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Temptation at Work: A Field Experiment on Willpower and Productivity^{*}

Alessandro Bucciol[†], Daniel Houser[‡] and Marco Piovesan[§]

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Temptations are a largely unavoidable part of life. Resisting them is usually seen as a virtuous behavior. Recent research in social psychology, however, suggests that using willpower to delay gratification can detrimentally impact performance on immediately subsequent tasks. Using standard economic theory, we develop a model connecting willpower to productivity. When delaying gratification is difficult, the model predicts exposure to a tempting good detrimentally impacts productivity, while when delaying gratification is easy, exposure to temptation can lead to productivity gains. We then report data from a field experiment with children of different ages. Since the research in child development has established that younger children have difficulty delaying gratification, while after age 10 children become skilled at doing so, we exploited this exogenous variation to test the predictions of our model. Our results suggest that a prohibited temptation affects work productivity in a way consistent with theory: it is negative for the youngest children (aged under 8) and positive for the oldest (aged above 10). We also observe a significantly different impact by gender. It thus seems that prohibiting a temptation needs not eliminate its impact on productivity, a result of importance to anyone interested in designing policies to promote efficiency.

Keywords: willpower; children; temptation; productivity; field experiment.

JEL-codes: C93; J13.

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1 Introduction

From youngest ages children are taught to resist temptation, and encouraged to develop willpower to assist in doing so. The reason is that succumbing leads to a transient enjoyment, but an eventual cost of greater significance than that momentary pleasure. These costs are typically connected to immediate financial costs (e.g., gambling losses), adverse health outcomes (e.g., cancer) or adverse psychological effects (e.g., guilt). Moreover, recent work in social psychology suggests that using willpower to resist temptations can impact negatively performance on subsequent tasks (Vohs and Heatherton, 2000). The explanation is that exerting willpower consumes energy, leaving people more passive in making decisions and weaker in completing tasks (see, e.g., Baumeister et al., 1998; Muraven et al., 1998). Although willpower receives increasing attention by economists (see, e.g., Houser et al., 2008a, 2008b; Ozdenoren et al., 2008), to the best of our knowledge connections between temptation, willpower, and productivity remain unstudied. We formalize these connections using a simple model, and then report data from a field experiment with children of different ages to test our model's implications. We study children from 6 to 13 years old because willpower is known to systematically increase as children grow older. By exploiting this exogenous variation we obtain clean evidence on links between willpower, temptation and productivity.

An extensive literature in psychology and economics demonstrates the importance of willpower to decision making. Several experiments in psychology suggest that willpower depletion can make it more likely to succumb to temptation (see, e.g. Baumeister et al., 1994; Shiv and Fedorikin, 1999; Baumeister and Vohs, 2003; Hinson et al., 2003; Vohs and Faber, 2007). This subject has also received attention in economics. For example, Malmandier and Della Vigna (2006) highlight that temptation preferences can lead people to pay not to go to the gym, while Houser et al. (2008a) take advantage of a natural experiment to demonstrate that "tempting" goods are more likely to be purchased from the checkout aisle when the wait-time is longer. Our study is novel in its investigation of the impact of temptation on productivity.

We collect decisions from children aged 6 to 13 attending an Italian summer camp. These are convenient ages, in that it is established that substantial improvements in the ability to exert willpower occur between the ages of 8 and 10 (see, e.g., Mischel and Metzner, 1962). This exogenous, age-based variation in willpower is important to our analysis strategy. We also collect information on other demographic variables in order to assess whether our results are robust to

various demographic controls, as well as to explore other systematic patterns in our data (e.g., gender effects).

Our experiment design includes a first stage designed to deplete willpower and a second stage designed to assess performance in a simple productivity task. Our procedure is inspired by Vohs and Heatherton (2000). They reported data from a study in which adults on diets sat in a waiting room either with tempting snacks nearby (the “temptation” treatment) or far away (the control treatment). Vohs and Heatherton hypothesized that people on diets would need to expend willpower to avoid consuming the snacks, and that this willpower expenditure might affect subsequent behavior in other domains. After remaining in the room for a period of time, participants were directed to a new location and asked to solve a series of puzzles. In relation to the control condition, they found that subjects in the “temptation” condition were less persistent in their efforts to obtain solutions (study 2, p. 252).

Our study is similar in to that since we study the effect of food temptations on a subsequent task’s outcomes. However, our work extends Vohs and Heatherton (2000) in three key ways. First, our key outcome variable of interest is labor output in a paper-folding task, an unambiguous measure of productivity. Second, productivity is saliently rewarded. Third, our participants are children who vary in ages in a way that is systematically related to one’s ability to delay gratification. In particular, it is well established that substantial improvements in the ability to delay gratification occur between the ages of 8 and 10 (see, e.g., Mischel and Metzner, 1962.)

Our key hypotheses are (i) willpower depletion reduces subsequent labor productivity; and (ii) the effect of willpower depletion on productivity varies with age. Our results confirm these hypotheses. We indeed find that exposure to a prohibited tempting item significantly affects productivity on a subsequent task. In addition, the productivity reduction after exposure to temptation (and presumably use of willpower) is much greater in younger than older children. Overall, we find the productivity impact to be especially detrimental for boys and children younger than 8 years of age.

The remainder of this paper is organized as follows. In section 2 we sketch a model of temptation and effort. In section 3 we describe the experiment. In section 4 we present our results and section 5 is a concluding discussion. The appendix provides details on the experiment.

2 A Model of Temptation and Effort

Self-control problems are receiving increasingly more attention in Economics. In particular, topics such as procrastination, life-cycle savings and credit-cards take-up are hotly debated (see DellaVigna, 2009, for a survey). A number of different models try to rationalize the evidence collected in many experimental laboratories (for instance see Laibson, 1997; O'Donoghue and Rabin, 1999; Gul and Pesendorfer, 2001; Fudenberg and Levine, 2006). To the best of our knowledge, Burger et al. (2009) is the first attempt to test these models in an experimental environment.

It is well-established that the ability to delay gratification, or resist temptation, increases with age (see, e.g., Mischel and Metzner, 1962; or for a survey review see Mischel et al., 1989). A reason is that as children age they increasingly understand how to employ self-control strategies (Mischel and Mischel, 1983). When children are very young (say, first-grade or younger) they often use strategies that make delay difficult, including “to expose the rewards during the delay period and to think about them, (for example, “because it makes me feel good”), thus defeating their own efforts to wait” (Mischel et al., 1989, p. 936). Their strategies slowly become more experienced, however, and by around fourth of fifth grade many delay gratification by focusing on abstract rather than arousing thoughts. The model below connects this fact to productivity in environments that include temptation.

Suppose an individual can provide effort at one of two levels, high (H) or low (L). H and L are real numbers representing the entire duration of effort on the task (e.g., 10 minutes or 5 minutes). Effort is fully observable, with high effort resulting in earnings $W(H) > W(L)$, the earnings associated with low effort. Next, let C be a twice continuously differentiable real function capturing the psychic costs of effort (‘willpower’). Costs increase in effort, so that $C' > 0$, and delay of gratification becomes increasingly difficult as C'' varies from negative to positive (because all else equal, willpower is used less when it is more costly). Finally, assume independent idiosyncratic mean-zero additive preference shocks $e(H)$ and $e(L)$.

Under this preference specification, it follows that the value to high effort is

$$V(H) = W(H) - C(H) + e(H) \tag{1}$$

while the value to low effort is

$$V(L) = W(L) - C(L) + e(L) \quad (2)$$

A person chooses high effort if and only if $V(H) - V(L) > 0$, that is

$$W(H) - W(L) > C(H) - C(L) + e(L) - e(H) \quad (3)$$

Hence,

$$\Pr(\text{effort} = H) = \Pr\left(\eta > [C(H) - C(L)] - [W(H) - W(L)]\right) \quad (4)$$

where $\eta = e(H) - e(L)$ is a mean zero random variable.

This framework can be easily extended to predict the effect of temptation and willpower depletion on effort. To do this, assume that using willpower to resist a tempting good for duration $\tau > 0$ is equivalent to providing effort on the productivity task for an amount of time $\lambda(\tau) > 0$, where λ is a monotonically increasing real function with $\lambda(0) = 0$. It follows that after resisting temptation, the costs of high and low effort are $C(H + \lambda(\tau))$ and $C(L + \lambda(\tau))$, respectively.

Therefore, when one is exposed to temptation we have

$$\Pr(\text{effort} = H) = \Pr\left(\eta > [C(H + \lambda(\tau)) - C(L + \lambda(\tau))] - [W(H) - W(L)]\right) \quad (5)$$

Note that (4) is a special case of (5) that occurs when $\tau = 0$.

Three cases arise:

Case 1. $C(\cdot)$ is convex. Here delay of gratification is difficult, because psychic costs increase rapidly with exposure to temptation. It is easy to prove that, in this case, exposure to temptation reduces the probability one makes a high effort choice.

Case 2. $C(\cdot)$ is linear. Delay of gratification is easier here than in Case 1. It is easy to show that, in this case, the probability of making a high effort decision is not affected by exposure to temptation.

Case 3. $C(\cdot)$ is concave. Delay of gratification is easiest to manage in this environment. Psychic costs of exposure to temptation increase at a decreasing rate. It is easy to prove that, in relation to the case where one is not exposed to temptation, the probability of a high effort choice after being tempted is greater in this case.

In sum, our model predicts that exposure to temptation will either reduce, not affect, or increase effort, depending on the way in which psychic costs increase with exposure to temptation. In light of the literature on delay of gratification in children discussed above, it seems natural to describe young children by Case 1, older children by Case 2 and yet older children (and adults) by Case 3.

3 The Experiment

3.1. Hypotheses

Our experiment investigates the following specific hypotheses motivated by the model above as well as the psychology literature (see Mischel and Metzner, 1962):

Hypothesis A: Average productivity among children aged younger than 8 years is lower after exposure to temptation. Productivity among children aged older than 10 is higher, and productivity among those aged between eight and 10 is not affected by exposure to temptation.

Hypothesis B: The age-profile of temptation effects is robust to demographic controls.

3.2. Procedures and Design

After receiving permission from the management and staff of the CUS Summer Camp in Padua (Italy)¹, we conducted our experiment during two sunny and warm days of July 2008 (the weather conditions were important to our design). The summer camp is an ideal environment for our experiment for several reasons. First, we are easily able to study decisions by children of various ages. Second, the sample of children enrolled in the summer camp is heterogeneous and representative of the local population. Third, in the context of summer camp children do not likely perceive our experiment as different from any other typical camp activity. Finally,

¹ Refer to the appendix for a description of the CUS activities and for details on the experiment.

enrollment in summer camp is weekly. Children meet on Monday, are not likely schoolmates and have a variety of family backgrounds.

A few days before the experiment we obtained informed consent from the parents of all the participants; among the 220 parents we contacted, 181 (82.27%) gave their consent, but 8 children were absent in the two days of the experiment. 12 of the remaining 173 children attended both sessions, but during the second day their data were not collected and they were kept separated from the others. Even after receiving the parents’ informed consent, we did not force children to participate. However, all of them chose to take part in the experiment.

The experiment took place outdoors, over two days between 9:00am and 5:30pm local time. Overall, as detailed in Table 1, we obtain observations from 11 groups in 11 sessions with age (described below) roughly balanced with respect to time-of-day.

Table 1. Timing of the experiment and observations per group

	Session	Day 1		Day 2	
		Obs.	Avg. age	Obs.	Avg. age
9:00 AM – 10:00 AM	1	17	9.82	16	7.07
10:00 AM – 11:00 AM	2	5	12.40	0	-
11:00 AM – 11:30 AM	BREAK	-	-	-	-
11:30 AM – 12:30 AM	3	20	11.26	18	7.33
12:30 AM – 2:00 PM	LUNCH	-	-	-	-
2:00 PM – 3:00 PM	4	17	6.53	14	8.57
3:00 PM – 4:00 PM	5	14	8.62	13	10.42
4:00 PM – 4:30 PM	BREAK	-	-	-	-
4:30 PM – 5:30 PM	6	12	7.25	10	12.40

Note: We were unable to collect data during Day 2, session 2.

We randomly split each of the 11 groups into two sub-groups: one participated in the Control Treatment (CT) and the other in the Food Treatment (FT). We seated the two sub-groups separately, and while they were separated provided them with identical instructions on how to complete the folding task. The instructions took only five minutes to complete, but in all sessions children remained seated in their separate areas for the entire 10 minutes.

The sub-group in FT was seated near a table with snacks and drinks during instructions. This table was not visible to children in CT. We bought snacks and we prepared the table to tempt the children in FT. The chosen food items in fact are commonly enjoyed by children, and the drinks were perhaps especially tempting in those hot summer days where the temperature varied

between 70° F and 88° F the first day, and between 61° F and 84° F the second day². Importantly, prior to the instructions the children in FT were informed that they were prohibited from enjoying the food and drinks because the snacks had been reserved for a different event to be held in the same day.

Following the 10-minute instruction period the two sub-groups re-joined and went to a long table to complete the task. We provided children with sheets of paper printed as shown in Figure 1, as well as highlighters, labels, and paper clips. Children were instructed to fold the sheet in three parts (following the dashed line), highlight the star, attach a label (over the text "etichetta") and close the sheet with a paper clip (over the text "clips").³ Children were told that they had 10 minutes to fold as many sheets as they could.

We gave an economic incentive to make children willing to do their best. We chose tokens to homogenize the incentives of children of different ages. Children knew they would earn one token for each sheet accurately folded. At the end of the day they used their tokens to purchase, according to their preferences, items from a menu of food, ice cream and drinks available at the summer camp's snack bar (1 token corresponds approximately to 10 eurocents).

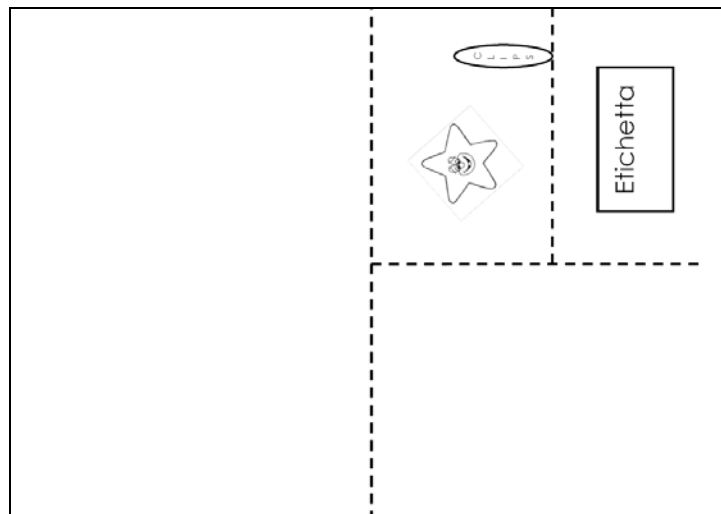


Figure 1. The sheet that kids were asked to fold

² From www.weather.co.uk.

³ Some psychologists pointed us out that the task is not suited for the youngest children, as they may find no interest on it, possibly preferring alternative tasks such as coloring a picture. We disagree with this remark. We needed a task that was identical for all the children and unambiguously interpretable. We also asked to highlight the star to attract the attention of the youngest children. Moreover, the youngest children enjoyed the atmosphere and were happy to compete with each other and earn a reward.

While asking for the parents’ informed consent, we collected basic information on each child (age, gender, a measure of performance in school, number of siblings, height, and weight⁴). Our final dataset comprises 156 children aged from 6 to 13 years. Table 2 reports the average characteristics of the children in the CT and FT groups. The two samples are approximately balanced in size and children's characteristics, although fewer children in the FT group are reported to perform better at school⁵.

Table 2. Average sample statistics

	Whole sample	CT	FT
N. sheets folded	5.79	5.86	5.71
Age	8.95	9.05	8.84
% Female	27.56	32.10	22.67
% Better at school	47.44	59.26	34.67
Number of siblings	0.97	0.93	1.01
Body Mass Index (BMI)	16.82	16.95	16.84
N. observations	156	81	75

4 Analysis

We begin by investigating Hypothesis A, which is that the detrimental effect of temptation on productivity is greater for younger ages. To perform this analysis, recall that psychologists have long pointed to the ages of 8-10 as critical years during which willpower develops (see, e.g., Mischel and Metzner, 1962). In light of this we organize our subjects into three relevant age groups: younger than eight, eight to ten, and older than ten. Figure 2 describes our data. We find a clear age-based trend in the way productivity changes between treatments. Participants aged under 8 in the FT treatment are indeed 28.7% less productive than those of the same age in CT; children aged between 8 and 10 are 4.1% less productive in FT, and those older than 10 are 14.8% more productive. The age-trend in productivity changes is statistically significant.

⁴ We use gender, age, weight and height to calculate the body mass index. To encourage a high response rate we collected only a limited amount of information on children’s characteristics. Furthermore, the summer camp staff asked us to ignore sensitive data on the household such as income, religion, etc.

⁵ About 47% of the parents reported that their children were “excellent” performers in school, a similar fraction reported “good” performance and no parent rated their child a “poor” performer.

Note that people in the oldest age group display an increase in productivity after being exposed to temptation. We explain below that this is not inconsistent with a temptation effect. However, the result is that the mean numbers of sheets correctly folded by the CT and FT groups are quite similar in magnitude (5.86 and 5.71, respectively) and not statistically significantly different.⁶

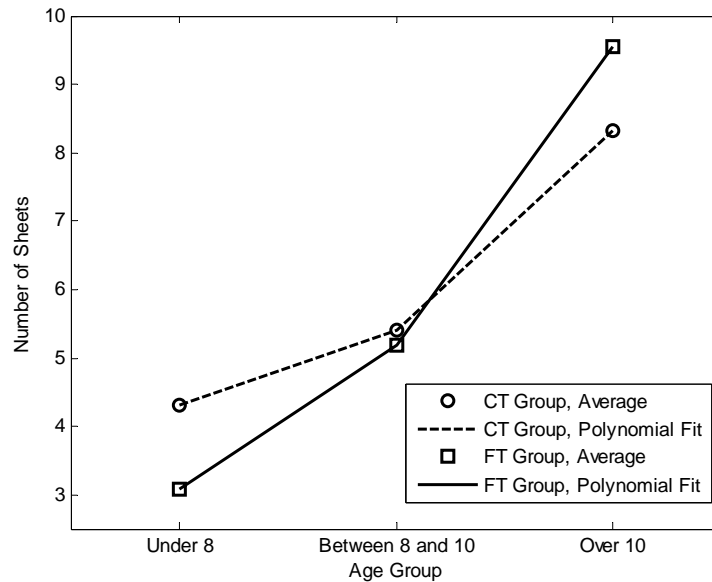


Figure 2. Average productivity by age

To investigate Hypothesis B, we use a regression analysis to explore whether this age-trend is robust to controlling for demographic and other variables. We model the number of sheets folded correctly by each child using a negative binomial regression.⁷ The dependent variable is the number of sheets correctly folded by each child, and the specification includes age effects and variables for gender, school performance, number of siblings, BMI, day and time of the experiment. In addition, we include a dummy variable for the treatment, along with interactions between the treatment and the other variables. The results of our analysis are reported in Table 3. The table reports two alternative specifications of the regression model. Specification (1) includes an indicator for number of siblings, while specification (2) includes a dummy variable for the

⁶ A two-sample parametric t-test rejects the null hypothesis at any significance level.

⁷ We choose this model rather than the more restrictive poisson regression model to allow for possible over-dispersion of the data. The over-dispersion coefficient we obtain in Table 3 is however statistically not different from zero, indicating that the mean and the variance of our dependent variable are essentially equal.

presence of siblings. Both specifications include interactions between age groups and the treatment.

The findings from the two regressions are similar. The reduced production among children under age eight is statistically significant, and the production change among those over age ten is statistically significantly higher than the production change among those aged under eight.⁸ The overall effect of treatment is also significantly different from zero.⁹ Although the interaction of the treatment with school performance and BMI is not significant, we find that the effect of treatment varies with gender. More precisely, girls tend to be more productive than boys. This finding is consistent with an ample psychological and experimental literature which sees girls to show more self-regulation and better effortful control (see the review in McCabe et al., 2004).

The overall treatment effect is determined by the combination of several variables. To gain a numerical understanding on the effect of temptation on children with different characteristics, we use specification (1) of Table 3 to compute for each child the elasticity of the number of sheets to willpower depletion; similar results are obtained using specification (2). For the negative binomial regression model, the underlying conditional mean ν of the number of sheets is described by

$$\nu = \exp \left\{ X' \beta + (tX)' \gamma \right\} \quad (6)$$

where β and γ are the coefficients, X is the set of explanatory variables used in specification (1), and t is a dummy variable equal to 1 in the FT group. The elasticity of (6) with respect to t is then estimated as $\overline{X}' \hat{\gamma}$, where \overline{X} is the sample average of the explanatory variables and $\hat{\gamma}$ is the estimate of the coefficients γ .

⁸ The test of equality of the two interactions between treatment and age is worth 11.13 (p-value: 0.0009) in specification 1, and 11.66 (p-value: 0.0006) in specification 2.

⁹ The test of joint significance of the treatment and its interaction with all the other variables is worth 21.25 (p-value: 0.0194) in specification 1, and 19.57 (p-value: 0.0336) in specification 2.

Table 3. Partial correlates of productivity

Dependent variable: number of sheets folded	(1)	(2)
Treatment	0.5982 (0.5437)	0.6247 (0.5598)
Age under 8	-0.0375 (0.1591)	-0.0293 (0.1620)
Age over 10	0.4673*** (0.1334)	0.4539*** (0.1314)
Female	0.1178 (0.1024)	0.1198 (0.1010)
Better at school	0.0112 (0.1144)	-0.0148 (0.1141)
Number of siblings	0.1400** (0.0607)	-
With siblings	-	0.1911 (0.1191)
BMI	0.0232 (0.0142)	0.0261* (0.0146)
Day 2	0.1722* (0.0928)	0.1496 (0.0953)
Sessions before a break	0.2626* (0.1380)	0.2776** (0.1419)
Sessions before a meal	0.1178 (0.1661)	0.1241 (0.1670)
Treatment * Age under 8	-0.4109* (0.2225)	-0.4220* (0.2247)
Treatment * Age over 10	0.3778 (0.2379)	0.3957* (0.2391)
Treatment * Female	0.3392* (0.1918)	0.3404* (0.1901)
Treatment * Better at school	0.2202 (0.1675)	0.2451 (0.1682)
Treatment * Number of siblings	-0.1791* (0.1061)	-
Treatment * With siblings	-	-0.2325 (0.2186)
Treatment * BMI	-0.0379 (0.0273)	-0.0405 (0.0278)
Treatment * Day 2	-0.0581 (0.1666)	-0.0302 (0.1647)
Treatment * Sessions before a break	-0.0288 (0.2041)	-0.0555 (0.2103)
Treatment * Sessions before a meal	0.0221 (0.2219)	0.0078 (0.2224)
Constant	0.8573** (0.3391)	0.8226** (0.3561)
Over-dispersion coefficient	0.0000 (0.0000)	0.0000 (0.0000)
Number of observations	123	123
Log-pseudo-likelihood	-274.9326	-275.8524
Chi ² test	173.93	189.55
Prob. > Chi ²	0.0000	0.0000

Method: negative binomial regression; dependent variable: number of sheets folded correctly; robust standard errors in parentheses. The number of observations in these analyses are lower than the number of children who took part in the experiment (156) as in several cases parents did not provide information on one or more of their child's characteristics. * = significant at 10%; ** = significant at 5%; *** = significant at 1%.

Figure 3 plots the average percentage elasticity by age groups. The whiskers in the top of each bar indicate the standard error. We see that the effect is increasing with age, is clearly negative for children aged below 8, and is clearly positive for children aged over 10. This effect implies that an average child aged below 8 in FT is expected to be 47.17% less productive (standard error: 6.63%) than a similar child in CT. On the other hand, a child aged over 10 would be expected to be 12.84% more productive (standard error: 7.27%) as a consequence of being exposed to food. The finding of a positive effect (but only marginally significantly, p-value: 7.74%) of willpower on performance may be due to our choice of the tempting goods. These essentially are similar to the rewards that can be exchanged with tokens.

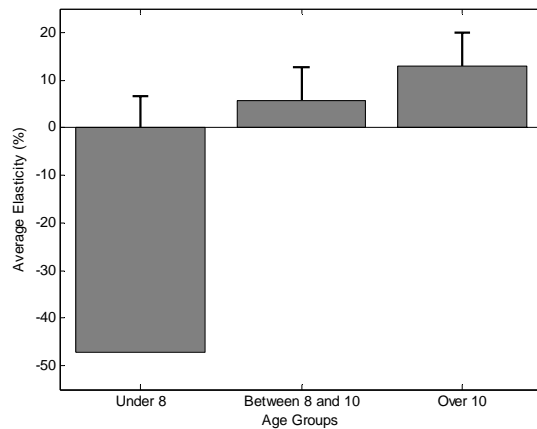


Figure 3. Treatment effect by age

Finally, Figure 4 describes that the effect of willpower depletion is negative in boys (average elasticity: -14.91%, standard error: 6.70%) and positive in girls (20.51%, std. error 7.53%).

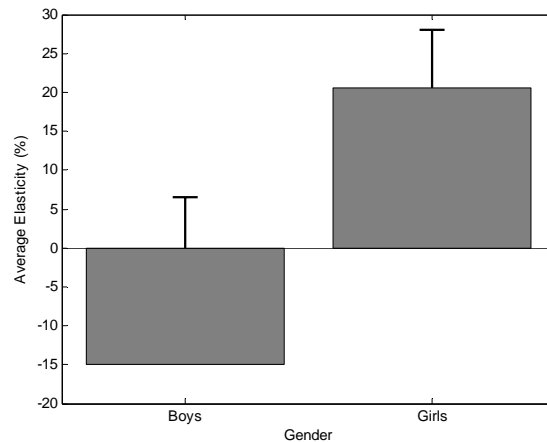


Figure 4. Treatment effect by gender

5 Discussion

We reported data from a novel field experiment investigating connections between exposure to a prohibited temptation and productivity. Our results confirm the psychological argument according to which willpower is a limited resource and can reduce the performance in subsequent tasks. They also confirm that willpower develops with age: in our sample, performance after willpower depletion is affected more heavily in young children than in old children. These findings are consistent with a lengthy psychology literature suggesting that younger children have a less-developed capacity for self-control (e.g., Mischel and Metzner, 1962) and reductions in willpower can have implications for behaviors in other domains (Vohs and Heatherton, 2000).

It is worth noting that our results are robust to controlling for demographics, and that the demographic influences we discover seem also consistent with delay-of-gratification and willpower as explanations for our results. For example, we found that girls' productivity was reduced less than boys after exposure to the tempting stimulus. This is consistent with the view that girls develop delay of gratification strategies more quickly than boys, a possibility also indicated by others (see, e.g., Bjorklund and Kipp, 1996).

There are of course alternative explanations for our data. Some have suggested that the food temptation, because it is closely related to the food reward, might have acted as a stimulus to productivity. If so, our estimated elasticities would be upward-biased, but the increasing trend in the relation willpower-productivity should still be true. Others have suggested that older children are less interested in snacks than younger¹⁰, so while younger children are "tempted," older children are "primed" by the presence of snacks and so desire the food reward more than others. Yet another possibility is that the differences we find are tied to age-related differences in the extent to which a person is "distracted" (but not tempted) by the presence of a snack during the instruction period. All of these suggestions require one to posit that something is different between older and younger children, and different in a way that explains our data. Our explanation appeals to well-established age-related changes in willpower and the ability to delay gratification. We used standard economic analyses to demonstrate that such changes are predicted to have systematically different consequences for productivity among children of different ages. Our field experiment then confirmed these predictions.

¹⁰ One of us, the father of a son aged nine, has accumulated substantial empirical evidence that children of all ages enjoy tasty snacks.

Research on connections between temptation and productivity are in their very early stage, and many questions remain open. For example, many businesses rely on the Internet, and as a result social networking, online shopping, or personal emails are just a mouse-click away for office employees. Would it be optimal to allow some level of non-work activity at some points during the day? How would that sort of policy compare to eliminating the temptation entirely, say by prohibiting some websites and other applications unnecessary for the job?¹¹ Which policy, or what other policy, would employees prefer? It would be profitable for future research to investigate the effect of willpower on the labor market.

In sum, our paper offered both methodological and substantive contributions. Methodologically we provided a new experimental procedure for assessing the impact of prohibited tempting items on performance. Substantively, our findings highlighted that prohibiting tempting activity need not eliminate the performance cost of the temptation. Even when prohibited activities are closely monitored, the psychic costs of delaying gratification may detrimentally impact economic performance.

¹¹ See the application called Temptation Blocker™, <http://webjillion.com/archives/2005/08/01/free-software-temptation-blocker/>.

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Appendix

A.1 Timeline

Our procedure comprises three phases: authorization, the experiment, and the reward. The first phase is conducted one week before the experiment, and consists of asking the parents of the children to read, fill in, and sign an authorization form. The form includes basic information on the child participating in the experiment, for example age, gender, school performance, number of siblings, height, and weight.

The second phase is the experiment itself, which was conducted on two Thursdays, the 3rd and 24th of July, in 2008, with multiple sessions for different groups of children between 9:00am and 5:30pm. The experiment took place outdoors, with temperatures between 70° F and 88° F on the first day, and 61° F and 84° F on the second.¹

The reward phase occurs after the experiment has concluded. At the end of each session, the results are given to the management of the summer camp, and these are subsequently used to distribute the rewards to the children. However, the children are not allowed to collect their rewards without their parents, so in all cases this occurred the day after the experiment.

A.2 Instructions (Script, Translated from Italian)

Stage 1: Greeting and introductory instructions for the group (5-10 minutes).

Hello everybody! First of all, thanks a lot for letting us come to your summer camp today. It's really nice to be here with you. Do you like the summer camp? Is it your first time here? (We also asked other questions, just to familiarize ourselves with children).

Today you are going to play a game. This game is easy and we hope also fun. The game gives you the chance to win some tokens, which you can exchange at the end of the day for candies, ice cream, or sodas at the clubhouse of CUS. Everybody will win something, but the more carefully you will listen to our instructions, the more tokens you will win. So, please do not

¹ A few days before the main experiment we ran a pilot experiment with 20 children to make sure that the task was doable.

talk, and try to listen what we will tell you over the next few minutes. If you have any questions, please raise your hand, and we will answer you.

The object of the game is to fold some papers in a certain way. For every sheet of paper you fold correctly, you will receive a token. As I said before, the more tokens you win, the more you can get at the clubhouse of CUS. Questions? Anybody has to go to the toilet?

Let's start the game.

Stage 2: Identification (5-10 minutes)

Since this is our first time here, and we do not know your name, we need to give you a tag with a number on it, which is on a string that you can wear around your neck. The number on the tag has no meaning. However, please do not lose it or remove it, because we will record your result using this number, and we will only give tokens to the children that return the number tag when the game is over.

Here we have a plastic bag with some cards. Each card has a number. My assistant is going to come by, and you can pick a card. Once you have a number, you have to go to that table, tell your name and then get your tag with the same number. During the game, we will use these numbers to identify you, since we do not know your names.

The assistants assign a tag to each child whose name is in the list of approved participants, corresponding to the number drawn. Once everybody has a tag, we continue with the instructions.

Since there are so many of you, we will have to split you into two groups. Please follow our assistant if your number is less than or equal to X^2 . All the others, please follow me.

At this point we divide children in two groups (see pictures below). We ask them to follow us to two different locations of the summer camp, approximately 200 meters far away from each other. During the transition phase we prevent any interaction between the two groups.

² X corresponds to half the group size.



The food treatment group (FT) is seated near a table with snacks and drinks during instructions (see right picture). This table is not visible to children in control treatment (CT), who are seated at a different location (see left picture). Importantly, prior to the instructions the children in FT are informed that they are prohibited from enjoying the food and drinks because the snacks have been reserved for a different event to be held later in the day.

Stage 3: Task explanation (exactly 10 minutes from the moment they were seated)

Please listen to me carefully, as I explain the game. This is really important, because you can win tokens only if you understand what I am about to tell you. As I said before, in the game you have to fold sheets of paper, which I will show you in a moment. After folding the paper, you also have to apply a sticker, highlight a star, and close it with a paper clip. It is really easy to do this task. Some of you might even think it is too easy. However, my experience tells me that it is not as easy as it seems.

Let me show you what you have to do. In few minutes, we will go to a table together. On the table, we have placed some paper sheets like this, along with highlighters, paper clips and stickers. Everyone will have enough material for this game, so do not use the materials of the other children. Ok?!

What do you have to do to win a token? First, take a sheet of paper like this. As you can see, the paper sheets have some dashed lines printed on them. The first thing you have to do is simply fold the paper in half, following the dashed line. Notice that there is another line that divides the folded sheet in two halves. The second thing you have to do is fold it again, also following this dashed line. There is one further dashed line that divides the sheet in two halves. Fold the paper a third time, again following the dashed line. In other words, you have to fold the paper three times, following these dashed lines. Please do it carefully. We will only accept papers folded in the

correct way. It does not have to be perfect, but try to do your best to follow the line and our instructions. Any question?

Once you have folded the paper three times, you will be holding this small sheet. As you can see now, there is a box printed on one side, with “label” written in it. What you have to do now is to cover this box with one of the stickers you will have on the table. Remove the sticker, and stick it onto to the paper that you folded. Again the sticker does not have to be perfectly applied, but in order to have a token from this game, you have to apply it in the right place. Is it ok?

Now turn over the folded paper. On the other side, as you can see, there is a star. This star is black and white. We want you to color this star using the yellow highlighters that we have put on the table. You do not need to be precise and stop highlighting at the boundaries of the star, but it is important that you do not leave any empty space *within* the star. If there is an empty space, we cannot count your sheet as a token-winner. Any question?

Last of all, use one of the paper clips on the table to keep the folded paper closed.

Once you are done with one sheet, you may start with a new one.

Let me just repeat what you have to do, showing once more the procedure you have to follow. (*see pictures below*)

- i. First fold the sheet (following the dashed line)
- ii. Then fold it once more
- iii. And once more again
- iv. Place the label, highlight the star and close the sheet with a paper clip



i



ii



iii



iv

We ask some questions, to check the children’s comprehension of the task, and the payoff implications. We answer their questions, or requests to repeat part of the instructions. We let the

children play around with the paper for a couple of minutes, so that they can familiarize themselves with the task. We then ask them to wait until the 10 minutes have elapsed.

Stage 4: Task performing (exactly 10 minutes)

After 10 minutes, we quickly go to the table. Assistants help the children to find the correct place at the table. When everybody is ready, we begin.

Ok, we are finally ready to play the game. Let's begin. Starting now, you have 10 minutes to fold as many papers as you can, using the steps we explained you. Good luck children!

During the experiment, assistants take care of ensuring that each child has the proper equipment and all the material needed. After ten minutes have elapsed, we conclude the task.

Stage 5: Counting (10 minutes)

Ok guys, stop now. Put everything you have in your hands on the table. The time is over. You did a wonderful job!

Please take several steps back, away from the table, so that we can count how many sheets of paper you folded.

Do not go away. We need to record your number, and write down the number of sheets you folded.



Assistants count the number of correctly folded sheets for each child, recording both this number and the number on the child's tag. Other assistants prepare a table with some drinks, to thank the children for their cooperation.

Stage 6: Farewells (10 minutes)

Thank you very much children. You really did a great job. Now, to thank you we have a surprise for you. There are some sodas, orange juices and water. Please follow us!

When saying farewell to the children, they are provided with some beverages. This was expressly requested by the management of the summer camp, to avoid any cruelty from exposing the children to food and beverages without allowing them to have any, and also to ensure a "prize" of some sort for all the children, even those who failed to fold a single sheet of paper.

In the meantime assistants prepare the bonuses with their corresponding prizes.

Guys, the game is now over. Please return the tag to us, and remember that after 5:30 this evening you can get a certificate showing the number of tokens you won. If you come to the clubhouse with your parents, this certificate can be used to get your rewards.

A.3 Material

The material used in the experiment is summarized by the pictures below.

A.3.1 Authorization form

The authorization form consists of four pages, as shown below. After the title page, the first page explains the purpose of the experiment, and the second is where the parents fill in authorization information (age, gender, school performance, number of siblings, height, and weight). The last page contains information about us.

Centri Estivi CUS Padova 2008

Da alcuni anni la teoria economica sta mostrando sempre più attenzione verso bambini e ragazzi. Studiarne il comportamento consente in particolare di trarre informazioni utili a capire i processi decisionali degli adulti. Conoscere adeguatamente cosa determina le azioni di bambini, ragazzi e adulti è essenziale per la costruzione di adeguati modelli teorici e, in ultima analisi, per indirizzare le scelte di politica economica verso percorsi che aumentino il benessere di tutti.

Per questo motivo avremmo in mente di coinvolgere suo figlio in un nostro progetto svolto in collaborazione con i centri estivi CUS e l'Università di Padova. L'analisi sarà condotta utilizzando semplici giochi rappresentativi di situazioni economiche stilizzate. Suo figlio percepirà la cosa come una normale ora di attività ricreative, per cui riceverà in cambio dei piccoli premi da ritirare (solo in suo compagnia) presso la sala Club della struttura sportiva.

Attività
Ricreative



Università degli Studi di Padova

Centri Estivi CUS Padova 2008

Caro genitore,

siamo due ricercatori in Scienze Economiche delle Università di Padova e Copenhagen. Avremmo in mente di far partecipare suo figlio nella giornata di giovedì ad un progetto le cui finalità sono descritte sul retro di questo foglio. Per ricevere ulteriori informazioni può contattarci ai recapiti che trova qui sotto, o chiedere informazioni al CUS.

Per poter coinvolgere suo figlio in questo progetto avremmo bisogno del suo consenso, che può darci compilando il modulo nella pagina accanto. La ringraziamo sin d'ora per la sua collaborazione.

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Centri Estivi CUS Padova 2008

AUTORIZZO Sì No

COGNOME _____

NOME _____

SESSO maschio femmine

ANNO DI NASCITA _____

COMUNE DI RESIDENZA _____

o prendere parte all'attività descritta in questo documento.

FIRMA _____

INFORMAZIONI FACOLTATIVE
(saranno usate in forme anonime per rilevazioni statistiche)

(EVENTUALE) NUMERO FRATELLI _____

ALTEZZA (cm.) _____

PESO (kg.) _____

RENDIMENTO SCOLASTICO

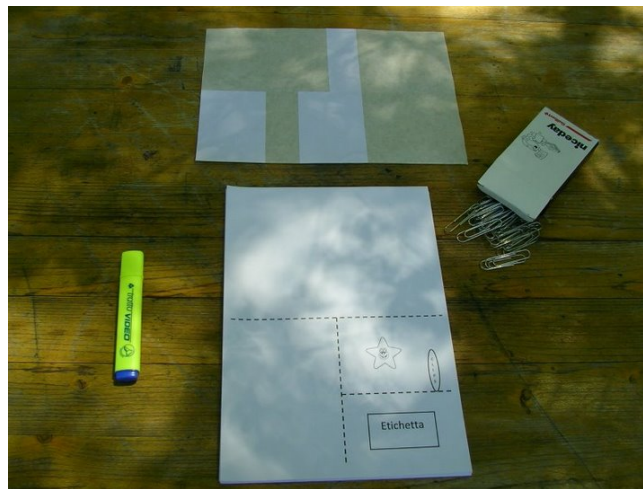
insufficiente sufficiente buono ottimo

Le informazioni raccolte saranno usate esclusivamente per le finalità suddette in conformità al D. lgs. n. 196/2003.

DA RITORNARE ENTRO GIOVEDÌ AI CENTRI ESTIVI CUS

A.3.2 Material used in the experiment

The material includes sheets of paper, a highlighter, labels, and paper clips.



A.3.3 Snacks and drinks

The food treatment group (FT) is seated near a table with snacks and drinks during instructions (see picture below).



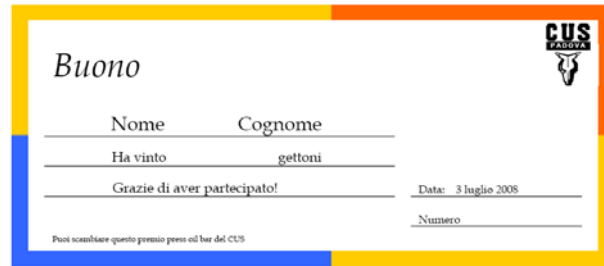
On the table we place the following items:

- Cold Beverage: Coca-Cola, Fanta orange, Estathe lemon ice tea, Lemonade
- Juices and Nectars: Santal Apricot, Red Orange, Exotic, Pineapple
- Snack Foods: Cerealix (chocolate and milk), Crackers Vitasnella, Bread-sticks, assorted Chips (Fonzies, Rodeo San Carlo, Cipster Saiwa, Dixie San Carlo), Giambonetti, Salatini, Focaccine.
- Candies: Fruit candies La Giulia, M&Ms, Gummi Bears, Skittles, Joy fruits
- Sweet snacks: Pic Nic break Nutella, cookies, biscuits Doria Bucaneve, Polpa Frutta Mela fruit dessert, Mars Bars, Twix

This table is not visible to children in control treatment (CT), who are seated at a different location. Importantly, prior to the instructions the children in FT are informed that they are prohibited from enjoying the food and drinks because the snacks had been reserved for a different event to be held later in the day.

A.3.4 Certificates

At the end of the day we give each child a certificate (see below) showing the number of tokens he or she won. If he or she comes to the clubhouse with his or her parents, this certificate can be used to get rewards.



A.4 Rewards

The reward phase occurs after the experiment has concluded. At the end of each session, the results are given to the management of the summer camp, and these are subsequently used to distribute the rewards to the children. However, the children are not allowed to collect their rewards without their parents, so in all cases this occurred the day after the experiment.

The clubhouse "Oasis" is very well supplied. These are only examples of what it is possible to buy: assorted ice cream, assorted candies, sodas (water, Coca Cola, Pepsi, Fanta, Iced tea), juices (pear, peach, pineapple, apricot, etc.) milk and coffee, assorted chips, cookies, croissants and muffins.

1 token corresponds approximately to 10 eurocents.

A.5 Supplementary Information on the Summer Camp

The "Centro Universitario Sportivo" (CUS) is a non-professional sport center created in the 40s to promote sport activities free of charge among the students of the Italian universities. In the past CUS athletes have often succeeded in national and international competitions, have won medals at the Olympic Games, and have set new Italian records. Every major Italian university manages its own center. Among others, the University of Padua currently counts around 60,000 students regularly enrolled in the various courses of its 13 faculties. The university owns two sport grounds located near the city walls. The main sport ground, where we ran the experiment, covers 70,000 square meters and includes facilities for playing athletics, field hockey, Greco-Roman wrestling, rugby, soccer, jogging, body building and tennis.

Besides its main purpose, the CUS has recently given more attention to children and young adults. The CUS of Padua has administered a summer camp since 1993. The summer camp covers 12 weeks from June to September, with a break in the middle of August. Enrollment is open to all children aged 15 or less, and costs between 95 and 110 Euros per week (depending on the week chosen). Although the CUS is a university-based structure, only few parents leaving their children in the summer camp are university employees. Parents choose the structure because of the quality of the instructors and its cheap prices. The fee allows taking part in all the activities organized by the summer camp, from Monday to Friday, 9.00 AM to 5.30 PM, with some breaks for snacks and lunch (offered by the CUS). The number of children enrolled in an average week of July is 120, with age mostly concentrated between 6 and 12. At the beginning of the week, children are divided in six groups of around 20 units each, roughly homogeneous in age; occasionally a special group is created for children in pre-scholar age. A highly-qualified instructor assists each group in the activities. Typical activities are athletics, judo, mini-volleyball, mini-basketball, rugby, soccer, but there is also room for chess, drawing, theater etc.