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# *Self-control Training for Young Children*

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***Abstract:*** Children's self-control is closely related to future success. We experimentally test whether self-control can be trained by reminders from parents. We find that participating children are very patient, and that the differences between short-run and long-run choices are insignificant. Surprisingly, according to our experiments, we also find that parental education makes children seem less patient. High baseline level of patience and adverse psychology could be two potential explanations for the negative effect of reminders from parents.

***Keywords:*** Self-control, Education

## 1. Introduction

Starting from the famous marshmallow experiment on delayed gratification in 1972, children's self-control problem has long been associated with their future success. However, little is known about whether self-control is nature or can be nurtured, especially for young children.

Inspired by inspired by a fair amount of theoretical literature and experimental work in behavioral economics about present bias and self-control, we conduct an experiment with children around year 6-10 years old to investigate whether self-control can be trained by reminders from parents.

Specifically, following Augenblick and Rabin, we measure children's baseline time preference by asking them to choose the number of extra Math problems to complete immediately today (Monday) and three days later (Thursday) [1]. To further explore whether education from parents is effective in reducing present bias, we randomly assign participating families into treatment and control groups in which parents in the treatment group nudge their children with a short reminder if their children choose fewer tasks than their plans three days earlier. We have 21 families in the control group and 22 in the treatment group. The experiment lasts for four weeks in total.

Surprisingly, we find a counter-intuitive result that nudges from parents actually backfire, making children's choices seem more impatient. We propose two potential mechanisms. Firstly, in the baseline, children don't exhibit self-control problems and they tend to choose more Thursday tasks on Thursday than on Monday. Therefore, reminders will not alleviate the self-control problem if the problem is not severe at all in the first place. Secondly, children's adverse psychology could also explain the surprising impact of parental education.

Our results have important implication to both school and family education. Different from the evidence from Education literature that self-control is closely related to children's future success [2,3] and that self-control could potentially be nurtured [4,5], our study adds to the literature by pointing out that the training method plays a crucial role in education about self-control. Nudges or reminders can sometimes backfire, and we should be cautious in choosing the correct training method from the behavioral and educational toolbox.

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## 2. Related literature

This paper is closely related to the literature on present bias and self-control. Laibson and O'Donoghue formalize the idea of present bias time preferences [5,6], followed by plenty of lab experiments that measure the present bias parameter [1], O'Donoghue, Toussaert and Kaur field experiments that apply it to real world settings [7,8], (e.g. Kaur, Ambec, Schilbach [9-11]). Even though commitment devices have been proposed by behavioral economist as a solution to self-control problems, take-up of commitment devices require individuals' sophistication and reduces the flexibility of actions in the future [12-14]. Despite the ample evidence on the existence of present bias and commitment devices as a candidate solution, little is known about whether time preferences can be affected by nudges or reminders (Some exceptions include Karlan [15]). We add to this literature by examining whether self-control can be nurtured with low-cost intervention (for example reminders), especially for young children.

This paper also shows the literature on education about children's cognitive ability. Tangney et al. shows that self-control is closely related to students' performance and academic success [16]. Vazou et al. further discuss that self-control and other cognitive functions can be nurtured through intervention [17]. For example, Meichenbaum and Goodman proposed training children to talk to themselves improves ability to control their emotions [18]. Rimm-Kaufman suggested that the quality of classes could help children improve their self-control ability [19]. Friese et al. provides a comprehensive review on whether self-control training improves children's self-control [20]. This paper contributes to the literature by exploring whether reminders from parents about children's previous goals can reduce self-control problems. The intervention that I investigate is both realistic and low-cost, which has important implications for family education.

In following parts of this paper, we describe the experimental design in detail in Section 2. Section 3 presents the main experimental results, and finally, we conclude and discuss future improvement in Section 4.

## 3. Experimental Design

We run an experiment with 43 primary school students (age between 6 and 12) and their parents to explore a) whether children have self-control problems (i.e., whether their short-run effort choice is different from the long-run effort choice) and b) whether the self-control could be cultivated by education from parents.

In order to measure children's time preferences and self-control problems, we follow Augenblick and Rabin ask them to choose the number of extra Math problems to complete immediately today (on Monday) and three days later (on Thursday) [1]. To further explore whether parental education is effective in reducing present bias, we randomly assign participating families into treatment and control groups where parents in the treatment group nudge their children with a short reminder if their children choose fewer tasks on Thursdays than their plans on Mondays. We have 21 families in the control group and 22 in the treatment group. The average age of these children are around 6 to 10 years old, and the radio of male and female is about 3:2. The average age of parents are around 30 to 38 years old and their earnings are about 200 thousand every year.

We distribute surveys to parents on Mondays and Thursdays for four consecutive weeks. The first week is the baseline week where all families get the same survey asking children's effort choice. Children are motivated to finish the Math problems with "blind boxes" (with toys in it) provided by us. For each 20 problems that they finish, they will get 1 point that they can use to exchange for blind boxes as gifts by the end of the whole experiment. On Monday, children choose the number of extra Math problems to complete immediately today and on Thursday. After that, they are encouraged to complete the extra Math problems that they choose. On Thursday, children choose the number of

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Math problems they'd like to finish again and then again complete the task. We compare their choices on Monday versus on Thursday to understand if children's short-run decision is different from their long-run decision in the baseline.

For week 2 and 3, the treatment group and control group get different instructions for Thursday while the Monday tasks remain the same for both groups. On Thursday, parents in the treatment group remind their children with their choices on Monday if their children choose an amount lower than their Monday choices. Specifically, they read the following to their children: "You planned to do more Math problems today three days ago, but you choose fewer today, why?" and then they further nudge their children: "I guess your plan on Monday suggests that you have the ability and interest to finish more problems, and it could lead to greater award in the future. Please think again about your choice today." Families in the control group do not read the reminders above and parents just let their children choose again on Thursday and implement their choices. We compare the number of Math problems completed on Thursday for these two groups to see whether self-control and ability to stick with the long-run plan could be cultivated by reminding from others, especially from parents for young children.

In the last week, we repeat the baseline experiment where both treatment and control groups don't get the reminders to see if the treatment effect of reminders last.

## 4. Experimental Results

As described in the experimental design, we elicited students' plans for their Thursday tasks twice: on Monday (3 days earlier) and on Thursday immediately before the task. We use the differences between those two plans as the proxy for students' present level. The more present-biased a student is, the more likely that he will plan more on Monday than on Thursday for the Thursday task.

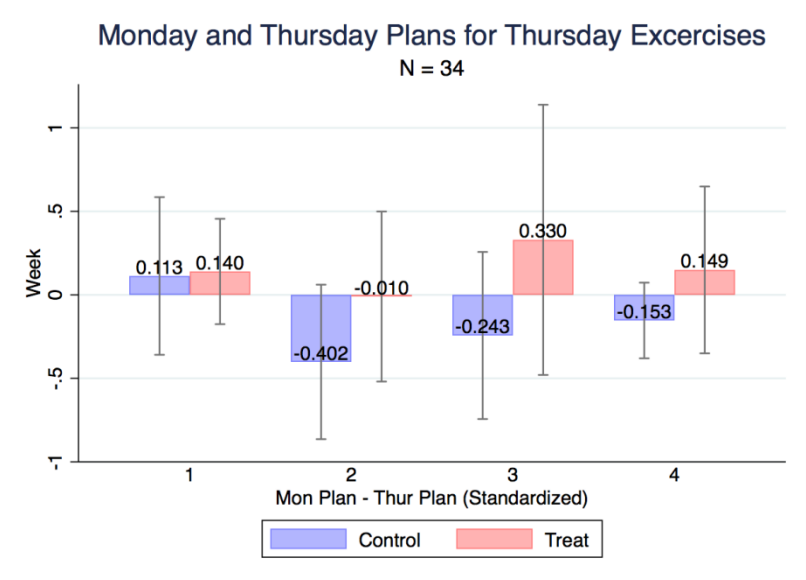


Figure 1: Monday and Thursday Plans for Thursday Exercises, Over four weeks.

Figure 1 shows the difference between Monday and Thursday plans for the Thursday task over four weeks for control group and treat group. The first week is the baseline week where neither group has reminders from parents. In week 2 and 3, parents in the treatment group remind their children about their Monday plans if their Thursday plans are lower. In week 4, the endline week, neither group has reminders. We says that no significant differences between the control and the treatment group in baseline. Moreover，children in both groups choose slightly more Thursday tasks on

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Monday than on Thursday (not statistically significant).

Surprisingly, we find that in weeks 2 to 4, children in the control group choose more Thursday tasks on Thursday than on Monday, suggesting zero or even "negative" present bias. This is inconsistent with the existing lab evidence on present bias, mainly for the following reason. Uncertainty for Thursday time arrangement is lower on Thursday than on Monday. Children's plan for extra math problems depends heavily on the amount of school assignments they get, and uncertainty about school assignments could discourage students from planning too much extra tasks for the future. Planning for today (Thursday planning Thursday) is more flexible than planning ahead (Monday planning Thursday), so children may plan more on Thursday because they have a better sense about their free time on that day.

However, for those in the treatment group, we observe the opposite. Although not statistically significant, the signs of the Monday minus Thursday plans flip for the treatment group. On average, children planned more on Monday than on Thursday for their Thursday tasks if their parents remind them about the Monday plans. Again, this is a counter-intuitived result: nudges from parents actually backfire. There are two possible explanations:

Firstly, as demonstrated in the control group, children tend to plan more on Thursday than on Monday probably because they have lower uncertainty on Thursday. Therefore, reminding them about their Monday plans, which are probably lower than their plans in Tuesday, is a discouragement instead of an encouragement of effort.

Secondly, parents and teachers sometimes encounter the problem of adverse psychology in students, which could make motivation and encouragement less effective. Children may get bored or even annoyed by constant reminders of "studying hard" and thus lower their effort level. Extrinsic motivation could crowd out intrinsic motivation.

OLS: Monday Plan - Thursday Plan

| | (1) Week 2-4 | (2) Week 2-4 | (3) Week 4 | (4) Week 4 |
|---|---|---|---|---|
| Treat | 0.422* | 0.425* | 0.303 | 0.304 |
| | (0.221) | (0.215) | (0.289) | (0.299) |
| age | | -0.142** | | -0.0153 |
| | | (0.0560) | | (0.0776) |
| baseline | | 0.185 | | -0.00768 |
| | | (0.137) | | (0.190) |
| Mean | -0.0425 | -0.0425 | 0.00691 | 0.00691 |
| SD | 1.129 | 1.129 | 0.843 | 0.843 |
| IDs | 34 | 34 | 34 | 34 |

Standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01

Figure 2: OLS: Monday Plan—Thursday Plan.

In addition, we run OLS regressions in Figure 2. In Columns (1) and (2) we look at the plan differences (Monday minus Thursday for Thursday tasks) over the week 2 to 4. Similar to what we observe in Figure 1, the positive coefficients of "Treat" in Columns (1) and (2) show that children in the treatment group tend to plan more on Monday than on Thursday for Thursday tasks as compared to their peers in the control group. In other words, they are more present-biased. In addition, we include age and baseline choices (week 1 choices) as control variables in Column (2) The negative coefficient of age in Column (2) suggests that older children are less present biased. Though not statistically significant, the positive correlation between week 1 and week 2-4 choices is consistent with what we would expect.

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In Columns (3) and (4), we further restrict our sample to the last week only to see if the treatment effect dies out after a week. All coefficients are not significant, suggesting no significant differences between the treatment group and the control group after the treatment ends.

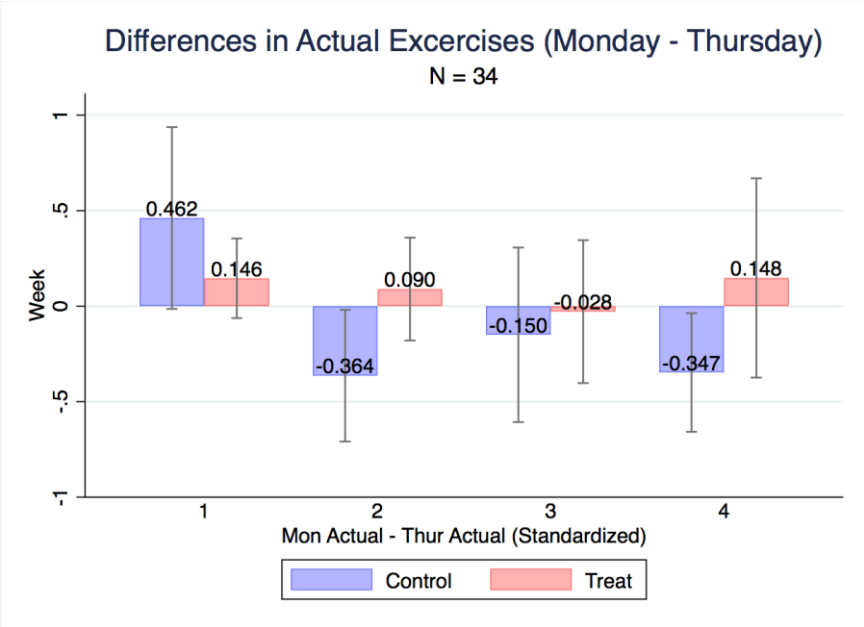


Figure 3: Monday and Thursday Actual Tasks for Thursday Exercises, Over four weeks.

Figure 3 shows the difference between actual math problems that children finish on Monday and on Thursday. In the control group, the actual number of tasks they do on Monday is generally lower than Thursday (except for the first week). In the treatment group, the sign flips again, the actual number of tasks they do on Monday is always higher than Thursday. In general, the pattern that we observe in Figure 3 is similar to Figure 1.

OLS: Monday Actual - Thursday Actual

| | (1) Week 2-4 | (2) Week 2-4 | (3) Week 4 | (4) Week 4 |
|---|---|---|---|---|
| Treat | 0.357** | 0.360** | 0.495 | 0.504 |
| | (0.160) | (0.160) | (0.317) | (0.311) |
| age | | -0.0570 | | -0.138* |
| | | (0.0415) | | (0.0807) |
| baseline | | 0.00525 | | -0.0711 |
| | | (0.101) | | (0.197) |
| Mean | -0.0982 | -0.0982 | -0.0851 | -0.0851 |
| SD | 0.820 | 0.820 | 0.942 | 0.942 |
| IDs | 34 | 34 | 34 | 34 |

Standard errors in parentheses
* p<0.1, ** p<0.05, *** p<0.01

Figure 4: OLS: Monday Actual—Thursday Actual.

Similarly, in Figure 4, we use the same specifications as in Figure 4 and the outcome variable becomes the differences between actual tasks completed on Monday versus Thursday. Again, the

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coefficients of "Treat" are positive in Column (1) and (2), suggesting similar treatment effects on both plans and actual tasks completed.

## 5. Conclusion and Discussion

In this paper, we investigate the effectiveness of parental education on nurturing children's self-control and we find that reminders by parents actually make children behave as if they are more impatient: the difference between their short-term choices and long-term plans are larger with reminders from parents. Seemingly counter-intuitive, children's high level of patience in the baseline and adverse psychology towards the treatment from parents could possibly explain the results.

One interesting extension would be to ask children to explain their choices on Mondays and Thursdays, which could allow us to explain the baseline patience level. One can also elicit children's attitudes towards reminders from parents, including how they feel about the reminders, and what they think about their parents after getting the reminders. This could potentially shed light on the adverse psychology channel.

One caveat limite sample size in our study. Because of the high level of commitment in participating in our study (participating for four consecutive weeks and completing surveys twice a week), we get a relatively small sample size with 43 families in total. Therefore,our example is not large enough to draw some conclusions. In future research activities, the purpose of us is to cooperate with primary schools or kindergartens to reach a larger sample size.

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