

Research Article

# Nudging Parental Engagement: Do Reminders Improve Shared Book Reading?

Simon Calmar Andersen<sup>\*</sup> and Jesper Asring Hansen<sup>†</sup>

**Abstract:** Engaging citizens in co-producing services is often a challenging task. This study explores strategies to facilitate participation, using the case of shared book reading—a practice widely recognized for enhancing children’s literacy skills. Yet, parents often fall short of their aspirations to read more with their children. We combine a survey experiment and a field experiment in Denmark to assess the effectiveness of reminders as a policy tool to change reading habits. The survey experiment aided in designing the field experiment through identifying the cluster of parents with the highest expected benefit from reminders. The field experiment further examined this group, focusing on parents who reported forgetting to read. Results showed only temporary effects on activity in an online reading platform gradually declining after the first week. The study contributes to the literature on citizen engagement and co-production, highlighting the importance of tailoring strategies to individual differences.

**Keywords:** Citizen participation, co-production, shared book reading, field experiment.

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Citizen participation plays a crucial role in promoting equity, influence, and social mobility (Clark, 2018; Jakobsen & Andersen, 2013), yet increasing engagement in social programs remains a persistent challenge (Bryson et al., 2013). Research on co-production and administrative burdens underscores the challenge of converting evidence-based initiatives into broad citizen engagement (Bovaird, 2007a; Moynihan et al., 2022), a persistent obstacle for researchers seeking to translate findings into increased participation (Bettinger et al., 2022a; Castleman et al., 2021; Linos et al., 2022).

We examine this challenge in the case of shared book reading between parents and their children, a proven strategy for enhancing children’s reading skills. Meta-analyses of randomized controlled trials in highly diverse contexts show substantial benefits to children’s reading scores and long-term outcomes from shared reading activities (Castro et al., 2015; Fitton et al., 2018). Yet, when asked, most parents do not read as much with their children as they aspire to. Our own data show that two thirds of all parents aspire to read more with their children than they currently do. Given the substantial benefits conferred to children through shared book reading, it becomes important to examine whether light-touch interventions can encourage this behavior.

Positive behaviors, such as shared book reading, often do not materialize due to bounded rationality, as parents’ limited attention and cognitive capacity make long-term benefits less salient—a challenge frequently highlighted in the nudging literature. To address this gap, we design a targeted behavioral campaign aimed at the individuals who are most likely to benefit from intervention.

This study investigates the impact of one of the most frequently used nudges: reminders. Reminders, typically delivered as brief text messages, are designed to encourage the formation of habitual, desirable behaviors, with the aim of producing long-term benefits. However, the existing literature on the effectiveness

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of reminders presents mixed results. While some studies report significant positive effects on desirable behaviors (Mayer et al., 2018; Owens & Sloan, 2023; Reyes et al., 2024), others indicate negligible (Bettinger et al., 2022b; Castleman et al., 2021; Gurantz et al., 2020; Shen et al., 2024) or even ambiguous outcomes (Dušek et al., 2022). Consequently, it remains uncertain whether reminders have a positive influence on parental reading habits.

We proceed to investigate the potential for reminders to increase shared book reading through a survey experiment and a field experiment in Denmark. Our survey experiment is designed to inform our field experiment about the optimal group to target with a reminder campaign. We sent out questionnaires to parents of primary school children ( $N = 3,144$ ) and tested the effect of a hypothetical scenario of receiving reminders against both a control group and a group that considered the prospect of receiving traditional advice on shared book reading at home. We found a negative average treatment effect of our hypothetical reminder treatment on parents' expectations of reading with their children. However, using machine learning, we classified parents into distinct groups to test for heterogeneous treatment effects on their expected willingness to read with their child. We found a cluster of parents characterized by low conscientiousness and self-efficacy who had positive expectations of reminders.

In our field experiment we further examined the group with positive expectations of reminders. The treatment group in our experiment had the option to request personalized assistance to enhance reading habits with their children. We identified four potential barriers to reading with children: forgetfulness, lack of reading material, discomfort in the situation, and time constraints. Among these, only parents who reported forgetting to read with their children ( $n = 570$ ) were further randomized. They were split into two groups: one received no additional support, while the other received text message reminders three times a week to engage in shared reading. These reminders were sent from February 20th to May 5th of 2023.

Our results reveal only temporary effects. The treatment group was only significantly more likely to enter our online reading platform, open our page with e-books, and read about e-books the first week upon which the effect gradually declined. Even in the first week, we found no impact on reading e-books on the platform. These results suggest that the reminders had a short-term effect on activating parents reading behavior, even if the available e-book selection may not have aligned with the interests of parents and children.

This study advances the growing literature on citizen participation (Barnes et al., 2003; Bell et al., 2023; Halling & Baekgaard, 2023; Jakobsen & Andersen, 2013; Linos et al., 2020) by offering both theoretical and methodological contributions. Theoretically, we refine the understanding of which citizens are most likely to benefit from behavioral interventions, shedding light on the role of individual differences in responsiveness to nudges. Methodologically, we demonstrate how survey experiments can be integrated with field experiments to identify and target those most in need of intervention, providing a scalable approach for enhancing participation in public programs. We also highlight the importance of tracking nudging effects over time, as our experiment shows they diminish after only one week.

### **Citizen Participation and Behavioral Campaigns**

Citizen participation is recognized as a key driver of important outcomes like equity, influence, and social mobility (Barnes et al., 2003; Bryson et al., 2013; Clark, 2018; Jakobsen & Andersen, 2013). Research on co-production and administrative burden seeks to enhance participation in social programs to achieve these goals (Bell et al., 2023; Bovaird, 2007b). While some initiatives have successfully improved citizen outcomes (Agarwal et al., 2015; Linos et al., 2020), it is widely acknowledged that this remains a significant challenge (DellaVigna & Linos, 2021; Medina, 2021). Even programs supported by robust scientific evidence and extensive outreach efforts may still fall short of their intended impact (Bettinger et al., 2022a; Castleman et al., 2021; Linos et al., 2022).

When citizens do not participate in beneficial programs, such shortcomings may arise from bounded rationality. As Herbert Simon observed, individuals have limited cognitive abilities and attention, constraining their decision-making processes (Battaglio et al., 2019; Simon, 1955). This literature has long recognized that limited attention can create a disconnect between one's long-term well-being and limited attention, leading to

suboptimal behavior (Sunstein & Thaler, 2008). As a result, individuals may refrain from participating in beneficial programs due to this internal conflict.

Suboptimal behavior can be addressed through behavioral interventions. Campaigns, such as nudges, have often succeeded in increasing access and equity in service delivery (Esmark, 2019). However, there still remains groups that are difficult to reach through such campaigns, which may be due to differences in personality traits or barriers faced by different groups (Duckworth et al., 2007; Liu et al., 2013). A key insight from research on administrative burden and nudges is that barriers disproportionately impact the most vulnerable citizens (Bell et al., 2023), while others remain largely unaffected. As a result, programs designed to assist the public must be carefully targeted toward those who need support the most. Traits such as conscientiousness, self-efficacy, and time discounting play a crucial role in determining whether individuals achieve desirable outcomes (Bayer & Osher, 2018; Breen et al., 2014; Duckworth et al., 2007; Liu et al., 2013; Steel, 2007). This research suggests that individuals with certain characteristics may rarely require behavioral interventions like reminders and nudges, whereas others rely heavily on them.

Parental reading with children provides significant long-term benefits, making it an important arena for aiming to increase participation. Shared book reading between parents and children has been shown to enhance children's reading skills. Meta-analyses of randomized controlled trials conducted in diverse settings highlight the substantial impact of shared reading on children's long-term development (Castro et al., 2015; Fitton et al., 2018). However, many parents report reading less with their children than they would like. Our data indicate that 83 % of parents aspire to read more with their children than they currently do. This gap makes parental reading a strong candidate for behavioral interventions, particularly through the use of reminders.

To identify those most in need of help, we first design a survey experiment and employ machine learning techniques to find the citizens who we expect to benefit most from reminders, upon which we target this group in a field experiment to improve their reading habits. We now describe the survey experiment.

## **Survey Experiment**

### ***Method and Participants***

The survey experiment aimed to identify the most suitable group for targeting with reminders in our field experiment. We collaborated with a large municipality in Denmark to evaluate parents' attitudes towards shared-book reading. Sample size was determined by including all 19,149 parents with a child in grade 1 or 2 in a public school in the municipality. Even with a low response rate this would be a large sample size for this design. 3,144 parents participated (mean age = 38.9 years, age range = 28–531; 68.4 % women), yielding a response rate of 19 %. Our data do not permit a comparison with all parents based on observable characteristics, as we only have information on the 3,144 parents who participated.

### ***Materials and Procedure***

As with many survey experiments, the artificial nature of the setting makes it difficult to measure the true effect of reminders in real-world conditions. This challenge is particularly relevant for behaviors prone to social desirability bias, where respondents may report ideal intentions rather than actual behavior. To address this limitation, we designed the framing to be as immediate and concrete as possible. By emphasizing short-term behavior, we aim to reduce bias and obtain a more accurate assessment of the reminder's potential effect.

**Hypothetical reminder treatment and reading intentions.** Parents were randomly assigned to one of three groups: 1) hypothetical reminder group primed with the sentence "Imagine you begin receiving reminders via text to read with your child," (N = 1,004), 2) hypothetical advice group primed with the sentence "Imagine you begin receiving advice on how to read with your child," (N = 1,123) or 3) a control receiving no hypothetical scenario (N = 1,017). After the priming (if any), parents were asked "How likely is it that you read to your child tonight?" ranging from 1 "Very unlikely" to 5 "Very likely".

**Parent characteristics.** To identify groups to target in the field experiment, we collected a substantial amount of data about the parents. The survey measured conscientiousness through the Revised NEO

Personality Inventory (Soto & John, 2009), self-efficacy through the general self-efficacy scale (Schwarzer & Jerusalem, 1995), and patience/time discounting through the validated global measure for time preferences (Falk et al., 2018). The survey also included questions about parents' motivation and preferences for reading with their child, and how often they or their child read books.

We combined the survey data with detailed administrative data about the individual respondents. The administrative data included gender, age, education, and income of the parent, number of children in the family, and age of the child.

### ***Analytical Strategy***

We tested the effect of the treatments by use of linear regression in the following equation:

$$(1) \quad Y_i = \beta_0 + \beta_1 D_{2i} + \beta_2 D_{3i} + \epsilon_i,$$

in which  $Y_i$  is the answer to the question of likelihood of reading with one's child,  $\beta_0$  denotes the control group average,  $D_{2i}$  is a dummy variable equal to 1 if the respondent is in the reminder-group and 0 otherwise, and  $D_{3i}$  denotes whether the respondent is in the advice group (1) or otherwise (0). The  $\beta$  coefficients thus represent the mean differences between the respective treatment groups and the control group.

To identify different groups of parents, we applied k-means clustering. K-means clustering is an unsupervised machine learning technique, which we used to classify parents into groups that were as different as possible. We applied the Hartigan-Wong algorithm (Hartigan & Wong, 1979), which minimizes the total within-cluster sum of squares (WSS) through the following equation:

$$(2) \quad W(C_k) = \sum_{X_i \in C_k} (X_i - \mu_k)^2$$

where  $C_k$  denotes a cluster,  $X_i$  is an observation, and  $\mu_k$  is the mean value of data points assigned to cluster  $k$ . Hence, the algorithm creates clusters that are as internally similar as possible, while being as dissimilar from other clusters as possible by minimizing the WSS. Finally, we interact the cluster membership variable with treatment status through the following equation:

$$(3) \quad Y_{ik} = \beta_0 + \beta_1 D_i + \beta_2 C_k + \beta_3 (D_i \times C_k) + \epsilon_{ik},$$

for which the parameter of interest is  $\beta_3$ , which shows how treatment effects vary across clusters.

## **Results**

### ***Baseline Balance***

Table A.2 in the Appendix presents a balance check showing no statistically significant differences between our experimental groups in terms of their gender composition, age, the number of children in the family, education months, and income. This supports the notion that the randomization worked as intended.

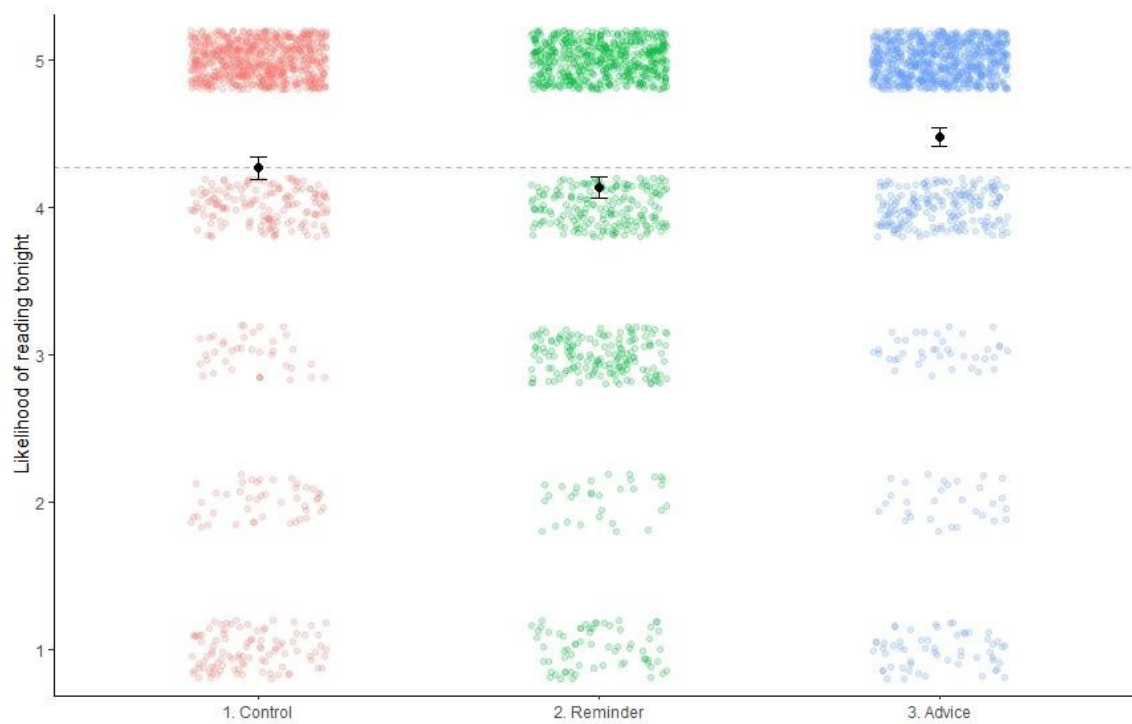
### ***Average Treatment Effects of Hypothetical Reminder Scenarios***

On average, our reminder treatment decreased the stated likelihood of reading with one's child tonight. Yet, this average treatment effect conceals considerable variation across the experimental conditions.

The reminder priming decreased parents' intentions to read with their children ( $t = -2.51$ ,  $p = .012$ , Cohen's  $d = -0.11$ , Confidence interval (CI) =  $[-0.197, -0.024]$ ) relative to the control group as seen in Figure 1. In contrast, the advice priming increased parents' intentions to read with their children ( $t = 4.11$ ,  $p < .001$ , Cohen's  $d = 0.17$ , CI =  $[0.092, 0.261]$ ) relative to the control group. All regression models are displayed in the supplementary Appendix.

Why might a hypothetical reminder reduce parents' willingness to read with their children? While the exact reason is unclear, one explanation could be that they trigger feelings of guilt or overwhelm. Another possibility is that parents who already read with their children feel annoyed by receiving unnecessary reminders. To better understand this effect, we now consider the heterogeneous impacts of reminders.

Figure 1. Effects of Reminders and Advice. Survey experiment.



**Note:** Likelihood of reading with one's child tonight in each treatment condition. Random jitter was added to the individual responses for this graph. Colored dots represent individual observations in each treatment condition. Black dots are averages in treatment conditions and vertical lines are 95 % confidence intervals. Horizontal dotted line goes through the mean in the control condition. Total N = 3,144. Control = 1,017, Reminder = 1,004, Advice = 1,123.

### *Heterogeneous Effects*

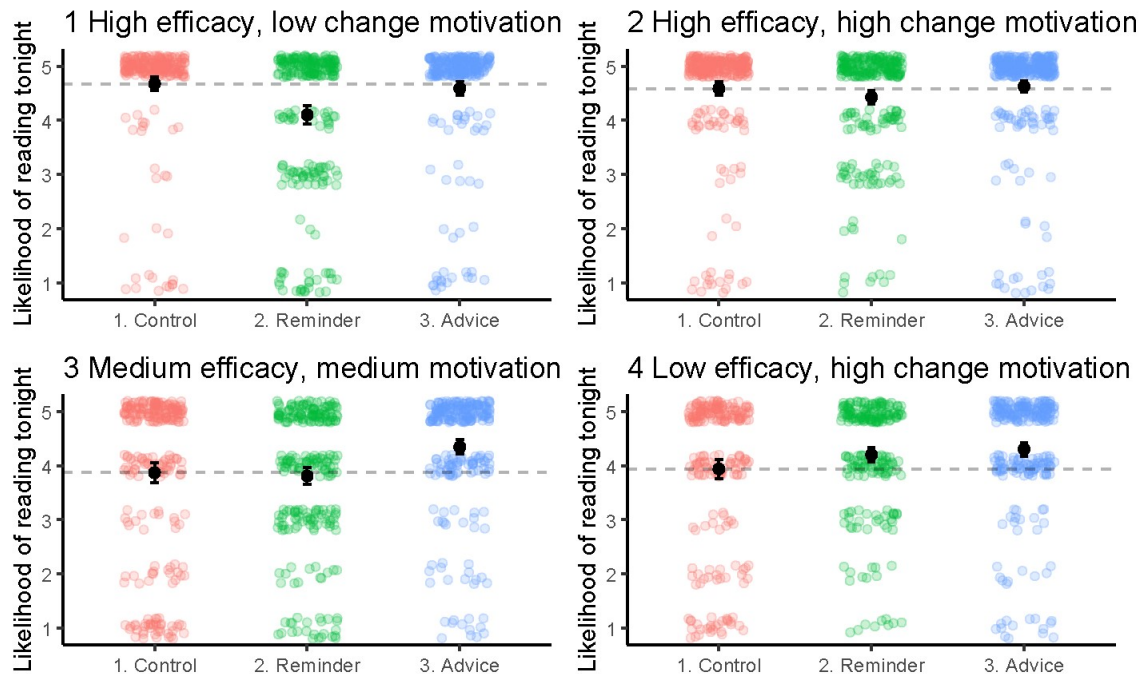
To better understand this effect, we now consider the heterogeneous impacts of reminders. We partitioned parents into different clusters through the k-means algorithm. All variables displayed in the supplemental Appendix for the survey experiment, except for the experiment and outcome, were used for k-means clustering. We did not find heterogeneity based on characteristics such as gender or immigrant status. We found that the optimal number of clusters was four (see the Appendix B for details about the selection of number of clusters, including their differences in terms of self-efficacy and motivation). There were clear differences between the clusters:

- 1) **High-self efficacy, low change motivation cluster:** Parents in the first cluster tended to have high levels of self-efficacy and education, low perceptions of barriers to reading with their children, and little motivation to change the quantity or the quality of their reading activities with their children.
- 2) **High-self efficacy, high change motivation cluster:** Parents in the second cluster had high self-efficacy (though lower than the first cluster), high education, many perceived barriers to reading, and a high motivation to change.
- 3) **Medium self-efficacy, medium motivation to change cluster:** this cluster was in-between in many respects, both self-efficacy, education, perceived barriers, and motivation to change.

- 4) **Low self-efficacy, high motivation to change cluster:** parents in the fourth cluster, who had low levels of self-efficacy, less education, high perceptions of barriers, and a high motivation to change their reading habits.

Figure 2 shows the effects of the reminder and advice treatments in each of the four clusters. The high self-efficacy, low change motivation cluster (Cluster 1) had a strong negative reaction to imagining receiving reminders, while advice had no effect in this cluster. The high-self efficacy, high change motivation cluster had a strong positive reaction to imagining advice and a slightly negative effect of reminders. There were no significant treatment effects in the medium self-efficacy, medium motivation to change cluster, even though reading intentions in the reminder group were lower than the control group (all these differences are displayed in the appendix).

**Figure 2: Heterogeneous Effects of Reminders and Advice. Survey experiment.**



**Note:** Likelihood of reading with one's child tonight in each treatment condition. Random jitter was added to the individual responses for this graph. Colored dots represent individual observations in each treatment condition. Black dots are averages in treatment conditions and vertical lines are 95 % confidence intervals. Horizontal dotted line goes through the mean in the control condition. Data points have been removed from Cluster 2, since Statistics Denmark does not allow for exporting any statistic displaying fewer than 3 data points.  $N = 3,637$ . Note that the  $N$  is lower because k-means clustering requires non-missingness for all variables. Cluster 1  $N = 810$ , Cluster 2  $N = 987$ , Cluster 3  $N = 916$ , Cluster 4  $N = 924$ .

Finally, the low self-efficacy, high motivation to change cluster was the only group displaying a positive effect on intended reading behavior when primed with reminders. Indeed, the treatment effect in this cluster was statistically significant and comparable to that of advice. Thus, parents in this cluster reacted positively to reminders, in contrast to all other clusters. This cluster is also the only one of the four in which a majority of parents (58 %) had a preference for receiving reminders when asked "would reminders help you read more with your child?" prior to the experiment. These findings suggest that the negative impact of hypothetical reminders in the survey experiment is primarily driven by parents who stated they already read enough with

their children. This supports the explanation that they do not want reminders because they already engage in sufficient reading.

After examining the heterogeneous effects of reminders, we shift our focus to our field experimental study, where we aim to target this low self-efficacy cluster with reminders to help them read more with their children.

## **Field Experiment**

### ***Method and Participants***

In our field experimental study, we investigated the real-world impact of reminders on encouraging parental engagement in reading activities with their children. We aimed at targeting the subset of parents with low self-efficacy identified in the survey experiment. Participants were a subset of parents of children in 1st grade participating in a larger study. All of the parents had first signed up to receive children's books and information on shared book reading between the 30th of September and 31st of October, 2022.

Selection of participants for the reminder experiment was based on how parents' answered a survey about their reading habits, which was sent out on the 27th of January, 2023. 3,912 parents answered the survey and were subsequently randomized into different groups. In this experiment, we only use a subset of 570 parents who stated that they 1) wanted to read more with their children, and 2) stated that they did not read enough with their children, because they forgot to do so.

As we show in the supplementary Appendix, this group aligns well with the characteristics found predictive of reminder-receptiveness in the survey experiment, given that they have lower self-efficacy than other parents do. These parents were randomized into receiving three reminders via text each week or no additional assistance (control condition).

### ***Materials and Procedure***

**Treatment and main outcome.** The participants in the field experiment had answered affirmatively to the question "I would like to read more with my child than I currently do" (to which 83 % of all parents answered "Yes"). Upon answering this question, parents who answered "Yes" were asked, why they did not read as much with their children as they wanted to. The parents in this study stated that the main reason was that they forgot to read with their children ( $n = 570$ ). The parents' answer to this survey question implies that this group is a subgroup for which we expect larger effects in line with our theoretical starting point and the survey experiment. This group of parents were subsequently randomized into receiving reminders to read with their children three times a week or become a part of the control group. We scheduled reminders to be sent out on Tuesdays, Thursdays, and Sundays every week at 2 p.m. The first reminder was dispatched on February 21, 2023, and the final one was sent on May 4, 2023. Parents had the option of opting out of receiving reminders, creating the potential for attrition. 11.2 % of parents chose to opt out. Notably, the first opt-out request was received in the third week—after the effect had already become insignificant—indicating that opt-outs likely did not influence our core findings.

Our online reading platform is a website, on which the parents can access advice on reading with their children informed by behavioral science along with several free e-books to read with their children. The e-books were selected by reading experts from a large Danish municipality. We measure multiple sequential activities on our online reading platform. The sequential activities measured through the platform are as follows: 1) logging into the platform, 2) visiting the page with e-books, 3) reading the description of an e-book, and 4) reading an e-book. These measures provide knowledge about the depth of parental engagement caused by the reminders.

We acknowledge that parents might respond to our treatments by reading more hard-copy books to their children, which could substitute for reading on our online platform and potentially bias our estimates downward for this variable.

We measured conscientiousness prior to the experiment in a survey administered from the 13th to the 30th of January 2023 through the Revised NEO Personality Inventory (Soto & John, 2009), self-efficacy through the general self-efficacy scale (Schwarzer & Jerusalem, 1995), and patience/time discounting through

the validated global measure for time preferences (Falk et al., 2018). The Appendix contains details about measures, scales, and descriptive statistics (Table A.1) for the field experiment.

### ***Analytical Strategy***

To examine the effect of reminders, we use separate OLS-regressions for each of the nine weeks in which we ran the study through the following equation:

$$(4) \quad Y_i = \beta_0 + \beta_1 D_i + \varepsilon_i,$$

in which  $Y_i$  denotes one of our online reading platform outcomes,  $D_i$  is a dichotomous indicator for treatment status, and  $\beta_1$  denotes the mean difference between the control group and the reminder treatment group.

In the first week, parents could access the platform, but we had not started the reminder treatment yet. In the eight following weeks, we administered three weekly reminders in the treatment group and we thus run separate OLS-regressions for each of these weeks.

## **Results**

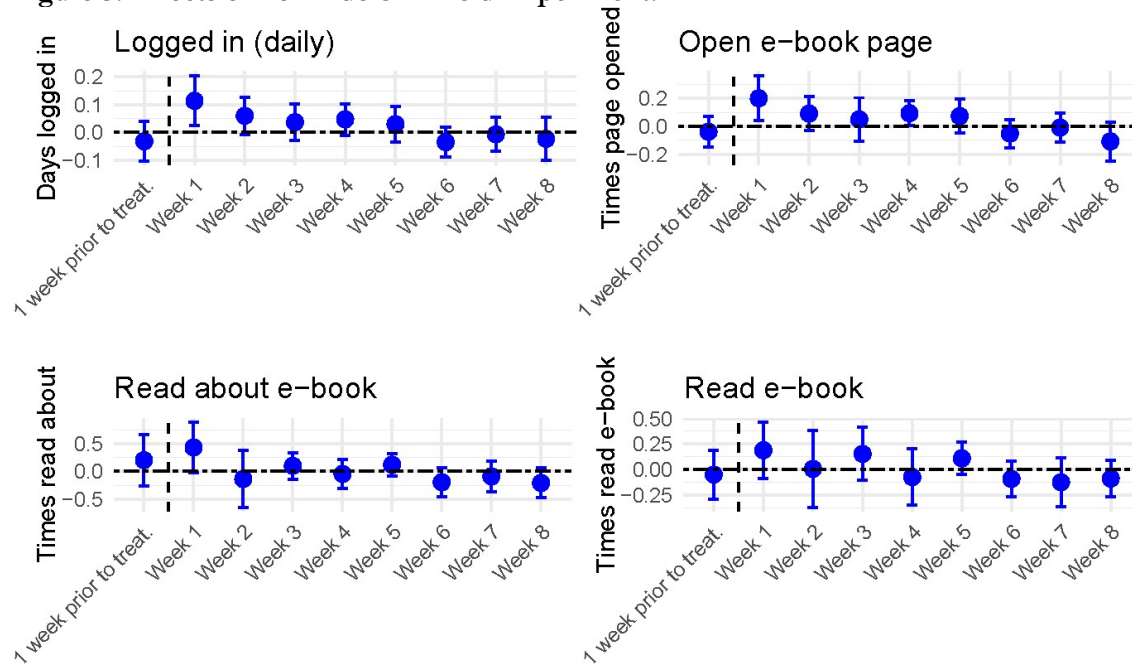
### ***Baseline Balance***

Table C.8 in the Appendix presents a balance check showing no statistically significant differences between our experimental groups in terms of days read per week, patience, conscientiousness, and self-efficacy. This supports the notion that the randomization worked as intended.

### ***Average Treatment Effects of Reminders***

We now turn to the experimental results. We have four dependent variables in the experiment: 1) logging into the platform, 2) opening the e-book page, 3) reading about the content of an e-book, and 4) reading an e-book. The results are displayed in figure 3.6. As can be seen in the upper left corner of the figure, there are no significant differences between the two groups in daily logins prior to the treatment. However, the treatment with three weekly reminders about reading increased parents' tendency to log in on our online reading platform by 11.4 % in week 1 ( $p < .05$ ). The effect declines rapidly. In the second week of the experiment, the three weekly reminders only increased logins by 6 % and the effect was statistically insignificant ( $p < .1$ ). After the first week, reminders do not lead to positive effects regarding daily logins to the platform. This results remains until week 8, marking the end of the experiment.

The same holds true for opening the page with e-books. In the first week of the experiment, we see a statistically significant effect of the reminder. Receiving the reminders increases the probability of opening the page by 20.1 % ( $p < .05$ ). However, the effect also declines and becomes insignificant after the first week. In the lower left corner in figure 3, we see the results for reading the description of an e-book on the webpage. This also seems to increase substantively in the first week by 42.9 % ( $p < .1$ ), though the effect similarly declines in the weeks to follow. Finally, we see in the lower right panel that the e-books did not seem to fit the parents' interests, however, as we see no statistically significant effects for reading an e-book on the webpage.

**Figure 3. Effects of Reminders in Field Experiment.**

**Note:** Results from OLS regressions with parental daily logins (0 = Did not log in, 1 = Logged in at least once) as the dependent variable in the upper left panel, opening the e-book page in the upper right panel, reading about an e-book in the lower left panel, and reading an e-book in the lower right panel. Vertical line denotes beginning of treatment. Experimental group (0 = Control, 1 = Three weekly reminders about reading) as the independent variable. 95 % confidence intervals. N = 570. Control = 303, Reminder = 267.

### Discussion and Conclusion

The co-production of services plays a crucial role in ensuring equity in public service delivery (Clark, 2018; Jakobsen & Andersen, 2013). One example is parental involvement in reading with their children, which has the potential to reduce inequalities (Fitton et al., 2018). However, many parents read with their children less than they aspire to—our data indicates that at least two-thirds face this challenge. If this discrepancy stems from forgetfulness, reminders could serve as a simple yet effective behavioral intervention to encourage more frequent parental reading.

Reminders, like other forms of nudges, are designed to encourage positive behavior by directing attention to specific actions that individuals might otherwise neglect (Chang et al., 2023). However, the effectiveness of nudges in boosting participation and reducing inequalities remains inconclusive, with mixed evidence on their impact (Bettinger et al., 2022a; Castleman et al., 2021; Linos et al., 2022).

In this study, we seek to examine the potential for reminders to reduce inequality in shared book reading. First, in a survey experiment, we showed an average negative effect of the prospect of receiving reminders on reading intentions. However, we applied machine learning and rich administrative data and found a group of parents reacting positively to a hypothetical reminder scenario. These parents were characterized by low self-efficacy and conscientiousness, and a tendency to forget reading with their children.

In the field experiment, we directly targeted this group to increase their reading with their children. We found that those who forget to read were similar to the cluster of parents identified in our survey experiment, in that they had lower conscientiousness and self-efficacy than parents who stated they did not forget to read with their children. We then treated these parents with three weekly reminders to read with their children with daily logins to our reading platform as the outcome. We only found a significantly positive effect in the first

week, which then gradually declined. From weeks 2-8, we found no statistically significant effects of the treatment on logins or engagements with e-books on our online reading platform.

The findings open up a new avenue for improving the precision and effectiveness of nudging campaigns, emphasizing the importance of targeting them to the group most in need of them while considering their potential to decay over time.

Practically, public sectors should use caution when applying nudges. Based on the notion that nudges do not use coercion or economic incentives, nudges have seemed to be a low-cost tool with no effects at worst and substantial, positive effects at best. However, if some people react negatively to such reminders—a reaction that may become more prevalent as more governmental organizations and private companies use reminders to capture people’s attention—this may be a sign that we need more knowledge about how targeting determines the fate of nudging campaigns. This raises a question about whether reminders should be used more strategically to target groups of residents that actually benefit from them, and if so, how these groups are identified.

The studies reported here uncover knowledge propositions about nudging, which we believe will help inform the literatures on co-production and parental reading with children. Furthermore, they can aid practitioners in targeting behavioral interventions to suitable audiences. The results suggest that both public sectors and researchers should collaborate to pinpoint receptive audiences for reminders.

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## A. Supplementary Information on the Survey Experiment

This section contains details about measures and descriptive statistics for the survey experiment. We distributed a questionnaire to all parents of children aged 6-7 in a Danish municipality, obtaining 3,144 valid responses (response rate = 16.4 %). The questionnaire contained 50 questions, which we supplemented with detailed administrative data from Statistics Denmark.

Table A.1 shows descriptive statistics for the variables used in the survey experiment. We do not report maximum and minimum values due to individual protection requirements from Statistics Denmark.

### Details About Measures

Female: Question about gender of the child where male is 0 and female is 1.

N (children in family): Administrative data on the number of children in a family.

Age of parent: The parent's age in years.

Age of child: Age of the child whose reading habits is the topic of the questionnaire. Times child read, Times child did not read, Times child read alone, Times partner read w. child: The number of days during the last week where the child performed reading in one of the four categories.

*Answering options: 1-7*

Motivation to read more: I want to read more with my child than I currently do. *Answering options: 1 (Strongly disagree) - 5 (Strongly agree)*

Motivation to read better: I want to find better ways to read with my child. *Answering options: 1 (Strongly disagree) - 5 (Strongly agree)*

Months educated: Administrative data on the number of education months the respondent has received.

Conscientiousness: Respondents' answers to the 8 questions about conscientiousness developed by (Soto & John, 2009). *Answering options: 1 (Strongly disagree) - 5 (Strongly agree)*

Patience (question): Respondents' answer to the question *How willing are you to give up something that is beneficial for you today in order to benefit more from that in the future?* developed by (Falk et al., 2018). *Answering options: 1 (Not at all willing) - 11 (Very willing)*. Patience (task): Respondents' choices in a set of task eliciting their patience preferences, such as *Would you rather receive 100 Danish kroner today or 500 Danish kroner in 12 months*. The procedure was developed by (Falk et al., 2018). *Answering options: 1 (Lowest level of patience) - 32 (Highest level of patience)*.

Patience (combined): The combination of the patience question and the patience task.

Solution questions: Questions about parents' preferences for different types of solutions to read more and better with their children. *Answering options: 1 (To a very low extent) - 5 (To a very high extent)*

Preference questions: Questions about parents' preferences for different aides to help them read more with their kids. *Answering options: 1 (To a very low extent) - 5 (To a very high extent)*

Barriers: Questions about parents' perceived barriers to read with their kids. *Answering options: 1 (To a very low extent) - 5 (To a very high extent)*

Income: Administrative data on parents' income.

Read w. child tonight: Parents' assessments of the likelihood that they will read with their child tonight. *Answering options: 1 (Not at all likely) - 5 (Very likely).*

**Table A.1: Descriptive Statistics. Survey Experiment**

|                                     | Mean   | Median | SD    |
|-------------------------------------|--------|--------|-------|
| Child female                        | 0.50   | 1.00   |       |
| N (children in family)              | 2.17   | 2.00   | 0.70  |
| Age of parent                       | 38.94  | 39.00  | 4.97  |
| Age of child                        | 6.65   | 7.00   | 1.14  |
| Times child read                    | 3.35   | 3.00   | 2.25  |
| Times read where child did not read | 3.64   | 3.00   | 2.84  |
| Times child read alone              | 3.28   | 2.00   | 3.70  |
| Times partner read w. child         | 6.22   | 7.00   | 2.88  |
| Motivation to read more             | 3.73   | 4.00   | 1.03  |
| Motivation to read better           | 3.20   | 3.00   | 1.08  |
| Months educated                     | 197.50 | 198.00 | 28.69 |
| Conscientiousness                   | 3.97   | 4.00   | 0.63  |
| General self-efficacy               | 9.54   | 9.67   | 1.20  |
| Reading self-efficacy               | 3.69   | 4.00   | 0.89  |
| Patience (question)                 | 8.91   | 9.00   | 1.71  |

|                                                    |        |        |        |
|----------------------------------------------------|--------|--------|--------|
| Patience (task)                                    | 24.59  | 28.00  | 8.29   |
| Patience (combined)                                | 16.75  | 18.00  | 4.31   |
| Solution: book suggestions                         | 2.69   | 3.00   | 0.90   |
| Solution: receiving advice                         | 2.45   | 2.00   | 0.90   |
| Solution: receiving reminders                      | 1.63   | 1.00   | 0.88   |
| Solution: information on development               | 2.74   | 3.00   | 0.91   |
| Solution: Overview on reading effort               | 1.99   | 2.00   | 0.93   |
| Preference for book suggestions                    | 3.81   | 4.00   | 0.92   |
| Preference for books at childs reading level       | 3.76   | 4.00   | 0.96   |
| Preference for books in childs interest            | 3.78   | 4.00   | 0.95   |
| Preferences for suggestions on where to find books | 2.95   | 3.00   | 1.24   |
| Preference for suggestions for dialogue about book | 2.95   | 3.00   | 1.24   |
| Preference for facts about childrens reading       | 3.47   | 4.00   | 1.02   |
| Preference for suggestions on how to structure day | 3.32   | 3.00   | 1.14   |
| Preference for reading tests                       | 3.39   | 4.00   | 1.19   |
| Preference for reading app                         | 2.89   | 3.00   | 1.34   |
| Preference for reading competition                 | 2.26   | 2.00   | 1.29   |
| Preference for goal setting w teacher              | 3.23   | 4.00   | 1.20   |
| Barrier: forget to read w. child                   | 2.21   | 2.00   | 1.15   |
| Barrier: difficult to find material                | 2.05   | 2.00   | 1.14   |
| Barrier: I have trouble reading                    | 1.13   | 1.00   | 0.52   |
| Barrier: My child has trouble reading              | 1.72   | 1.00   | 1.06   |
| Barrier: childs motivation                         | 1.88   | 1.00   | 1.09   |
| Barrier: Dont have the time                        | 2.25   | 2.00   | 1.08   |
| Barrier: Not motivated                             | 2.30   | 2.00   | 0.99   |
| Barriers (Combined)                                | 2.07   | 2.00   | 0.62   |
| Income (1000s)                                     | 371.04 | 372.16 | 267.90 |
| Read w. child tonight                              | 4.30   | 5.00   | 1.18   |

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## Balance Check

Table A.2 reports a balance check for the variables female, age of parent, age of child, the number of children in the family, months educated, and income. Across all variables we see very similar means for the three experimental groups, suggesting that the randomization worked as intended.

**Table A.2: Balance Across Experimental Conditions. Survey Experiment**

|                        | 1. Control |       | 2. Reminder |       | 3. Advice |       | F-test p-value |
|------------------------|------------|-------|-------------|-------|-----------|-------|----------------|
|                        | Mean       | SD    | Mean        | SD    | Mean      | SD    |                |
| Child female           | 0.51       |       | 0.49        |       | 0.50      |       | 0.442          |
| Age of parent          | 38.9       | 5.2   | 39.1        | 4.9   | 38.8      | 4.8   | 0.41           |
| Age of child           | 6.7        | 1.2   | 6.6         | 1.1   | 6.6       | 1.1   | 0.212          |
| N (children in family) | 2.2        | 0.7   | 2.2         | 0.7   | 2.2       | 0.7   | 0.645          |
| Months educated        | 196.3      | 30.3  | 197.8       | 28.4  | 198.3     | 27.5  | 0.198          |
| Income in 1000s        | 364.7      | 239.4 | 365.5       | 226.7 | 382.2     | 323.2 | 0.192          |

The F-test in the rightmost column of table A.2 shows that none of the means for any of the variables are significantly

## Models

This subsection presents the regression models for the survey experiment. First, we display the model for the treatment effect. Secondly, we show how the treatment effect differs across the four identified clusters.

Table A.3 show results used to produce Figure 1. The table displays a negative average effect of the reminder-treatment on the stated likelihood that a parent will read with his or her child tonight ( $t = 2.51$ ,  $p = 0.012$ , Cohen's  $d = -.11$ , Confidence interval (CI) = [-0.197, -0.024]). Advice, on the other hand, has a positive treatment effect ( $t = 4.11$ ,  $p < .001$ , Cohen's  $d = .17$ , CI = [0.092, 0.261]) compared to the control group.

**Table A.3: Survey Experiment: Average Treatment Effects**

Table A.3: Survey experiment: Average treatment effects

|                         | <i>Dependent variable:</i>     |
|-------------------------|--------------------------------|
|                         | Read with child tonight (std.) |
| Reminder                | -0.111**<br>(0.044)            |
| Advice                  | 0.177***<br>(0.043)            |
| Constant                | 3.608***<br>(0.031)            |
| Observations            | 3,144                          |
| R <sup>2</sup>          | 0.014                          |
| Adjusted R <sup>2</sup> | 0.014                          |
| Residual Std. Error     | 0.993 (df = 3141)              |
| F Statistic             | 22.765*** (df = 2; 3141)       |
| <i>Note:</i>            | *p<0.1; **p<0.05; ***p<0.01    |

**Table A.4: Survey Experiment: Heterogeneous Effects**

|                                           | Read with child tonight (std.) |
|-------------------------------------------|--------------------------------|
| Treatment - reference: Control Reminder   |                                |
|                                           | -0.465***<br>(0.081)           |
| Advice                                    | 0.0002<br>(0.081)              |
| Clusters - reference: Cluster 1 Cluster 2 |                                |
|                                           | -0.624***<br>(0.082)           |
| Cluster 3                                 | 0.071<br>(0.085)               |
| Cluster 4                                 | -0.529***<br>(0.090)           |
| Reminders x Cluster 2                     | ***<br>0.447(0.116)<br>***     |
| Advice x Cluster 2                        | 0.375(0.114)<br>***            |
| Reminders x Cluster 3                     | (0.121)<br>0.3290.012          |
| Advice x Cluster 3                        |                                |
| Reminders x Cluster 4                     | (0.118)<br>0.750 ***           |
| Advice x Cluster 4                        | (0.127)<br>**0.310             |
| Constant                                  | (0.126)<br>***                 |
|                                           | 0.236(0.059)                   |

|                         |                           |
|-------------------------|---------------------------|
| Observations            | 3,091                     |
| R <sup>2</sup>          | 0.068                     |
| Adjusted R <sup>2</sup> | 0.064                     |
| Residual Std. Error     | 0.970 (df = 3079)         |
| F Statistic             | 20.341*** (df = 11; 3079) |

---

\*                \*\*                \*\*\*  
*Note:* p<0.1; p<0.05; p<0.01

Table A.4 shows the heterogeneous effects of reminders as displayed in Figure 2. The treatment condition has been interacted with cluster membership. The dependent variable remains the stated likelihood of reading with one's child tonight. The reference group is Cluster 1 and the control arm of the study. The table shows the interaction between the treatments and cluster membership. Hence, the important thing to note in the table is the interaction coefficients, which refer to treatment effects relative to the control group in cluster 1.

The most noteworthy finding in the study is that Cluster 4 has a significant and positive reaction to the reminder-treatment relative to the differences between the control and reminder-treatments in the other clusters.

## A.1 Cluster Differences

We ran a random forest regression to find the most important predictors of cluster membership. What we found was that motivation, self-efficacy, conscientiousness, and barrier perceptions were the strongest predictors of cluster membership. The differences are displayed in table A.5.

What we found was that the first cluster had the highest self efficacy, followed by the second and third cluster, and finally the fourth cluster had the lowest self-efficacy. These differences were highly statistically significant ( $p < .001$ ). The same was true for the personality trait, conscientiousness, where cluster 4 had significantly lower conscientiousness than the other cluster ( $p < .001$ ).

Turning to barrier perceptions, the same pattern was evident. Cluster 1 did not perceive that many barriers, whereas cluster 4 had a high perception of barriers ( $p < .001$ ).

Finally, with regards to change motivation, the fourth cluster had the highest change motivation, followed by cluster 3 and 2, whereas cluster 1 had very little change motivation ( $p < .001$ ).

**Table A.5: Survey Experiment: Cluster Differences**

|                    | Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 | F-test p-value |
|--------------------|-----------|-----------|-----------|-----------|----------------|
| Self-efficacy      | 0.47      | 0.07      | -0.08     | -0.7      | <.001          |
| Conscientiousness  | 0.31      | 0.16      | -0.18     | -0.39     | <.001          |
| Barrier perception | -1.02     | -0.39     | 0.27      | 1.02      | <.001          |
| Change motivation  | -1.03     | 0.05      | 0.035     | 0.861     | <.001          |

## B Determining the Number of Clusters

This section of the appendix describes how we determined the number of clusters in the k-means clustering analyses.

To find the optimal number of clusters, we apply the Gap Statistic, a method proposed by Tibshirani and colleagues (2001). The gap statistic loops over different clustering solutions to find the one that maximizes the intracluster variation relative to a null reference distribution of the data without any clustering. The gap statistic for a given k is defined by the following equation:

$$Gap_n(k) = E_n^* \log(W_k) - \log(W_k) \quad (B.1)$$

Where k denotes the number of clusters and E is the expectation for a given sample size n in the reference distribution. The further away a potential solution for any given k is from the null reference distribution, the larger the gap statistic.

Tibshirani and colleagues (2001) suggested using this method for clustering, and their proposal for the definition of the optimal number of clusters is the one satisfying the following equation:

$$f(k) \geq f(k+1) - S_{k+1} \quad (B.2)$$

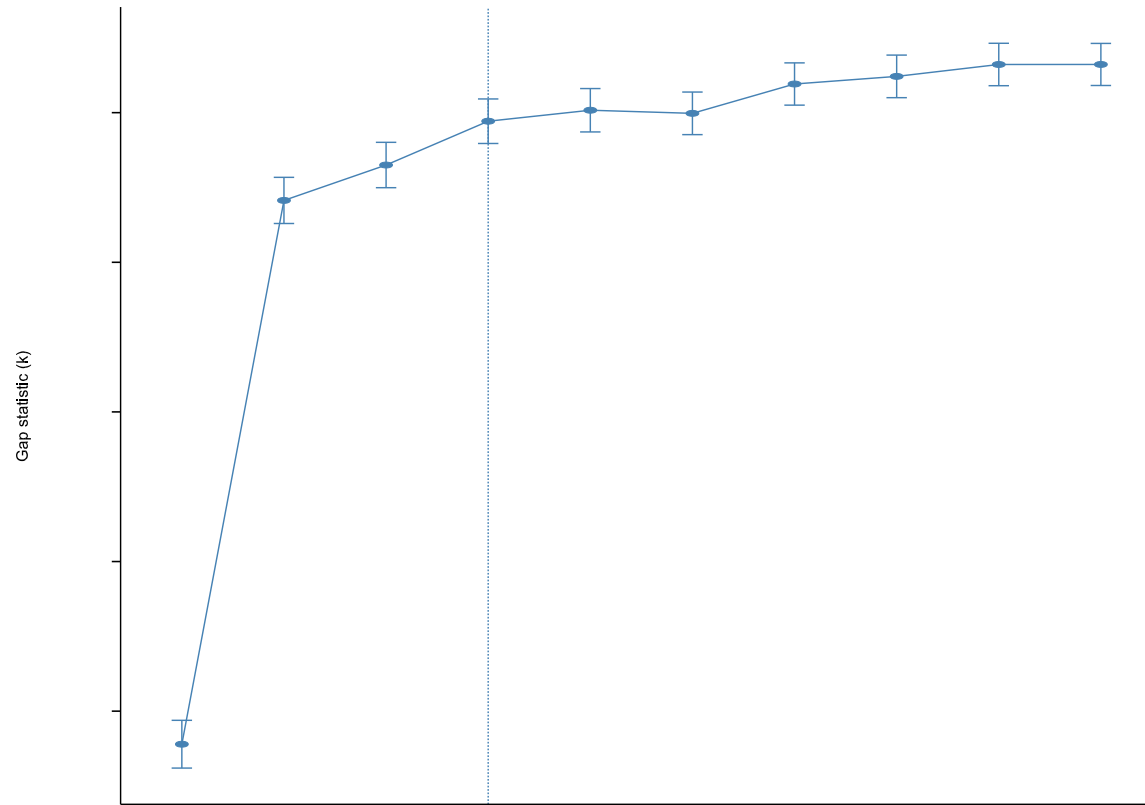
Where  $S_{k+1}$  is the standard error for a given solution, k.

We leverage this solution to find the optimal number of clusters for the first study. We draw 500

Monte Carlo simulations to define our values for  $E_n^*$ , the uniform reference distribution. We choose 25 initial configurations for the algorithm to start from and select 10 as the maximum number of clusters. Applying these parameters, we see that the optimal number of clusters suggested by the algorithm is 4. Thus, we choose four clusters (see Figure B.1).

**Figure B.1: Optimal Number of Clusters**

Optimal number of clusters



Note: The figure shows the optimal clustering solution according to Tibshirani and colleagues (2001) as described in equation 2. This solution is the one with the highest gap statistic relative to the next with one additional cluster subtracted by the standard error for the solution. Four clusters is the optimal solution according to this equation.

## C Supplementary Information on Field Experiment

## Descriptive Statistics

Below we display descriptive statistics for the field experiment. Prior to the treatment, we asked parents about their patience, self-efficacy, and conscientiousness in the same way as previously reported in the study.

**Table C.6: Descriptive Statistics. Field Experiment**

|                   | Mean | Median | SD   | Min  | Max |
|-------------------|------|--------|------|------|-----|
| Patience          | 7.26 | 8      | 2.2  | 1    | 11  |
| Conscientiousness | 3.85 | 4      | 0.63 | 1.67 | 5   |
| Self-efficacy     | 4.28 | 4      | 0.63 | 1    | 5   |

### C.1 Alignment with Group Found in Survey Experiment

We will now show the alignment between the group identified in the survey experiment as being receptive to reminders and the group targeted in the field experiment. We analyze differences between parents who stated they forget to read with their children (and therefore target group for reminders,  $n = 570$ ) and those who state they read enough ( $n = 369$ ). Our data grants us the possibility of examining differences between those who forget to read with their children and those who read enough on three fundamental traits predictive of belonging to the low self-efficacy, high change motivation cluster, namely self-efficacy, conscientiousness, and patience.

We see in Table C.7 that self-efficacy and conscientiousness are predictive factors for individuals who express a desire to change their behavior due to forgetfulness. Specifically, a one-unit increase in self-efficacy (on a scale of 1-5) is linked to a 5.9 percentage-point decrease in this probability ( $t = 2.38$ ,  $p < .05$ , Cohen's  $d = -0.08$ , 95 % CI =  $[-0.11, -0.01]$ ).

Similarly, a one-point increase in conscientiousness (on a scale of 1-5) is associated with a

15.6 percentage-point reduction in the likelihood of stating they read enough and attributing their insufficient reading to forgetting ( $t = -6.06$ ,  $p < .01$ , Cohen's  $d = -.19$ , 95 % CI =  $[-0.206, -0.105]$ ). However, there are no statistically significant differences between patient and impatient parents ( $t = 0.42$ ,  $p > .1$ , Cohen's  $d = 0.01$ , 95 % CI =  $[-0.01, 0.017]$ ). It appears that both self-efficacy and conscientiousness contributes to predicting membership in the target group, suggesting that this group is similar to the one identified as receptive to reminders in the survey experiment.

**Table C.7: Predicting Reading Enough (vs. Does Not Read Enough Because of Forgetting)**

|                   | Reads enough      |
|-------------------|-------------------|
| Self efficacy     | −0.059* (0.025)   |
| Conscientiousness | −0.156*** (0.026) |
| Patience          | 0.003 (0.007)     |
| Num.Obs.          | 939               |
| R2                | 0.046             |
| R2 Adj.           | 0.043             |

+ p < 0.1, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

**Balance Check**

We examined whether the groups in the experiment differ in terms of how often they read with their children, time discounting, conscientiousness, and self efficacy. The results are displayed in Table C.8.

The table shows, that there are no significant differences between the experimental groups.

**Table C.8: Balance - Field Experiment.**

| Category           | Control   | Reminders | F-test p-value |
|--------------------|-----------|-----------|----------------|
| Days read per week | 4.2 (2.4) | 4.5 (2.0) | 0.139          |
| Patience           | 7.3 (2.1) | 7.3 (2.3) | 0.975          |
| Conscientiousness  | 3.9 (0.6) | 3.8 (0.6) | 0.915          |
| Self efficacy      | 4.3 (0.7) | 4.3 (0.6) | 0.875          |

*Note:* Means. S.D. in parentheses.

## Models

Below we display the regression models, regressing whether a parent logged in daily (0, 1) on reminder treatment status (0, 1). The results are also displayed in Figure 3 in the paper.

**Table C.9a: Regression Results Over Weekly Intervals: Logins.**

|                           | <i>Dependent variable: daily login</i> |                     |                    |                     |                    |                     |                     |                     |                     |
|---------------------------|----------------------------------------|---------------------|--------------------|---------------------|--------------------|---------------------|---------------------|---------------------|---------------------|
|                           | Week -1                                | Week 1              | Week 2             | Week 3              | Week 4             | Week 5              | Week 6              | Week 7              | Week 8              |
| Reminder treatment        | -0.032<br>(0.036)                      | 0.114**<br>(0.046)  | 0.060*<br>(0.034)  | 0.037<br>(0.033)    | 0.047<br>(0.029)   | 0.030<br>(0.033)    | -0.035<br>(0.028)   | -0.007<br>(0.031)   | -0.023<br>(0.039)   |
| Constant                  | 0.122***<br>(0.025)                    | 0.096***<br>(0.031) | 0.056**<br>(0.024) | 0.083***<br>(0.023) | 0.046**<br>(0.020) | 0.059***<br>(0.023) | 0.073***<br>(0.019) | 0.056***<br>(0.021) | 0.109***<br>(0.027) |
| Observations              | 570                                    | 57                  | 570                | 570                 | 570                | 570                 | 570                 | 570                 | 570                 |
| R2                        |                                        | 0.001               | 0.005              | 0.002               | 0.005              | 0.001               | 0.003               | 0.0001              | 0.001               |
| F Statistic (df = 1; 568) | 0.001                                  | 6.2                 | 3.041*             | 1.262               | 2.590              | 0.844               | 1.556               | 0.057               | 0.341               |

\* \*\* \*\*\*  
*Note:*  $p < 0.1$ ;  $p < 0.05$ ;  $p < 0.01$ .

**Table C.9b: Regression Results Over Weekly Intervals: Open E-Book Page.**

|                           | <i>Dependent variable: Open e-book page</i> |                     |                    |                     |                    |                   |                    |                    |                     |
|---------------------------|---------------------------------------------|---------------------|--------------------|---------------------|--------------------|-------------------|--------------------|--------------------|---------------------|
|                           | Week -1                                     | Week 1              | Week 2             | Week 3              | Week 4             | Week 5            | Week 6             | Week 7             | Week 8              |
| Reminder treatment        | -0.038<br>(0.056)                           | 0.201**<br>(0.082)  | 0.092<br>(0.063)   | 0.05<br>(0.079)     | 0.094**<br>(0.045) | 0.074<br>(0.061)  | -0.051<br>(0.052)  | -0.008<br>(0.052)  | -0.107<br>(0.071)   |
| Constant                  | 0.162***<br>(0.038)                         | 0.132***<br>(0.056) | 0.102**<br>(0.043) | 0.152***<br>(0.054) | 0.059*<br>(0.031)  | 0.076*<br>(0.042) | 0.122**<br>(0.036) | 0.083**<br>(0.036) | 0.182***<br>(0.048) |
| Observations              | 570                                         |                     | 570                | 570                 | 570                | 570               | 570                | 570                | 570                 |
| R2                        |                                             | 0.001               | 0.004              | 0.001               | 0.008              | 0.003             | 0.002              | 0.00004            | 0.004               |
| F Statistic (df = 1; 568) | 0.465                                       |                     | 2.128              | 0.407               | 4.421**            | 1.471             | 0.942              | 0.021              | 2.271               |

\*            \*\*            \*\*\*  
*Note:* p<0.1; p<0.05; p<0.01.

**Table C.9c: Regression Results Over Weekly Intervals: Read About E-Book.***Dependent variable: Read about e-book*

|                           | Week -1            | Week 1             | Week 2             | Week 3              | Week 4            | Week 5            | Week 6             | Week 7             | Week 8              |
|---------------------------|--------------------|--------------------|--------------------|---------------------|-------------------|-------------------|--------------------|--------------------|---------------------|
| Reminder treatment        | 0.201<br>(0.236)   | 0.429*<br>(0.232)  | -0.139<br>(0.261)  | 0.099<br>(0.122)    | -0.046<br>(0.135) | 0.119<br>(0.101)  | -0.196<br>(0.132)  | -0.092<br>(0.143)  | -0.21<br>(0.137)    |
| Constant                  | 0.376**<br>(0.161) | 0.347**<br>(0.158) | 0.413**<br>(0.179) | 0.231***<br>(0.083) | 0.241*<br>(0.093) | 0.135*<br>(0.069) | 0.294***<br>(0.09) | 0.234**<br>(0.098) | 0.182***<br>(0.048) |
| Observations              | 570                | 570                | 570                | 570                 | 570               | 570               | 570                | 570                | 570                 |
| R <sup>2</sup>            | 0.001              | 0.004              | 0.0005             | 0.001               | 0.0002            | 0.002             | 0.004              | 0.001              | 0.004               |
| F Statistic (df = 1; 568) | 0.723              | 3.428*             | 0.283              | 0.655               | 0.116             | 1.401             | 2.213              | 0.413              | 2.361               |

\*        \*\*        \*\*\*  
*Note:* p<0.1; p<0.05; p<0.01.

**Table C.9d: Regression Results Over Weekly Intervals: Read E-Book.**

|                           | <i>Dependent variable: Read e-book</i> |                     |                   |                    |                    |                  |                     |                    |                     |
|---------------------------|----------------------------------------|---------------------|-------------------|--------------------|--------------------|------------------|---------------------|--------------------|---------------------|
|                           | Week -1                                | Week 1              | Week 2            | Week 3             | Week 4             | Week 5           | Week 6              | Week 7             | Week 8              |
| Reminder treatment        | -0.051<br>(0.123)                      | 0.188<br>(0.14)     | 0.005<br>(0.193)  | 0.152<br>(0.133)   | -0.076<br>(0.141)  | 0.109<br>(0.08)  | -0.094<br>(0.09)    | -0.126<br>(0.124)  | -0.09<br>(0.093)    |
| Constant                  | 0.29**<br>(0.084)                      | 0.257***<br>(0.096) | 0.257*<br>(0.132) | 0.185**<br>(0.091) | 0.241**<br>(0.097) | 0.086<br>(0.055) | 0.188***<br>(0.062) | 0.205**<br>(0.085) | 0.224***<br>(0.064) |
| Observations              | 570                                    | 570                 | 570               | 570                | 570                | 570              | 570                 | 570                | 570                 |
| R2                        | 0.0003                                 | 0.003               | 0.000             | 0.002              | 0.001              | 0.003            | 0.002               | 0.002              | 0.002               |
| F Statistic (df = 1; 568) | 0.171                                  | 1.81                | 0.001             | 1.309              | 0.291              | 1.87             | 1.092               | 1.039              | 0.919               |

\*                \*\*                \*\*\*  
*Note:* p<0.1; p<0.05; p<0.01.

## **Ethical Considerations**

In our work, we comply with current standards for research transparency and ethics, including the American Political Science Association's "Principles and Guidance for Human Subjects Research" as approved by the APSA Council in April, 2020.

### **D.1 Study 1.**

Study 1 was a survey sent out to all parents in a large Danish municipality.

The participation in our study was voluntary, which we made clear in the introductory text of the survey. To the respondent, there was no doubt that the experimental treatment was hypothetical, so neither deception nor misinformation was used in this study.

The research has not been reviewed by an internal review board. Prospective review is not an requirement for this type of research in our country. (Until recently the ethics committee only handled biological/health research.) The research involves no deception and minimal, if any, risk or harm to participants.

### **D.2 Study 2.**

Participation in Study 2 was voluntary. However, since Study 2 was a field experiment involving actual rather than hypothetical behavior, we ensured the acceptance of our institutional review board for this study.

We received the acceptance on the 4<sup>th</sup> of November 2021. The acceptance number is 202199. We will make the acceptance letter available after review, though we are currently not enclosing it to maintain our anonymity throughout the peer review process.

The funds for conducting this research were obtained from [institution anonymized for peer review].

