 subsidized pre-schools across Chicago

To be eligible for CAPER:

- Have 3-4 y/o child at one of these schools
- Have a cell phone
- Willing to receive up to 4 text message/week
- Must speak Spanish or English

Participating parents where then randomized into treatment or control groups

Sample Details

CAPER tablet:

- Distributed 479 tablets
- Collected reading time for 397 (83%)

CELF Assessments:

- 553 children assessed at baseline
- 300 (54%) of these assessed at follow-up

Attrition: t-tests show not driven by treatment status or baseline score

Estimating Equations

Reading minutes (excludes No-Tablet group; Tablet = reference group):

$$y_i = \alpha + \beta_1 Remind_i + \beta_2 Goal_i + \epsilon_{i,c}$$

CELF scores (excludes No-Tablet group; Tablet = reference group):

$$y_{i,t_1} = \alpha + \beta_1 Remind_i + \beta_2 Goal_i + \gamma y_{i,t_0} + \epsilon_{i,c}$$

CELF scores (No-Tablet = reference group):

$$y_{i,t_1} = \alpha + \beta_1 Remind_i + \beta_2 Goal_i + \beta_3 Tablet_i + \gamma y_{i,t_0} + \epsilon_{i,c}$$

We also estimate models that include:

- Child Age
- School-level fixed effects

Reading Time:

Relative to the Tablet Only group:

- Goal setting group had a significantly higher reading time (50% ↑)
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Preview of Results

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Impact of Tablet:

- Tablet Only group scored 0.30 SD more than control
- Pooled average of all 3 tablet groups was 0.20 SD more than control

The Number of Minutes Parents Read to Their Child
Using the CAPER App by Treatment Groups over 45 weeks (N=351)
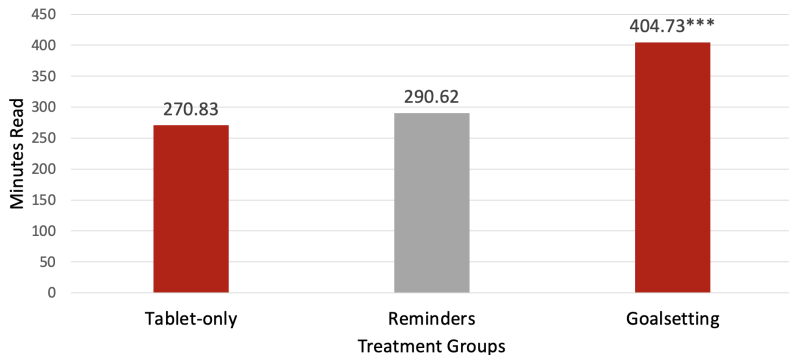
Table 2: Treatment Effect of Reminder and Goal Setting Texts on Reading Time

	(1)	(2)	(3)
	Reading time	Reading time	Reading time
Reminders	19.79	34.25	34.89
	(50.94)	(50.87)	(51.04)
Goal Setting	133.90**	145.84**	150.08**
	(61.34)	(58.30)	(58.33)
Constant	270.83***	39.47	-244.13
	(39.21)	(44.90)	(173.75)
Control Mean	270.83	270.83	270.83
Control SD	418.67	418.67	418.67
N	351	351	351
School FE	N	Y	Y
Child Age Control	N	N	Y

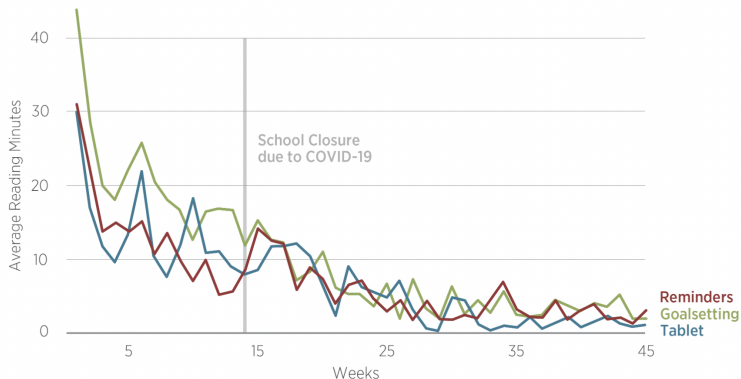*Notes:* The omitted group is the tablet-only group. Robust standard errors are in parentheses.
*p<0.1; **p<0.05; ***p<0.01. Reading Time is measured as the total number of minutes read
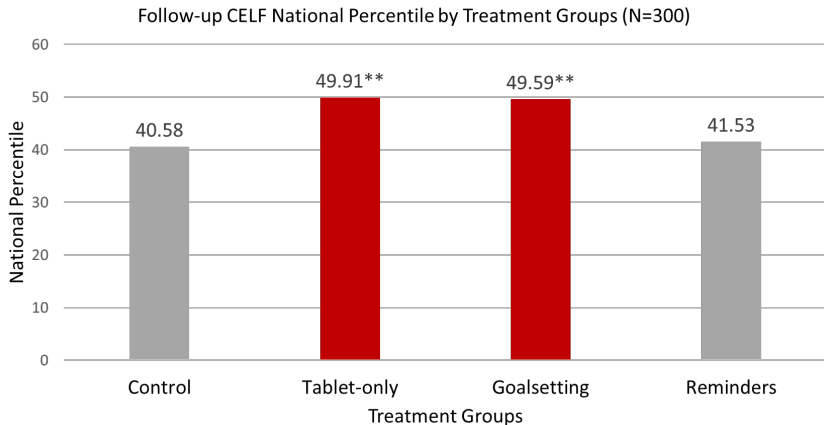on the CAPER app during the entire 11-month (45 week) period.

CAPER (N=351) & PACT (N=169):
The Number of Minutes Parents Read to Their Child Over 6 Weeks
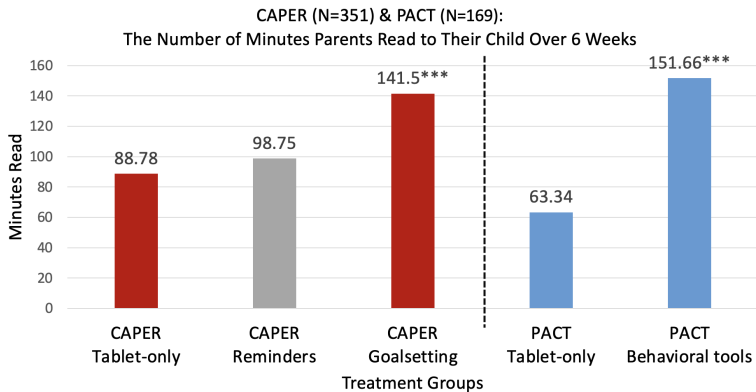
Average Weekly Reading Time over 45 Weeks

Follow-up CELF National Percentile by Treatment Groups (N=300)

Table 3: Treatment Effect of Digital Library on Literacy Skills

	(1)	(2)	(3)	(4)
	CELF	CELF	CELF Percentile	CELF Percentile
Tablet Only	4.98***	5.05***	8.92**	9.73***
	(1.87)	(1.83)	(3.80)	(3.72)
Reminders	2.10	2.18	2.72	3.88
	(1.91)	(1.88)	(3.76)	(3.73)
Goal Setting	4.53**	3.79*	7.58*	6.70*
	(1.99)	(1.95)	(3.89)	(3.81)
Constant	23.58***	24.75***	21.66***	4.20
	(1.85)	(6.42)	(3.20)	(12.86)
Control Mean	39.53	39.53	40.58	40.58
Control SD	17.43	17.43	32.02	32.02
N	300	300	300	300
Baseline CELF	Y	Y	Y	Y
School FE & Age	N	Y	N	Y

Table 4: Treatment Effect of Reminder and Goal Setting Texts on Literacy Skills

	(1) CELF	(2) CELF	(3) CELF Percentile	(4) CELF Percentile
Reminders	-2.93*	-2.96*	-6.27*	-6.15*
	(1.61)	(1.59)	(3.38)	(3.35)
Goal Setting	-0.46	-1.31	-1.31	-3.21
	(1.69	(1.66)	(3.48)	(3.40)
Constant	29.24***	30.76***	31.23***	16.72
	(1.72)	(7.06)	(2.98)	(14.08)
Control Mean	45.60	45.60	49.92	49.92
Control SD	15.79	15.79	31.91	31.91
N	257	257	257	257
Baseline CELF	Y	Y	Y	Y
School FE & Age	N	Y	N	Y

Notes: The omitted group is the tablet only group. Robust standard errors are in parentheses.
*p<0.1; **p<0.05; ***p<0.01.

What explains the results?

Why don't additional reading minutes in the Goal Setting group translate to higher literacy scores?

Hypothesis 1: The extra minutes read by the Goal Setting group benefits children in ways other than improving literacy skills.

**Hypothesis 2**: The reading by both Nudge groups was of lower quality.

- Goal Setting group would have to read more to get the same score.
- Reminders group would score less despite reading the same amount.

Simple Model: Reading Production Function

- $R_i =$ Amount of reading time
- $f(R_i) =$ Production function (literacy skills)
- $\eta =$ Nag Factor

A Model of Literacy Skills Production

Total Reading Time by Hour
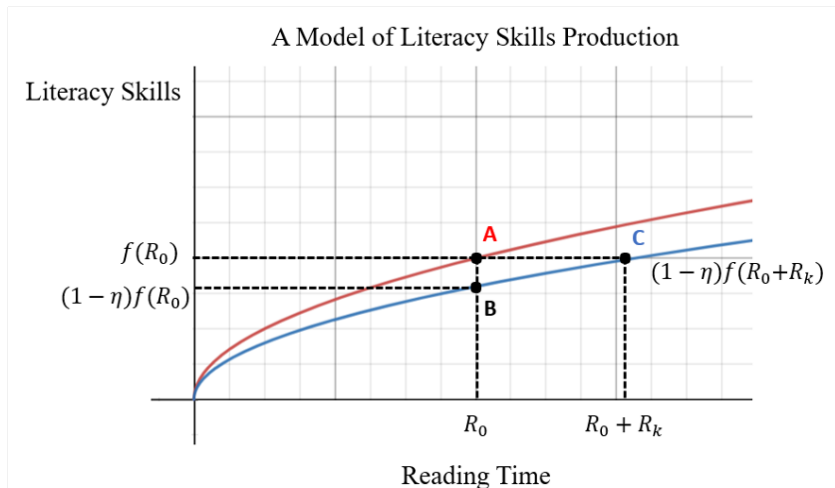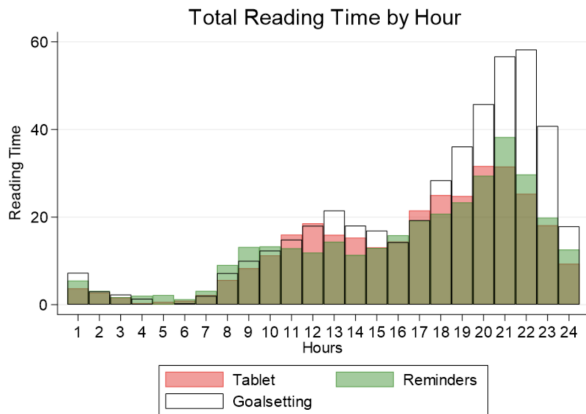
Conclusion

Takeaways:

- Goal Setting messages were more effective than Reminders at increasing parental engagement.
- Reminders had negative effect on skills relative to tablet-only.
- Tablet on its own increased literacy skills by 0.3 SD.

Future directions:

- Novelty effect: reading time decrease over time
- Cost-effectiveness of tablet
- Video analysis of reading quality

Thank You

Thank you!

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Special Thanks

Ana Arellano
BIP Lab Research Assistant Team
Valhalla Foundation